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Nursing Experience of One-Piece Ostomy Bag Closure Combined with Negative Pressure Drainage in Pharyngeal Fistula Drainage

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Abstract: Objective To summarize the effect of one-piece ostomy bag closure combined with negative pressure drainage technology in the drainage of pharyngeal fistula patients, reflect on the shortcomings of nursing, in order to accumulate experience for future clinical work. Nursing points: Early assessment and monitoring of pharyngeal fistula, the application of ostomy bag combined with closed negative pressure drainage technology for the selection of ostomy bag, maintenance of effective continuous negative pressure drainage is particularly important in nursing, at the same time, during the nursing process to observe the skin infection at the incision, incision healing time, dressing change times and comfort level of patients, reflect on the shortcomings in nursing. It is expected to achieve the expected therapeutic effect and shorten the length of hospitalization after active treatment and careful nursing.

Keywords: Ostomy Bag; Negative Pressure Closed Drainage; Pharyngeal Fistula; Nursing

1. Clinical Data

The patient is a 68-year-old male. She was admitted to hospital because of "sore throat and swallowing pain for 3 months, and throat mass was found for 17 days". In April 2022, the patient developed pharyngeal pain and dysphagia 3 months after reduction surgery for right shoulder fracture. Laryngoscopy revealed new organisms in the right arytenoid area, and mucosal lesions in the pharyngeal piriform fossa and arytenoid tuberculum were subsequently observed during gastroscopy, and squamous cell carcinoma was pathologically diagnosed. Radical resection of hypopharyngeal carcinoma + tracheotomy under general anesthesia in May 2022. On the 7th day after surgery, the patient's neck incision was split and pharyngeal leakage occurred. The doctor changed the dressing with traditional dressing methods. After 8 days, the patient's right neck incision was split until the pharyngeal orifice fistula was enlarged to 10cm, and the pharyngeal fistula seepage was large. 3 days after the formation of large pharyngeal fistula, the wound ostomy specialist nursing team was invited for consultation, and combined with the experience, the patients began to apply the integrated ostomy bag closure and negative pressure drainage for pharyngeal fistula drainage.

2. Nursing process

When patients developed large pharyngeal leakage, doctors gave sterile gauze cover and pressure bandage, but usually after changing 3-4 times a day, about 90% of the pharyngeal fistula gauze was soaked by exudate, and there were still more exudate seepage to the neck and chest of patients, contaminating gowns and bed units, causing strong discomfort for patients. To prevent the exudate from continuing to seep and irritate the surrounding skin, try using a one-piece ostomy bag to collect the drainage tube exudate. Nursing staff prepared items: such as 75% alcohol, physiological saline, cotton balls, sterile scissors, one-piece ostomy bag, dressing change bag, drainage bag, negative pressure device, etc. The specific operations are as follows: (1) Use a sterile cotton ball dipped in normal saline to wipe the exudate around the pharyngeal fistula, remove the obvious necrotic tissue and foreign body several times, fully stop the bleeding, and wipe the surrounding skin. (2) Materials were selected according to the size of the wound. The size of the wound in this patient was larger than the diameter of the

ostomy bag bottom plate. The edge foam or hydrocolloidal dressing was cut according to the shape of the wound and pasted around the wound. (3) Cut the middle hole in the ostomy bag chassis, and the aperture distance is trimmed according to the size of the fistula, and in a radial shape. Cut the edge of the ostomy bag chassis every 3cm or so, tear off the backing, flatly paste it on the edge foam dressing or hydrocolloidal dressing and the skin around the wound, and press it for 2 ~ 4min. Put the drainage tube into the open end of the stomy bag and tie the open end tightly with several strips of 3M elastic soft cotton tape to form a closed space so as not to affect the drainage. (4) Prepare a drainage tube according to the size of the wound, the leakage situation and shape. Place one end of the drainage tube close to the bottom edge of the ostomy bag, and draw out the central negative pressure from the open end of the ostomy bag. The open end of the ostomy bag is folded and wrapped around the drainage tube along the longitudinal axis, and the junction is tightened with 3M elastic soft cotton wide tape to prevent leakage. ⑤ Finally, cut several pieces of 3M elastic flexible cotton wide tape of corresponding size and paste them around the bottom plate of the ostomy bag and the foam of the bridge to prevent curling caused by friction and shear force and the failure of negative pressure caused by air leakage. ⑥ Adjust negative pressure. Adjust the appropriate negative pressure value (0.02 ~ 0.04kPa) according to the size of the wound and the amount of seepage to maintain the negative pressure state of the ostomy bag and keep the drainage smooth. In the daily management of the ostomy bag, the chassis of the ostomy bag should be replaced immediately when there is leakage. If there is no leakage but the incision is infected, the replacement frequency is 1 ~ 2d/ time. In other cases, the general replacement frequency is 3 ~ 5d/ time. One week after using this dressing change method, it was observed that the pharyngeal orifice fistula of the patient was significantly reduced, the seepage at the orifice fistula was significantly reduced, the skin around the orifice fistula was dry without seepage adhesion, and the patient's hospital dressing unit was contaminated.

3. Nursing experience

Pharyngeal fistula is a common complication after total laryngectomy for laryngeal cancer and hypopharyngeal cancer. Treatment of pharyngeal fistula is difficult because of its particularity. Positive results have been obtained in promoting the early recovery of pharyngeal fistula patients with closed negative pressure drainage. Negative pressure wound treatment is one of the wound treatment methods, including closed negative pressure drainage and negative pressure assisted wound closure two key techniques. The treatment helps improve local blood flow, reduce tissue edema, reduce bacterial count, and promote granulation tissue growth. The use of closed negative pressure drainage of orifice fistula can reduce the pollution of saliva and food to the fistula cavity and avoid the direct action of sputum suction tube on the fistula cavity, so as to keep the drainage of orifice fistula smooth is the focus of care for pharyngeal fistula patients. Nursing attention points of pharyngeal fistula closed negative pressure drainage: (1) Maintain continuous and effective negative pressure, pay attention to observe whether the application at the fistula is loose, whether the negative pressure device is tight, whether there is air leakage, and whether the drainage tube is compressed or folded, so as to block the negative pressure source. Emphasize the importance of maintaining continuous negative pressure suction and ask patients to move around the bed as much as possible. Properly fix the negative pressure suction pipe, and inform the patient to avoid pulling when changing the position, so as to prevent the pipe from falling off or leaking. Observe whether the negative pressure of the negative pressure source is within the prescribed range. The negative pressure in this case is adjusted at 0.02 ~ 0.04MPa. (2) Pay attention to observe whether the negative pressure drainage tube is fixed and smooth, and whether there is liquid drainage. If the negative pressure is good, and there is no liquid drainage, the position of the suction tube can be adjusted appropriately. If there is no negative pressure, it may be a lax seal and air leakage. The common leakage part is the liquid leakage on the edge of the application and the skin wrinkle; Disordered lamination leads to a "gap" between the film and film; The open end seal of the ostomy bag is not in place; The ostomy bag is broken. The leak can be resealed with a transparent compress and redressed if necessary. In addition, when the negative pressure source is abnormal, such as insufficient negative pressure caused by the damage of the suction device, air leakage at the junction of the drainage channel, power failure and short circuit of the power supply, it should be dealt with according to specific reasons^[2].

Effects of dressing bypass technology In this case, the pharyngeal orifice fistula of the patient was irregular in shape and the maximum length of the leakage orifice was more than 10cm, which was a refractory wound in the ear, nose and throat specialty. Due to the lack of clinical materials, there was no wound collection bag of appropriate size. The foam or hydrocolloidal dressing is used to absorb the seepage and paste with edges to narrow the space above the wound surface, create conditions conducive to the effective paste of the stomachs bottom plate, and provide a new choice for a large area of difficult wounds.

Function of the ostomy bag The patient's wound seepage volume exceeds 100mL within 24h. Due to continuous seepage, it cannot be completely absorbed by using conventional dressing. In order to prevent sustained damage to the patient's skin caused by the seepage, we must change the dressing every day, sometimes even several times a day. The skin around the wound will be in a state of infiltration for a long time, which is easy to cause skin-related inflammation and infection. Some patients will sometimes have pain, and even the wound suppuration and odor. The application of one-piece ostomy bag can reduce the frequency of dressing replacement, more effectively avoid the wound seepage infiltrating the surrounding skin, and keep the skin around the wound clean and dry, which will greatly reduce the impact on the patient's bed activities. In addition, in clinical work, the color, character and quantity of wound drainage fluid are all key parameters, which are related to the accurate determination of follow-up treatment plan for patients. The traditional nursing model requires medical staff to judge the amount of fluid seepage of patients' wounds only by observing the wetting condition of dressings and the number of dressing changes, which cannot provide accurate clinical data for the follow-up treatment of patients. One-piece ostomy bag is transparent, easy to observe, and can accurately measure and record the amount of drainage fluid, providing more intuitive and accurate data for medical staff, so as to ensure better treatment effect for patients.

Reducing nursing workload For patients with continuous leakage of pharyngeal opening fistula, medical staff need to replace dressing for patients more than three times a day. The improved application of one-piece ostomy bag not only greatly reduces the workload of medical staff, but also can effectively collect seepage and save medical resources.

4. Summary

According to the experience, dressing the ostomy bag according to the patient's wound condition and using dressing bypass dressing change technology can better adapt to the specificity of pharyngeal fistula wound, reduce the workload of medical care, improve the comfort level of patients, save the cost of consumables and shorten the healing time of pharyngeal fistula, so it is an effective treatment method for pharyngeal fistula.

References

- [1] Pang XF, Pei XY. Cause analysis and nursing strategy of pharyngeal fistula after laryngeal cancer surgery [J]. World Latest Medical Information Abstract, 2019, 19(38): 237, 239.
- [2] Xie LY, Yang H. Application of closed negative pressure drainage in pharyngeal fistula patients after total laryngectomy [J]. Journal of Nursing, 2013, 28(16): 53-54.

Clinical Study of Internal Fixation with Different Approaches for Calcaneal Fracture

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Abstract: Objective: To observe the effect of internal fixation according to different approaches in the surgical treatment of calcaneal fracture. **Methods:** According to the method of comparative surgery, 74 patients with calcaneal fracture were selected from May 2020 to October 2022. They were randomly divided into control group (37 cases, conventional L-shaped incision) and observation group (37 cases, eight-shaped incision). The surgical effects of the two groups were analyzed. **Results:** Compared with the operation time, hospital stay, fracture healing time, intraoperative bleeding volume, postoperative Gissane angle and calcaneal height of the two groups, the observation group had advantages ($P < 0.05$). **Conclusion:** In the treatment of patients with calcaneal fracture, the operation according to the splayed incision approach can effectively reduce the trauma caused to the patients during the operation and help the patients recover as soon as possible.

Keywords: Internal Fixation with Different Approaches; Calcaneal Fracture

Introduction

Among the common clinical fracture diseases, calcaneal fracture is the most common fracture type with a high incidence, which has maintained a high incidence in young and middle-aged people. The inducing factors are relatively complex. From the clinical diagnosis, it can be seen that most patients present as comminuted fracture or burst fracture, which causes great damage to patients^[1]. During the clinical treatment, the internal fixation operation can promote the rapid restoration of the anatomical layer of the fracture site. This study mainly analyzes the specific clinical application value of internal fixation surgery through different approaches.

1. Data and methods

1.1 General information

The study was carried out according to the method of comparative surgical treatment. 74 patients with calcaneal fracture were selected from May 2020 to October 2022. They were randomly divided into the control group (37 cases, conventional L-shaped incision) and the observation group (37 cases, eight-shaped incision). The basic data of the two groups of patients were analyzed. There were 20 males and 17 females in the control group, aged from 28 to 52 years, with an average of (38.84 ± 1.74) . In the observation group, there were 19 males and 18 females, aged from 27 to 51 years, with an average of (37.84 ± 1.83) . Compare the basic data of the two groups, $P > 0.05$.

1.2 Method

The control group was operated according to the conventional "L" shaped approach. The patients were routinely disinfected and anesthetized, and "L" shaped incision was performed. The Kirschner wire was inserted into the lateral ankle tip, talus and cuboid of the patients, and the lower joint and fracture end were exposed, and the fracture site was treated.

Then insert 4mm Kirschner wire into the calcaneal joint, adjust the height of the force line and the height of the calcaneus, temporarily fix the medial wall of the calcaneus after accurate reduction, and observe all aspects of the force line under the effect of fluoroscopy to avoid the occurrence of calcaneus varus. The observation group was treated with internal fixation according to the splay approach. Routine disinfection and anesthesia were carried out, and the splayed incision was made, and the patient's calcaneal joint was pulled with 4mm Kirschner wire, and the internal and external sides of the calcaneus were squeezed to restore the original width and flatten the bone block. Make a 3cm incision under the lateral ankle of the patient, pull the lateral fracture wall of the calcaneus and the tendon sheath of the peroneal long and short muscles, remove the soft tissue in the periosteal sinus, expose the subtalar joint surface, recover the height of the posterior articular process under direct vision, and fix it with Kirschner wire after ensuring satisfactory reduction. After the completion of internal fixation, the patients in both groups sutured the surgical orifice in a conventional way and received postoperative anti-infection treatment.

1.3 Observation indicators

In the study, the operation time, hospital stay, fracture healing time, intraoperative bleeding volume, and postoperative Gissane angle and calcaneal height of the two groups need to be counted.

1.4 Statistical methods

The data related to the two groups were processed according to SPSS20.0, and the mean \pm standard deviation was the measurement data. The difference was statistically significant ($P < 0.05$) in t test.

2. Results

2.1 Comparison of operation time, hospital stay, fracture healing time and intraoperative bleeding between the two groups

For the operation time, hospital stay, fracture healing time and intraoperative bleeding volume of patients in the two groups, the observation group has advantages ($P < 0.05$), as shown in Table 1 below.

Table 1 Comparison of operation time, hospital stay, fracture healing time and intraoperative bleeding between the two groups ($\bar{x} \pm s$)

| Groups | Number of cases | Operation time (min) | Hospital stay (d) | Fracture healing time (week) | Intraoperative bleeding volume (ml) |
|-------------------|-----------------|----------------------|-------------------|------------------------------|-------------------------------------|
| Observation group | 37 | 51.54 \pm 1.34 | 7.62 \pm 1.24 | 10.12 \pm 2.14 | 36.32 \pm 7.11 |
| Control group | 37 | 59.56 \pm 1.22 | 11.21 \pm 1.13 | 12.51 \pm 1.13 | 68.12 \pm 10.12 |
| <i>t</i> | - | 10.425 | 11.785 | 7.252 | 13.425 |
| P | - | 0.001 | 0.001 | 0.001 | 0.001 |

2.2 Comparison of Gissane angle and calcaneal height between the two groups

For the Gissane angle and calcaneal height of the two groups of patients after operation, the observation group has

advantages ($P<0.05$), as shown in Table 2 below.

Table 2 Comparison of Gissane angle and calcaneal height between the two groups ($\bar{x} \pm s$)

| Groups | Number of cases | Gissane angle ($^{\circ}$) | | Calcaneal height (mm) | |
|-------------------|-----------------|------------------------------|--------------------------|-------------------------|--------------------------|
| | | 1 month after operation | 3 months after operation | 1 month after operation | 3 months after operation |
| Observation group | 37 | 28.54 \pm 2.67 | 33.13 \pm 2.75 | 41.41 \pm 2.13 | 44.42 \pm 2.05 |
| Control group | 37 | 20.02 \pm 2.17 | 27.65 \pm 2.42 | 37.05 \pm 2.42 | 40.68 \pm 1.88 |
| <i>t</i> | - | 10.425 | 11.258 | 6.425 | 9.858 |
| P | - | 0.001 | 0.001 | 0.001 | 0.001 |

3. Discussion

Calcaneal fracture is the most common type of tarsal bone fracture, which is mainly caused by sudden external exposure. According to clinical diagnosis, this type of fracture usually involves multiple joint surfaces. If the treatment is not timely, it is easy to lead to the increase of heel width and height loss of patients, resulting in the collapse of foot arch, increasing the incidence of traumatic arthritis, and affecting the foot function^[2].

In the conventional internal fixation surgery, the treatment is mainly carried out in the way of L-shaped internal fixation, which can promote the full exposure of the fracture site of the patient, and under the left and right fixation of Kirschner wire, promote the reduction of the fracture site, and maintain the stability of the joint. However, this operation has a great impact on the soft tissue of the injured part of the patient, and will affect the local blood circulation, which is not conducive to the rapid recovery of the patient after the operation. The treatment was carried out according to the internal fixation of the splay approach^[3-4]. It can effectively reduce the injury caused to patients during the operation, improve the efficiency of the soft tissue peeling range at the fracture site, and maximize the microcirculation at the fracture site. On the basis of the reduction of the fracture site, it can reduce the amount of intraoperative bleeding, help the patients recover in a short time after the operation, and also reduce the incidence of postoperative complications^[5-6]. In this study, the patients in the observation group were treated according to the internal fixation operation of the splay approach during the internal fixation operation. Compared with the conventional L-shaped approach operation, the splay approach operation scheme caused less trauma to the patients, and the injured part of the Gissane angle and the height of the calcaneus were improved more rapidly after the operation, which can effectively improve the clinical treatment effect on the patients with calcaneal fracture.

Based on this study, the patients with calcaneal fracture can be treated according to the internal fixation operation through the eight-word approach, which effectively guarantees the clinical treatment efficiency of this part of patients and promotes the patients to recover as soon as possible after surgery.

References

- [1] Zhao YB, Zhang CY, Chen XK, et al. The Effect of Internal Fixation with Different Approaches on Sanders Type III Calcaneal Fracture [J]. *Journal of Local Digestive Surgery*, 2022, 31 (08): 721-725.
- [2] Li MK, Zhou BJ, Liang F. The Effect of Plate Internal Fixation Through Different Incisions in the Treatment of Calcaneal Fractures [J]. *Clinical Medicine*, 2021,41 (08): 12-14.
- [3] Huo GH. Comparison of Curative Effects of Internal Fixation with Plates Through Different Incisions in the Treatment of Calcaneal Fractures [J]. *Practical Clinical Journal of Integrated Traditional Chinese and Western Medicine*, 2021,21 (09): 128-129.
- [4] Shen WH, Pu PJ, Zhong XP. Observation on the Effect of Plate Internal Fixation under Different Approaches in the Treatment of Sanders II and III Calcaneal Fractures [J]. *Harbin Pharmaceutical*, 2021,41 (02): 47-48.
- [5] Cao Y, Qiao XG, Yang YH. Analysis of the Effect of Anatomical Locking Plate Internal Fixation through Tarsal

Sinus Approach in the Treatment of Sanders Type III Calcaneal Fractures of Different Subtypes [J]. *Chinese and Foreign Medical Research*, 2020,18 (30): 27-30.

[6] Chen ML, Zhou YJ, Ding S. Comparison of Two Different Approaches for Open Reduction and Internal Fixation in the Treatment of Sanders Type II and III Calcaneal Fractures [J]. *Chinese Journal of Sports Medicine*, 2020,39 (07): 520-526.

Current State of the Nurse's First Aid Ability in the Non-Acute and Critical Care Unit of a 3A Grade Hospital

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Abstract: **Objective:** To understand the emergency ability of clinical non-acute and critical care nurses facing various emergencies and to provide targeted strategies. **Methods:** A total of 713 non-acute and critical care nurses from a 3A grade hospital were selected in July 2021. A questionnaire developed by Zhao et al. was administered using the clinical emergency care evaluation for non-emergency department nurses. Data were evaluated by descriptive statistics, analysis of variance, and multiple linear regression analysis. **Results:** The total score of the clinical emergency ability of non-acute and critical care nurses was 127.43 ± 11.91 points, of which the score of emergency management ability was the highest (56.54 ± 6.27). The theoretical knowledge reserve reached the lowest score (12.72 ± 1.53). One-way analysis of variance showed that non-acute and critical care nurses with different ages, capability levels, nursing ages, educational backgrounds, working abilities, and whether they had the first aid ability operation and theory training were found to have significant differences in the total score and the scores of each dimension of clinical first aid ability ($P < 0.05$). Multiple linear regression analysis revealed that nursing age, capability level, and whether they had trained in the first aid ability operation were the primary influencing factors of the clinical emergency ability of non-acute and critical care nurses. **Conclusion:** Non-acute and critical care nurses need to improve their knowledge reserves and response skills for treating emergencies. It is necessary for non-acute and critical care nurses to improve their theoretical knowledge, practical skills, and comprehensive capacity in clinical emergency treatment.

Keywords: Non-Emergency Department; Nurse; Clinical Emergency Ability

Introduction

The nurse's first aid ability refers to a broad range of nursing staff's capacity to attentively and promptly monitor changes in patients' conditions in clinical practice, give reasonable analysis and judgment, apply professional skills, and make prompt decisions regarding rescue and disposition^[1]. Although non-acute and critical care nurses have fewer opportunities to participate in first aid than emergency department nurses, they often fail to timely and accurately recognize disease changes in emergencies involving acute, critical, and critically ill patients. Due to this, hospitals, departments, and patients are exposed to potential severe safety risks, and there may be nursing deficiencies or escalating conflicts^[2]. Given this, the study aims to investigate the current state of the comprehensive emergency capabilities of non-acute and critical care nurses and analyze the influencing factors, serving as a foundation for future training in these areas.

1. Subject and method

1.1 Subject

In July 2021, a convenience sampling method was used to select nurses from a tertiary care hospital's non-acute and critical care department in Nanjing, Jiangsu Province. Inclusion criteria: In-service registered nurses. Exclusion criteria: ① Acute and critical care nurses; ② nurses with more than one year of working experience in the emergency sector but not in a

specialty related to acute and critical care; ③ nurses who have been out of the workforce for more than one month; ④ refresher nurses.

1.2 Instrument

After obtaining the authors' permission via email, the clinical first aid ability of non-emergency department nurses was evaluated using a questionnaire created by Zhao et al. The questionnaire included five dimensions: first aid management ability, critical condition observation ability, first aid response-ability, first aid disposal ability, and theoretical knowledge reserve. Twenty-eight items were rated by the Likert 5-level classification, eight of which were reverse questions, and the rest were forward questions. We assigned grades of "5, 4, 3, 2, and 1" for "extremely necessary, necessary, generally necessary, less necessary, and unnecessary", respectively. The reverse question was assigned a score of reverse points, and the forward question was given a score of forwarding points. The questionnaire's construct validity was 0.92, and its Cronbach's α coefficient was 0.927^[4].

1.3 Investigation method

The survey was conducted using a questionnaire star. The nursing department sent a link to qualified non-acute and critical care nurses through the WeChat group. The investigators followed standardized guidelines for completing the requirements. All items were set as mandatory questions to ensure the questionnaire completeness. Each device could only answer once to avoid repeated responses. The completion time was one week.

1.4 Statistical analysis

The data that did not meet the logical relationship were censored after the data exported from the questionnaire star were coded, sorted out, and established for a database. The remaining information was added to SPSS version 21.0 software. Measurement data were described by mean and standard deviation. Counting data were presented as frequency and percentage. The difference in nurses' clinical first aid competency scores in the non-emergency department was examined using one-way analysis of variance (ANOVA) and multiple linear regression. The test level was set at α of 0.05. $P < 0.05$ was considered statistically significant.

2. Results

2.1 General information for nurses in non-acute and critical care units

As detailed in Table 1, 713 clinical non-acute and critical care nurses were included in this study. With a recovery rate of 99.7%, 711 valid surveys were returned. The mean age was 30.91 ± 6.17 years. The average nursing age was 9.14 ± 6.60 years.

Table 1 General information on the 711 study participants

| Indicator | Category | Case (n) | Percentage (%) |
|-------------------|---------------------------|----------|----------------|
| Age | 20 to 29 years | 335 | 47.1 |
| | 30 to 39 years | 314 | 44.2 |
| | ≥ 40 years | 62 | 8.7 |
| Title | Junior | 564 | 79.3 |
| | Intermediate | 135 | 19.0 |
| | Senior | 12 | 1.7 |
| Nursing age | ≤ 5 years | 204 | 28.7 |
| | 6 to 10 years | 306 | 43.0 |
| | > 10 years | 201 | 28.3 |
| Personnel benefit | Officially in preparation | 35 | 4.9 |
| | Personnel agency | 64 | 9.0 |

| | | | |
|--------------------------------------|------------------------|-----|------|
| Capability level | Employment | 612 | 86.1 |
| | N0 | 31 | 4.4 |
| | N1 | 144 | 20.3 |
| | N2 | 407 | 57.2 |
| | N3 | 119 | 16.7 |
| Highest degree | N4 | 10 | 1.4 |
| | College | 95 | 13.4 |
| | Bachelor | 610 | 85.8 |
| | Master degree or above | 6 | 0.8 |
| Department | Non surgical area | 363 | 51.1 |
| | Surgical area | 348 | 48.9 |
| First aid ability operation training | Yes | 651 | 91.6 |
| | No | 60 | 8.4 |
| First aid ability theory training | Yes | 648 | 91.1 |
| | No | 63 | 8.9 |

The total score of the clinical emergency ability for non-acute and critical care nurses was 127.43 ± 11.91 points, with the highest dimension score (56.54 ± 6.27) of emergency management capacity and the lowest score (12.72 ± 1.53) of theoretical knowledge reserve.

Table 2 Each dimension score and total scores of nurses' emergency abilities in clinical non-acute and critical care department (n=711)

| Item | Mean | Standard deviation | Highest score | Lowest score |
|--|--------|--------------------|---------------|--------------|
| Theoretical knowledge reserve | 12.72 | 1.526 | 15 | 6 |
| Critical condition observation ability | 21.62 | 2.271 | 25 | 12 |
| First aid response-ability | 18.71 | 1.792 | 20 | 12 |
| First aid disposal ability | 17.85 | 1.980 | 20 | 10 |
| First aid management ability | 56.54 | 6.265 | 65 | 36 |
| Total score | 127.43 | 11.912 | 145 | 87 |

ANOVA revealed a significant difference in the total score of clinical first aid ability among non-acute and critical care nurses with different ages, professional titles, nursing ages, and capability levels, and whether they had the first aid ability operation and theory training ($P < 0.05$). Additionally, non-acute and critical care nurses with various degrees showed statistically significant differences in their clinical first aid response-abilities and disposal ability scores ($P < 0.05$).

Table 3 Influencing factors of all dimensions and total scores of nurses' first aid abilities in clinical non-acute and critical care department (n=711)

| Item | Category | Total score | | Theoretical | | Critical | | First aid | | First aid | | First aid | |
|-------|-----------------|-------------|------|-------------|------|----------|------|-----------|------|-----------|------|-----------|------|
| | | x | s | x | s | x | s | x | s | x | s | x | s |
| Age | 20 to 29 | 125. | 12.4 | 12.67 | 1.46 | 21.29 | 2.37 | 18.4 | 1.91 | 17.65 | 1.98 | 335.0 | 55.7 |
| | 30 to 39 | 128. | 11.1 | 12.70 | 1.61 | 21.87 | 2.15 | 18.9 | 1.64 | 18.01 | 1.97 | 314.0 | 57.1 |
| | ≥ 40 years | 129. | 11.5 | 13.06 | 1.42 | 22.16 | 2.08 | 18.8 | 1.73 | 18.13 | 1.94 | 62.00 | 57.6 |
| | <i>F/t</i> | 6.20 | | 1.797 | | 7.448 | | 6.51 | | 3.302 | | 5.232 | |
| | <i>P</i> | 0.00 | | 0.167 | | 0.001 | | 0.00 | | 0.037 | | 0.006 | |
| Title | Junior | 126. | 12.0 | 12.64 | 1.52 | 21.47 | 2.29 | 18.6 | 1.82 | 17.76 | 1.97 | 56.25 | 6.37 |
| | Intermedi | 130. | 10.4 | 13.06 | 1.50 | 22.22 | 2.12 | 19.0 | 1.58 | 18.23 | 1.95 | 57.80 | 5.52 |
| | Senior | 126. | 15.2 | 12.50 | 1.78 | 21.83 | 2.21 | 18.1 | 2.37 | 17.83 | 2.52 | 55.92 | 7.91 |

| Item | Category | Total score | | Theoretical | | Critical | | First aid | | First aid | | First aid | |
|----------------------------------|------------|-------------|------|-------------|-------|----------|-------|-----------|------|-----------|------|-----------|------|
| Nursing | <i>F/t</i> | 5.10 | | 4.27 | | 6.061 | | 3.52 | | 3.051 | | 3.425 | |
| | <i>P</i> | 0.00 | | 0.014 | | 0.002 | | 0.03 | | 0.048 | | 0.033 | |
| | ≤5 years | 125. | 12.1 | 12.68 | 1.401 | 21.2 | 2.366 | 18.4 | 1.90 | 204 | 17.6 | 204 | 55.4 |
| | 6 to 10 | 127. | 12.0 | 12.68 | 1.496 | 21.64 | 2.235 | 18.7 | 1.78 | 306 | 17.8 | 306 | 56.7 |
| | >10 | 129. | 11.1 | 12.81 | 1.689 | 22.02 | 2.159 | 18.9 | 1.63 | 201 | 18.0 | 201 | 57.3 |
| | <i>F/t</i> | 5.24 | | 0.527 | | 6.797 | | 4.60 | | 2.539 | | 4.754 | |
| First aid ability operatio | <i>P</i> | 0.00 | | 0.591 | | 0.001 | | 0.01 | | 0.08 | | 0.009 | |
| | Yes | 128. | 11.4 | 12.8 | 1.507 | 12.8 | 1.507 | 18.8 | 1.70 | 17.96 | 1.92 | 56.85 | 6.06 |
| | No | 119. | 13.9 | 11.8 | 1.447 | 11.8 | 1.447 | 17.6 | 2.36 | 16.65 | 2.19 | 53.17 | 7.40 |
| | <i>F/t</i> | 4.71 | | 4.945 | | 5.537 | | 3.56 | | 4.998 | | 3.735 | |
| | <i>P</i> | 0.00 | | 0.000 | | 0.000 | | 0.00 | | 0.000 | | 0.000 | |
| | Yes | 128. | 11.6 | 12.79 | 1.52 | 21.73 | 2.238 | 18.7 | 1.73 | 17.93 | 1.95 | 56.8 | 6.16 |
| First aid ability | No | 121. | 12.7 | 12.02 | 1.42 | 20.48 | 2.306 | 18 | 2.21 | 17.06 | 2.11 | 53.86 | 6.68 |
| | <i>F/t</i> | 4.25 | | 3.858 | | 4.244 | | 2.69 | | 3.336 | | 3.586 | |
| | <i>P</i> | 0.00 | | 0.000 | | 0.000 | | 0.00 | | 0.000 | | 0.000 | |
| | N0 | 121. | 12.2 | 12.45 | 1.362 | 20.65 | 2.058 | 17.6 | 1.80 | 17.52 | 1.63 | 53.74 | 6.80 |
| | N1 | 125. | 13.3 | 12.71 | 1.514 | 21.24 | 2.665 | 18.2 | 2.06 | 17.69 | 2.07 | 55.69 | 6.88 |
| | N2 | 127. | 11.4 | 12.63 | 1.527 | 21.65 | 2.132 | 18.8 | 1.66 | 17.81 | 1.94 | 56.63 | 6.09 |
| Capabil | N3 | 130. | 10.3 | 13.11 | 1.5 | 22.22 | 2.124 | 19.0 | 1.60 | 18.29 | 1.98 | 57.99 | 5.35 |
| | N4 | 126. | 16.3 | 12.4 | 1.955 | 22.1 | 2.234 | 18.1 | 2.51 | 17.9 | 2.51 | 56.2 | 8.56 |
| | <i>F/t</i> | 4.82 | | 2.633 | | 4.747 | | 7.23 | | 2.023 | | 3.89 | |
| | <i>P</i> | 0.00 | | 0.033 | | 0.001 | | 0.00 | | 0.089 | | 0.004 | |
| | College | 126. | 12.3 | 126.8 | 12.38 | 21.44 | 2.328 | 18.4 | 2.05 | 17.87 | 2.01 | 56.34 | 6.41 |
| | Bachelor | 127. | 11.8 | 127.6 | 11.84 | 21.66 | 2.266 | 18.7 | 1.74 | 17.87 | 1.97 | 56.6 | 6.24 |
| Highest | Master | 118. | 7.78 | 118.6 | 7.789 | 20.17 | 1.329 | 17.1 | 1.60 | 15.67 | 0.81 | 53 | 5.51 |
| | <i>F/t</i> | 1.83 | | 0.005 | | 1.637 | | 3.67 | | 3.715 | | 1.039 | |
| | <i>P</i> | 0.16 | | 0.995 | | 0.195 | | 0.02 | | 0.025 | | 0.354 | |
| | | 1 | | | | | | 6 | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Multiple linear regression analysis showed that nursing age and whether they had received emergency ability operation training were the primary influencing factors on the total score of the clinical emergency ability of non-acute and critical care nurses. A longer nursing age was associated with a higher total score of clinical first aid abilities of non-acute and critical care nurses. Non-acute and critical care nurses who had undergone training in first aid ability operation had a higher overall clinical first aid ability score. Furthermore, higher title levels were related to higher scores of nurses' clinical emergency response abilities in non-critically ill units.

Table 4 Assignment of variables in multiple linear stepwise regression analysis

| Variable | Assignment form |
|--------------------------------------|------------------------------------|
| Age (years) | Continuous variable |
| Professional title | Junior=0; Intermediate=1; Senior=2 |
| Nursing age (years) | Continuous variable |
| Capability level | N0=0; N2=1; N2=2; N3=3; N4=4 |
| First aid ability operation training | Yes=0; No=1 |
| First aid ability theory training | Yes=0; No=1 |

Table 5 Multiple linear stepwise regression analysis of influencing factors of nurses' first aid abilities in non-acute and critical care departments (n=711)

| Variable | b | β | t | P | R ² | F | P |
|---|---------|---------|--------|-------|----------------|--------|-------|
| Total score | | | | | | | |
| (Constance) | 134.383 | —— | 70.866 | 0.000 | 0.056 | 21.898 | 0.000 |
| First aid ability operation training | -8.353 | -0.195 | -5.332 | 0.000 | | | |
| Nursing age | 0.231 | 0.128 | 3.497 | 0.001 | | | |
| Theoretical knowledge reserve | | | | | | | |
| (Constance) | 13.804 | —— | 60.858 | 0.000 | 0.032 | 24.448 | 0.000 |
| First aid ability operation training | -1.002 | -0.183 | -4.945 | 0.000 | | | |
| Critical condition observation ability | | | | | | | |
| (Constance) | 22.851 | —— | 63.395 | 0.000 | 0.061 | 24.097 | 0.000 |
| First aid ability operation training | -1.568 | -0.192 | -5.265 | 0.000 | | | |
| Nursing age | 0.052 | 0.150 | 4.105 | 0.000 | | | |
| First aid response-ability | | | | | | | |
| (Constance) | 18.816 | —— | 48.649 | 0.000 | 0.048 | 18.811 | 0.000 |
| First aid ability operation training | -0.999 | -0.155 | -4.200 | 0.000 | | | |
| Capability level | 0.335 | 0.144 | 3.899 | 0.000 | | | |
| First aid disposal ability | | | | | | | |
| (Constance) | 19.276 | —— | 65.539 | 0.000 | 0.033 | 24.979 | 0.000 |
| First aid ability operation training | -1.313 | -0.184 | -4.998 | 0.000 | | | |
| First aid management ability | | | | | 0.039 | 15.323 | 0.000 |
| (Constance) | 59.242 | —— | 58.879 | 0.000 | | | |

| Variable | b | β | <i>t</i> | <i>P</i> | R ² | F | <i>P</i> |
|--------------------------------------|--------|---------|----------|----------|----------------|---|----------|
| First aid ability operation training | -3.470 | -0.154 | -4.174 | 0.000 | | | |
| Nursing age | 0.116 | 0.122 | 3.303 | 0.001 | | | |

3. Discussion

3.1 Current state of the nurse's emergency ability in the non-acute and critical care department

Our study revealed that non-acute and critical care nurses had the lowest theoretical knowledge reserve scores, consistent with the relevant domestic surveys^[7]. The reason might be the lack of understanding of the emergency first aid concept. Another explanation could be that the patient's condition was reasonably stable in non-acute and critical care departments. Furthermore, nurses had few opportunities to deal with sudden events that might have been life-threatening or confront emergency, critical, and critically ill patients. As a result, there was a lack of awareness of active learning and a poor reserve of theoretical knowledge when saving patients for nurses in these departments.

3.2 Influencing factors of the nurse's first aid ability in the non-acute and critical care department

3.2.1 Age, nursing age, and education

Univariate analysis showed the first aid ability scores of non-acute and critical care nurses with various ages, nursing ages, and educational levels. The nurse's first aid skills became more confident with more working years, work experience, and steady growth in working ability. However, 13.4% of the nurses had a bachelor's degree or below in this survey. The majority of 85.8% of bachelor's degrees were obtained through in-service education. Moreover, younger age was present in 28.6% of nurses with less than five years of employment. It was urgent to strengthen the proportional adjustment of human resources and the training of first aid capabilities for nurses due to the rapid development of the nursing profession.

3.2.2 Title and capability level

The study found that non-acute and critical care nurses with professional titles of supervisor and above showed a significantly greater capacity for reacting to public health emergencies than senior nurses and nurses. Similar to relevant domestic research, the senior nurse's competence was greater than that of the nurse, indicating that the professional title was one of the main factors affecting the response capacity of public health emergencies in non-acute and critical care nurses^[10-11]. Nurses with higher professional titles would likely have longer working years, richer working experience, more valuable clinical practice skills, more teaching experience, and higher emergency response capacities. Only 20.6% of the nurses had intermediate or higher professional levels in this study, indicating that the overall qualification was low. Therefore, the management department should strengthen the implementation of hierarchical level training.

3.2.3 First aid training

This study demonstrated that the nurses who underwent first aid capability-related operational and theoretical training had a much higher emergence capability than those who did not. Zhang et al. have confirmed that training drills could improve the nurse's emergency response ability^[13]. Therefore, improving nursing emergency skills in non-acute and critical care departments requires more systematic and practical training of nurses at various levels.

3.3 Countermeasures

3.3.1 Hierarchical training and emergency drill

In the study on training first aid level of operating room nurses, Nurses' first aid skills increase with ongoing learning and operation. Hierarchical training is a strong guarantee for improving the nurse's emergency response ability and an effective way to address the tension between the variety and complexity of current training material. It can suit the middle-level and senior nurses' desires to learn new enterprises and the primary nurse's urgent requirement to raise the technical operation level. Our hospital established the hierarchical training goal under the organization of the nursing department. Furthermore, the nurse could participate in the nursing guidance and research for the relevant speciality, grasp the latest development trends, and lead the nursing staff's continuous quality improvement. Nurses could be familiar with the contents of the emergency plan, the rescue process, and the rescue responsibility through emergency drills. They could further develop their sensitivity to emergencies, rescue capabilities, and willingness and confidence to participate in rescue operations effectively. Nurses can discuss how to handle emergencies, psychological reactions, and pressure relief in monthly nursing emergency experience discussion workshops, which enhance their risk prevention awareness and emergency response skills.

3.3.2 Enhancing self-psychological quality and increasing self-efficacy

sensation

Maintaining a healthy psychological state was the most important while handling several emergencies. Those with poor psychological health were easy to experience emotional instability, fatigue, anxiety, irritability, and other stress-related symptoms during the first aid response. High self-efficacy individuals would regard the pressure as an opportunity, face it actively, treat the difficulty as an exercise, pick up a variety of new skills, and start a positive cycle. It was evident that nurses' first aid proficiency and other professional skills might be enhanced by their self-efficacy levels. The nurse's confidence should be enhanced through daily first aid training and drills when participating in rescue operations as nursing management. Besides, they should develop their mental capacity, increase their sense of self-efficacy, and ensure sustained use of the approach in a demanding setting.

3.3.3 Providing social support

Social support refers to the mental and material supports that individuals obtain from their social relationships, including instrumental, emotional, information, and peer supports. With this assistance, the individual may feel less psychological and mental strain and be more sociable. Nursing social support is the assistance and support from relatives, friends, and colleagues. Good social support can effectively improve the first aid ability. Therefore, nursing managers should create a good working environment, positive interpersonal relationships, and a harmonious organizational atmosphere. They should also promote communication among nurses and provide assurances for efficiently increasing first aid skills.

References

- [1] Xiao SZ. Nursing Research [M]. Changsha: Hunan Science and Technology Press, 2001.
- [2] Zhao LT. Research progress of first aid ability of clinical nurses [J]. Nursing Research, 2015, 5 (11): 974-975.
- [3] Yao AQ, Feng QL, Liu XP, et al. Investigation and study on the influencing factors of nursing decision-making ability of prehospital emergency nurses [J]. Journal of Nursing, 2015, 30 (5): 60-62.
- [4] Zhang SG, Zhao XZ, Gao Y, et al. Evaluation of clinical emergency treatment ability of non-emergency department nurses in tertiary a general hospital in Taiyuan [J]. Chinese Journal of Practical Nursing, 2017, 33 (19): 1505-150.

- [5] Guangzhi Qianyezi, Liu RS (Translation School). Current Situation and Prospect of Recognition System for Japanese Specialist Nurses [J]. Chinese Nursing Education, 2004, 1 (2): 88-90.
- [6] Zhang Y. Improving the first aid ability of junior nurses in maternity ward by applying first aid scenario simulation drill [J]. Nursing and Rehabilitation, 2013, 5 (3): 278-279.
- [7] Zhang SG, Zhao XZ, Yang H, et al. Preliminary development of questionnaire for clinical first aid ability evaluation of nurses in non-emergency department [J]. China Medical Innovation, 2016, 13 (34): 92-95.
- [8] Wu YF. Analysis on the current situation of emergency response ability of nurses and countermeasures. Journal of Nursing Education, 2009, 24 (20): 034.
- [9] Ning N, Kang Z, Jiao M, et al. Emergency Factors affecting preparedness competency of public health inspectors: a cross-sectional study in northeastern China [J]. BMJ Open, 2014, 4 (1): e003832.
- [10] Qiao WL, Yang WH. Construction of emergency response ability evaluation system for public health emergencies in emergency nurses [J]. China Nursing Management, 2014, 14 (7): 696-699.
- [11] Wang DY, Zhang WL, Xiang SM, et al. Investigation and analysis of emergency response ability of community nurses in Wenzhou City [J]. Journal of Nursing, 2016, 31 (4): 82-84.
- [12] Mayinur T Malhamba B, Li P. Current Investigation of Emergency Ability of Minority Nurses in Minority Hospitals in Xinjiang for Public Health Emergencies [J]. Journal of Nursing, 2018, 33 (5): 56-58.
- [13] Zhang H, Zhang ZS, He XY, et al. Effect of training drills on emergency response ability to public health emergencies [J]. Chinese Journal of Health Supervision, 2011, 18 (3): 249-252.
- [14] Zhang J, Guo TW. Systematic analysis of the training effect of first aid ability of operating room nurses [J]. Journal of Nursing Management, 2015, 15 (8): 585-586.
- [15] Zhao XN, Zhang HM, Lv XC. Effect of multi-station imitation of real training on self-efficacy of new nurses in first aid skills [J]. Grassroots Medical Forum, 2016, 20 (14): 1999-2000.

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Clinical Effect of Dexmedetomidine in Preventing Postoperative Delirium in Patients Undergoing Cardiac Surgery: A Meta-analysis of Randomized Controlled Trials

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Abstract: Objective To evaluate the clinical effects of dexmedetomidine on preventing postoperative delirium in patients undergoing cardiac surgery by Meta-analysis. **Methods** PubMed, Cochrane Library Embase, Web of Science database were searched for randomized controlled trials (RCTs) of dexmedetomidine in the prevention of postoperative delirium in patients undergoing cardiac surgery. The experimental group was treated with dexmedetomidine, and the control group was intervened with placebo or other anesthetic drugs. The search time is from inception to 31 December 2022. Two reviewers evaluated the quality of the literature independently, and Meta-analysis was performed using RevMan5.3 software. A total of 15 RCTs were enrolled, including 3222 subjects, In which 1625 cases in the experimental group and 1597 cases in the control group. **Results** Meta-analysis results showed that dexmedetomidine could reduce the incidence of postoperative delirium in patients with cardiac surgery [relative risk ratio (RR) = 0.65, 95 % confidence interval (CI) (0.48, 0.87), $P = 0.0004$], but it may increase the risk of postoperative hypotension [RR = 1.23, 95%CI(1.11, 1.36), $P < 0.001$], meanwhile the incidence of postoperative bradycardia [RR = 1.38, 95 % CI (0.7, 2.70), $P = 0.04$] and postoperative atrial fibrillation [RR = 0.92, 95 % CI (0.8, 1.07), $P = 0.45$] had no significant difference between two groups. **Conclusion** Dexmedetomidine has a certain effect on the prevention of postoperative delirium in patients undergoing cardiac surgery, it may increase the risk of postoperative hypotension, but not increase the incidence of postoperative bradycardia and postoperative atrial fibrillation. But this needs to be confirmed by more high-quality and large-sample studies.

Keywords: Dexmedetomidine; Postoperative Delirium; Cardiac Surgery; Meta-Analysis

Introduction

Delirium is a common clinical acute brain dysfunction, mainly manifested as attention disorder and acute consciousness fluctuation ^[1], it is usually caused by physical diseases, anesthesia, surgical trauma and so on. It has been reported that the incidence of postoperative delirium in patients undergoing cardiac surgery is 4.1 % to 54.9 % ^[2], It is closely related to increased mortality, prolonged hospital stay and a significant increase in medical costs ^[3].

The mechanism of delirium is very complex, mainly including neuroinflammatory response, brain metabolic disorder and so on. Among them, brain metabolic disorder is an important mechanism. Studies have shown that the locus coeruleus in the brain is involved in the occurrence of delirium ^[4]. α_2 receptor agonists can prevent postoperative delirium by acting on the locus coeruleus. Dexmedetomidine is a highly selective α_2 -adrenoceptor agonist that exerts antisympathetic, sedative, and analgesic effects by activating α_2 -adrenergic receptors ^[5]. It has been observed that dexmedetomidine can reduce the incidence of delirium in patients after cardiac surgery ^[6]. However, a recent randomized controlled trial failed to reveal the beneficial effect of dexmedetomidine in preventing delirium after cardiac surgery ^[7]. In view of the inconsistent research results, it is difficult to conclude the preventive value of dexmedetomidine on delirium in patients after cardiac surgery; therefore, this study included new randomized controlled trials to explore the effect of dexmedetomidine on the occurrence of cardiac POST delirium through meta-analysis, in order to provide evidence-based basis for clinical decision-making on

the treatment of POST delirium.

1. Data and methods

1.1 Inclusion exclusion criteria

Inclusion criteria: (1) The subjects were older than 18 years old and underwent cardiac surgery. (2) The study compared dexmedetomidine with placebo or other anesthetics; (3) The incidence of POST delirium as the primary outcome or secondary outcome; (4) The study was a randomized controlled trial.

Excluded criteria: (1) Pediatric surgery and non-cardiac surgery; (2) Non-RCT studies such as retrospective studies and observational studies; (3) Failure to provide sufficient information or data.

1.2 Data source and retrieval strategy

Search PubMed, Cochrane Library, Embase and Web of Science for randomized controlled trials. The combination of subject words and free words is adopted. Search formulation (“dexmedetomidine”) AND (“cardiac surgery”OR“ CPB ”OR “CABG” OR “coronary artery bypass” OR“aortic surgery”) AND (“delirium”OR“postoperative delirium” OR“POD”).

1.3 Data extraction and quality evaluation

Two researchers independently screened, extracted data and evaluated the quality, and then cross-checked. If there were differences, the third researcher would decide. The extracted contents included the first author, publication year.etc. The quality of the literature was evaluated according to the Jadad scale.

1.4 Statistical method

Meta-analysis was performed using RevMan5.3 software, and the relative risk (RR) of 95 % confidence interval (CI) was used as the evaluation index. The Q test I test was used to test the heterogeneity of the results. When the P value > 0.1 and the I² value ≤ 50 %, there was no significant heterogeneity between the results of the study. The fixed effect model was used for analysis, and the random effect model was used for analysis. A forest map was created for each result, and a funnel plot was drawn to assess publication bias. P < 0.05 was considered statistically significant.

2. Result

2.1 Literature Retrieval Process and Results

A total of 192 related literatures were obtained by optimizing the initial search. After several screenings, 15 literatures were finally included in the study. **Figure 1.**

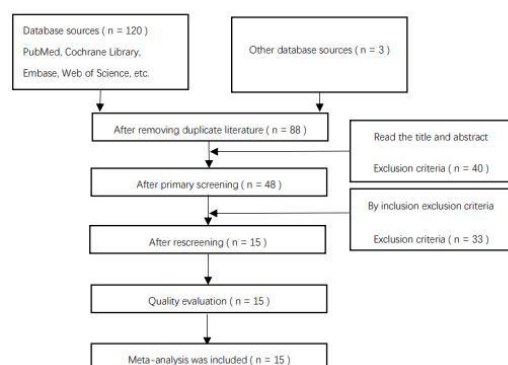


Figure 1 Literature screening flow chart

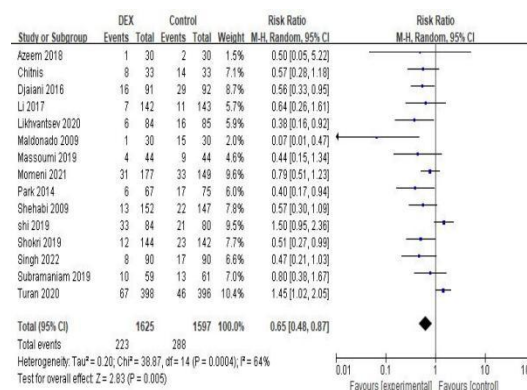


Figure 2 Incidence of postoperative delirium

2.2 Basic characteristics and quality evaluation of included studies

A total of 3222 patients with cardiac surgery were counted. **Table 1.**

Table 1 Basic characteristics of included studies

| Author/Year | Number | Age (DEX/CON TROL) | Time of using drug | Control group | Main outcome | Secondary outcomes | Jadad score |
|--|--------|--|-----------------------|------------------------|---------------------|----------------------------------|----------------|
| Turan ^[7] 2020 | 794 | 63 ±11/ 62 ±12 | INTRA+POST | placebo | POD | renal function.et c | 3 |
| Likhvantsev ^[8] 2020 | 169 | 62.6±6.7/ 62.4±7.2 | INTRA+POST | placebo | POD | ICU stay.etc. | 4 |
| Shi ^[9] 2019 | 164 | 74.7±7.2/ 74.2±7.7 | INTRA | propofol | POD | Delirium time.etc. | 3 |
| Shokri ^[10] 2019 | 286 | 63.75±3.29/ 64.38±4.81 | INTRA+POST | clonidine | POD | length of ICU stay | 4 |
| Massoumi ^[11] 2019 | 88 | 61.8±7.9/ 61.3±8.9 | INTRA+POST | placebo | POD | length of ICU stay.etc. | 3 |
| Subramaniam ^[12] 2019 | 120 | 64 (63-72) ; 69 (63-74) / 70 (66-75) ; 71 (64-79) | POST | propofol | POD | POD duration.et c. | 5 |
| Azeem ^[13] 2018 | 60 | 65.3±4.8/ 66.7±5.6 | POST | morphine | POD | Vital signs.etc. | 4 |
| Maldonado ^[14] 2009 | 90 | 55±16/ 58±18; 60±16; | POST | propofol, midazolam | POD | ICU and hospital stay.etc. | 3 |
| Shehabi ^[15] 2009 | 299 | 71.5 (66-76) / 71.0 (65-75) | INTRA+POST | morphine | POD | ICU and hospital stay.etc. | 4 |
| Singh ^[16] 2022 | 180 | 60.3±8.1; 60.1±10.3 | POST | propofol | POD | ICU length of stay.etc. | 4 |
| Djaiani ^[17] 2016 | 183 | 72.7±6.4/ 72.4±6.2 | POST | propofol | POD | atrial fibrillation. etc. | 3 |
| Park ^[18] 2014 | 142 | 51.09±16.10/ 54.35±14.97 | POST | remifentanil | POD | ICU and hospital stay.etc | 2 |
| Momeni ^[19] 2021 | 349 | 71 (61-81) ; 70 (59-81) | POST | placebo | POD | Delirium duration.et c | 4 |
| Li ^[20] 2017 | 285 | 66.4±5.4/ 67.5±5.3 | INTRA+POST | placebo | POD | ICU and hospital stay.etc | 4 |
| Chitnis ^[21] 2022 | 66 | 78.7/ 78.8 | POST | propofol | quality recovery | POD | 4 |

DEX: dexmedetomidine; POD: postoperative delirium

2.3 Meta-analysis results

2.3.1 Main outcome: Incidence of postoperative delirium

The incidence of postoperative delirium in the dexmedetomidine group and the control group was 13.72 % (223 / 1625) and 18.03 % (288 / 1597). **Fig. 2.** Random effect model analysis showed that the incidence of postoperative delirium in the

dexmedetomidine group was lower than that in the control group, and the difference was statistically significant. Further subgroup analysis was divided into subgroups according to the time of administration. **Table 2.**

| Subgroup | Number of study groups | Number of delirium | Result [95% CI] | Heterogeneity |
|--|------------------------|--------------------|--------------------------------------|--|
| Different administration time | | | | |
| Intraoperative-postoperative sequential administration | 6 | 236/1921 | 0.64[0.38,1.09]; <i>P</i> =0.10 | <i>I</i> ² =71%; <i>P</i> =0.004 |
| Only administered after surgery | 8 | 221/1137 | 0.58[0.43,0.78]; <i>P</i> =0.0003 | <i>I</i> ² =19%; <i>P</i> =0.28 |
| Only administered during surgery | 1 | 54/164 | - | - |
| Different control drugs | | | | |
| Placebo | 5 | 230/1662 | 0.74[0.44,1.257]; <i>P</i> =0.26 | <i>I</i> ² =69%; <i>P</i> =0.01 |
| Other anesthetics | 10 | 281/1560 | 0.59[0.41,0.87]; <i>P</i> =0.007 | <i>I</i> ² =59%; <i>P</i> =0.009 |
| Different age | | | | |
| Elderly(≥ 60 years) | 13 | 472/3020 | 0.62[0.47,0.81]; <i>P</i> =0.02 | <i>I</i> ² =59%; <i>P</i> =0.003 |
| Non-elderly(< 60 years) | 2 | 39/202 | 0.20[0.03,1.19]; <i>P</i> =0.09 | <i>I</i> ² = 66%; <i>P</i> =0.08 |

2.3.2 Adverse reactions: the incidence of postoperative hypotension, postoperative bradycardia and postoperative atrial fibrillation.

Of the 15 studies included in the meta-analysis, 9 compared the incidence of postoperative hypotension. Random effect model analysis showed that dexmedetomidine was associated with the incidence of postoperative hypotension, and the difference was statistically significant. **Fig. 3.**

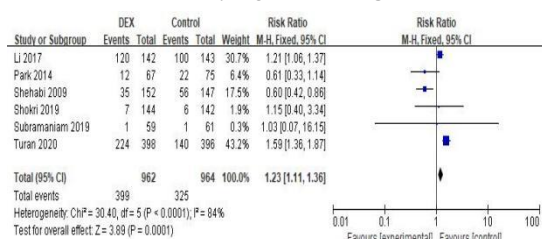


Figure 3 Incidence of postoperative hypotension

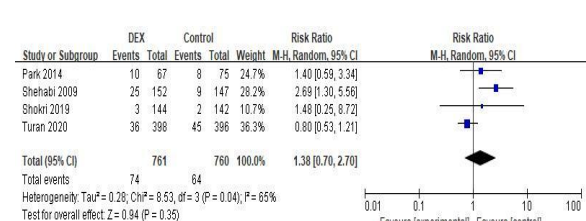


Figure 4 Incidence of postoperative bradycardia

Among the 15 studies included in the meta-analysis, 6 studies compared the incidence of postoperative bradycardia. Random effect model analysis showed that dexmedetomidine was not related to the incidence of postoperative bradycardia, and the difference was not statistically significant. **Fig 4.**

Among the 15 studies included in the meta-analysis, 5 studies reported the occurrence of atrial fibrillation. The fixed effect model was used for analysis. The results showed that dexmedetomidine was not related to the incidence of postoperative atrial fibrillation, and the difference was not statistically significant, Fig. 5.

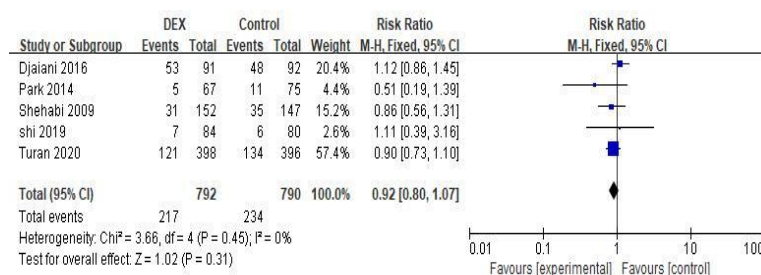


Figure 5 postoperative atrial fibrillation incidence

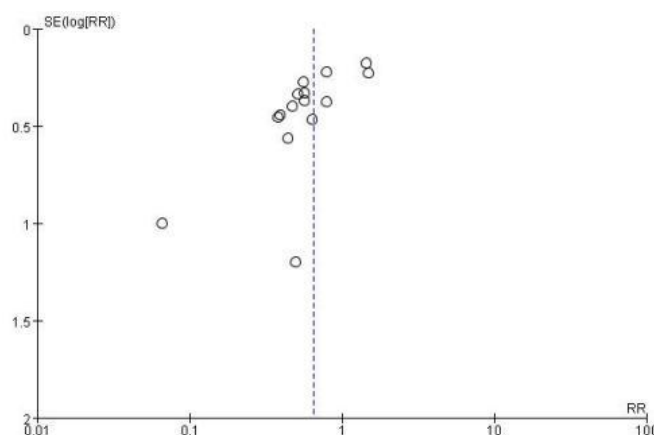


Figure 6 Postoperative delirium funnel plot

2.4 Publication bias analysis

The results showed that the two sides of the funnel plot were basically symmetrical, and there was no obvious publication bias between the studies. **Fig. 6.**

3. Discussion

Delirium is a common postoperative complication, which seriously affects the clinical prognosis of patients. Active prevention of delirium by non-drug and drug means is an important part of perioperative management ^[1]. The updated 2021 guidelines for the treatment of pain, agitation and delirium recommend the use of drugs such as dexmedetomidine to reduce the incidence of postoperative delirium ^[22].

Dexmedetomidine is a highly selective α_2 receptor agonist with dual effects of analgesia and sedation. It is widely used in anesthesia and ICU analgesia and sedation. However, there are different conclusions on the preventive effect of dexmedetomidine on delirium in postoperative patients and critically ill patients, and the effect of dexmedetomidine on heart rate and blood pressure has also attracted much attention. In this study, patients after cardiac surgery were selected as the observation objects, and the latest clinical studies on the prevention of delirium in patients after cardiac surgery were included. Meta-analysis was used to obtain some valuable research results, which are worthy of further discussion.

3.1 Dexmedetomidine reduces the incidence of delirium after cardiac surgery

In this study, we conducted a meta-analysis of the newly published literature on dexmedetomidine for the prevention of delirium after cardiac surgery. A total of 3222 patients were enrolled. The results showed that dexmedetomidine could significantly reduce the incidence of delirium after cardiac surgery. In order to further clarify the influencing factors of dexmedetomidine in preventing delirium after cardiac surgery, the research group conducted subgroup analysis based on

administration time, control drug and age group. Studies have shown that age is an independent risk factor for postoperative delirium [23], however, the incidence of delirium after cardiac surgery is not affected by the age of patients, which may be related to the diversity and complexity of delirium risk factors and their causes [24]. The timing of dexmedetomidine given only after surgery can significantly reduce the incidence of delirium after cardiac surgery, and its preventive effect is limited only when used sequentially during and after surgery. This may be related to the postoperative use of dexmedetomidine can reduce the use of opioids or benzodiazepines, because opioids and benzodiazepines can significantly increase the incidence of postoperative delirium [25, 26]. Therefore, the incidence of drug-induced delirium is reduced, and there is only one study on intraoperative administration, so it is not discussed. In order to clarify whether other anesthetics have the preventive effect of postoperative delirium, this study conducted a subgroup analysis. Dexmedetomidine was compared with placebo or other anesthetics. The results showed that placebo could not reduce postoperative delirium. Other anesthetics such as propofol and midazolam could not reduce the incidence of postoperative delirium. Dexmedetomidine showed a unique preventive effect on delirium, suggesting that dexmedetomidine may be a better choice when patients with risk factors for delirium after cardiac surgery need analgesic and sedative treatment.

3.2 Effects of dexmedetomidine on postoperative hypotension, bradycardia and atrial fibrillation

Maintaining hemodynamic stability after cardiac surgery is essential, but hypotension and bradycardia are the most common adverse reactions of dexmedetomidine [27]. Therefore, it is of great clinical significance to explore the effect of dexmedetomidine on blood pressure and heart rate in patients after cardiac surgery. This study suggests that postoperative hypotension may be an adverse reaction of dexmedetomidine used in cardiac surgery to prevent delirium, which is basically the same as that reported in the drug instructions of dexmedetomidine. Therefore, it is necessary to be alert to the occurrence of postoperative hypotension when dexmedetomidine is used to prevent delirium. The results of this meta-analysis showed that there was no significant difference in the incidence of postoperative bradycardia between the dexmedetomidine group and the control group, suggesting that dexmedetomidine was relatively safe in cardiac surgery and no obvious bradycardia occurred. However, this requires a comprehensive consideration of various factors such as the loading dose of dexmedetomidine and its administration rate, volume status, and the use of vasoactive drugs. In addition, atrial fibrillation is the most common complication after cardiac surgery [28]. Although studies have shown that dexmedetomidine can reduce myocardial ischemia-reperfusion injury and prevent arrhythmia [29], However, the results of this study did not confirm that dexmedetomidine could reduce the incidence of atrial fibrillation after cardiac surgery. In view of the large heterogeneity of this study. In order to explore the source of heterogeneity, the research group conducted subgroup analysis of delirium in patients after cardiac surgery according to the administration time, age group and control drug. The results of heterogeneity test showed no significant change, so the administration time, age and control drug were not the main factors leading to significant heterogeneity. A reasonable explanation may be found from the perspective of sample size, dose, concentration and delirium assessment methods, but more high-quality clinical studies are needed to confirm it.

3.3 Limitations of the study

Some of the outcome indicators in the study are heterogeneous, and more homogeneity studies are needed to verify them in the future, and the optimal dose of dexmedetomidine to prevent delirium after cardiac surgery is discussed.

4. Conclusion

Dexmedetomidine can reduce the incidence of delirium in patients after cardiac surgery, and will not cause bradycardia and atrial fibrillation, but may increase the incidence of postoperative hypotension. However, the randomized controlled trials included in this study have great heterogeneity, and the above conclusions need to be confirmed by high-quality,

large-sample randomized controlled trials.

References

- [1] Mattison MLP. Delirium [J]. *Ann Intern Med*, 2020, 173(7): Itc49-itc64.
- [2] Chen H, Mo L, Hu H, et al. Risk factors of postoperative delirium after cardiac surgery: a meta-analysis [J]. *J Cardiothorac Surg*, 2021, 16(1): 113.
- [3] Gleason LJ, Schmitt EM, Kosar CM, et al. Effect of Delirium and Other Major Complications on Outcomes After Elective Surgery in Older Adults [J]. *JAMA Surg*, 2015, 150(12): 1134-40.
- [4] O'Neill E, Griffin ÉW, O'Sullivan R, et al. Acute neuroinflammation, sickness behavior and working memory responses to acute systemic LPS challenge following noradrenergic lesion in mice [J]. *Brain Behav Immun*, 2021, 94: 357-68.
- [5] Gerresheim G, Schwemmer U. [Dexmedetomidine] [J]. *Anaesthesist*, 2013, 62(8): 661-74.
- [6] Wang G, Niu J, Li Z, et al. The efficacy and safety of dexmedetomidine in cardiac surgery patients: A systematic review and meta-analysis [J]. *PLoS One*, 2018, 13(9): e0202620.
- [7] Turan A, Duncan A, Leung S, et al. Dexmedetomidine for reduction of atrial fibrillation and delirium after cardiac surgery (DECADE): a randomised placebo-controlled trial [J]. *Lancet*, 2020, 396(10245): 177-85.
- [8] Likhvantsev VV, Landoni G, Grebenchikov OA, et al. Perioperative Dexmedetomidine Supplement Decreases Delirium Incidence After Adult Cardiac Surgery: A Randomized, Double-Blind, Controlled Study [J]. *J Cardiothorac Vasc Anesth*, 2021, 35(2): 449-57.
- [9] Shi C, Jin J, Qiao L, et al. Effect of perioperative administration of dexmedetomidine on delirium after cardiac surgery in elderly patients: a double-blinded, multi-center, randomized study [J]. *Clin Interv Aging*, 2019, 14: 571-5.
- [10] Shokri H, Ali I. A randomized control trial comparing prophylactic dexmedetomidine versus clonidine on rates and duration of delirium in older adult patients undergoing coronary artery bypass grafting [J]. *J Clin Anesth*, 2020, 61: 109622.
- [11] Massoumi G, Mansouri M, Khamesipour S. Comparison of the incidence and severity of delirium and biochemical factors after coronary artery bypass grafting with dexmedetomidine: A randomized double-blind placebo-controlled clinical trial study [J]. *ARYA Atheroscler*, 2019, 15(1): 14-21.
- [12] Subramaniam B, Shankar P, Shae'fi S, et al. Effect of Intravenous Acetaminophen vs Placebo Combined With Propofol or Dexmedetomidine on Postoperative Delirium Among Older Patients Following Cardiac Surgery: The DEXACET Randomized Clinical Trial [J]. *Jama*, 2019, 321(7): 686-96.
- [13] Azeem TMA, Yosif NE, Alansary AM, et al. Dexmedetomidine vs morphine and midazolam in the prevention and treatment of delirium after adult cardiac surgery; a randomized, double-blinded clinical trial [J]. *Saudi J Anaesth*, 2018, 12(2): 190-7.
- [14] Maldonado JR, Wysong A, Van Der Starre PJ, et al. Dexmedetomidine and the reduction of postoperative delirium after cardiac surgery [J]. *Psychosomatics*, 2009, 50(3): 206-17.
- [15] Shehabi Y, Grant P, Wolfenden H, et al. Prevalence of delirium with dexmedetomidine compared with morphine based therapy after cardiac surgery: a randomized controlled trial (DEXmedetomidine Compared to Morphine-DEXCOM Study) [J]. *Anesthesiology*, 2009, 111(5): 1075-84.
- [16] Singh A, Garg V, Mehta Y, et al. Perioperative dexmedetomidine reduces delirium after coronary artery bypass graft surgery: A prospective, single-blind, observational study [J]. *Ann Card Anaesth*, 2022, 25(4): 490-7.
- [17] Djaiani G, Silvertown N, Fedorko L, et al. Dexmedetomidine versus Propofol Sedation Reduces Delirium after Cardiac Surgery: A Randomized Controlled Trial [J]. *Anesthesiology*, 2016, 124(2): 362-8.
- [18] Park JB, Bang SH, Chee HK, et al. Efficacy and safety of dexmedetomidine for postoperative delirium in adult cardiac surgery on cardiopulmonary bypass [J]. *Korean J Thorac Cardiovasc Surg*, 2014, 47(3): 249-54.

- [19] Momeni M, Khalifa C, Lemaire G, et al. Propofol plus low-dose dexmedetomidine infusion and postoperative delirium in older patients undergoing cardiac surgery [J]. *Br J Anaesth*, 2021, 126(3): 665-73.
- [20] Li X, Yang J, Nie XL, et al. Impact of dexmedetomidine on the incidence of delirium in elderly patients after cardiac surgery: A randomized controlled trial [J]. *PLoS One*, 2017, 12(2): e0170757.
- [21] Chitnis S, Mullane D, Brohan J, et al. Dexmedetomidine Use in Intensive Care Unit Sedation and Postoperative Recovery in Elderly Patients Post-Cardiac Surgery (DIRECT) [J]. *J Cardiothorac Vasc Anesth*, 2022, 36(3): 880-92.
- [22] Seo Y, Lee HJ, Ha EJ, et al. 2021 KSCCM clinical practice guidelines for pain, agitation, delirium, immobility, and sleep disturbance in the intensive care unit [J]. *Acute Crit Care*, 2022, 37(1): 1-25.
- [23] Pinho C, Cruz S, Santos A, et al. Postoperative delirium: age and low functional reserve as independent risk factors [J]. *J Clin Anesth*, 2016, 33: 507-13.
- [24] Inouye SK, Charpentier PA. Precipitating factors for delirium in hospitalized elderly persons. Predictive model and interrelationship with baseline vulnerability [J]. *Jama*, 1996, 275(11): 852-7.
- [25] Pavone KJ, Jablonski J, Cacchione PZ, et al. Evaluating Pain, Opioids, and Delirium in Critically Ill Older Adults [J]. *Clin Nurs Res*, 2021, 30(4): 455-63.
- [26] Shi HJ, Yuan RX, Zhang JZ, et al. Effect of midazolam on delirium in critically ill patients: a propensity score analysis [J]. *J Int Med Res*, 2022, 50(4): 3000605221088695.
- [27] Coursin DB, Coursin DB, Maccioli GA. Dexmedetomidine [J]. *Curr Opin Crit Care*, 2001, 7(4): 221-6.
- [28] Wang X, Yao L, Ge L, et al. Pharmacological interventions for preventing post-operative atrial fibrillation in patients undergoing cardiac surgery: a network meta-analysis protocol [J]. *BMJ open*, 2017, 7(12): e018544.
- [29] Hayashi Y, Sumikawa K, Maze M, et al. Dexmedetomidine prevents epinephrine-induced arrhythmias through stimulation of central alpha 2 adrenoceptors in halothane-anesthetized dogs [J]. *Anesthesiology*, 1991, 75(1): 113-7.

Research Progress of Survival Outcomes in Early-Stage Cervical Cancer Patients Undergoing Robotic Radical Hysterectomy

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Abstract: Minimally invasive surgical (MIS) for early-stage cervical cancer (ECC) has been controversial following the publication of The LACC trial. However, MIS consists of traditional laparoscopic surgery and robotic-assisted laparoscopic surgery. The aim of this article is to discuss the research progress of ECC undergoing robotic radical hysterectomy (RRH) with a view to providing more surgical options for patients.

Keywords: Early-Stage Cervical Cancer; Robotic Radical Hysterectomy; Survival Outcomes

Introduction

Cervical cancer is the fourth malignancy of women, with 300,000 death worldwide in 2018 ^[1]. With the widespread availability of human papilloma virus (HPV) vaccination and cervical cancer screening, more patients have been diagnosed at an early stage and the proportion of ECC is on the rise per year.

The standard treatment for ECC is radical hysterectomy (RH) plus pelvic lymph node dissection. ECC is defined as stage IA-IB1 and optionally stage IIA1 according to the FIGO 2009 staging ^[2]. Until the pioneering of laparoscopic techniques in the early 1990s, open surgery was the standard procedure for ECC ^[3-4]. MIS including traditional laparoscopic techniques and robot-assisted laparoscopic techniques has developed rapidly over the past 20 years. Previous studies had reported that MIS was associated with less operative time, lower estimated intraoperative bleeding, and fewer intraoperative and postoperative complications than ARH, and the long-term oncology outcomes are not inferior to open ^[5-8]. However, a prospective randomized controlled trial published in the New England Journal in 2018 produced alarming results. The LACC trial ^[9] noted that MIS led to lower 3-year disease-free survival (DFS) and lower 3-year overall survival (OS). A large cohort study including 2,461 patients reached similar conclusions. These two high-quality studies called into question the use of MIS in ECC, and even subsequent NCCN guidelines recommended open surgery as the standard procedure for patients with ECC.

However, in the LACC trial, only 15.6% of patients in the MIS group underwent RRH. It is well known that the robotic laparoscopic platform was developed to address the limitations of conventional laparoscopic surgery by providing a clearer 3D view, performing tremor filtering of surgical instruments, and using robotic arms to perform more delicate operations that cannot be performed manually. Based on this, the author summarized the research progress in ECC undergoing RRH, with a view to providing more surgical options for ECC patients.

1. The controversy of ECC undergoing MIS

Previous studies had reported no difference in long-term oncology outcomes between LRH and ARH. Bogani *et al.* performed a propensity-matched analysis of 65 pairs of patients who underwent LRH or ARH and showed no statistical difference in 5-year DFS and OS ^[10]. In addition, Wang *et al.* conducted a retrospective study of patients with stage Ia2-IIa2 cervical cancer who underwent LRH and ARH and matched the two groups according to risk factors for recurrence. Their

survival analysis showed no significant difference in recurrence rates between the two groups. The 5-year DFS and OS were without difference ^[11], and LRH had a lower rate of postoperative complications.

The publication of the LACC trial shattered this calm, in which patients were randomly allocated to either the MIS group (n=319) (LRH or RRH) or ARH group (n=312), with a DFS at 4.5 years of 86.0% in the MIS group and 96.5% in ARH group. MIS was associated with a lower 3-year DFS (91.2% vs. 97.1%), a difference that persisted after adjusting for age, body mass index (BMI), staging, LVSI, and lymph node involvement. MIS was also associated with a lower 3-year OS (93.8% vs. 99.0%). Individual countries subsequently reported their data. The SUCCOR study in Europe reported by Chiva *et al.* ^[12] was a multi-center, retrospective, observational cohort study that included 693 patients who underwent MIS or ARH. Their results showed that MIS increased the risk of recurrent death, but when patients underwent MIS with protective vaginal closure, the recurrence rate was similar to that of ARH.

2. The research progress of ECC undergoing RRH

The DaVinci robotic surgical system was first described by Sert and Abeler in 2006 ^[13]. It inherits the advantages of laparoscopy, but is superior to it in that 1) 3D high-definition imaging technology; 2) simulated wrist surgical instruments eliminate chatter; 3) the robotic hand has greater dexterity, accuracy, and freedom of movement, enabling fine manipulation in confined spaces. Robotic surgery was originally introduced with the expectation that it would prove optimal and evolve to eventually replace conventional laparoscopic surgery ^[14]. Some relevant studies have also confirmed that RRH has lower intraoperative bleeding, shorter hospital stays, lower rates of wound-related complications, and postoperative fever-related complications than LRH in terms of comparative intraoperative and short-term postoperative outcomes.

Alfonzo ^[15] *et al.* conducted a Swedish national population-based cohort study that included 864 patients (236 ARH, 628 RRH) with stage IA1-IB cervical cancer who underwent RRH, and 5-year OS in the ARH and RRH groups were 92% and 94%, and 5-year DFS of 84% and 88%, respectively, with similar patterns of recurrence in both groups. Using propensity score analysis, 232 patients were included in each group and there was no difference in survival between the two groups. Similarly, Jensen ^[16] *et al.* reached a similar conclusion for Danish population-based data. Falconer ^[17] *et al.* performed follow-up statistics on patients who received RRH at their referral hospital, with a median follow-up time of 52 months, a recurrence rate of 5.6%, a 4.5-year PFS of 93.1%, and a 4.5-year OS was 95.1%. When stratified by tumor diameter, patients with tumors >2 cm had a worse PFS ($p = 0.01$), and there were no statistically significant for OS. A meta of 26 studies comparing RRH and ARH showed that RRH had better perioperative numbers ^[18].

3. Looking forward

The results of the LACC trial have been widely discussed. However, shortcomings regarding its study are also noteworthy: 1) only 15.6% of patients undergoing RRH which was a relatively small sample; 2) data on tumor size, postoperative histopathology, and adjuvant treatment were severely missing; 3) the survival rate in the ARH group was too high, with its 3-year OS of 99.0%, compared with a 5-year OS of 94% in ARH in a large retrospective study of FIGO stage IB1 patients by Park *et al.* ^[19]; 4) only two patients per center per year, whose surgical experience and quality of the surgery by surgeons in MIS group had to be questioned; and 5) the grossly uneven distribution of recurrent cases, with all recurrent cases concentrated in 14 of the 33 centers.

MIS had been shown safe and feasible in endometrial ^[20] and rectal cancers ^[21]. In this regard, some possible reasons have been suggested to explain the disadvantages of cervical cancer: firstly, contact compression of the tumor tissue in the cervical region by the uterine manipulator, the vaginal incision under direct vision, may lead to spillage of tumor cells into the pelvis, resulting in local recurrence. Kanao *et al.* used a "no-look no-touch" technique and concluded that survival outcomes were similar in the MIS and open groups ^[22]. In addition, the size of the tumor diameter should be considered. Recent studies have shown that tumors <2 cm are more suitable for MIS ^[23]. Ponce *et al.* retrospectively collected data from 9 consecutive years of RRH in Spanish and Portuguese centers and demonstrated that tumors >2 cm was an independent risk

factor for recurrence (HR: 2.37) [24].

In summary, new technology is always evolving and MIS should not be completely dismissed. By improving the surgical experience of the gynecologist, rational patient selection, and strict tumor-free principles, MIS can bring benefits to ECC.

References

- [1] Arbyn M, Weiderpass E, Bruni L, et al. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. *Lancet Glob Health*[J]. 2020 Feb;8(2):e191-e203.
- [2] NCCN Clinical Practice Guidelines in Oncology, Cervical Cancer. Version 2.2018.
- [3] Canis M, Mage G, Pouly J L, et al. Laparoscopic radical hysterectomy for cervical cancer[J]. *Baillieres Clin Obstet Gynaecol*. 1995 Dec;9(4):675-89.
- [4] Nezhat CR, Nezhat FR, Burrell MO, et al. Laparoscopic radical hysterectomy and laparoscopically assisted vaginal radical hysterectomy with pelvic and paraaortic node dissection[J]. *J Gynecol Surg*. 1993 Summer;9(2):105-20.
- [5] Wang YZ, Deng L, Xu HC, et al. Laparoscopy versus laparotomy for the management of early stage cervical cancer[J]. *BMC Cancer*. 2015 Nov 24;15:928.
- [6] Shah CA, Beck T, Liao JB, et al. Surgical and oncologic outcomes after robotic radical hysterectomy as compared to open radical hysterectomy in the treatment of early cervical cancer[J]. *J Gynecol Oncol*. 2017 Nov;28(6):e82.
- [7] Sert BM, Boggess JF, Ahmad S, et al. Robot-assisted versus open radical hysterectomy: A multi-institutional experience for early-stage cervical cancer[J]. *Eur J Surg Oncol*. 2016 Apr;42(4):513-22.
- [8] Mendivil AA, Rettenmaier MA, Abaid LN, et al. Survival rate comparisons amongst cervical cancer patients treated with an open, robotic-assisted or laparoscopic radical hysterectomy: A five year experience[J]. *Surg Oncol*. 2016 Mar;25(1):66-71.
- [9] Ramirez PT, Frumovitz M, Pareja R, et al. Minimally invasive versus abdominal radical hysterectomy for cervical cancer[J]. *N Engl J Med*. 2018;379(20):1895–904.
- [10] Bogani G, Cromi A, Uccella S, et al. Laparoscopic versus open abdominal management of cervical cancer: long-term results from a propensity-matched analysis[J]. *J Minim Invasive Gynecol*. 2014 Sep-Oct;21(5):857-62.
- [11] Wang W, Shang C, Huang J, et al. Long-term oncological outcomes after laparoscopic versus abdominal radical hysterectomy in stage I a2- II a2 cervical cancer: a matched cohort study[J]. *Zhong hua Fu Chan Ke Za Zhi*. 2015 Dec;50(12):894-901. Chinese.
- [12] Chiva L, Zanagnolo V, Kucukmetin A, et al. SUCCOR study. An international european cohort observational study comparing minimally invasive surgery versus open abdominal radical hysterectomy in patients with stage IB1 (FIGO 2009, <4 cm) cervical cancer operated in 2013–2014[J]. *Int J Gynecol Cancer*. 2019;29:A1–2.
- [13] Sert BM, Abeler VM. Robotic-assisted laparoscopic radical hysterectomy with node dissection-case report[J]. *Eur J Gynaecol Oncol*, 2006: 531—533.
- [14] Zanagnolo V, Baroni C, Achilarré MT, et al. Oncological outcomes of robotic radical hysterectomy (RRH) for patients with early stage cervical cancer: experience at a referral cancer center[J]. *Ann Surg Oncol*. 2020.
- [15] Alfonzo E, Wallin E, Ekdahl L, et al. No survival difference between robotic and open radical hysterectomy for women with early-stage cervical cancer: results from a nationwide population based cohort study[J]. *Eur J Cancer*. 2019;116:169–77.
- [16] Jensen PT, Schnack TH, Froding LP, et al. Survival after a nationwide adoption of robotic minimally invasive surgery for early-stage cervical cancer -a population-based study[J]. *Eur J Canc* 2020;128:47e56.
- [17] Falconer H, Palsdottir K, Stalberg K, et al. Robot-assisted approach to cervical cancer (RACC): an international multi-center, open-label randomized controlled trial[J]. *Int J Gynecol Cancer*. 2019;29(6):1072–6.
- [18] Shazly SA, Murad MH, Dowdy SC, et al. Robotic radical hysterectomy in early stage cervical cancer: a

systematic review and meta-analysis. *Gynecol Oncol* 2015; 138: 457–71.

[19] Walker JL, Piedmonte MR, Spirtos NM, et al. Recurrence and survival after random assignment to laparoscopy versus laparotomy for comprehensive surgical staging of uterine cancer: Gynecologic Oncology Group LAP2 Study[J]. *J Clin Oncol*. 2012 Mar 1;30(7):695-700.

[20] Kearney DE, Coffey JC. A Randomized Trial of Laparoscopic versus Open Surgery for Rectal Cancer[J]. *N Engl J Med*. 2015 Jul 9;373(2):194.

[21] Choi CH, Lee JW, Lee YY, et al. Comparison of laparoscopic-assisted radical vaginal hysterectomy and laparoscopic radical hysterectomy in the treatment of cervical cancer[J]. *Ann Surg Oncol*. 2012 Nov;19(12):3839-48.

[22] Passerotti CC, Franco F, Bissoli JC, et al. Comparison of the learning curves and frustration level in performing laparoscopic and robotic training skills by experts and novices[J]. *Int Urol Nephrol*. 2015 Jul;47(7):1075-84.

[23] Ponce J, Fernandez-Gonzalez S, Gil-Moreno A, et al. Risk Factors for Recurrence after Robot-Assisted Radical Hysterectomy for Early-Stage Cervical Cancer: A Multicenter Retrospective Study[J]. *Cancers (Basel)*. 2020 Nov 16;12(11):3387.

[24] Shah CA, Beck T, Liao JB, et al. Surgical and oncologic outcomes after robotic radical hysterectomy as compared to open radical hysterectomy in the treatment of early cervical cancer[J]. *J Gynecol Oncol*. 2017 Nov;28(6):e82.

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Effect of Hollow Nail Combined with Titanium Cable Internal Fixation in the Treatment of Patellar Fracture

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Abstract: Objective: To observe the effect of hollow nail combined with titanium cable internal fixation in the treatment of patella fracture. **Methods:** A total of 60 patients with patellar fracture treated in our hospital from September 2019 to February 2022 were selected as subjects, and randomly divided into control group (30 patients treated with conventional surgical protocol) and observation group (30 patients treated with hollow nails combined with titanium cable internal fixation). The recovery of the two groups was analyzed. **Results:** Comparing the operation time, intraoperative blood loss, fracture healing time and loss Angle between the two groups, the observation group had advantages, $P < 0.05$. Compared with the knee function scores of the two groups, there was no difference before surgery, 1 week, 3 weeks, 5 weeks after surgery, the observation group had advantages, $P < 0.05$. **Conclusion:** In the treatment of patients with patellar fracture, using the hollow nail combined with titanium cable internal fixation can reduce the intraoperative trauma of patients, and promote the recovery of patients' knee function as soon as possible.

Keywords: Cannulated Screw Combined With Titanium Cable Internal Fixation; Patellar Fracture

Introduction

Among the common clinical fracture diseases, patella fracture is the most common fracture type with a high incidence. The patella plays a very important role in the daily normal knee joint activity. From the clinical diagnosis, we can see that there are many inducing factors of patella fracture, direct violence or abnormal traction between quadriceps femoris may lead to fracture. Such fracture will directly affect the knee extension function of patients, and lead to the destruction of the integrity of the patella joint surface^[1-2]. In the process of treating such fracture patients, it is more necessary to take effective treatment measures to promote the recovery of patients as soon as possible. According to hollow nail combined with titanium cable internal fixation, the treatment of this part of patients is rapidly applied in clinical practice. This study mainly analyzes the specific value of this surgical treatment.

1. Data and methods

1.1 General information

According to the way of comparative surgical treatment, 60 patients with patellar fracture who were treated in our hospital from September 2019 to February 2022 were selected as subjects and randomly divided into the control group (30 cases, treated with conventional surgical scheme) and the observation group (30 cases, treated with hollow nail and titanium cable internal fixation). In terms of patient composition, the control group had 16 males and 14 females, aged between 45 and 75 years, with an average of (62.34 ± 1.83) . In the observation group, there were 17 males and 13 females, aged between 43 and 74 years, with an average of (63.04 ± 1.94) . Comparison of basic data, $P > 0.05$.

1.2 Method

The control group was treated with routine surgery, and internal fixation with Kirschner wire tension band was carried out. The body position was kept in supine position, and the anesthesia method was intravenous general anesthesia. After disinfection of the wound surface, the knee joint was bent about 20 degrees. The incision was made in the anterior and central position of the patient's patella, and the subcutaneous tissue was exposed layer by layer to promote the exposure of the fracture end, and the blood accumulation in the joint was cleaned up, and the temporary fixation was carried out with reduction forceps, and the Kirschner wire was used to fix the patellar joint surface after the reduction was smooth. After the accurate reduction, the surgical opening was sutured layer by layer. The observation group was treated with hollow screw and titanium cable internal fixation. During the operation, the body position was selected in supine position, and the conventional method was used to stop the bleeding, and the patient was slightly under the knee raise it, bend the knee joint about 20 degrees, and cut it at the front and middle of the patient's knee joint, so that the fracture end can be fully exposed, and the blood accumulation in the joint can be treated in the same way as the control group. Then the fracture reduction is carried out, and the flatness of the patellar joint surface is restored. After the knee joint is fixed with tissue clamp, the knee joint is flexed about 20°~30°, and the guide pin is inserted for temporary fixation. The fixed position is determined with the help of C-arm machine, and then the hollow screw is inserted, the titanium cable is crossed in the front end of the patella, and the lock buckle needs to be placed in the expected position on the bone surface. After the reduction is accurate, the surgical opening is conventionally sutured. Both groups of patients need to undergo anti-infection treatment during surgery.

1.3 Observation indicators

The operation time, intraoperative bleeding, fracture healing time and loss angle of the two groups should be counted during the comparison of surgical treatment. The knee joint function of the patients should be evaluated with Lysholm score before and after the operation for 1 week, 3 weeks and 5 weeks.

1.4 Statistical methods

The data related to the two groups were processed with SPSS20.0, and the measurement data were expressed with mean \pm standard deviation. The difference was statistically significant in t test ($P < 0.05$).

2. Results

2.1 Comparison of operation time, intraoperative bleeding, fracture healing time and loss angle between the two groups

Compared with the operation time, intraoperative bleeding, fracture healing time and loss angle of the two groups, the observation group has advantages ($P < 0.05$), as shown in Table 1 below.

Table 1 Comparison of operation time, intraoperative bleeding, fracture healing time and loss angle between the two groups ($\bar{x} \pm s$)

| Groups | Number of cases | Operation time (min) | Intraoperative bleeding volume (ml) | Fracture healing time (week) | Loss angle (°) |
|-------------------|-----------------|----------------------|-------------------------------------|------------------------------|------------------|
| Observation group | 30 | 42.54 \pm 10.34 | 196.53 \pm 20.24 | 10.12 \pm 0.54 | 10.32 \pm 0.41 |
| Control group | 30 | 52.56 \pm 11.22 | 213.21 \pm 17.13 | 12.51 \pm 0.23 | 15.12 \pm 0.52 |
| <i>t</i> | - | 12.425 | 12.141 | 10.252 | 12.436 |
| P | - | 0.001 | 0.001 | 0.001 | 0.001 |

2.2 Knee joint function score of two groups

Compared with the knee joint function score of the two groups, there was no difference before the operation. The observation group had advantages at 1, 3 and 5 weeks after the operation ($P<0.05$), as shown in Table 2 below.

Table 2 Knee joint function score of two groups ($\bar{x} \pm s$)

| Groups | Number of cases | Preoperative | 1 week after operation | 3 weeks after operation | 5 weeks after operation |
|-------------------|-----------------|--------------|------------------------|-------------------------|-------------------------|
| Observation group | 30 | 42.05±1.34 | 52.53±2.24 | 65.12±3.54 | 75.32±2.41 |
| Control group | 30 | 42.56±1.22 | 47.21±3.13 | 56.51±2.23 | 66.12±3.52 |
| <i>t</i> | - | 1.242 | 10.425 | 12.725 | 13.425 |
| <i>P</i> | - | 0.801 | 0.001 | 0.001 | 0.001 |

3. Discussion

Patella fracture is the most common type of fracture in orthopedics, which will directly affect the normal physiological activities of patients and reduce the quality of life of patients. Moreover, this type of fracture is mostly caused by sudden external forces, and there is a large trauma. Surgical treatment is the most important way to treat patella fracture in the current clinical treatment, which can promote the rapid recovery of the normal physiological structure of the fracture site of patients, and promote the improvement of the knee joint function of patients [3-4].

In the conventional surgical treatment, the treatment is mainly carried out by Kirschner wire internal fixation, assisted by steel wire tension band. However, the steel wire is prone to fatigue, and it is easy to break the steel wire during the continuous torsion and other operations. At the same time, during the operation process, it may affect the adjacent synovial tissue of the patient, increase the incidence of postoperative pain, infection and other complications, and more likely affect the normal activity of the knee joint. It is not conducive to the recovery of the patient. The treatment is carried out by hollow nail combined with titanium cable internal fixation, which is relatively simple, and the hollow nail will not cause compression to the patient's tendon, and will cause little negative stimulation to the surrounding tissue, which can avoid loosening or slipping [5]. At the same time, titanium cable has high biocompatibility, high mechanical strength, and generally does not break, which is helpful for patients to recover after surgery. In this study, the observation group was treated according to hollow nail combined with titanium cable internal fixation surgery. Combined with the observation, it can be seen that under the effect of this surgical scheme, the patients suffered little trauma during surgery, and the knee joint function recovered relatively quickly during the recovery process, which can effectively improve the surgical treatment effect of patients with patellar fracture.

Based on this study, hollow nail combined with titanium cable internal fixation can be preferentially selected in the surgical treatment of patellar fracture patients, which can effectively improve the clinical surgical effect of this part of patients and help patients recover the damaged joint function.

References

- [1] Fan SY, Zeng ZY, Song YX. Clinical Effect of Internal Fixation with Titanium Wire and Titanium Cable with Holes in the Treatment of Patellar Fracture [J]. *Journal of Clinical Orthopedics*, 2022,25 (03): 417-419.
- [2] Wang HC, Sang YT. The Effect of Arthroscopic Assisted Minimally Invasive Percutaneous Closed Reduction in the Treatment of Non-serious Comminuted Patellar Fracture (fracture block≤3) [J]. *China Contemporary Medicine*, 2022,29 (14): 81-85.
- [3] Xu P, Xu C, Qiang XJ. Clinical Observation on the Treatment of Patellar Fracture with Hollow Nail and Titanium Cable Internal Fixation Combined with Percutaneous Tension band Fixation [J]. *Practical Clinical of Integrated Traditional Chinese and Western Medicine*, 2020,20 (11): 25-26.
- [4] Zhou WS, Fan TC, Bai YX, Chilie GG. Clinical Observation on treatment of patellar fracture with hollow nail

titanium cable tension band [J]. *Tibetan Medicine*, 2019, 40 (04): 154-155.

[5] Xie JB. Study on the Application of Closed Reduction Combined with Mini-incision Cannulated Screw and Titanium Cable in the Treatment of Patellar Fracture [J]. *Contemporary Medicine*, 2019, 25 (22): 128-129.

Research Progress on Peripheral Blood Lymphocyte Count and Cytokines for Sepsis

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Abstract: Sepsis is a life-threatening organ dysfunction caused by infection leading to host immune dysregulation, and many studies display that it occurs high mortality and occupies a large of medical resources. Early diagnosis and timely treatment can significantly improve the prognosis of patients, and early anti-infective treatment is one of the most important treatment measures for serious infections, as it prevents the transition from pre-sepsis to sepsis and prevents direct death from infection. However, the current criterion, Sepsis-3, does not fully meet the definition of sepsis, and is not suitable for outpatient patients, so it is urgent to explore other ways to assist in early screening of sepsis. Starting from the pathophysiological mechanism of sepsis, this article summarizes the research progress on lymphocyte and cytokines for sepsis, and found that lymphocyte, IL-10 and IL-6 may be used as a joint indicator to diagnose sepsis and the prognosis so as to improve the prognosis of sepsis.

Keywords: Sepsis; IL-6; IL-10; Lymphocytes; Early Diagnosis

Introduction

Sepsis is a life-threatening organ dysfunction caused by infection leading to host immune dysregulation and is the leading cause of death in critically ill patients, which greatly occupies medical resources. Early intervention can significantly improve the prognosis of patients. The diagnosis of sepsis has gone through 3 stages: Sepsis-3 proposed by SCCM/ESICM in 2016 are the latest one, and it still has obvious shortcomings. Well known, the hallmark of onset is any organ dysfunction far from the site of infection, while some of these patients who meet Sepsis-3 do not meet the definition. Therefore, there will inevitably be a high misdiagnosis rate in the application of Sepsis-3, and are prone to advanced antibiotic abuse. In addition, to comply with Sepsis-3, it is necessary to meet the SOFA of 2 or greater, which means the body has had organ dysfunction, so unavailable in early screening for sepsis. In order to better treat sepsis, it is necessary to identify sepsis as early as possible in outpatient and emergency departments, and the current sepsis screening method commonly used outside the ICU cannot fully meet this need. Early inflammatory factor storms and immunosuppression in sepsis are considered to be important pathophysiological features of sepsis. Starting from the pathophysiological mechanism, a more intuitive and simple method may be found.

1. Cytokine storm

When hit by a severe infection, the body will produce a stronger immune response. Nowadays, most current studies believe that the emergence of sepsis is accompanied by strong pro-inflammatory and anti-inflammatory immune responses, which jointly affect the development of the disease; In the early stages, it is mainly manifested by excessive inflammatory reaction; In the later stage, the anti-inflammatory response is the mainstay, and the immunosuppression is further enhanced, which is also the reason for the poor prognosis of sepsis in the late stage^[1].

1.1 Pro-inflammatory factors

Based on previous studies, IL-6 is a key factor in inflammatory response. IL-6 is a polypeptide molecule with a molecular weight of 21 kD in the IL-6 family, which is genetically mapped to chromosome 7. It plays an important role in promoting the development of inflammation. The gene expression of IL-6 is related to NF- κ B, NF-IL6 and hypoxia-inducible factor-1 α , and plays a role through two pathways, classical signaling and trans-signaling pathways, leading to anti-inflammatory and pro-inflammatory responses, respectively. IL-6 is elevated under the guidance of infection, trauma, surgery and other factors, but the degree is different. When the body is stimulated by severe infection, it will produce lyaggrin metalloproteinase-17 to activate the trans signaling pathway to promote inflammation^[2, 3] and IL-6 rises rapidly and significantly within 2 hours. Previous studies have confirmed the importance of IL-6 in the diagnosis and treatment of sepsis. A prospective study in recent years showed that IL-6 could distinguish between sepsis and healthy controls at an optimal cut-off value of 52.6 pg/mL, with high sensitivity and specificity (97% and 97.2%, respectively). At an optimal cut-off value of 348.92 pg/mL, septic shock can be identified, and its sensitivity is still high, while the specificity is poor (63.2%)^[4], there have been some same conclusion. However, it was not possible to compare whether there was a clear difference in IL-6 between sepsis and mild infections. And because both infection and trauma can cause elevated IL-6, the reliability of a single indicator was poor. In addition, the study was carried out in the neonatal population, it is not easy to draw adult patterns^[5]. In addition, IL-6 exhibits excellent kinetics in monitoring the effectiveness of antibiotic therapy and can be used to monitor therapeutic efficacy^[6]. In summary, IL-6 is preferred as a representative biological index of pro-inflammatory factors as one of the joint indicators for early screening of sepsis.

1.2 Anti-inflammatory factors

IL-10 is considered to play a more critical role in the anti-inflammatory response^[7]. IL-10 was first discovered in 1989 as a class of inhibitory factors for cytokine synthesis secreted by T helper 2 cells; and it is located on human chromosome 1's gene encodes with a molecular weight of 35 kD. Subsequent studies have found that IL-10 can be produced by almost all leukocyte subsets, and the production pathways are closely related to extracellular signal-regulatory kinases (ERKs), transcriptional activator pathways (STATs), and Toll-like receptors (TLRs)^[8]. When the body is stimulated by severe infection, serum IL-10 levels can rise markedly early (within six hours)^[9] and persist for a long time. In addition, there have been many previous studies suggesting a close relationship between IL-10 and sepsis. Potjo et al. found that serum IL-10 was elevated more significantly in patients with sepsis than noninfectious SIRS^[10], and it can effectively distinguish noninfectious SIRS and sepsis. This is also reflected in neonatal sepsis, but it is less effective in diagnosing sepsis alone^[11]. A recent prospective study has reached the same conclusion and demonstrated the advantages of IL-10 as a combination screening for sepsis^[12], however, this conclusion was not strictly based on Sepsis-3, and the study population of high-quality studies was limited to neonates. IL-10 also plays an important role in predicting the prognosis of sepsis, and Fabri et al. found that elevated serum IL-10 correlates with the severity of sepsis and can be used to predict organ dysfunction in sepsis^[13]. Several studies on sepsis have suggested that IL-10 level were higher in the death group than in the survival group^[14]. Moreover, compared with IL-6, elevated serum IL-10 levels are more reflective of sepsis than the strong inflammatory response and immune dysregulation in patients with mild infections.

2. Peripheral blood lymphocytes

Lymphocytes is one kind of white blood cells, which play a key role in adaptive immunity. Lymphocytes were previously considered associated with viral infection usually, but as follow-up studies progress, it has been found that infections such as *Klebsiella* and *Pseudomonas aeruginosa* can damage the host's lymphocyte DNA and thus affect lymphocyte count^[15]. Decreased lymphocytes can occur in both viral and bacterial infections. Other than that Post-infectious immunosuppression is considered to be one of the core components of sepsis pathogenesis. When severe infection occurs, T

cells in vivo are gradually depleted through the expression of negative costimulatory molecule on the cell surface, regulatory T cells, neuroendocrine, and others, at the same time there is a decrease in lymphocyte count and function in peripheral blood, and it runs throughout the stages of sepsis. Previous studies on Lymphocyte and sepsis mostly focus on prognosis, such as sepsis-induced continuous lymphocyte count reduction is positively correlated with adverse sepsis outcomes, and long-term low levels increase the risk of nosocomial infection^[16]. However, in recent years, there have also been concerns about the importance of lymphocyte in the diagnosis of sepsis, and a small sample size prospective study has found lymphocyte at the optimal cut-off value of $0.76 \times 10^9/L$ in the case of non-viral infection has a certain value in the diagnosis of sepsis^[17], and persistent reduction is indicative of higher mortality.

In hospital, infectious diseases account for a large part, and patients with clinically suspected or confirmed infection can often be seen in the emergency department, but not all patients can eventually transform into sepsis. The current diagnostic criteria include subjective and objective indicators, and patients with high requirements for perfect diagnosis and treatment procedures and unclear previous organ function damage further increase the difficulty. Commonly used screening methods in emergency have poor sensitivity and specificity, and should not be used alone. By summarizing previous studies, lymphocyte, IL-10 and IL-6 were found to have certain value in the diagnosis and treatment of sepsis.

References

- [1] Hotchkiss RS, Monneret G, Payen D. Sepsis-induced immunosuppression: from cellular dysfunctions to immunotherapy [J]. *Nat Rev Immunol*, 2013, 13(12):862-874.
- [2] Copaescu A, Smibert O, Gibson A, et al. The role of IL-6 and other mediators in the cytokine storm associated with SARS-CoV-2 infection [J]. *J Allergy Clin Immunol*, 2020, 146(3):518-534.e511.
- [3] Kang S, Tanaka T, Inoue H, et al. IL-6 trans-signaling induces plasminogen activator inhibitor-1 from vascular endothelial cells in cytokine release syndrome [J]. *Proc Natl Acad Sci U S A*, 2020, 117(36):22351-22356.
- [4] Song J, Park DW, Moon S, et al. Diagnostic and prognostic value of interleukin-6, pentraxin 3, and procalcitonin levels among sepsis and septic shock patients: a prospective controlled study according to the Sepsis-3 definitions [J]. *BMC Infect Dis*, 2019, 19(1):968.
- [5] Yang KD, He Y, Xiao S, et al. Identification of progranulin as a novel diagnostic biomarker for early-onset sepsis in neonates [J]. *Eur J Clin Microbiol Infect Dis*, 2020, 39(12):2405-2414.
- [6] Celik IH, Demirel FG, Uras N, et al. What are the cut-off levels for IL-6 and CRP in neonatal sepsis? [J]. *J Clin Lab Anal*, 2010, 24(6):407-412.
- [7] Leech JM, Lacey KA, Mulcahy ME, et al. IL-10 Plays Opposing Roles during *Staphylococcus aureus* Systemic and Localized Infections [J]. *J Immunol*, 2017, 198(6):2352-2365.
- [8] Saraiva M, O'Garra A. The regulation of IL-10 production by immune cells [J]. *Nat Rev Immunol*, 2010, 10(3):170-181.
- [9] Marchant A, Devière J, Byl B, et al. Interleukin-10 production during septicaemia [J]. *Lancet*, 1994, 343(8899):707-708.
- [10] Potjo M, Theron AJ, Cockeran R, et al. Interleukin-10 and interleukin-1 receptor antagonist distinguish between patients with sepsis and the systemic inflammatory response syndrome (SIRS) [J]. *Cytokine*, 2019, 120:227-233.
- [11] Wang Q, Peng G, Gan L, et al. The Value of Interleukin-10 in the Early Diagnosis of Neonatal Sepsis: A Meta-Analysis [J]. *Pediatr Crit Care Med*, 2021, 22(9): e492- e501.
- [12] Doerflinger M, Haeusler GM, Li-Wai-Suen CSN, et al. Procalcitonin and Interleukin-10 May Assist in Early Prediction of Bacteraemia in Children With Cancer and Febrile Neutropenia [J]. *Front Immunol*, 2021, 12:641879.
- [13] Umakoshi K, Choudhury ME, Nishioka R, et al. B lymphocytopenia and Bregs in a not-to-die murine sepsis model [J]. *Biochem Biophys Res Commun*, 2020, 523(1): 202-207.

[14] Yoo JR, Kim TJ, Heo ST, et al. IL-6 and IL-10 Levels, Rather Than Viral Load and Neutralizing Antibody Titers, Determine the Fate of Patients With Severe Fever With Thrombocytopenia Syndrome Virus Infection in South Korea [J]. *Front Immunol*, 2021, 12:711847.

[15] Karabacak P, Toğay VA, Aşcı Çelik D. Lymphocyte DNA damage in sepsis and septic-shock intensive-care patients: Damage is greater in non-intubated patients [J]. *Mutat Res Genet Toxicol Environ Mutagen*, 2022, 879-880:503516.

[16] Girardot T, Rimmele T, Venet F, et al. Apoptosis-induced lymphopenia in sepsis and other severe injuries [J]. *Apoptosis*, 2017, 22(2):295-305.

[17] Jiang J, Du H, Su Y, et al. Nonviral infection-related lymphocytopenia for the prediction of adult sepsis and its persistence indicates a higher mortality [J]. *Medicine*, 2019, 98(29):e16535.

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The Effect of Oxytocin in Labor Induction and Augmentation in Obese Women in an Eastern Coastal City of China

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Abstract: Background: The problem of obesity during pregnancy is becoming more and more prominent in China. In the past, little attention was paid to the induced labor of obese parturients. Aim: To explore the dose difference of oxytocin and delivery outcome in different BMI parturients. Methods: A retrospective cohort study was conducted in a third-class hospital in Wenzhou from January to October 2019. A total of 644 parturients were divided into normal group (n=130), overweight group (n=316), and obese group (n=197), and were compared on the dosage and continuous infusion time of oxytocin, duration of delivery, and birth outcome. Results: Maternal BMI was positively correlated with the dose and duration of oxytocin infusion. Obese women required a higher dose and longer drip time than women with normal BMI. In comparison with the normal group and overweight group, the obese group had significantly longer duration of first-stage and total stages of labor, and a significantly higher rate of postpartum hemorrhage and intermediate cesarean delivery, and the incidence of large babies. Conclusions: Obese women needed more oxytocin and longer time to achieve vaginal delivery. Obesity is an independent risk factor for adverse pregnancy outcomes in oxytocin-induced labor.

Keywords: Oxytocin; Obese; Labor Induction; Augmentation; Delivery Outcome

1. Introduction

Oxytocin is the first-line drug for clinical labor induction and augmentation as it can increase tone of the uterine smooth muscle and increase the frequency of contractions, but still maintain the rhythm, symmetry and polarity. It has been noted that labor inductions apply to women with different BMIs have different results. Hu et al [1-2] suggested that the factors influencing the effectiveness of oxytocin in inducing labor in obese women might be related to their suppressed uterine contractility. Excessive weight gain during pregnancy also increases the risk of gestational diabetes, preterm birth and pre-eclampsia. Studies has found that obese women tend to fail in labor induction, and have a higher risk of caesarean section, postpartum hemorrhage, giant babies, fetal distress and physical abnormalities in newborns [3-4]. Study on the effect of oxytocin induction and augmentation in obese population is scarce[4]. This study explored the differences in the use of oxytocin and the outcome of delivery in pregnant women with different BMI, so as to provide insight for the management of oxytocin in obese pregnant women.

2. Methods

2.1 Participants

Six hundred and forty-four singleton primiparous mothers who met the inclusion criteria and delivered in a third-class hospital in Wenzhou, China, from January to October 2019 were selected. Data collected included :① maternal data: age, height, weight, gestational week, fetal membrane status at admission, uterine dilation; ② fetal data: fetal biparietal diameter,

fetal birth weight; (3) labor outcome: caesarean section rate, postpartum hemorrhage rate; (4) labor process data: first, second, third and total stage labor duration, rate of epidural anesthesia; (5) total amount of oxytocin used and duration of continuous intravenous drip. Inclusion criteria: ①labor with oxytocin infusion; ②primiparous women; ③singleton, head position; ④ no contraindications of vaginal delivery; ⑤ has indications for induction of labor with oxytocin; ⑥ no other uterine contraction-promoting drugs. Exclusion criteria: ① fetal abnormalities such as fetal malformation; ② presence of serious disease; ③ incomplete clinical data.

2.2 Settings

After admission, the women who met the inclusion criteria, were recruited in this study. Maternal BMI was calculated based on height and weight at admission and three groups were divided according to BMI. $18.5 \text{ kg/m}^2 \leq \text{BMI} < 24 \text{ kg/m}^2$ was considered normal; $24 \text{ kg/m}^2 \leq \text{BMI} < 28 \text{ kg/m}^2$ was considered overweight; and $\text{BMI} \geq 28 \text{ kg/m}^2$ was considered obese^[2]. Use of oxytocin: The low-dose oxytocin regimen recommended by the Obstetrics and Gynaecology Group of the Chinese Medical Association was used to labor induction and augmentation^[5]. The speed was controlled by the Shenzhen Shengnuo SN-1500H infusion pump and the fetal heart monitor was a Philips FM-20 model from Germany.

2.3 Statistical analysis

Data analysis were performed in IBM SPSS Statistics version22.0. Count data were expressed in (%) using the χ^2 test. Measurement data conformed to a normal distribution (K-S test) was expressed as mean \pm standard deviation (\pm S), and group comparisons were performed using one-way ANOVA, with $P < 0.05$ being considered a statistically significant difference.

2.4 Ethical considerations

This study has been approved by the Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University (No. 2019089). Informed consent was sought from participants. Data regarding maternal delivery were collected and analysed anonymously.

3. Results

A total of 644 women were included, 130 in the normal group, 316 in the overweight group and 197 in the obese group. See Table 1 for general information. The differences in general information were not statistically significant ($P > 0.05$) in the three groups.

Table 1 General maternal information (\pm S) (%)

| Item | Normal group n=130 | Overweight group n=316 | Obese group n= 198 | F-value | χ^2 | P-value |
|---|-----------------------|---------------------------|-----------------------|---------|----------|---------|
| Age | 27.84 \pm 3.81 | 28.87 \pm 4.09 | 28.37 \pm 4.54 | 2.951 | - | 0.053 |
| Gestational week | 39.30 \pm 1.62 | 39.48 \pm 1.62 | 39.43 \pm 1.22 | 1.033 | - | 0.356 |
| Height | 159.3 \pm 5.15 | 160.6 \pm 3.84 | 161.13 \pm 5.06 | 0.654 | - | 0.524 |
| Biparietal diameter | 91.82 \pm 4.55 | 93.13 \pm 3.82 | 98.04 \pm 64.52 | 1.548 | - | 0.213 |
| Painless delivery | 75 (57.59%) | 189 (62.66%) | 115 (58.08%) | - | 0.241 | 0.887 |
| Dilation of the uterus on admission | 0.64 \pm 0.97 | 0.40 \pm 1.01 | 0.29 \pm 0.88 | 0.975 | - | 0.887 |

The total dose of oxytocin used in the obese group was significantly higher than that in the overweight and normal groups ($P < 0.05$). In the duration of oxytocin drip, there was a significant difference between the three groups, and by LSD

test, the obese group was higher than the normal group ($P<0.05$), and the difference between the overweight and obese groups was not statistically significant ($P>0.05$), see Table 2.

Table 2 Total dose of oxytocin used, duration of continuous titration ($\pm S$)

| Item | Number of cases | Total dose of oxytocin (mIU/min) | Duration of oxytocin titration (min) |
|------------------|-----------------|----------------------------------|--------------------------------------|
| Normal group | 130 | 5.15 \pm 3.06 | 296.76 \pm 272.37 |
| Overweight group | 317 | 6.03 \pm 3.57 | 377.06 \pm 311.19 |
| Obese group | 198 | 9.01 \pm 4.31 | 405.84 \pm 329.21 |
| F-value | | 54.304 | 5.047 |
| P-value | | 0.000 | 0.007 |

In the comparison of the duration of labor stages (table 3), the first stage was longer in the obese group than in the normal group and the overweight group, and the difference between the normal group and the overweight group was not statistically significant ($P>0.05$). The difference between the duration of the second and third stage of the three groups was not statistically significant ($P>0.05$). In the total stage duration, the obese group was significantly higher than the normal group and the overweight group ($P<0.05$), and the difference between the overweight group and the obese group was not statistically significant ($P>0.05$). The differences between the overweight and obese groups were not statistically significant ($P>0.05$).

Table 3 Time of first, second, third and total stage of labor (min) ($\pm S$)

| Group | Number of cases | First stage | Second stage | Third stage | Total stage |
|------------------|-----------------|---------------------|-------------------|-------------------|---------------------|
| Normal group | 130 | 687.39 \pm 363.95 | 74.52 \pm 47.81 | 7.90 \pm 2.94 | 769.81 \pm 367.81 |
| Overweight group | 316 | 710.58 \pm 369.97 | 74.03 \pm 48.32 | 8.19 \pm 3.23 | 791.45 \pm 376.74 |
| Obese group | 197 | 783.68 \pm 375.08 | 85.72 \pm 70.85 | 13.38 \pm 73.58 | 880.41 \pm 380.85 |
| F-Value | | 3.368 | 2.907 | 1.145 | 4.548 |
| P-value | | 0.0351 | 0.055 | 0.319 | 0.011 |

As shown in Table 4, after Z-test, the rate of postpartum hemorrhage in the obese group was significantly higher than that in the normal group and the overweight group ($P<0.05$), while the difference between the normal group and the overweight group was not statistically significant ($P>0.05$). And the difference in caesarean section rate between the three groups was not statistically significant ($P>0.05$). The incidence of huge babies in the obese group was significantly higher than that in the normal group and the overweight group ($P<0.05$).

Table 4 Comparison of postpartum haemorrhage rates, birth outcomes and incidence of large babies [n (%)]

| Group | Number of cases | Postpartum haemorrhage (%) | Normal birth (%) | Caesarean section (%) | Giant baby (%) |
|------------------|-----------------|----------------------------|------------------|-----------------------|----------------|
| Normal group | 130 | 4 (3.08%) | 113 (86.92%) | 17 (13.08%) | 2 (1.54%) |
| Overweight group | 316 | 11 (3.48%) | 271 (85.76%) | 44 (13.92%) | 18 (5.70%) |
| Obese group | 197 | 17 (8.63%) | 164 (83.25%) | 34 (17.26%) | 24 (12.18%) |
| χ^2 value | | 7.953 | 1.364 | 1.364 | 15.065 |
| P-value | | 0.019 | 0.506 | 0.506 | 0.001 |

4. Discussion

One of the main findings of this study was that the amount of oxytocin used and the duration of the drip were significantly higher in the obese group than in the normal group, with an increase in oxytocin dose of approximately 57% and an increase in duration of the drip of approximately 73% compared to the normal group. This is consistent with the majority of scholarly reports^[6]. The reasons for this may be: ① Obese pregnant women are affected by estrogen, and the oxytocin receptors in the myometrium increases. In order to achieve effective uterine contraction, more oxytocin should be

combined with them. ②Studies have shown that uterine contractility is negatively correlated with endocrine factors such as cholesterol, leptin and growth hormone-releasing peptide. These factors are significantly higher in the serum of obese women, whose uterine contractility is inhibited. ③The total volume of intravenous oxytocin is absorbed by the extracellular fluid, and obese women have more extracellular fluid space than normal women. Because of this physiological difference, obese women require more oxytocin to facilitate effective labor^[6-8]. The total dose of oxytocin in this study was lower than those reported in the United States, Australia, and the United Kingdom, which may be due to the fact that the Chinese diagnostic criteria for obesity were lower than international standards. Asian women are generally small in size compared with European and American women. For the latter more oxytocin are needed to achieve a vaginal delivery.

The duration of labor was not accelerated in obese women despite receiving a higher dose and longer duration of induction of labor with oxytocin. In this study, the duration of the first stage of labor was significantly longer in the obese group than in the normal group. In a Swedish study involving 15,259 women, the first stage of labor is longer in obese women, especially when the cervix is between 4 and 10 cm.^[8] This is thought to be related to the suppression of uterine contractility during the first stage of labor in obese women. In the second and third stage, the differences between the three groups were not statistically significant, consistent with that reported by Roloff et al^[6].

The rate of postpartum hemorrhage and incidence of macrosomia were higher in the obese group than in the normal and overweight groups in the results of this study, and there was no statistically significant difference in the rate of caesarean section when comparing the three groups, which is consistent with Zhang's study^[9]. The study showed that BMI was significantly correlated with cesarean delivery, macrosomia and postpartum hemorrhage rate. And the risk of cesarean delivery rate and incidence of macrosomia were 2.5 times and 2 times higher in obese women respectively compared to normal women. And the rate of postpartum hemorrhage also increased with the increase in BMI^[10-11]. The reason why there was no statistical difference between the three groups in this study in terms of the rate of caesarean section after induction of labor with oxytocin may be due to the fact that obese women and their families did not have a strong desire to have a normal delivery and the choice of delivery method was mostly caesarean section, which was not included in this study. Obese women who chose to have a normal birth had a better chance of having a normal birth as they had been fully assessed by the doctor and had better perineal and cervical conditions. The reasons for the high rate of hemorrhage and giant babies in obese women are considered to be related to the accumulation of excess adipose tissue in the abdominal cavity, the relative narrowing of the soft birth canal, which does not facilitate the descent of the fetal head and the lack of abdominal pressure accompanied by weak contractions, leading to an increased rate of postpartum hemorrhage. Also, obese women are prone to giant babies, leading to cephalopelvic disproportion, causing difficulties in labor and increasing the rate of caesarean section and postpartum hemorrhage^[12-13].

5. Conclusion

The results of this study show that obese women require more oxytocin and longer induction of labor to achieve vaginal delivery, longer duration of the first and total stage, and higher risk of postpartum hemorrhage and macrosomia. And obesity is an independent risk factor for adverse outcomes of induced abortion. Management of obese women should be strengthened with contractions to induce labor, and maternal weight management, fetal monitoring and neonatal monitoring should be strengthened.

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References

- [1] Hu TT, Zhang YC, Yuan ZM, et al. Construction of a model for intelligent regulation of oxytocin in a population undergoing vaginal trial of labor after caesarean section[J]. *Journal of Wenzhou Medical University*, 2022, 52(4): 266-271.
- [2] Hu TT, Fan SL, Zhu XL, et al. Research progress on the use of oxytocin in transvaginal trial of labor in scarred uterus[J]. *Ch in J Clin Obstet Gynecol*, 2020, 21(6): 651-653.
- [3] Tuuli MG, Keegan MB, Odibo AO, et al. Progress of labor in women induced with misoprostol versus the Foley catheter[J]. *American Journal of Obstetrics & Gynecology*, 2013, 209(3): 237.e1-e7.
- [4] Zhang L, Zheng F. Correlation of pre-pregnancy BMI and weight gain changes with pregnancy outcome in pregnant women[J]. *China Maternal and Child Health Care*, 2018, 33(08): 1759-1761.
- [5] Obstetrics and Gynecology Group of the Chinese Medical Association, Obstetrics and Gynecology Branch. Guidelines for promoting cervical maturation and induction of labor in late pregnancy (2014)[J]. *Chinese Journal of Obstetrics and Gynecology*. 2014, (12).
- [6] Roloff K, Peng S, Sanchez-Ramos L, Valenzuela, G. J. (2015). Cumulative oxytocin dose during induction of labor according to maternal body mass index. *International Journal of Gynecology & Obstetrics*, S0020729215003987.
- [7] Mager JR. Fluid alterations in extreme obesity: An evaluation of related factors contributing to extracellular fluid expansion, and clinical methods for fluid compartment assessment. ; 2009 (Doctoral dissertation). Retrieved from ProQuest. (3348168).
- [8] Mager JR. Fluid alterations in extreme obesity: An evaluation of related factors contributing to extracellular fluid expansion, and clinical methods for fluid compartment assessment.; 2009 (Doctoral dissertation). Retrieved from ProQuest. (3348168).
- [9] Zhang HJ, Chen LM. Effect of body mass control during pregnancy in obese pregnant women on pregnancy outcome, maternal lipid levels and serum adipokines[J]. *China Maternal and Child Health Care*, 2018, 33(23): 5322-5325.
- [10] Zheng JL, Wang ZP. Meta-analysis of the correlation between pre-pregnancy overweight pregnant women and pregnancy complications in China[J]. *Zhejiang Practical Medicine*, 2014, 19(01): 72-77.
- [11] Li L, Shen L, Cai XJ, et al. Analysis of the relationship between pre-pregnancy body mass index and pregnancy complications and pregnancy outcomes[J]. *Chinese Journal of Modern Medicine*, 2016, 5: 2.
- [12] Mao XM, Xu RQ, Sheng XQ. The impact of obesity during pregnancy on pregnancy outcome and neonatal outcomes[J]. *Medical Review*, 2017, 23(01): 108-111.
- [13] Leng Q, Zhang Y, Xu XF, Cao YX, Wei ZL. Relationship between pre-pregnancy body mass index body mass index increase during pregnancy and pregnancy complications and neonatal outcomes[J]. *Anhui Medicine*, 2017, 38(09): 1123-1126.

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The Role of Psychological Intervention in Patients with Rheumatoid Arthritis

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Abstract: **Objective:** To analyze the effect of psychological intervention on patients with rheumatoid arthritis. **Methods:** The subjects included in this study were 78 patients with rheumatoid arthritis who visited our department from February 2021 to February 2022. Random number table method was used for grouping. Intervention group A received psychological intervention on the basis of routine intervention (n=39), intervention group B received routine nursing (n=39). Intervention effect, anxiety and depression scores, compliance and quality of life were used to evaluate the intervention effect of the two groups. **Results:** The comparison of intervention effects between intervention groups A and B showed that intervention group A was significantly higher ($P<0.05$). The scores of anxiety and depression in intervention group A and B were not significantly different before intervention ($P>0.05$), but significantly lower in intervention group A after intervention ($P<0.05$). Comparison of compliance between intervention groups A and B showed that intervention group A was significantly higher ($P<0.05$). The quality of life in intervention group A and B was significantly higher than that in intervention group A ($P<0.05$). **Conclusion:** The effect of psychological intervention on patients with rheumatoid arthritis is more prominent, which can eliminate the negative emotions of patients and improve their treatment compliance and quality of life. This method is worth popularizing in clinical practice.

Keywords: Psychological Intervention; Rheumatoid Arthritis; Intervention Effect; Anxiety and Depression; Compliance; Quality of Life

Introduction

Rheumatoid arthritis is a common clinical disease, mainly manifested as symmetric polyarticular swelling and pain. This disease is more common in middle-aged women, and can worsen with the prolongation of the course of the disease. It can cause damage to important organ functions, deformation of small joints in the limbs (as shown in Figure 1), and other dysfunction in patients. Currently, there is no clinical cure for this disease, which can lead to mental tension, anxiety, fear, and insomnia after the onset of the disease. For young and middle-aged patients, they are mainly concerned about the impact of disease on work and family life. For elderly patients, the main concern is that they become useless people unable to take care of themselves after becoming ill, which increases the burden on the family, thereby losing treatment confidence and being unable to better comply with treatment, ultimately having a significant impact on the treatment effect [2]. Therefore, this study aims to analyze the effect of psychological intervention on patients with rheumatoid arthritis.



Figure 1: Joint Deformities

1. Data and Methods

1.1 Basic Data

The subjects included in this study were patients with rheumatoid arthritis, with a total of 78 cases included from February 2021 to February 2022. Grouping method: Randomized number table method was used for grouping, with intervention group A receiving psychological intervention based on routine intervention ($n=39$), and intervention group B receiving routine nursing ($n=39$). After diagnosis, both groups of patients met the diagnostic criteria for rheumatoid arthritis, and their basic data were complete. After explaining the significance of this study to them, they were able to actively participate in the study. Persons with severe diseases of the heart, brain, kidney, and other organs, mental illness, cognitive impairment, and other factors who cannot cooperate with this study were excluded. The number of male and female patients in intervention group A was 16 and 23, aged 42-76 years, with a mean range of (58.76 ± 2.31) years, a course of 1-14 years, and a mean range of (7.65 ± 2.56) years. The number of male and female patients in intervention group B was 15 and 24, aged 43-75 years, with a mean range of (58.43 ± 2.54) years, a course of 1-14 years, and a mean range of (7.65 ± 2.56) years. There was no significant difference between the two groups ($P>0.05$).

1.2 Method

1.2.1 Intervention Group B

This group received routine intervention, closely observing the patient's condition, giving them medication according to the doctor's instructions, and giving them medication guidance. Explain disease related knowledge to them, such as etiology, symptoms, treatment, and related precautions. At the same time, they were given dietary intervention, instructing them to focus on low-fat, high-protein, high-calorie, and vitamin rich foods, and avoiding spicy, raw, and cold foods.

1.2.2 Intervention Group A

This group adopts psychological intervention based on intervention in Group B. The methods are as follows:

(1) Building a good nurse-patient relationship: Nurses need to adopt positive language, expressions, and attitudes that affect patients' feelings and perceptions, and change their negative psychology and behavior. Assist them in rebuilding their confidence in treatment and rehabilitation. During daily rounds, nursing personnel need to actively hold the patient's hand, give them cordial greetings, understand their sleep, diet, and medication in detail, and provide them with appropriate guidance and assistance to enable them to experience the care and enthusiasm of nursing personnel. At the same time, strengthening communication with patients can facilitate communication from the perspective of life and encourage them to express their inner unhappiness. Nurses can provide them with positive relief while on the sidelines, so as to gain the full trust of patients and promote a good nurse-patient relationship.

(2) Creating a comfortable environment: After admission, patients will inevitably experience resistance to unfamiliar

environments. Therefore, it is necessary to create a comfortable inpatient environment based on the patient's preferences. If the patient loves flowers and plants at ordinary times, green plants can be placed in the ward, and if the patient loves movies and plays, they can be played. If the patient likes music, they can be given their favorite music. At the same time, the indoor temperature and humidity should be controlled within a reasonable range, and noise and strong light should be reduced. In addition, treatment and care for patients should be concentrated to avoid affecting their rest. For older patients, it is also necessary to take protective measures, such as placing anti-skid pads in the bathroom, and equipping the bedside with handrails and guardrails, to reduce the occurrence of adverse events.

(3) Humanistic environment intervention: Nursing personnel should have a high level of healthy psychology and professional accomplishment to reflect the humanistic environment. During the intervention period for patients, nursing personnel should possess high medical ethics and superb technology, as well as good psychological quality and humanistic literacy. Before caring for patients, they should continue to improve themselves, strengthen the learning of relevant knowledge, and enhance relevant skills. To correctly solve the problems that arise during patient communication, patient subjectivity and initiative are the key elements. It is necessary to encourage their active participation, listen to their ideas, and conduct in the form of "co participation" to better achieve goals. In addition, enhancing emotional communication between patients can improve their confidence. Emotions between patients can interfere with each other, which can have both positive and negative effects. Therefore, a patient with good therapeutic effects should be invited to share their personal treatment experiences, experiences, and feelings, thereby helping other patients gain confidence in treatment.

(4) Family cooperation and intervention: A warm and harmonious family relationship can greatly help patients' psychology. Therefore, nursing personnel should explain the impact of family and social intervention on patients' treatment to family members and friends, so that they can actively provide care and support to patients. At the same time, family members should also be given education to avoid their own emotions affecting the patient, and corresponding psychological intervention guidance should be given to facilitate their ability to provide relief to the patient.

1.3 Effect observation

1.3.1 Intervention effect

Determine the effect based on the improvement of the patient's symptoms. Among them, significant relief of patient symptoms is effective, ideal improvement of patient symptoms is effective, and no improvement of patient symptoms is ineffective. Calculation method: $(\text{significant} + \text{effective}) / \text{total number of cases} \times 100\%$.

1.3.2 Anxiety and depression scores

The anxiety and depression of the two groups of patients before and after intervention were evaluated using SDS and SAS scales. The higher the score, the more serious the negative emotions.

1.3.3 Compliance

Use the compliance evaluation table to understand the treatment compliance of the two groups. The grades are full compliance, basic compliance, and non compliance. Calculation method: $(\text{full compliance} + \text{basic compliance}) / \text{total number of cases} \times 100\%$.

1.3.4 Quality of life

The quality of life of the two groups was evaluated using the SF-36 scale, and a high score was associated with a high quality of life.

1.4 Statistical methods

The data obtained in the study were processed using SPSS 23.0 software. ($\pm s$) is used to represent measurement data, using a t-test; (%) is used to represent counting data and is tested with (χ^2). When the calculated $P < 0.05$, there is a significant difference between the objects being compared.

2. Results

2.1 Comparison of intervention effects between the two groups

Table 1 shows that the intervention effect comparison between intervention groups A and B shows that the intervention group A is significantly higher ($P < 0.05$).

Table 1 Comparison of Intervention Effects between the Two Groups [n, (%)]

| Groups | Number of cases | Significant effect | Effective | Invalid | Intervention effectiveness (%) |
|----------------------|-----------------|--------------------|-------------|-------------|--------------------------------|
| Intervention Group A | 39 | 24 (61.54%) | 13 (33.33%) | 2 (5.13%) | 94.87% (37/39) |
| Intervention Group B | 39 | 19 (48.72%) | 10 (25.64%) | 10 (25.64%) | 74.36% (29/39) |
| χ^2 | - | - | - | - | 6.303 |
| P | - | - | - | - | 0.012 |

2.2 Comparison of anxiety and depression scores between the two groups

Table 2 shows that there is no significant difference in anxiety and depression scores between intervention groups A and B before intervention ($P > 0.05$), but after intervention, it can be seen that intervention group A is significantly lower ($P < 0.05$).

Table 2 Comparison of anxiety and depression scores between the two groups ($\bar{x} \pm s$) (points)

| Groups | Number of cases | Anxiety score | | Depression score | |
|----------------------|-----------------|---------------------|--------------------|---------------------|--------------------|
| | | Before intervention | After intervention | Before intervention | After intervention |
| Intervention Group A | 39 | 43.42 \pm 2.32 | 21.24 \pm 3.26 | 47.68 \pm 3.42 | 24.43 \pm 2.35 |
| Intervention Group B | 39 | 42.35 \pm 2.67 | 35.43 \pm 3.75 | 46.79 \pm 4.36 | 34.56 \pm 2.16 |
| t | - | 1.889 | 17.834 | 1.003 | 19.819 |
| P | - | 0.062 | 0.001 | 0.319 | 0.001 |

2.3 Comparison of compliance between the two groups

Table 3 shows that the compliance comparison between intervention groups A and B found that intervention group A was significantly higher ($P < 0.05$).

Table 3 Comparison of compliance between the two groups [n, (%)]

| Groups | Number of cases | Complete compliance | Basic compliance | Noncompliance | Intervention effectiveness (%) |
|----------------------|-----------------|---------------------|------------------|---------------|--------------------------------|
| Intervention Group A | 39 | 28 (71.79%) | 10 (25.64%) | 1 (2.56%) | 97.44% (38/39) |
| Intervention Group B | 39 | 23 (58.97%) | 7 (17.95%) | 9 (23.08%) | 76.92% (30/39) |
| χ^2 | - | - | - | - | 7.341 |
| P | - | - | - | - | 0.007 |

2.4 Comparison of quality of life between the two groups

Table 4 shows that the quality of life of intervention group A and B is significantly higher than that of intervention group A ($P < 0.05$).

Table 4 Comparison of quality of life between the two groups ($\bar{x} \pm s$)

| Groups | Number of cases | Quality of life |
|----------------------|-----------------|-----------------|
| Intervention Group A | 39 | 87.54±2.31 |
| Intervention Group B | 39 | 72.32±3.47 |
| <i>t</i> | - | 22.801 |
| <i>P</i> | - | 0.001 |

3. Discussion

Patients with rheumatoid arthritis are prone to anxiety and depression after long-term treatment, and the main reasons are as follows. Firstly, rheumatoid arthritis is a multiple inflammatory disease, autoimmune disease, and so on. The pain caused by the disease, the cumbersome treatment and examination, the prolonged illness, the limited daily activities, and the difficulty in recovering over time will inevitably cause patients to experience adverse emotions such as anxiety, depression, depression, and loneliness [4]. Secondly, patients exhibit anxiety and anxiety about their condition, as well as excessive worry, suspicion, and thinking about their condition, often becoming extremely sensitive to things [5]. Third, the impact of diseases, such as pain, disability, unemployment, etc., leads to panic and suspicion among patients, as well as doubts about the diagnosis and treatment of the disease [6].

In this study, psychological intervention was used in patients with rheumatoid arthritis. The results showed that the intervention effect of group A and group B was significantly higher than that of group A ($P < 0.05$). The scores of anxiety and depression in intervention group A and B were not significantly different before intervention ($P > 0.05$), but significantly lower in intervention group A after intervention ($P < 0.05$). Comparison of compliance between intervention groups A and B showed that intervention group A was significantly higher ($P < 0.05$). The quality of life in intervention group A and B was significantly higher than that in intervention group A ($P < 0.05$). The above research results suggest that psychological intervention can eliminate the negative emotions of patients, help improve their treatment compliance, thereby promoting treatment effectiveness, improving their related symptoms, and improving their quality of life. The author analyzes and believes that establishing a good nurse-patient relationship with patients, based on equality, respect, civilization, courtesy, care, fraternity, and sincere treatment of others, guides patients to confide in their difficulties and concerns [7]. Help them overcome depression with a rational and mature way of thinking, let them go out of the pain of illness, lay down their ideological burden, get rid of fear and depression, and make them cooperate with treatment with confidence [8]. For those who cannot take care of themselves, they should actively take care of their daily lives. Encourage their families, relatives, friends, and relevant social personnel to give care to patients, and actively participate in the relevant treatment of patients, so that they can receive care and consideration, and promote them to regain treatment confidence [9-10]. At the same time, attention should also be paid to treating different patients differently during the intervention process, encouraging them to ask questions, helping them solve the issues they are most concerned about, building a good nurse-patient relationship, and a high sense of trust. These are the keys to the success of psychological intervention [11-13].

In summary, the effect of psychological intervention in patients with rheumatoid arthritis is more prominent, which can eliminate the negative emotions of patients, improve their treatment compliance, promote their intervention effect, and improve their quality of life. At the same time, it can improve patient satisfaction. This method is worth popularizing in clinical practice.

References

- [1] Xu ZH. Effect Analysis of Systematic Health Education Nursing Model in Rheumatoid Arthritis Nursing [J]. *Medical Diet and Health*, 2022,20 (05): 147-150.

- [2] Wang Q. Evaluation of Psychological Nursing Effect on Anxiety and Depression in Patients with Rheumatoid Arthritis [J]. *Chinese Medical Guide*, 2021,19 (31): 177-179.
- [3] Li YH. Application Effect of Continuous Care in Patients with Rheumatoid Arthritis [J]. *China Urban and Rural Enterprise Health*, 2021,36 (10): 193-194.
- [4] Shen M, Li JX, Chang MX. The Effect of PDCA Circulation Combined with Psychological Care on Patients with Rheumatoid Arthritis [J]. *Psychological Monthly*, 2021,16 (23): 193-195.
- [5] Zhao CF. The Impact of Comprehensive Nursing on the Quality of Life of Patients with Diabetes and Rheumatoid Arthritis [J]. *Diabetes New World*, 2021,24 (18): 150-153+162.
- [6] Wang M, Wang XT. The Application Effect of Comprehensive Nursing in Patients with Rheumatoid Arthritis [J]. *China Minkang Medical Journal*, 2021,33 (17): 136-137+140.
- [7] Xu XQ. Research Progress on Family Function in Patients with Rheumatoid Arthritis [J]. *General Nursing*, 2021,19 (22): 3083-3085.
- [8] Tian L. Psychological Care and Health Education for Patients with Rheumatoid Arthritis [J]. *Chinese Medical Guide*, 2021,19 (18): 183-184+187.
- [9] Liang LJ. Psychoanalysis and Nursing Strategies for Patients with Rheumatoid Arthritis [J]. *Chinese Medical Guide*, 2021,19 (13): 193-194+197.
- [10] Wang HX, Ma YM, Xiao L, et al. The Impact of Collaborative Family Care and Health Education on Patients with Rheumatoid Arthritis [J]. *China Continuing Medical Education*, 2021,13 (11): 189-192.
- [11] Ye H. The Application Effect of Psychological Nursing and Health Education in the Clinical Care of Patients with Rheumatoid Arthritis [J]. *Capital Food and Medicine*, 2020,27 (04): 134.
- [12] Zheng J. Study on the Effect of Psychological Nursing Combined with Health Education on Patients with Rheumatoid Arthritis [J]. *Gansu Science and Technology*, 2019, 35 (24): 159-161.
- [13] Kang LQ. Evaluation of the Effect of Psychological Nursing Intervention on the Care of Rheumatic Patients [J]. *World Latest Medical Information Digest*, 2019,19 (94): 86-87.

Project topic: Research on the mechanism of iNKT cells in rheumatoid arthritis (20220628)

HPV Testing Can Be Used as a Primary Screening Method for Cervical Lesions Among Women in Western China

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Abstract: Objective: The purpose of our study is to explore screening strategies suitable for cervical cancer and precancerous lesions in Western Chinese women. **Methods:** Between January 2010 and December 2020, a total of 7009 patients were diagnosed with high-grade squamous intraepithelial neoplasia (CIN2+) after HPV testing, cytology screening or a combination of both. **Results:** The positive rate of human papillomavirus (HPV) was 91.2% and the cytology was 75.1%. The negative rate of co-testing was 2%. 2453 (45.2%) cases were infection with HPV16, following HPV58 (1131, 20.8%), HPV52 (1043, 19.2%), HPV33 (566, 10.4%), HPV18 (294, 5.4%). HPV16/18-positive and cytology-negative infection rate was 54.5%, HPV52/58/33-positive and cytology-negative infection rate was 44.7%, the difference was 9.8%. 35-45 years old is the peak age for the incidence of CIN2+ patients. **Conclusion:** The common genotypes of HPV infection are HPV16, 58, 52, 33 and 18. Cytology negative patients with HPV52/58/33 positive are recommended to be referred for colposcopy as soon as possible. HPV testing is the primary method of cervical cancer or cervical lesions screening among women in western China, and HPV testing is more sensitive than cytology in predicting cervical lesions.

Keywords: Cervical Cancer; High-Grade Squamous Intraepithelial Lesions; Cervical Cancer Screening; HPV; Cytology

Introduction

According to the World Health Organization (WHO), In China, cervical cancer caused 106,430 new cases and 47,739 deaths in 2018^[1]. Based on the epidemiological evidence available in Chinese mainland urban and rural areas, the annual number of new cases of cervical cancer will increase significantly without intervention, a possible increase of approximately 40-50% over 2010-2050^[2]. HPV and cytology testing is the main strategy for secondary prevention of cervical cancer.

ASCCP proposed cytology screening for cervical cancer in 2001, HPV DNA testing as an adjunctive method for cytology screening for abnormal shunting in 2006. A combined HPV and cytology screening protocol was proposed in 2012 and HPV as a primary screening method for cervical cancer in the 2015 guidelines. Cervical cancer screening methods are constantly adjusted with the deepening of human cognition. HPV plays a very important role in the occurrence and development of cervical cancer, the status of HPV detection in the secondary prevention screening process of cervical cancer is also gradually increasing. Preliminary studies have been conducted on precancerous lesion and canceration caused by HPV infection in some areas of China^[3-5]. This study will explore the impact of HPV infection on CIN2+ patients in western China.

1. Materials and Methods

1.1 Patient Selection

With Institutional Research Review Board approval, a retrospective study was performed to document CIN2+ patient reports. Between January 2010 and December 2020, In the Department of Gynecology of the First Affiliated Hospital of

Chongqing Medical University, a total of 7009 patients were diagnosed with CIN2+ (CIN2/3, Adenocarcinoma (AIS), squamous cell carcinoma (SCC) or adenocarcinoma (ADC)) after HPV test, cytology test or a combination of both. We collected the results of the cytology, HPV DNA, HPV E6/E7mRNA, colposcopy biopsy and pathological reports after cervical conization. Informed consent of all participants was obtained before sample collection.

1.2 Pap Test

Sample of patients from 2010 to 2016 underwent ThinPrep (Hologic) and from 2017 to 2020 experienced Liqui-PREP™ (LGM International Inc., Melbourne, FL, USA). All Pap tests were screened, interpreted and reported by experienced pathologists.

1.3 HPV testing

1.3.1 Real-time fluorescence quantitative PCR method

HPV genotypes were determined using an HPV Geno-Array Test Kit (Chaozhou HybriBio Biotechnology Limited Corporation, Guangdong, China), according to the manufacturer's instructions. Geno-Array is capable of identifying 21 HPV genotypes, including 15 HR-HPV subtypes (HPV16, 18, 31, 33, 35, 39, 45, 51, 52, 53, 56, 58, 59, 66, and 68) and six LR-HPV subtypes (HPV6, 11, 42, 43, 44, CP8304).

1.3.2 HPV E6/E7 mRNA

The kit used for HPV E6/E7mRNA is Aptima in 2018-2020, which is the world's first E6/E7 mRNA based HR-HPV kit approved by the FDA of the United States. Results: Copy number ≥ 1 copy / mL positive (+) and the opposite is negative (-). No data have been recorded for HPV E6/E7 mRNA from 2010-2017.

1.4 Statistical Analysis

The chi-square test was used in our study. P-values <0.05 were considered to indicate statistical significance. Statistical analysis was performed using SPSS software (version 26.0; IBM Corp., Armonk, NY).

2. Results

As shown in Figure 1, among 7009 patients, a total of 4797 patients were selected for cytology testing and 3603 patients positive (ASCUS and above), accounting for 75.1%. A total of 6064 patients were selected for HPV test and 5529 patients positive (including HPV DNA positive and HPV E6/E7 positive), accounting for 91.2%. There were 5429 (98.2%) HPV DNA positive cases and 100 (1.8%) HPV E6/E7 positive cases. A total of 4499 patients underwent both cytology and HPV testing. 3097 cases (68.8%) were positive for both methods. In the combined screening, the positive rate of HPV was 92.5% (4164/4499), the positive rate of cytology was 74.2% (3342/4499) and the negative rate of both screening methods was 90 (2%).

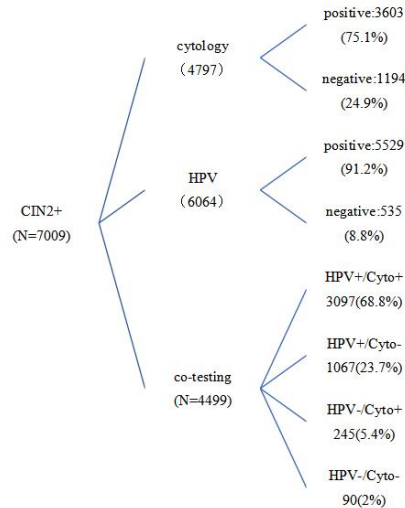


Figure 1: HPV and cytology screening results of 7009 patients with CIN2+. Cytology-positive, ASC-US or worse; HPV+/-, including HPV DNA+/- and HPV E6/E7 mRNA+/- and including either HR-HPV positive and/or LR-HPV positive results. HPV+, HPV-positive; HPV-, HPV-negative (including HPV DNA+/- and HPV E6/E7 mRNA+/-) ; Cyto+, cytology-positive; Cyto-, cytology-negative.

A total of 5429 of 7009 patients selected HPV genotypes, as shown in Table 1, 2453 (45.2%) cases were infection with HPV16, following HPV58 (1131, 20.8%), HPV52 (1043, 19.2%), HPV33 (566, 10.4%), HPV18 (294, 5.4%), HPV31 (239, 4.4%), HPV53 (169, 3.1%), HPV51 (168, 3.1%), HPV39 (114, 2.1%), HPV56 (108, 2%). All ten genotypes were HR-HPV infection.

| | | HPV type(n=5429) | | | | | | | | | |
|----------|--|------------------|------|------|-------|------|-------|------|-----|-------|------|
| | | 16 | 18 | 31 | 33 | 39 | 52 | 53 | 56 | 58 | 51 |
| positive | | 2453 | 293 | 239 | 566 | 114 | 1043 | 169 | 108 | 1131 | 168 |
| | | 45.2% | 5.4% | 4.4% | 10.4% | 2.1% | 19.2% | 3.1% | 2% | 20.8% | 3.1% |

Table 1: The top ten most common types of HR-HPV are distributed in CIN2+.

Table 2 shows HPV infection in 1076 HPV-positive and cytology-negative patients, including single infection and multiple infection, of which 994 patients selected for HPV typing test. There were 466 HPV-positive patients, accounting for 46.9%, 52 type 21.1%, 58 type 15.9%, 33 type 7.7% and 18 type 7.6%. In the single infection of HPV, there were 322 HPV16 positive patients, accounting for 32.4%, 52 type 12.8%, 58 type 9.3%, 33 type 4.3% and 18 type 3.6%.

| Cytology negative (n=1067) | | | | | | |
|----------------------------|------------|----------|----------|------------|------------|--------------------------|
| HPV type (n=994) | 16 | 18 | 33 | 52 | 58 | other |
| positive (%) | 466 (46.9) | 76 (7.6) | 77 (7.7) | 210 (21.1) | 158 (15.9) | 106 (10.7) |
| Cytology negative(n=1067) | | | | | | |
| single HPV type (n=994) | 16 | 18 | 33 | 52 | 58 | other/Multiple infection |
| positive (%) | 322 (32.4) | 36 (3.6) | 43 (4.3) | 127 (12.8) | 92 (9.3) | 37 (37.6) |

Table 2: Percentage of cytological negative patients who were positive different HPV types.

As shown in Figure 2, the peak age of HPV infection is 35-44 years for both HPV16/18 and non-HPV16/18. There were more HPV16/18 infections than non-HPV16/18 infections in 25-34 years old and more non-HPV16/18 infections in 45-54 years old than HPV16/18 infections.

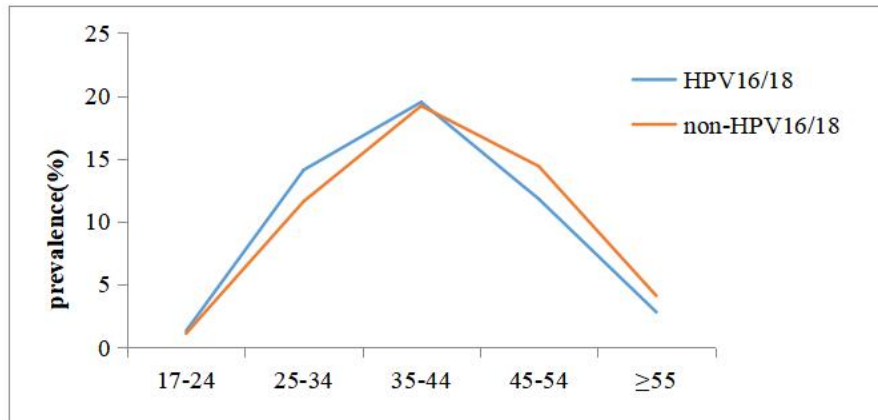


Figure 2: Prevalence of HPV16/18 and non-HPV16/18 in different age groups in patients with CIN2+.

3. Discussion

HPV testing is based on molecular biology to determine etiology, while cytology testing relies on exfoliated cells to determine pathology^[6]. Due to the vast territory of western China, the backward economic development and uneven distribution of healthcare resources between rural and urban areas compared with the eastern coastal areas^[7-8]. Convenient, private, efficient and accurate sampling of HPV test is in line with the characteristics of social development in the region. The “self-sampling HPV test” model introduced in 2017 is not restricted by region, the test samples are easily available and analyzed by laboratory tests, which further promotes the popularization of cervical cancer screening in China and makes cervical cancer screening easily available to women in areas with poor health resources^[9-10].

It is undeniable that positive rate of combined test is slightly higher than of single HPV test (6.8%). At the same time, the test cost increases significantly, which is twice that of single test, greatly increasing the financial burden of patients and also a waste of social resources. Therefore, single HPV test has excellent cost performance and it can be used as a primary screening program for cervical cancer in western China. In a Dutch study^[11], it is expected that five years after the introduction of the HPV test as a primary screening test for cervical cancer, the cost of screening will be lower and the screening time will be shorter.

Different types of HPV infection can lead to cervical cancer, with types 16, 18, 31, 33, 39, 45, 51, 52, 56, 58, 59, 66 and 68 considered high-risk^[12]. In our study, the top 5 most common HPV genotypes in western China were HPV16, 58, 52, 33 and 18. In 5429 patients who selected HPV genotype test, the positive infection rate of HPV16/18 was 50.6% and that of HPV52/58/33 was 50.4%, the difference between the two was only 0.2%. It can be said that the risk of CIN2+ in HPV52/58/33 positive patient is the same as that in HPV16/18 positive patients. Among cytology-negative and HPV-positive patients, the infection rate of HPV16/18 positive patients is 54.5% and that of HPV52/58/33 positive patients is 44.7%. Therefore, we should pay more attention to patients with HPV52/58/33 positive infection, while the current guidelines only recommend referral to colposcopy for patients with HPV16/18 positive^[12]. We recommend that HPV52/58/33-positive and cytology-negative patients also be referred for colposcopy.

In the current guidelines, HPV-based screening strategies have been used as primary screening for cervical cancer^[13-15]. Furthermore, 35-45 years old is the peak age for the incidence of CIN2+ patients. Standardized cervical cancer screening during this period can effectively detect precancerous lesions of cervical cancer, early detection and treatment, in order to achieve the goal of eliminating cervical cancer^[16-17]. This study provides strong evidence for HPV testing as a primary screening program for cervical cancer in western China.

4. Conclusion

The results of this study indicate that Patients with negative cytology should also attach attention to HPV testing.

Cytology negative patients with HPV52/58/33 positive are recommended to be referred for colposcopy as soon as possible. Moreover, HPV testing is more sensitive than cytology in predicting cervical lesions. Therefore, HPV testing can be used as a primary screening method for cervical cancer in women in western China.

Disclosure Statement

We have no conflicts of interest to disclose.

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Author contributions

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References

- [1] WHO. Global strategy towards the elimination of cervical cancer as a public health problem. WHO 2019.
- [2] Chen W, Zheng R, Baade PD, Zhang S, Zeng H, Bray F, et al. Cancer Statistics in China, 2015. CA. Cancer J. Clin. 2016, 66 (2), 115–132.
- [3] Papanicolaou GN, Traut HF. The diagnostic value of vaginal smears in carcinoma of the uterus. American Journal of Obstetrics and Gynecology 1941; 42: 193–206.
- [4] Zhao XL, Hu SY, Zhang Q, Dong L, Feng RM, Han R, et al. High-Risk Human Papillomavirus Genotype Distribution and Attribution to Cervical Cancer and Precancerous Lesions in a Rural Chinese Population. J. Gynecol. Oncol. 2017, 28 (4), e30.
- [5] Yuanyue L, Baloch Z, Yasmeen N, Tao Y, Xiaomei W, Xueshan X. The Distribution of Human Papillomavirus Genotypes in Cervical Cancer and Intraepithelial Neoplasia Lesions among Chinese Women in Yunnan Province. J. Infect. Public Health 2018, 11 (1), 105–110.
- [6] Polman NJ, Ebisch RMF, Heideman DAM, Melchers WJG, Bekkers RLM, Molijn A C, et al. Performance of Human Papillomavirus Testing on Self-Collected versus Clinician-Collected Samples for the Detection of Cervical Intraepithelial Neoplasia of Grade 2 or Worse: A Randomised, Paired Screen-Positive, Non-Inferiority Trial. Lancet Oncol. 2019, 20 (2), 229–238.
- [7] Arbyn M, Verdoodt F, Snijders PJF, Verhoef VMJ, Suonio E, Dillner L, et al. Accuracy of Human Papillomavirus Testing on Self-Collected versus Clinician- Collected Samples: A Meta-Analysis. Lancet Oncol. 2014, 15 (2), 172–183.
- [8] Polman NJ, Snijders PJF, Kenter GG, Berkhof J, Meijer CJLM. HPV-Based Cervical Screening: Rationale, Expectations and Future Perspectives of the New Dutch Screening Programme. Prev. Med. 2019, 119, 108–117.
- [9] Huh WK, Ault KA, Chelmow D, Davey DD, Goulart RA, Garcia FAR, et al. Use of Primary High-Risk Human Papillomavirus Testing for Cervical Cancer Screening: Interim Clinical Guidance. Gynecol. Oncol. 2015, 136 (2), 178–182.
- [10] Castanon A, Landy R, Sasieni P. By How Much Could Screening by Primary Human Papillomavirus Testing Reduce Cervical Cancer Incidence in England? J. Med. Screen. 2017, 24 (2), 110–112.
- [11] Hillemanns P. The Paradigm Shift in Cervical Cancer Screening in Germany. Arch. Gynecol. Obstet. 2016, 293 (1), 3–4.
- [12] Schiffman M, Doorbar J, Wentzensen N, de Sanjosé S, Fakhry C, Monk BJ, et al. Carcinogenic Human Papillomavirus Infection. Nat. Rev. Dis. Primer 2016, 2, 16086.

[13] Monsonego J, Cox JT, Behrens C, Sandri M, Franco EL, Yap PS, et al. Prevalence of High-Risk Human Papilloma Virus Genotypes and Associated Risk of Cervical Precancerous Lesions in a Large U.S. Screening Population: Data from the ATHENA Trial. *Gynecol. Oncol.* 2015, 137 (1), 47–54.

[14] Gage JC, Katki HA, Schiffman M, Fetterman B, Poitras NE, Lorey T, et al. Age-Stratified 5-Year Risks of Cervical Precancer among Women with Enrollment and Newly Detected HPV Infection. *Int. J. Cancer* 2015, 136 (7), 1665–1671.

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Analysis of the Value of Health Education in the Treatment of Ankylosing Spondylitis with Adalimumab

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Abstract: Objective: To analyze the role of health education in patients with ankylosing spondylitis during the treatment with adalimumab. Methods: From March 2021 to November 2022, 68 patients in our hospital were selected as study samples, and randomly divided into control group (34 cases, routine nursing) and observation group (34 cases, routine nursing+health education). Analyze the patient's recovery. Results: Compared with the quality of life of the two groups during treatment, the observation group was higher than the control group ($P<0.05$). Compared with the two groups, the awareness rate of disease content in the observation group was higher than that in the control group in terms of disease basic knowledge, hazard awareness, examination and treatment, and prevention of complications ($P<0.05$). Compared with the treatment compliance and nursing satisfaction of the two groups, the observation group was higher than the control group ($P<0.05$). Conclusion: Timely health education for patients with ankylosing spondylitis during the treatment with adalimumab can improve the quality of life of patients during the treatment, increase the disease awareness rate of patients, and improve the treatment compliance and nursing satisfaction of patients.

Keywords: Health Education; Adamumab; Ankylosing Spondylitis

Introduction

Ankylosing spondylitis is a chronic inflammatory disease that mainly affects the sacroiliac joint, spine, soft tissue adjacent to the spine and peripheral joints, and can also be accompanied by extra-articular manifestations. The patients have a long treatment cycle and poor treatment compliance, which may eventually lead to spinal deformity and rigidity, and have a great negative impact on the quality of life of patients [1-2]. The early treatment of adalimumab can improve the prognosis of the disease to a large extent, but the long-term regular diagnosis and treatment has an equally important impact on the progress of the disease. In order to effectively improve the patient's compliance and improve the prognosis, we should do a good job in nursing during the treatment. This study focuses on the analysis of the role of health education in the care of patients with ankylosing spondylitis treated with adalimumab.

1. Data and methods

1.1 General information

From March 2021 to November 2022, 68 patients in our hospital were selected as study samples, and randomly divided into the control group (34 cases, carrying out routine nursing) and the observation group (34 cases, routine nursing+health education). In terms of patient composition, there were 30 males and 4 females in the control group, aged from 27 to 41 years, with an average of (31.05 ± 1.52) . In the observation group, there were 31 males and 13 females, aged from 26 to 40 years, with an average of (30.91 ± 1.46) . Compared with the basic data, $P>0.05$.

1.2 Method

During the treatment of the control group, the nursing staff carried out various nursing operations in accordance with the conventional clinical nursing regulations, patiently explained the current treatment plan to the patients, and did a good job in the routine diet guidance and life guidance of the patients during the treatment, requiring the patients to strictly follow the medical advice during the treatment. When nursing the observation group, health education was carried out: (1) disease knowledge education. In the process of communicating with patients, nursing staff should accurately evaluate the patients' understanding of ankylosing spondylitis and the current clinical treatment plan. Patiently explain the predisposing factors of the disease and the clinical research progress of the disease to patients in a way that is easy to understand. Promote patients to have a clear understanding of their own disease characteristics. Inform the patient to cooperate with the doctor to carry out all aspects of treatment, and naturally recover as soon as possible. (2) Health education at drug use level. Due to the long treatment time of ankylosing spondylitis, the nursing staff should patiently explain the current treatment plan, medication method and treatment period to the patient during the treatment. The adverse reactions that may occur in the course of medication were explained to the patients in detail in combination with the physical conditions of the patients. Inform the patient that during the treatment with adalimumab, it can promote the rapid improvement of pain and other symptoms, achieve the purpose of alleviating pain, and help the patient's joint function improve rapidly. In the course of medication, if the patient has adverse reactions, including allergy, infection, etc., it is necessary to inform the doctor in time. (3) Mental health education. Because ankylosing spondylitis has a great negative impact on the normal life and work of patients, during the treatment period, patients have serious negative emotions such as tension, anxiety and fear due to their worries about their recovery. In the process of communicating with patients, nursing staff should accurately evaluate the psychological status of patients, conduct targeted psychological counseling, and inform patients of the effectiveness of the current treatment plan, so as to achieve the purpose of improving the negative emotions of patients. In addition, it can guide patients to do some things they like during recovery, such as reading, reading, etc., and transfer their attention to alleviate negative psychology. (4) Health education at the life level. During the rehabilitation of patients, it is necessary to help them develop good living habits and achieve scientific diet. Reduce the intake of spicy, greasy, raw, cold and hard foods, and reduce the irritation to the patient's digestive tract. Properly increase the intake of protein and vitamin rich foods, including fish, fruit, vegetables, etc. (5) Health education in functional exercise. During the treatment, patients should be guided to maintain good exercise habits. During bed rest, try to choose low pillows or not to use pillows, mainly in supine position, and try to reduce semi-lying position. After the clinical corresponding symptoms are relieved, the patient can be guided to carry out appropriate activities, including passive and active activities, and the patient can be guided to actively carry out chest expansion or deep breathing, so as to improve the lung function.

1.3 Observation indicators

In this study, the quality of life of patients during treatment needs to be analyzed and assessed with SF-36 scale ^[3]. The awareness rate of patients' disease knowledge during the treatment period was counted, including basic knowledge of disease, hazard awareness, examination and treatment, and prevention of complications. Statistics of patients' treatment compliance and nursing satisfaction during treatment.

1.4 Statistical methods

The data related to the two groups were processed with the help of SPSS20.0. The percentage was expressed as the counting data, and the chi-square test was expressed as the mean \pm standard deviation for the measuring data. The difference between t test and $P < 0.05$ was statistically significant.

2. Results

2.1 Quality of life analysis of the two groups

Compared with the quality of life of the two groups during treatment, the observation group was higher than the control group ($P<0.05$), as shown in Table 1 below.

Table 1 Quality of life analysis of two groups ($\bar{x} \pm s$)

| Group | Number of cases | Energy | | Vigour | | Social functions | |
|-------------------|-----------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
| | | Before intervention | After intervention | Before intervention | After intervention | Before intervention | After intervention |
| Observation group | 34 | 75.05±2.62 | 92.15±2.02 | 74.55±2.34 | 93.45±2.08 | 76.89±2.05 | 91.63±2.72 |
| Control group | 34 | 75.11±2.71 | 82.42±2.11 | 74.62±2.26 | 82.63±2.61 | 76.91±2.17 | 84.05±2.42 |
| <i>t</i> | - | 1.525 | 13.425 | 1.142 | 12.425 | 1.858 | 14.425 |
| <i>P</i> | - | 0.634 | 0.001 | 0.725 | 0.001 | 0.725 | 0.001 |

2.2 Statistics of awareness rate of disease contents in the two groups

Comparing the content awareness rate of the two groups, the observation group was higher than the control group in terms of disease basic knowledge, hazard awareness, examination and treatment, and complication prevention ($P<0.05$), as shown in Table 2 below.

Table 2 Statistics of awareness rate of disease content in the two groups [n, (%)]

| Group | Number of cases | Basic knowledge of disease | Hazard awareness | Check and treatment | Prevention of complications |
|-------------------|-----------------|----------------------------|------------------|---------------------|-----------------------------|
| Observation group | 34 | 32 (94.12) | 31 (91.18) | 33 (97.06) | 32 (94.12) |
| Control group | 34 | 27 (79.41) | 27 (79.41) | 26 (76.47) | 28 (82.35) |
| χ^2 | - | 10.241 | 8.425 | 11.253 | 11.253 |
| <i>P</i> | - | 0.001 | 0.001 | 0.001 | 0.001 |

2.3 Analysis of compliance and nursing satisfaction of the two groups

In terms of treatment compliance, the observation group was 97.06% (33/34), and the control group was 82.35% (28/34). The contrast $X^2=8.028$, $P=0.001<0.05$. In terms of nursing satisfaction, the observation group was 94.12% (32/34), and the control group was 79.41% (27/34). The comparison $X^2=10.928$, $P=0.001<0.05$.

3. Discussion

Ankylosing spondylitis is a chronic immune disease characterized by tendinitis and ligament attachment. Early symptoms such as lumbosacral pain and morning stiffness can occur, and continuous development often leads to spinal deformity and rigidity, which seriously affects the quality of life of patients [4]. The treatment cycle of patients is long. During the treatment with adalimumab, the symptoms of most patients can be quickly relieved to control the disease progress [5]. However, during the treatment, the disease itself has a great negative impact on the physiological and psychological aspects of patients. Many patients have negative emotions such as tension and anxiety, and lack awareness of the importance of long-term treatment and follow-up, which is easy to lead to interruption of treatment and disease progress.

Carry out health education in time during the treatment of patients. Accurate assessment of patients' understanding of their own diseases and treatment programs, and targeted health education can promote patients to have a scientific understanding of ankylosing spondylitis. In the process of mental health education, patients can be relieved of their negative emotions and maintain a positive and optimistic mental state during treatment^[6]. In the process of life level health education, it can help patients develop good living habits during the treatment process, achieve scientific diet, work and rest on time, and play a very important role in promoting their own recovery^[7]. It also guides patients to actively carry out functional exercise and promote the recovery of joint function of patients, which plays an extremely important role in improving the quality of life of patients during treatment^[8]. In this study, the patients in the observation group used health education during the treatment of adalimumab, which can improve the quality of life of the patients during the treatment, increase the rate of mastering disease knowledge, help the patients maintain good compliance behavior during the rehabilitation process, and also improve the satisfaction of the patients with clinical nursing work, which also has a very important role in helping the patients recover.

Based on this study, patients with ankylosing spondylitis can carry out health education in time during the treatment of adalimumab to help them increase their awareness of their own diseases, improve their compliance, improve their prognosis and improve their quality of life.

References

- [1] Yang LQ, Lei JH, Gao S. Effect of Health Education based on Empowerment Theory on Self-efficacy and Quality of Life of Patients with Ankylosing Spondylitis [J]. *Clinical Medical Research and Practice*, 2022,7 (21): 152-154+192.
- [2] Si YJ. The Impact of Internet Plus Health Education on DMSM Scores of Patients with Ankylosing Spondylitis under Schramm's Two-way Communication Theory [J]. *Today Pharmacy*, 2021,31 (07): 557-560.
- [3] Feng XH, Wang WX. The Effect of Multidisciplinary Collaborative Rehabilitation Education on the Compliance and Quality of Life of Patients with Ankylosing Spondylitis [J]. *Contemporary Nurses* (last ten-day), 2021,28 (06): 79-82.
- [4] Cao LY. Effect of Systematic Health Education on Joint Function and Quality of Life of Patients with Ankylosing Spondylitis [J]. *Contemporary Nurses* (last ten-day), 2021,28 (05): 156-157.
- [5] Liu DL, Long YH. The Effect of Traditional Chinese Education on Self-perception and Quality of Life of Patients with Ankylosing Spondylitis [J]. *Psychological Monthly*, 2020,15 (11): 12-13+15.
- [6] Hu XF, Dai XL, Zheng C. Effect of WeChat Platform Continuous Care on Treatment Compliance and Functional Status of Discharged Patients with Ankylosing Spondylitis [J]. *Contemporary Nurses* (Midten-day), 2020,27 (05): 125-127.
- [7] Zhong Y, Dai MH, Ma H. Meta-analysis of the Effect of Continuous Nursing on the Quality of Life and Psychological Status of Patients with Ankylosing Spondylitis [J]. *Evidence-based Nursing*, 2020,6 (02): 97-104.
- [8] Nan H, Jiang S, Li XL. Study on the Exploration and Effect of Chronic Disease Management Model in Patients with Ankylosing Spondylitis [J]. *Jilin Medical Journal*, 2019, 40 (07): 1650-1652.

Project: Clinical study of intestinal microbial changes in patients with AS treated with adalimumab (2241ZF333)

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Advances in the Study of Exercise Compliance in Essential Hypertension

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Abstract: Hypertension remains an important risk factor for death from cardiovascular disease to date, and prevention and control of hypertension has become a core strategy to curb the epidemic of cardiovascular disease. A large number of domestic and international studies have fully demonstrated that exercise therapy can ideally control hypertension and delay the progression of hypertensive disease, while improving the health status of patients and Therefore, exercise therapy has become one of the most important tools in the six-part process of antihypertensive. However, most studies have shown that the current status of exercise in hypertensive patients is not optimistic, and the problem of low adherence to exercise needs to be addressed. Therefore, this paper describes the factors influencing exercise compliance and interventions in patients with essential hypertension, aiming to summarize the experience of exercise for hypertensive patients, improve their exercise compliance, and control hypertension more effectively.

Keywords: Essential Hypertension; Exercise Therapy; Exercise Compliance; Integration of Sports and Medicine

Introduction

The latest data from the China Cardiovascular Health and Disease Report 2021 shows that the number of people with hypertension in China has reached 245 million, and the number of people with normal high blood pressure has reached 435 million^[1]. Compared with previous surveys^[2], the overall trend of prevalence is increasing. Blood pressure levels have a continuous, independent and direct positive correlation with cardiovascular risk, often causing serious events such as myocardial infarction and stroke, and remain an important risk factor for cardiovascular mortality to date. According to studies, for every 10 mmHg reduction in systolic blood pressure (1 mmHg = 0.133 kPa), or 5 mmHg reduction in diastolic blood pressure, patients can reduce their risk of death by 10%-15%, stroke risk by 35%, coronary heart disease risk by 20%, and heart failure risk by 40%^[3]. Therefore, effective prevention and treatment of hypertension has become one of the major strategies to curb the epidemic of cardiovascular and cerebrovascular diseases in China.

A large number of scholarly studies have fully demonstrated that exercise therapy can ideally control hypertension and delay the progression of hypertensive disease, while improving the health status of patients and improving the quality of life^[4]. Therefore, exercise therapy has become one of the top six components of a healthy lifestyle for lowering blood pressure. The Guidelines for the Primary Care of Hypertension 2019 states^[5] that in addition to activities of daily living, moderate intensity aerobic exercise (e.g. walking, jogging, cycling, swimming, etc.) is recommended for patients with hypertension for 4-7 d per week for a total of 30-60 min per day, and can be combined with resistance exercise in moderation. However, despite the exercise recommendations of relevant guidelines, the current status of exercise in hypertensive patients is still not optimistic due to the long-standing lack of awareness of the harmful effects of hypertension. A foreign study on the correlation between physical activity patterns and blood pressure levels showed^[6] that people with hypertension are more physically inactive than those without hypertension, and it is also estimated that by 2025, up to 30% of adults worldwide will have hypertension, and the likelihood of physical inactivity will continue to increase^[7]. In China, a literature review by

Wenyan Zhang et al.^[8] on the prevalence and self-management of hypertension in low-income populations indicated that the proportion of hypertensive patients in low-income areas who were physically active was only 11.3%. After Zhou Jianhong et al.^[9] analyzed the current status of self-management of 658 hypertensive patients in Jinshan District, Shanghai, it was found that up to 58.9% of hypertensive patients had no regular exercise habits. The exercise adherence of patients varies between regions due to factors such as economic level and education, but overall the current exercise adherence of hypertensive patients in China is poor, and the problem of low patient exercise adherence needs to be addressed. Therefore, this paper focuses on the factors influencing exercise adherence and interventions for patients with essential hypertension, aiming to summarize the experience of exercise for hypertensive patients, improve their exercise adherence, and control hypertension more effectively.

1. Factors affecting exercise compliance in hypertensive patients

1.1 Disease awareness

Hypertension as a chronic disease, in the public perception often belongs to the category of "can not be cured, can not die", especially in the majority of hypertension patients do not have any discomfort symptoms, did not attract sufficient attention. Data survey shows that the awareness rate, treatment rate and control rate of hypertension in China are 51.5%, 46.1% and 16.9% respectively, which are at a low level, of which only 15.3% can manage their blood pressure up to the standard^[5]. Most hypertensive patients have the idea that medical treatment is more important than physical treatment, and believe that they only need to adhere to medication after the disease. In fact, medication should be based on a healthy lifestyle, and both are indispensable, and many people have poor blood pressure control precisely for this reason. Sun Kaige et al.^[10] analyzed the factors influencing exercise in 879 cases of hypertensive patients in Shunyi District, Beijing, and concluded that the more educated people are, the more comprehensive their disease awareness is, the higher their awareness of the relationship between exercise and health, and the higher their disease management behavior. The findings of Sun Yudan et al.^[11] showed that patients' exercise compliance and blood pressure compliance rates were significantly improved after they correctly perceived the disease, understood the treatment plan, and understood the purpose of exercise.

1.2 Mechanism of integration of sports and medicine

The "Health China 2030" planning outline for the first time put forward the "integration of sports and medicine", while adhering to the concept of whole life cycle services, clearly strengthen the integration of physical medicine and non-medical health interventions. Subsequently, the national policy further encourages medical units at all levels to open exercise for health guidance services^[12], promote the construction of exercise prescription library, and promote the in-depth integration of national fitness and national health. However, because the mechanism of sports-medicine integration in China has not yet been perfected, there is still a split management mode of "sports for sports" and "medicine for medicine"^[13], coupled with a serious shortage of professional talents for sports-medicine integration, the number of medical experts and sports instructors with the ability to issue sports prescriptions is too small, leading to the lack of sports prescriptions. The shortage of medical professionals and the number of medical experts and sports instructors with the ability to prescribe sports is too small, which may lead to inaccurate sports prescriptions, single types of sports, unscientific sports intensity, and loopholes in sports safety protection, making the construction of sports prescriptions slow to advance, so the situation of "doctors do not understand sports and sports do not understand medicine" still exists in various regions.

1.3 Social environment support

Social environment support mainly refers to the hardware and software facilities required for exercise as well as the support of patients' family members, close friends, neighbors and other people with close relationships. As China is currently in the transition stage of "integration of sports and medicine" to "integration of sports and health", the public service

measures for national fitness are still insufficient^[14], and there is a lack of fitness venues and fitness equipment, resulting in patients having to choose community parks and other places when exercising. In addition to the lack of professional sports equipment, patients prefer walking, running and other single sports without relying on equipment when choosing sports. In addition, some fitness facilities have certain exercise conditions, but they are often closed to the public and lack corresponding medical equipment. In addition, the prevention and treatment of hypertension requires a high level of diet, exercise and lifestyle habits, especially exercise as one of the key aspects of disease prevention and treatment, and without the support and encouragement of family members and close friends^[15], it is often difficult for patients to increase their motivation to exercise and achieve an effective reduction in the prevalence of hypertension.

1.4 Supervision mechanism

Supervision refers to medical supervision during the exercise process. Because of the greater autonomy of the patient's choice of exercise, patients often lack effective communication with medical workers when exercising according to exercise prescriptions, resulting in patients not systematically grasping the correct exercise methods and failing to achieve the purpose of disease prevention and control, thus losing confidence in medical workers and even exercise, and compliance declines quickly.

2. Interventions

2.1 Change the mind and establish the correct concept of disease perception

Since patients' perceptions of the disease can directly or indirectly affect their treatment behaviors, it is particularly important to popularize knowledge about hypertension and conduct health education. Health education based on the transtheoretical model (TTM) has been widely used in the care of hypertensive patients. He Shuping^[16] et al. summarized the current status of research on the transtheoretical model in the care of hypertensive patients in China and found that the transtheoretical model Type interventions enhance patients' awareness of disease severity by giving them targeted guidance, help them establish good life patterns, and improve their exercise adherence. For some patients with low literacy and relatively poor comprehension, learning and memory abilities, it is more important to pay attention to patients' feedback on health education information. Hou Xiaoli^[17] et al. found that when 50 hypertensive patients were given feedback health education based on the WeChat platform, patients' awareness of the disease was better than unilateral conventional education. Therefore, it is important to strengthen the targeted education of hypertension disease and establish the correct cognition of hypertension disease in patients to improve their exercise compliance, better control blood pressure and delay the disease progression.

2.2 Improve the mechanism of integration of sports and medicine

As a new trend in disease prevention and treatment, the integration of sports and medicine, as an important element in the construction of a healthy China and a strong sports country, still faces many difficulties in the construction of institutional mechanisms^[18]. At present, the split management model of "sports for sports" and "medicine for medicine" is still in place, and the lack of sports experts in the medical field and the weakness of sports intervention in diseases have seriously hindered the development of sports-medicine integration. Therefore, it is urgent to break the mechanism barriers, refine the operation system led by the government, the community, medical units, sports research centers to participate in multiple subjects, and improve the allocation of resources in the process of integration of sports and medicine to ensure. Especially in terms of human resources, we can apply "community health service team + social sports knowledge", "social sports work team + medical knowledge", "medical-related profession + social sports knowledge", "social sports-related professional + medical knowledge" four models^[19] to carry out sports-medical combination of composite talent training,

establish a professional qualification certification system, promote the construction of sports prescription library, and realize the perfect integration of medical resources and sports resources.

2.3 Create a supportive social environment

The healthy development of physical medicine integration requires the implementation of various safeguards. The guarantee of venue and facility resources directly affects the feasibility of exercise for patients. In response to social security problems such as restricted exercise venues and insufficient equipment, it is necessary to reintegrate community resources^[20], reasonably allocate exercise and fitness venues, and renovate and upgrade hardware facilities in the community under the guidance of professionals. Also strengthen the deep integration of artificial intelligence and exercise^[21], through cell phone APP, website, etc., to push patients nearby continuously open and well-equipped exercise places and exercise teaching videos, etc., to guide patients to develop good exercise habits. Another important part of establishing a supportive social environment is to enlist the support of patients' families and close friends. Support from family and peers is crucial to disease management^[22-23]. By providing health education to the patient's close group, family members and close friends can fully participate in exercise so that patients can harvest more encouragement from their families, which helps to provide emotional support for patients, improve their self-management ability and motivation to exercise, and fully improve the quality of life of hypertensive patients.

2.4 Strengthening medical supervision

Medical supervision, as an important part of the integration of physical medicine, can more effectively intervene in the prevention and treatment of diseases by monitoring the health and function of patients and ensuring the smooth implementation of exercise training to achieve the purpose of lowering blood pressure^[24]. During the supervision process, patients are first assessed by physical examination, and then a practical and personalized exercise program is proposed. The type of exercise, time, intensity, frequency, and exercise precautions should be explained in detail when the patient exercises to try to avoid adverse events during the exercise process. At the same time, the exercise diary should be used to track the patient's exercise and help the patient to develop the habit of self-monitoring. With the long-term efforts of both doctors and patients, it will not only enhance doctor-patient trust, but also enable patients to develop a scientific approach to exercise, obtain good antihypertensive effects, and ultimately promote disease recovery.

3. Summary and outlook

In summary, with the continuous development and progress of the times, people's disease prevention and treatment of hypertension has not only been limited to medication, but also exercise as one of the effective means to lower blood pressure is slowly gaining more and more attention. However, due to the above factors, the current situation of exercise in hypertensive patients is not optimistic, and there are many problems that need to be solved. There is a lack of research on exercise adherence in hypertensive patients, and future research can be based on our national policy, analyzing more influencing factors, and formulating effective, personalized, and targeted interventions to address the problems and eliminate hindering factors in a timely manner, so as to improve exercise adherence in hypertensive patients.

References

- [1] China Cardiovascular Health and Disease Report Writing Group. Summary of the China Cardiovascular Health and Disease Report 2021[J]. Chinese Journal of Circulation, 2022, 37(6):553-578.
- [2] Wang ZW et al. Status of Hypertension in China: Results From the China Hypertension Survey, 2012-2015[J]. Circulation, 2018, 137(22): 2344-2356.
- [3] Williams B, Mancia G, Spiering W, et al. 2018 ESC/ESH guidelines for the management of arterial hypertension [J]. Eur Heart J, 2018, 39(33): 3021-3104.

- [4] Liu X, Zhang D, Liu Y, Sun X, Han C, Wang B, Ren Y, Zhou J, Zhao Y, Shi Y, Hu D, Zhang M. Dose-response association between physical activity and incident hypertension: a systematic review and meta-analysis of cohort studies. *Hypertension* 2017;69:813-820.
- [5] Chinese Medical Association, Chinese Medical Journal Society, Chinese Medical Association General Practice Branch, et al. Guidelines for primary care of hypertension (2019) [J]. *Chinese Journal of General Practitioners*, 2019, 18(4):301-313.
- [6] Churilla JR, Ford ES. Comparing physical activity patterns of hypertensive and nonhypertensive US adults[J]. *Am J Hypertens*, 2010, 23:987-993.
- [7] He L and Wei WR and Can Z. Effects of 12-week brisk walking training on exercise blood pressure in elderly patients with essential hypertension: A pilot study.[J]. *Clinical and experimental hypertension (New York, N.Y. : 1993)*, 2018, 40(7) : 1-7.
- [8] Zhang WY, Liu Y, Zhang M. Research progress on the current status of hypertension prevalence and self-management among low-income people[J]. *Journal of Nursing*, 2020, 27(6):12-16.
- [9] Zhou JH, Chen W, Shen F. Analysis of the current situation of self-management of hypertensive patients aged 35-59 in Langxia Town, Jinshan District, Shanghai[J]. *Wisdom Health*, 2021, 7(16):187-190.
- [10] Sun KG, Zhang XXX, Wu SY. et al. Applying the health belief model to explore exercise and exercise behavior and its influencing factors in hypertensive patients[J]. *China Health Education*, 2016, 32(05):414-418.
- [11] Sun YD, Yang L, Liu J, et al. Impact of behavioral lifestyle on quality of life in rural hypertensive patients[J]. *China Rural Health Care Management*, 2020, 40(8):594-598.
- [12] Li J, Li ZH. The development dilemma and countermeasures thinking of China's corporal medicine integration in the context of population aging[J]. *Journal of Liaoning Normal University (Natural Science Edition)*, 2022, 45(03):410-416.
- [13] Dong H, Dai J, Yin P. The realistic dilemma and optimization path of the supply-side reform perspective of the supply model of sports and medical integration services[J]. *Journal of Wuhan Institute of Sports*, 2019, 53(9):15-21.
- [14] National Bureau of Statistics. The 70th Anniversary of the Founding of New China Economic and Social Development Achievement Series Report No. 20 [EB/OL]. (2019-08-22)[2020-02-24]. http://www.gov.cn/xinwen/2019-08/22/content_5423308.htm.
- [15] Huang JW. Myths and health education strategies of hypertensive patients and their families[J]. *Chinese and Foreign Medical Research*, 2012, 10(06):153.
- [16] He SP, Lin LP. Current status of research on cross-theoretical models in the care of hypertensive patients in China[J]. *Contemporary Nurse (Upper Journal)* 2019, 26(09):16- 17.
- [17] Hou XL, Hao YY. Effect of feedback-based health education combined with individualized lifestyle guidance on heart rate variability and self-efficacy in elderly patients with essential hypertension based on WeChat platform[J]. *Clinical Medicine Research and Practice*, 2022, 7(30):161-163.
- [18] Shen Z, Hu HQ, Qiu J. Research progress, hot spotlight and future prospect of sports medicine integration in China[J]. *Kinesiology Research*, 2021, 35(1): 9-19.
- [19] Ye CM, Yu SJ, Yang QJ. The training mode and strategy of "physical medicine" composite talents[J]. *Journal of Sports Culture*, 2019(01):7-10+53.
- [20] Zhu H, Zhou LY, Lu YQ. The development model and community path of "health promotion"[J]. *Market Week*, 2020(01):185-188.
- [21] Wang G, Lin L, Qiao FJ. Research on artificial intelligence for the integration of sports and medical care in the context of healthy China[J]. *China Sports Science and Technology*, 2022, 58(10):109-113.
- [22] Pesantes MA, Del Valle A, Diez Canseco F, et al. Family support and diabetes: patient's experiences from a public hospital in Peru. *Qual Health Res*, 2018, 28(12): 1871-1882.
- [23] Dennis C L. Peer support within a health care context: a concept analysis. *Int J Nurs Stud*, 2003, 40(3): 321-332.

[24] Liu Y, Ning L, Zhang JL. Research on the importance of medical supervision in sports training in the context of "Healthy China"[C]. Proceedings of the 7th Guangzhou International Symposium on Sports and Health, 2022: 230-231.

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Role of Diabetes in the Lung injury

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Abstract: Diabetes mellitus is a chronic, progressive metabolic disorder whose incidence is steadily increasing worldwide. Diabetes causes systemic damage to the body, leading to chronic inflammation and impaired immune function, and is easily complicated by serious infections. Over the past decade, an increasing number of studies have focused on lung injury in diabetes. Diabetes is a common disease in the ICU, and a better understanding of the relationship between the diseases is of great importance for clinical management. This reviews the advances in epidemiology, pathophysiology, and therapeutic management.

Keywords: Diabetes; Lung Injury; ARDS; Mechanism

1. Introduction

Diabetes mellitus (DM) and its associated complications are a global health problem^[1]. According to the statistics of the International Diabetes Federation in 2019, the number of diabetic patients worldwide has exceeded 460 million, and this number is expected to increase in the future^[2]. Previous studies have reported diabetes-related lung diseases, such as reduced lung function, pulmonary microangiopathy, and pulmonary hypertension.

Due to the close relationship between diabetes and lung injury, assessing the risk factors for the occurrence and prognosis of diabetes combined with lung injury will help to identify people at risk of organ dysfunction early and provide some guidance for early prevention and treatment.

2. Underlying mechanism

The pathophysiology of diabetic lung injury is complex, multifactorial, and not fully understood. Underlying mechanisms include hyperglycemia, hyperinsulinemia, autonomic neuropathy, inflammatory, oxidative stress, alveolar capillary and pulmonary arteriolar microangiopathy, impaired lung function, surfactant dysfunction, and respiratory muscle dysfunction.

2.1 Inflammation

Previous studies have shown that circulating levels of acute phase proteins (such as C-reactive protein (CRP), haptoglobin, fibrinogen, plasminogen activator inhibitor, and serum amyloid A) and sialic acid, as well as cytokines and chemokines, are elevated in patients with T2DM^[3, 4]. The inflammatory storm plays an important role in the onset and development of ARDS. The inflammatory response is likely to contribute to the occurrence of T2DM by causing insulin resistance, which in turn is enhanced in the presence of hyperglycemia to promote long-term complications of diabetes^[5]. The triggering mechanisms of inflammation in T2DM are still poorly understood. Possible mechanisms involved: hypoxia, cell death, NF- κ B and JNK pathways, IL-6 and insulin resistance, IL-1 system as a sensor of metabolic stress, and adipokines^[6].

2.2 Oxidative stress

Hyperglycemia is thought to contribute to the development of vascular dysfunction in diabetes through oxidative stress^[7]. In chronic hyperglycemia and diabetes, NADPH oxidase is activated, leading to increased ROS in the lung and pulmonary vasculature^[8]. John and colleagues^[9] found that hyperglycemia increased pulmonary vascular permeability and vascular superoxide. Moreover, inhibition of NADPH oxidase or management in chronic glycemic control could improve pulmonary vascular permeability.

2.3 Immunosuppression

Several studies have shown that most diabetic patients have immunosuppression, such as abnormal adhesion, chemotaxis, and phagocytosis of neutrophils. In COVID-19 patients with diabetes, the levels of immune-related biomarkers (including C-reactive protein, serum ferritin, and IL-6) and the incidence of lymphopenia were higher^[10]. The expression level of angiotensin-converting enzyme II on the surface of monocytes/macrophages, the level of secreted IL-1 β , and the level of viral load in the cells are all positively correlated with the blood glucose concentration in the culture medium under different blood glucose concentrations^[11]. Due to mild chronic inflammation in the development of diabetes, patients are more prone to cytokine storms leading to systemic organ failure.

2.4 Coagulation

A major pathophysiologic feature of ARDS is coagulopathy, manifested by tissue factor (TF) exposure, pathway activation, anticoagulant dysfunction, microvascular thrombosis, and endothelial injury. Lorente also found that in ARDS patients with diffuse alveolar damage (DAD), P/F ratio and dynamic respiratory compliance were lower, SOFA scores and INR were higher, and death from hypoxemia was more likely^[12]. In addition, prolonged INR has been reported as an early prognostic indicator of severe ARDS in patients with COVID-19^[13].

2.5 Lung Function

Diabetic microangiopathy can involve alveolar tissue and capillaries, leading to restriction of lung volume and alveolar gas transport, as manifested by the reduced diffusing capacity of the lung for carbon monoxide (DLCO), as well as its components: membrane diffusing capacity and pulmonary capillary blood volume (VC)^[14]. WILLIAM and colleagues found that a modest loss of alveolar-capillary reserves can be quantified by noninvasive methods independent of physical fitness and correlates with glycemia as well as systemic microangiopathy^[15]. Others showed that diabetic polyneuropathy impairs respiratory neuromuscular function^[16], potentially affecting pulmonary volumes.

3. Effect of diabetic management

Diabetes is a confounder and other factors associated with diabetes treatment or management are truly related to the variable risk of developing lung injury.

3.1 Insulin

The notion that the effects of insulin extend far beyond simple glycemic control is now well established. In animal and clinical studies of critical illness, insulin is immunomodulatory. Independent of glycemic control, insulin has been shown to modulate inflammation via the mannose-binding lectin pathway, nuclear factor- κ B, and through an alternation of proinflammatory and anti-inflammatory cytokines^[17, 18].

3.2 Oral drugs

Insulin is not the only diabetic treatment that may modulate the development of ALI. Agonists of PPAR- γ and

metformin have been shown to reduce the severity of LPS-induced lung injury by modifying mitochondrially derived reactive oxygen species, thereby reducing oxidative injury^[19, 20].

Diabetic patients are often treated with ACE inhibitors because of the high incidence of cardiovascular disease. ACE inhibitors improve endothelial function in sepsis and prevent the development of pulmonary arterial hypertension and ARDS^[21]. In animal models, ACE inhibitors or angiotensin receptor blockers attenuate barotrauma-induced lung inflammation and apoptosis and reduce the fibro proliferative response after bleomycin-induced lung injury^[22].

Hydroxymethylglutaryl-CoA reductase inhibitors are also commonly used for dyslipidemia in diabetic patients. Statin use has been associated with reduced mortality in hospitalized patients with community-acquired pneumonia, a leading cause of ARDS^[23].

4. Conclusions

In conclusion, more and more studies prove that the lung is the target organ of diabetes damage, lung injury caused by diabetes is more and more attention, but research on the mechanism of diabetic lung injury is still not very clear, so in-depth research on diabetic lung injury, further explore the mechanism of diabetic lung injury is of great significance.

References

- [1] Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Pract* 2010;87(1):4-14.
- [2] Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9(th) edition. *Diabetes Res Clin Pract* 2019;157:107843.
- [3] Spranger J, Kroke A, Möhlig M, Hoffmann K, Bergmann MM, Ristow M, et al. Inflammatory cytokines and the risk to develop type 2 diabetes: results of the prospective population-based European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam Study. *Diabetes* 2003;52(3):812-7.
- [4] Herder C, Brunner EJ, Rathmann W, Strassburger K, Tabák AG, Schloot NC, et al. Elevated levels of the anti-inflammatory interleukin-1 receptor antagonist precede the onset of type 2 diabetes: the Whitehall II study. *Diabetes Care* 2009;32(3):421-3.
- [5] Lontchi-Yimagou E, Sobngwi E, Matsha TE, Kengne AP. Diabetes mellitus and inflammation. *Curr Diab Rep* 2013;13(3):435-44.
- [6] Donath MY, Shoelson SE. Type 2 diabetes as an inflammatory disease. *Nat Rev Immunol* 2011;11(2):98-107.
- [7] Xiang L, Hester RL, Fuller WL, Sebai ME, Mittwede PN, Jones EK, et al. Orthopedic trauma-induced pulmonary injury in the obese Zucker rat. *Microcirculation* 2010; 17(8): 650-9.
- [8] Lopez-Lopez JG, Moral-Sanz J, Frazziano G, Gomez-Villalobos MJ, Flores-Hernandez J, Monjaraz E, et al. Diabetes induces pulmonary artery endothelial dysfunction by NADPH oxidase induction. *Am J Physiol Lung Cell Mol Physiol* 2008;295(5):L727-32.
- [9] Clemmer JS, Xiang L, Lu S, Mittwede PN, Hester RL. Hyperglycemia-Mediated Oxidative Stress Increases Pulmonary Vascular Permeability. *Microcirculation* 2016;23(3):221-9.
- [10] Ince C, Mayeux PR, Nguyen T, Gomez H, Kellum JA, Ospina-Tascón GA, et al. The Endothelium in Sepsis. *Shock* 2016;45(3):259-70.
- [11] Kolahian S, Leiss V, Nürnberg B. Diabetic lung disease: fact or fiction? *Rev Endocr Metab Disord* 2019;20(3):303-19.
- [12] Lorente JA, Cardinal-Fernández P, Muñoz D, Frutos-Vivar F, Thille AW, Jaramillo C, et al. Acute respiratory distress syndrome in patients with and without diffuse alveolar damage: an autopsy study. *Intensive Care Med* 2015;41(11):1921-30.

- [13] Baranovskii DS, Klabukov ID, Krasilnikova OA, Nikogosov DA, Polekhina NV, Baranovskaia DR, et al. Prolonged prothrombin time as an early prognostic indicator of severe acute respiratory distress syndrome in patients with COVID-19 related pneumonia. *Curr Med Res Opin* 2021;37(1):21-5.
- [14] Litonjua AA, Lazarus R, Sparrow D, Demolles D, Weiss ST. Lung function in type 2 diabetes: the Normative Aging Study. *Respir Med* 2005;99(12):1583-90.
- [15] Chance WW, Rhee C, Yilmaz C, Dane DM, Pruneda ML, Raskin P, et al. Diminished alveolar microvascular reserves in type 2 diabetes reflect systemic microangiopathy. *Diabetes Care* 2008;31(8):1596-601.
- [16] Kabitz HJ, Sonntag F, Walker D, Schwoerer A, Walterspacher S, Kaufmann S, et al. Diabetic polyneuropathy is associated with respiratory muscle impairment in type 2 diabetes. *Diabetologia* 2008;51(1):191-7.
- [17] Hansen TK, Thiel S, Wouters PJ, Christiansen JS, Van den Berghe G. Intensive insulin therapy exerts antiinflammatory effects in critically ill patients and counteracts the adverse effect of low mannose-binding lectin levels. *J Clin Endocrinol Metab* 2003;88(3):1082-8.
- [18] Dandona P, Aljada A, Mohanty P, Ghanim H, Hamouda W, Assian E, et al. Insulin inhibits intranuclear nuclear factor kappaB and stimulates IkappaB in mononuclear cells in obese subjects: evidence for an anti-inflammatory effect? *J Clin Endocrinol Metab* 2001;86(7):3257-65.
- [19] Cuzzocrea S, Pisano B, Dugo L, Ianaro A, Patel NS, Di Paola R, et al. Rosiglitazone, a ligand of the peroxisome proliferator-activated receptor-gamma, reduces the development of nonseptic shock induced by zymosan in mice. *Crit Care Med* 2004;32(2):457-66.
- [20] Zmijewski JW, Lorne E, Zhao X, Tsuruta Y, Sha Y, Liu G, et al. Mitochondrial respiratory complex I regulates neutrophil activation and severity of lung injury. *Am J Respir Crit Care Med* 2008;178(2):168-79.
- [21] Liu H, Zhao J. An experimental study of therapeutic effect of ACEI on chemical-induced ARDS in rats. *Zhonghua Yu Fang Yi Xue Za Zhi* 2002;36(2):93-6.
- [22] Wösten-van Asperen RM, Lutter R, Haitsma JJ, Merkus MP, van Woensel JB, van der Loos CM, et al. ACE mediates ventilator-induced lung injury in rats via angiotensin II but not bradykinin. *Eur Respir J* 2008;31(2):363-71.
- [23] Mortensen EM, Pugh MJ, Copeland LA, Restrepo MI, Cornell JE, Anzueto A, et al. Impact of statins and angiotensin-converting enzyme inhibitors on mortality of subjects hospitalised with pneumonia. *Eur Respir J* 2008;31(3):611-7.

Research Status of Authentic Leadership Theory in the Field of Nursing Management

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Abstract: This paper reviews the philosophical basis of authentic leadership theory and the key characteristics of authentic leadership under the background of medical reform, summarizes the concepts, dimensions and measurement tools of authentic leadership, reviews the application status of real leadership theory in the field of nursing management, and puts forward a prospect, aiming to provide new ideas and theoretical references for nursing managers to optimize leadership behavior.

Keywords: Authentic Leadership; Nursing Management; Leadership Behavior

Introduction

With the deepening of medical reform, the continuous expansion of the scope of nursing work, the increasing level of nursing knowledge and technology, and the diversification of nursing staff's thinking, nursing management is facing great challenges today. The words and actions of nursing managers affect the work attitude, behavior, and quality of care of nursing staff ^[1]. According to Avolio and Gardner, authentic leadership is a relatively new style of relational leadership designed to help people find meaning in their work and encourage trust, optimistic and transparent relationships, and inclusive, healthy work environments that influence employee performance and organizational outcomes^[2]. As a new leadership theory, real leadership has become a research hotspot in management and psychology, but it is relatively lacking in the field of nursing.

1. Authentic leadership theory

1.1 The conceptual and philosophical foundations of authentic leadership

Truth, defined as "the quality of truth," the concept of the real type originated from the ancient Greek philosopher Socrates, who taught the importance of knowing oneself and being true to oneself, requiring self-awareness and the ability to act according to one's true self. Hatchell ^[3] points out that authenticity in nursing means living in the moment, being authentic to oneself and having the characteristics of display, in how individuals support others and what is right for them.

Authentic leadership is an emerging leadership style rooted in humanism, which centers on the personal experience of individuals. Humanism places more emphasis on qualities such as self-actualization and self-worth. Another major feature of humanism is the help of others with personal development and the realization of what humanists call self-actualization. The theory of "authentic leadership" is a complex theory that applies the principles of authenticity and humanism to leadership theory and believes that being true to oneself produces more positive outcomes. Authentic leadership theory can be used in conjunction with any other leadership style and have a significant positive impact on the workplace ^[4].

1.2 Structure and characteristics of authentic leadership

The four key elements of authentic leadership are: balanced approach, transparency in relationships, internalizing ethical perspectives and self-awareness, and building a healthier work environment. Authentic leadership theory identifies 5 key characteristics of authentic leadership: the ability to reason ethically, lead attentively, maintain relationships, be disciplined, and have a clear purpose. Without the development of these important characteristics, authenticity cannot exist. For a true leader, self-discipline is essential and must be able to overcome pressures that can influence judgment or lead to inconsistent behavior, and failure to be consistent can ultimately lead to distrust and disrespect. The behavior of authentic leaders is rooted in their positive moral and ethical values^[1]. Detached leadership styles won't succeed in the 21st century, and today's employees demand more personal relationships with leaders before they can dedicate themselves to their work.

2. Measurement tools for true leadership

For authentic leaders, a variety of measurement tools, such as personality tests, exist to help leaders become more self-aware and create a personal leadership style. There is also a one-on-one interview format, most commonly a scale measurement. Representative ones include the evidence-based Authentic Leadership Questionnaire developed by Avolio et al.^[5], the Authentic Leadership Inventory (ALI) of Neider and Schriesheim^[6], and the Authentic Leadership Self-Assessment Questionnaire based on a sample of people. ALSAQ-P^[7], A shortened version of an 8-item scale^[8], on the whole, the scales developed by domestic scholars are mostly based on the theoretical research of previous foreign experts, and there is no substantial change in the nature of measurement.

3. Research on authentic leadership theory in the field of nursing management

3.1 Study of antecedent variables

What antecedents are relevant to authentic leadership? Ninety-one retrospective studies found that: few studies explored the relationship between antecedents and true leadership, and a large number of cross-sectional studies limited the interpretation of causality; Through research, some scholars have proposed that personal life experience, life events have a role in real leadership, and confirmed that the external environment is also one of the influencing factors. Early literature suggests that humble personality has a positive effect on authentic leadership behavior, and overall there is a lack of large, long-term cohort studies demonstrating factors influencing authentic leadership^[9].

3.2 Mediation variable research

In the included study, there were 21 mediating factors between true leadership and 25 different outcome variables. It is roughly attributed to personal factors, organizational environmental factors. (1) Personal factors: Structural empowerment was the most commonly tested mediating factor, linking authentic leadership to 7 different outcomes, such as job satisfaction, job performance, burnout, social capital, staffing shortages, work-life disruptions, and professional practice environment. Burnout and emotional exhaustion are important mediators between authentic leadership and job satisfaction and intention to leave. Empowerment has a partial mediating role in the relationship between the true leadership of the head nurse and the job satisfaction of nurses, and has a perfect mediating role in the relationship between the true leadership of the head nurse and nursing performance^[10]. (2) Organizational environmental factors: Organizational identity acts as a mediator between state-owned enterprises, true leadership, Christian religious beliefs, and immoral organizational behavior^[11]. Organizational commitment^[12] and perceived organizational support^[13] play a part-mediating role in the influence of honest leadership of nurse managers on nurses' advocacy behavior. Perception of organizational support, innovation atmosphere,

and work atmosphere has shown multiple mediations between real leadership and nurse mindfulness, creativity, work performance, and other outcomes in multiple studies. Honest leadership of head nurses can influence nurses' work engagement and willingness to stay through the mediating role of nursing organizational culture.

3.3 Study of outcome variables

3.3.1 Healthcare Provider Results

Personal psychological state: Psychological capital includes optimism, identity includes personal and social/organizational identity, trust includes trust in leaders, organizations, or colleagues, and resilience, all of which reflect an individual's psychological state.

Work attitude and behavior: including job satisfaction, career satisfaction, intention to leave, work engagement, work adaptation level, and work restrictions. Authentic leadership in nurses' work environments is important in reducing the causes of faulty care, improving perception of a safe atmosphere, and job satisfaction.

Performance: including work performance, knowledge sharing, creativity, innovative behavior, advice behavior, scientific research ability, organizational citizenship behavior, and behavioral goal achievement. Authentic leadership styles have a positive impact on employees' environmental organizational citizenship behavior (OCBE). Authentic leaders engage employees and help them develop, and for the organization, they increase productivity, creativity, and financial returns ^[14]. Authentic leadership by head nurses is positively correlated with empowerment, job satisfaction, and nursing performance. Authentic leadership is the precursor to team initiative, which has an impact on productivity and team members' well-being, and promotes team flourishing and performance.

3.3.2 Patient outcomes

Authentic leadership and a healthy work environment help staff engage and improve patient outcomes. The four dimensions of authentic leadership, self-awareness, internalized ethical perspectives, balanced approach, and relationship transparency, are positively correlated with the quality of patient care, and authentic leadership can positively predict the quality of patient care ^[15]. There is a strong relationship between authentic leadership, employee engagement, and reduced burnout. Burnout is associated with absenteeism, which affects the quality of patient care ^[16]. Developing and supporting authentic care managers is important for patient outcomes, nurses and their organizations, and occupational and healthcare ^[17]. There is a moderate correlation between authentic leadership and a healthy work environment, which contributes to staff engagement and improved patient outcomes ^[18]. Sincere leadership can help mitigate the negative impact of ICU nurses on work quality under high work pressure.

4. Summary

As a new leadership style, the core content of authentic leadership is a positive and positive form of leadership. This theory advocates the discovery and development of positive psychological abilities of leaders and their subordinates. Some scholars pointed out that the core content of authentic leadership coincides with employees' demands for leaders. Therefore, from the perspective of the hospital, in the process of selecting and training nursing managers, the current nursing managers can be cultivated by combining the real leadership theory, the current situation of the hospital and the feelings and needs of nurses. When nurses perceive their leadership as authentic, open, honest, and willing to invite them to participate in decision-making, they respond positively to their work and trust their leadership.

References

[1] Carol AW, Edmund JW. Reflections on a decade of authentic leadership research in health care[J]. J Nurs Manag, 2020,28,(1):1-3.

- [2] Alilyyani B, Carol AW, Greta Cummings. Antecedents, Mediators, and Outcomes of Authentic Leadership in Healthcare: A Systematic Review[J].2018,00:1-58.
- [3] Hatchell W. An authentic nurse leader[J]. South Carolina Nurse, 2016, 23(1): 8-8.
- [4] Specchia ML, Cozzolino MR, Carini E, *et al.* Leadership Styles and Nurses' Job Satisfaction. Results of a Systematic Review[J].Int. J. Environ. Res. Public Health, 2021,18(4):1-15.
- [5] Avolio BJ, Gardner WL. Authentic leadership development: getting to the root of positive forms of leadership[J]. Leadership Q,2005,16(3):315-338.
- [6] Neider L, Schriesheim C. The Authentic Leadership Inventory (ALI): development and empirical tests[J]. Leadership Q,2011,22 (6):1146-1164.
- [7] Panczyk M, Jaworski M, Iwanow L, *et al.* Psychometric properties of Authentic Leadership Self- Assessment Questionnaire in a population-based sample of Polish nurses[J].J Adv Nurs.2019,75(3): 692-703.
- [8] Xu BD, Zhao SK, Li CR, *et al.* Authentic leadership and employee creativity: testing the multilevel mediation model [J]. Leadership and Organization Development Journal,2017,38(3): 482- 498.
- [9] Zeng CN, Zhang JH, *et al.* Research progress of true leadership of head nurses[J].Nursing Research,2020,34(19): 3449- 3452.
- [10] Li SS, Sun LH, Shan XZ, *et al.* Path analysis of the influence of young nurses' perception of authentic leadership and burnout on job satisfaction[J].Journal of Nursing Management, 2020, 20(7): 457-461.
- [11] Shapira LO, Benoliel P. Nurses' psychological empowerment: An integrative approach[J]. J Nurs Manag, 2018, 00:1-10.
- [12] Tomasz G. Leadership, religiousness, state ownership of an enterprise and unethical pro- organizational behavior: The mediating role of organizational identification[J]. Journal. Pone, 2021, 00:1-27.
- [13] Liu SQ, Wang YH, Li CX, *et al.* Research on the relationship between nurses' advocacy behavior and integrity leadership and organizational commitment[J].Journal of Nursing, 2019, 34(19): 67-70.
- [14] Vilma Ž. Leadership values and values based leadership: what is the main focus? [J].Research in Health and Social Sciences, 2018,15(1): 43-58.
- [15] Puni A, Hilton SK. Dimensions of authentic leadership and patient care quality[J]. LHS, 2020, 00: 1-18.
- [16] King AT, Gontarz J, Wei H. Employee engagement and absenteeism: A step towards improving patient care[J].Nurs Forum,2020,55(3):356-361.
- [17] Doherty DP, Hunter Revell SM. Developing nurse leaders: Toward a theory of authentic leadership empowerment [J]. Nurs Forum, 2020, 55(3): 416-424.
- [18] Raso R, Fitzpatrick JJ, Asick K. Clinical Nurses' Perceptions of Authentic Nurse Leadership and Healthy Work Environment[J].JONA,2020,50(9):489-494.

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Progress in Research During Pregnancy and Postpartum Exercise

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Abstract: As our two children, three policy, older pregnant women also increasing, in order to avoid risk, appropriate exercise during pregnancy also increasingly attention, in addition, studies have shown that lack of exercise during pregnancy, can lead to natural birth difficulty increase, but the national requirements to reduce cesarean section rate, and research confirmed that pregnancy and postpartum exercise can reduce adverse birth outcomes, is conducive to postpartum recovery, so now more and more people will focus on the movement during pregnancy, also realized the importance of movement.

Keywords: Exercise During Pregnancy; Birth Outcomes; Importance

Introduction

Numerous studies have shown that exercise during pregnancy and postpartum is not only good for the fetus, but also for the mother. But the current situation is not optimistic, and very few pregnant women can do exercise during pregnancy. At the same time, China has no specifically for pregnancy and postpartum sports guidelines or expert consensus, so this paper will combine Canada, the United States, Australia and the asia-pacific region during pregnancy and postpartum sports activity guide consensus, and research on pregnancy and postpartum exercise in recent years, clinical care and future direction research to provide reference.

1. The status quo of exercise during pregnancy in China

Due to the traditional Chinese view that activity should be reduced during pregnancy, the vast majority of pregnant women almost spend the whole pregnancy sitting quietly except for daily life. Now, especially in developed countries, they have proved that exercise during pregnancy is beneficial to the fetus and the mother, while exercise does not increase the adverse delivery outcomes. Studies in China have also shown that exercise during pregnancy can shorten the second course of labor and is beneficial to the recovery of postpartum pelvic floor muscles. But studies have shown that more than 20 percent of pregnant women have little physical activity every day^[1]. Moreover, the "Healthy China 2030" planning outline also clearly points out that pregnant women should actively carry out exercise. Although exercise during pregnancy is beneficial to the pregnant woman and the fetus, the current situation of exercise during pregnancy in China still needs to be improved. A survey of 15 Chinese provinces showed that 9.1 percent of pregnant women were consistently physically inactive throughout pregnancy, and only 36.2 percent could maintain the activity their bodies need^[2].

2. The benefits of the exercise

Prenatal exercise is considered as a first-line, preventive and therapeutic approach to reduce pregnancy complications and optimize maternal-fetal health. Guidelines experts recommend encouraging physical exercise throughout pregnancy in the absence of exercise contraindications and pregnancy complications^[3].

2.1 Benefits of exercise during pregnancy

Studies have shown that regular exercise during pregnancy for pregnant women's physical and mental health, but also can help the weight management, the 2021 Asia Pacific consensus: pregnancy and postpartum physical activity and exercise will Asia prepregnancy body mass index (BMI) category of optimal gestational weight gain (GWG) defined as underweight of 19.5 kg, normal weight of 13.7 kg, overweight 7.9 kg, obese women is 1.8 kg^[4]. Therefore, prenatal physical exercise is beneficial to control the body mass index (BMI) and pregnancy weight gain (GWG) of pregnant women, and then significantly improve blood sugar, reduce the occurrence of gestational diabetes and avoid obesity; Meanwhile, pregnancy exercise can reduce neonatal complications, reduce preeclampsia, premature birth, pregnancy hypertension and lumbar-pelvic pain, reduce caesarean section, device delivery and postpartum weight gain, prevent postpartum depression and postpartum and urinary incontinence, promote postpartum recovery and shorten postpartum rehabilitation time^[3,4,5,6].

2.2 Postpartum exercise benefits

The guidelines strongly recommend that all pregnant women undergo pelvic floor muscle exercises (pelvic floor muscle training, PFMT) during pregnancy and postpartum, and that starting PFMT before delivery can reduce the incidence of postpartum urinary incontinence in about 30% of European women^[5], PFMT should be started immediately after normal vaginal delivery and cesarean delivery^[4]. There is also evidence that postpartum aerobic exercise reduces the symptoms of maternal postpartum depression and that regular aerobic exercise in lactating women can improve their cardiovascular health^[6].

3. Exercise advice

Experts suggest that pregnant women should carry out physical exercise for no less than 3 days a week, and should accumulate at least 150 min of moderate-intensity physical activity per week^[3,4]. Pregnant women are encouraged to combine aerobic exercise and resistance training to exercise, and aerobic exercise is safe and encouraged to start in the first trimester of pregnancy for approximately 30-60 min per day, at least 3-4 times per week until delivery^[4]. However, exercise should follow a gradual process, gradually increasing the time and frequency. For special pregnant women, such as highly inactive, the speed of progress should be slower. Meanwhile, it is recommended that pregnant women should have pelvic floor muscle exercise throughout pregnancy.

3.1 Type of movement

The guidelines recommends moderate intensity exercise including aerobic and resistance training, aerobic exercise, including brisk walking, modified yoga, modified Pilates, swimming, stationary cycling, jogging, etc.; resistance training such as squatting, lunges and push-ups; light dumbbell lifting exercises and resistance belt exercises; and moderate weight bearing and daily housework, such as gardening and window washing^[3,4].

3.2 Exercise intensity

Test the intensity of pregnant women exercise mainly has the first "talk test", such as pregnant women in the process of exercise, can maintain the dialogue, prove the intensity is appropriate, but can not sing, if can not maintain the dialogue, the intensity should be reduced^[3,4]. Second, maternal heart rate is also a measure of the intensity of physical activity, such as Table 1, moderate intensity physical activity (40% -59% heart rate reserve (HRR)), high intensity physical activity (60% -80% (HRR))^[3,4]; Pregnant women, especially athletes, should avoid exercise with the highest heart rate with an intensity greater than 90% in the first and second trimester of pregnancy^[4]. Third, perceived exercise (RPE) can also be used to assess the intensity of physical activity, with moderate intensity exercise rated as 13-14 in the 6-20 Borg perceived Exercise scale (somewhat difficult)^[6]As shown in Table 2.

3.3 Conduction to exercise

3.3.1 With absolute contraindications

(1) Placental abruption^[3,4]; (2) Preterm birth^[3,4]; (3) Persistent vaginal bleeding of unknown causes^[3,4]; (4) Placenta previa appeared after 28 weeks of gestation^[3,4]; (5) Severe preeclampsia^[3,4]; (6) Cervical insufficiency^[3,4]; (7) Intrauterine growth restriction^[3,4]; (8) Multiple pregnancy (e. g., triplets)^[3,4]; (9) poorly controlled type I diabetes, hypertension or thyroid disease^[3,4]; (10) Other serious cardiovascular, respiratory, or systemic diseases^[3,4].

3.3.2 With relative contraindications

(1) Mild preeclampsia^[3,4]; (2) Type 1 diabetes mellitus is well controlled^[3,4]; (3) A history of spontaneous abortion, preterm birth, or fetal growth restriction^[3,4]; (4) Mild/moderate cardiovascular or respiratory disease^[3,4]; (5) Symptomatic anemia^[3,4]; (6) Malnutrition or eating disorders^[3,4]; (7) Twin pregnancies after week 28^[3,4]; (8) Moderate to heavy smoking (> 20 cigarettes per day)^[3,4]; (9) Other major diseases^[3,4].

In addition, in the 2021 Asia Pacific Consensus: Pregnancy and Postpartum Physical Activity and Exercise, based on the empirical evidence that pregnant women can benefit from prenatal exercise, these are no longer considered contraindication:

(1) Chronic hypertension^[4]; (2) Gestational hypertension^[4]; (3) Overweight or obese women^[4]; (4) Recurrent abortion^[4]; (5) Shorter of the uterine cervix^[4]; (6) Multiple fetal pregnancies^[4]; (7) epilepsy^[4]; (8) Anemia^[4]; (9) Limitations of orthopedics^[4]; (10) A history of a sedentary lifestyle, preterm birth, or fetal growth restriction^[4].

3.4 Stop the movement signal

If the pregnant woman has the following conditions during exercise, stop exercising immediately:

(1) Persistent and excessive shortness of breath can not be relieved at rest^[3,4]; (2) Severe chest pain^[3,4]; (3) Frequent painful uterine contractions^[3,4]; (4) The vaginal bleeding^[3,4]; (5) Continuous loss of vaginal fluid indicates rupture of fetal membranes^[3,4]; (6) Severe headache or swelling^[3,4]; (7) Persistent dizziness or syncope, can not disappear at rest^[3,4].

3.5 Safety guarantee measures

It is recommended that pregnant women wear loose clothes to exercise in a cool environment, and ensure sufficient water and heat to avoid the occurrence of dehydration and hypoglycemia. Every pregnant woman should have enough "warm-up" and "cooling" exercise. For safety reasons, the following situations should be avoided:

(1) exercising in the presence of high fever; (2) some activities or sports that touch the body or are at risk of falling; (3) diving; (4) lowland women living below 2500 m should prevent physical activity at high altitude (> 2500 m)^[3]; (5) Rapid change of direction and jumping during exercise increases the risk of injury; (6) prolonged standing time and a significant reduction in cardiac output^[4]; (7) The supine exercise after the first trimester can lead to reduced cardiac output, aortic-inferior-cava compression, and hypotension^[4]; (8) Excessive abdominal movements, such as abdominal bending, may cause rectus dispersion requiring postnatal repair^[4].

4. Summary

To sum up, pregnancy and postpartum exercise benefits greater than risk, encourage all pregnant women to take an active part in sports, can optimize the health of the two generations, but it is important to note that all pregnant women before deciding to exercise to consult the doctor, fully evaluate all aspects of pregnant women, then according to the doctor's advice to take the appropriate type of exercise, and regularly check the fetus, adjust at any time, must be safety first, avoid blindly follow suit. It is also hoped that this study can provide a reference for the formulation of a pregnancy exercise program in China.

Table 1 Target heart rate ranges for different exercise intensities in pregnant women

| Pregnant woman age (years) | Exercise intensity | Heart rate (sub / min) |
|----------------------------|--------------------|------------------------|
| <29 | mild | 102~124 |
| | secondary | 125~146 |
| | violent | 147~169 |
| 30+ | mild | 101~120 |
| | secondary | 121~141 |
| | violent | 142~162 |

Table 2 Borg Perception Activity Scale (Borg Scale)

| grade | level |
|-------|------------------------|
| 6 | |
| 7 | Very, very light |
| 8 | |
| 9 | very light |
| 10 | |
| 11 | light |
| 12 | |
| 13 | a little bit difficult |
| 14 | |
| 15 | difficulty |
| 16 | |
| 17 | in troubled water |
| 18 | |
| 19 | Very, very difficult |
| 20 | |

References

- [1] Li J, Zou FL, Huang SR, et al. Health Beliefs and Health Behavior Survey of women in pregnancy [J]. Journal of Nursing, 2017,32 (08): 25-28.
 - [2] Chen YL, Ma HH, Shi YJ, et al. Physical activity levels of pregnant women in different pregnancies and their influencing factors [J]. Chinese Journal of Disease Control, 2021,25 (02): 149-154.
 - [3] Mottola Michelle F,Davenport Margie H, Ruchat Stephanie-May, et al. 2019 Canadian guideline for physical activity throughout pregnancy [J]. BJSM, 2018, 52(21).
 - [4] Lee R, Thain S, Tan LK, et al. Asia-Pacific consensus on physical activity and exercise in pregnancy and the postpartum period. BMJ open sport & exercise medicine. 2021,7 (2): e000967.
 - [5] Brown WJ, Hayman M, Haakstad LAH, et al. Australian guidelines for physical activity in pregnancy and postpartum.Journal of Science and Medicine in Sport.2022,25 (6):511-519.
 - [6] Physical Activity and Exercise During Pregnancy and the Postpartum Period: ACOG Committee Opinion, Number 804.Journal of International Obstetrics and Gynecology. 2020, 135 (4): e178-e188.
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A Review of Research on Fall Prevention in Elderly Hospitalized Patients

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Abstract: With the increasing aging of our population, the proportion of elderly inpatients is increasing year by year, and falls are a common injury in elderly inpatients with increasing incidence. They are one of the leading causes of severe complications and death. Therefore, early recognition of falls in elderly inpatients has become even more critical. This paper reviews the risk factors and protective measures for falls in elderly inpatients to guide the development of clinical fall protection, improve inpatient safety, and promote the harmonious development of the doctor-patient relationship.

Keywords: Elderly Inpatients; Falls; Care

Introduction

A fall is a sudden, involuntary, unintentional change in body position, falling to the ground or a lower plane^[1]. The National Cause of Death Surveillance Dataset issued by the Chinese CDC shows that falls are the leading cause of injury-related death among people aged 65 and older in China, with a mortality rate of 67.74 per 100,000, adding to the economic and medical burden on families and society. The incidence of falls in the elderly population is high, with studies showing that 30% of people over 65 fall one or more times per year, and the incidence of falls in people over 80 years of age is as high as 50%^[2]. In addition, the incidence of falls is more elevated in hospitals^[3], and the incidence of inpatient falls is one of the most critical indicators to evaluate the quality of hospital care management^[4]. This study outlines the risk factors and protective measures for falls in elderly inpatients to provide a guiding basis for the preventive care of falls in elderly inpatients and contribute to improving the quality of hospital care.

1. Factors associated with falls in elderly hospitalized patients

1.1 Physiological factors

Degeneration of physiological functions, reduced muscle capacity, gait stability, and balance are the main factors affecting falls in the elderly. It has been reported that the incidence of falls among hospitalized patients with an abnormal ratio is about 38.24% in the elderly^[5].

1.2 Disease factors

Cardiovascular diseases, diabetes, hypertension, etc. are all common diseases in the elderly as they age, and those with these diseases are at high risk of falling in the elderly^[6]. Cardiovascular diseases such as hypertension and cardiac arrhythmia can cause blurred vision, darkness and loss of consciousness in a short period, resulting in a dramatic increase in the risk of falls; meanwhile, because of the high sensitivity of the visual and auditory systems, these symptoms may be triggered or aggravated by sudden changes in external environmental stimuli. The audiovisual and other proprioceptive

senses and human balance are closely related. The audiovisual dysfunction makes the patient slow to respond to the sound and color signals of danger alarms, causing the patient's peripheral vestibular function to diminish, leading to falls.

1.3 Drug factors

Prolonged oral use of capillary dilators, sedative sleeping pills, antihyperglycemic drugs and NSAIDs can affect patients' consciousness, gait and blood pressure, increasing the risk of falls. A cross-sectional study based on U.S. Medicare data showed that the incidence of falls among medication users was as high as 10.29% compared to 5.42% in the non-medication taking population^[7]. A prospective case-control study showed that a pharmacist-led intervention to screen for and recommend medications that increase the risk of falls successfully reduced the incidence of falls in older patients by 12.4%^[8].

1.4 Environmental factors

Environmental factors also have a significant impact on the safety of hospitalized patients. Wet floors, uneven floors, poor lighting, obstacles en route, misplaced furniture, and the absence of handrails on toilets or low-floor steps increase the risk of falls in older adults. Studies show that 57.7% of fall place situations during hospitalization for elderly patients are in toilets and 30.8% are at the bedside^[9].

1.5 Psychological factors

Negative psychological conditions, such as depression, frustration, and irritability, can impair the elderly's ability to assess and recognize risky events around them, thereby increasing the risk of falls. Patients with a history of falls are more prone to negativity, inactivity, and fearfulness when moving around, which significantly increases the probability of falls.^[10]

2. Protective measures for falls in elderly inpatients

2.1 Fall risk assessment tool

Accurate assessment of fall risk in older adults is a prerequisite for fall prevention. The Morse Fall Scale, Thomas Fall Risk Assessment Tool, and Johns Hopkins Fall Risk Assessment Scale are commonly used in clinical practice today. Nursing staff can choose different assessment tools according to the place of treatment and purpose of treatment of the assessment target, assess patients' fall risk, and give early interventions to reduce the adverse events caused by falls.

2.2 Health Education

Health education is one of the effective ways to prevent falls among the elderly. Chen Gao^[11] found that the occurrence of falls was related to the lack of knowledge of fall prevention among the elderly and caregivers through a comprehensive assessment of 65-year-olds, and based on this, the results showed that the incidence of falls among the elderly and the degree of injury was reduced by strengthening fall prevention health education (including guidance on dressing for the elderly, guidance on the use of bed rails, and guidance on the "three steps of waking up"). The difference is statistically significant when compared with the control group. The implementation of health education should be based on guiding the elderly to identify the risk factors in daily life and then targeting the corresponding interventions.

2.3 Application of management methods

Root cause analysis (root cause analysis, RCA) is a quality management approach that uses an organizational, systematic, retrospective analysis of adverse events as its core concept. Using root cause analysis helps identify the root cause of a patient's fall and then find targeted ways to reduce the occurrence of the fall by addressing the cause. A study by Wu et al.^[12] showed that using RCA can accurately find the root cause of falls and has a good effect on reducing patient falls. Liu-Liu

Xu^[13] applied RCA to manage fall prevention in female psychiatric patients.

2.4 Fall detection system

Choosing a real-time and efficient fall detection system is crucial to prevent falls in elderly hospitalized patients. A fall monitoring system accomplishes real-time monitoring of falls by monitoring the patient's physiological information and processing the results professionally accordingly. Currently, a wearable fall monitoring system is commonly used in clinical practice. This system usually embeds the device into the patient's cell phone, clothing, accessories, and other locations, collect the body parameters in real-time, and uses the relevant data to determine whether there is a risk of falling. The method is not constrained by physical activity areas and is easy to operate. Ruru Zhao et al.^[14] designed a cell phone short message-based fall detection device for the elderly, which can distinguish between regular physical activity and fall events and automatically generate fall alarm signals to improve the efficiency of patient rescue and treatment. However, the accurate recognition rate and effectiveness of the fall detection device are not high due to the complexity and variability of daily human activities and fall situations, and the elderly have not accepted such devices; therefore, only by enhancing the recognition rate and effectiveness of the fall detection system can we benefit elderly patients.

3. Conclusion

The occurrence of falls in elderly inpatients is the result of a combination of factors, but the prevention of falls in elderly inpatients remains a major challenge in clinical care. The study of falls in elderly inpatients should not only analyze the relevant factors and preventive measures but also focus on multi-departmental and multidisciplinary cooperation using a combination of resources and technologies. Only by combining these prevention strategies can patients be better protected from falls. There are many ways to prevent falls in elderly inpatients, all of which can be effective, but there is a lack of appropriate fall management models. In the future, a multidisciplinary fall prevention team should be formed based on the data of elderly inpatients in China. A fall prevention management model should be built for elderly inpatients in China based on foreign experience.

References

- [1] World Health Organization Fact Sheet.Falls [EB/OL]. [2018-01-16]. <https://www.who.int/en/news-room/fact-sheets/detail/falls>.
- [2] Liu H, Dou W, Wang R, et al. Evaluation of the effect of using fall prevention and fall propaganda magnetic suction board to improve the awareness of fall risk factors among hospitalized elderly patients[J]. *China Geriatric Health Medicine*, 2022, 20(04): 146-148.
- [3] Shi C. Interventions for preventing falls in older people in care facilities and hospitals[J]. *Orthop Nurs*, 2014, 33(1): 48-49.
- [4] Van RF, Suurmond J, Wagner C, et al. Role of relatives of ethnic minority patients in patient safety in hospital care:a qualitative study[J]. *BMJ Open*, 2016, 6(4): e009052.
- [5] Yang XL, Liu LX, Chen X. An overview of the factors associated with falls in elderly hospitalized patients and nursing countermeasures[J]. *China Practical Medicine*, 2013, 8(30):199-200.
- [6] Mitchell RJ, Lord SR, Harvey LA, et al. Obesity and falls in older people: mediating effects of disease, sedentary behavior, mood, pain and medication use. *Arch Gerontol Geriatr*. 2015 Jan-Feb;60(1):52-8.
- [7] Zhou S, Kong JH, Zong YT, et al. Advances in research and interventions for pharmacogenic fall risk in the elderly[J]. *Chinese Journal of Hospital Pharmacy*, 2022, 42(01):98-103.
- [8] Gross K, King AN, Steadman E. Impact of a Pharmacy-Led Fall Prevention Program for Institutionalized Older People. *Sr Care Pharm*. 2021 Apr 1;36(4):217- 222.
- [9] Wang KM, Luo QD, Mao LL, et al. Analysis of factors associated with falls and bed falls in patients admitted to

tertiary care hospitals[J]. Journal of Nursing Practice, 2012, 27(03): 258-259.

[10] Lavedán A, Viladrosa M, Jürschik P, et al. Fear of falling in community-dwelling older adults: a cause of falls, a consequence, or both? PLoS One. 2018 Mar 29; 13(3): e0194967.

[11] Chen GF. Study on the application of total quality management model in preventing falls in elderly inpatients[D]. Guangdong Pharmaceutical University, 2019.

[12] Wu XY, Zhang QY, Li AIS. The application of root cause analysis in the management of falls in elderly patients[J]. China Nursing Management, 2014, 14(05): 494-496.

[13] Xu LL, Lv WJ, Du Z, et al. Root cause analysis and nursing countermeasures of falls in female psychiatric inpatients[J]. Modern clinical nursing, 2015, 14(10): 43-46.

[14] Zhao RR, Wu HX, You MM. Cell phone short message based fall detection device for the elderly[J]. Medical and Health Equipment, 2012, 33(03): 25-27.

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Research Progress on the Mechanisms of Coagulation Dysfunction and Immune Inflammatory Response Related to Sepsis

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Abstract: Thrombocytopenia and Disseminated Intravascular Coagulation (DIC) are clinical pathological syndromes characterized by an imbalance between clotting and fibrinolysis activation as the primary pathogenic mechanism. DIC is a fatal complication of sepsis, which significantly increases the patient's mortality rate. Inflammation and coagulation act as the first line of defence against infection, with inflammation activation leading to the upregulation of clotting function, resulting in DIC. Thrombus formation due to the inflammatory response is a sacrifice of tissue circulation in order to prevent the systemic spread of pathogens, but it can be detrimental to the host itself. There is a close link between the inflammatory response and sepsis-related coagulopathy. Studies of coagulopathy mechanisms from immunologic and inflammatory aspects provide new approaches for early diagnosis and prognostic evaluation of DIC. This paper aims to summarize the research results in terms of immunoinflammatory and review the mechanism of sepsis-related coagulopathy.

Introduction

Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection. It is a complex clinical syndrome with a high incidence rate, increasing by 8.7% annually over the past 20 years^[1]. Coagulation activation and inflammatory response are the basic defense measures of the host during sepsis, including immune thrombosis, platelet involvement in coagulation, immune and inflammatory responses, damage-associated molecular patterns, activation of neutrophils and neutrophil extracellular traps, and vascular endothelial glycocalyx damage.

Tissue factor participates in sepsis-related coagulation dysfunction

TF is a transmembrane glycoprotein expressed by endothelial cells, including pericytes and fibroblasts, as well as blood-derived immune cells. Toll-like receptor 4 detects pathogen-associated molecular patterns, such as lipopolysaccharides, and rapidly induces TF expression at the messenger ribonucleic acid level, promoting the formation of coagulation factors and ultimately resulting in immune thrombosis^[2]. The activation of TF is closely related to cell pyroptosis, which can be achieved through the nucleotide-binding oligomerization domain-containing protein 3 signaling pathway, containing NOD-, LRR-, and pyrin domains, or through a non-classical pathway activated by caspase-11, to reach the target area of TF. After activation, TF is highly expressed in the circulating outer membrane vesicles, forming a cell surface complex with coagulation factor VII/activated coagulation factor VII (FVII/VIIa) and activating factor IX to IXa and factor X to Xa through proteolysis. However, a study using a preclinical model of sepsis showed that the deletion of TF in endothelial cells did not decrease the production of α -thrombin or the mortality rate.

Thrombin is involved in sepsis-related coagulation dysfunction

Thrombin is generated through the cleavage of prothrombin, which is secreted by liver cells. Alpha-thrombin is generated in the extrinsic pathway through exposure to negatively charged molecules, such as inorganic polyphosphate secreted by platelets, RNA/DNA released by damaged or apoptotic cells, or the negatively charged surface of bacterial cell walls^[3]. Thrombin plays a critical role in linking coagulation and inflammation, as it can cleave multiple substrates and regulate thrombus formation and inflammatory responses mainly through interaction with G protein-coupled receptors called protease-activated receptors (PARs). Four PARs have been identified: PAR1, PAR3, and PAR4 are activated by thrombin and tissue factor protease, while PAR2 can be activated by trypsin-like proteases, pancreatic enzymes, FVIIa and FXa. Upon cleavage of PARs by alpha-thrombin on platelets, a large amount of pro-inflammatory molecules are released, including chemokines, growth factors (such as platelet-derived growth factor), serotonin, P-selectin, adenosine diphosphate, CD40 ligand, thromboxane A2, and thrombin itself. This release triggers platelet procoagulant activity.

Platelet-mediated immune response in sepsis-associated coagulopathy

In 2013, Engelmann and Massberg^[4] proposed the concept of immune thrombosis, which is induced by the innate immune response triggered by thrombus formation within blood vessels. The function of innate immune cells that aggregate in the clot is regulated by the coagulation pathway and platelet release products. For instance, chemokine ligands such as CXCL1, CXCL4, CXCL5, CXCL7, and other mediators are released, promoting leukocyte bactericidal activity. At the same time, innate immune cells express PAR, which is activated by thrombin and factor Xa, and promotes pro-inflammatory signaling in dendritic cells. Platelet factor 4, stored in alpha granules, is a member of the CXC chemokine family, and is released during platelet activation. It can induce thrombus formation by activating and aggregating platelets through the immunoglobulin G of anti-PF4/heparin antibodies, which bind to Fc gamma receptor IIA on platelets. On the other hand, it has also been observed that integrin alpha IIb/beta 3 on platelets can bind to Mac-1 on monocytes and achieve fibrinogen binding. Furthermore, Mac-1 interacts with GPIb on platelets, causing white blood cells to adhere to the platelet surface and further enhancing platelet-von Willebrand factor interaction, which is also beneficial for the formation of stable clots.

Damage-associated molecular patterns (DAMPs) are involved in sepsis-associated coagulation disorders

Damage-associated molecular patterns (DAMPs) represent molecular patterns associated with danger or damage. These patterns are released passively after cell death or activated by inflammasomes. DAMPs from many different components or organelles have been identified, including histones, chromosomal DNA, mitochondrial DNA, high mobility group box 1 (HMGB1), heat shock proteins, S100 proteins, and adenosine triphosphate. HMGB1 is a protein that is widely present in the nucleus of cells and appears in almost all cell types. It is an important regulatory factor that plays a key role in innate immune responses and inflammation^[5]. Initially, HMGB1 was described as a nuclear protein that binds to DNA. However, with further research, it was found that HMGB1 can also be secreted into the cytoplasm and extracellular space, becoming a cytokine. In standard models of systemic and local inflammation, HMGB1 can stimulate monocytes/macrophages to produce pro-inflammatory responses.

Endothelial cells participate in sepsis-related coagulation disorders

Endothelial cells are the primary targets of coagulation dysfunction and injury in sepsis. During coagulation dysfunction, activated polymorphonuclear neutrophils release NETs, reactive oxygen species, and other pro-inflammatory mediators. These immune and thrombotic reactions are very complex, producing not only procoagulant, proadhesive, and proinflammatory conditions but also causing glycan damage, upregulation of adhesion molecules, release of VWF, and vascular elastin damage, among other effects^[6]. One of the earliest and most crucial injury sites during sepsis is the endothelial glycocalyx. Plasma proteins regulate vascular permeability and ensure vascular health. The primary

physiological function of the glycocalyx is to inhibit leukocyte adhesion, thereby protecting the vessel and enhancing its self-repair ability. Once bacterial infection occurs, the glycocalyx may be targeted by inflammatory mediators such as histones and proteases, leading to its shedding and inducing leukocyte adhesion. At the same time, endothelial cells also express innate immune receptors^[7], such as TLRs and PARs, which can interact with TLR agonists such as lipopolysaccharides, lipoteichoic acids, and peptide glycan, producing immune response effects such as regulating microvascular permeability and adhesion molecule expression.

Summary

Although sepsis-associated coagulopathy has been studied for decades, the understanding of the mechanisms underlying coagulopathy in sepsis is still limited. To date, no effective treatment for patients has been discovered, nor have new and safer anticoagulants been developed to target inflammasome activation and the mediators of the coagulation cascade. Therefore, interventions before the activation of the coagulation cascade and thrombin generation are necessary. Additionally, new approaches to improving endothelial function by addressing endothelial cell damage and repair mechanisms in sepsis can be effective strategies for addressing coagulopathy. Furthermore, the use of biomarker detection systems to identify and monitor coagulation abnormalities in sepsis patients can guide treatment. Sepsis is a complex disease that involves multiple systems and can lead to a wide range of complications, immune states, and susceptibility to infection. Therefore, a single treatment approach is unlikely to achieve good results in immune thrombosis.

References

- [1] Evans L, Rhodes A, Alhazzani W, et al. Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021[J/OL]. *Intensive Care Medicine*, 2021, 47(11): 1181-1247.
- [2] Yang X, Cheng X, Tang Y, et.al. Bacterial Endotoxin Activates the Coagulation Cascade through Gasdermin D-Dependent Phosphatidylserine Exposure[J/OL]. *Immunity*, 2019, 51(6): 983-996.e6.
- [3] Gajewicz JM, Smith SA, Morrissey JH. Polyphosphate and RNA Differentially Modulate the Contact Pathway of Blood Clotting[J/OL]. *Journal of Biological Chemistry*, 2017, 292(5): 1808-1814.
- [4] Engelmann B, Massberg S. Thrombosis as an intravascular effector of innate immunity[J/OL]. *Nature Reviews Immunology*, 2013, 13(1): 34-45.
- [5] Grégoire M, Tadié JM, Uhel F, et.al. Frontline Science: HMGB1 induces neutrophil dysfunction in experimental sepsis and in patients who survive septic shock[J/OL]. *Journal of Leukocyte Biology*, 2017, 101(6): 1281-1287.
- [6] Iba T, Levy JH. Derangement of the endothelial glycocalyx in sepsis[J/OL]. *Journal of Thrombosis and Haemostasis*, 2019, 17(2): 283-294.
- [7] Bourne JH, Beristain-Covarrubias N, Zuidschewoude M, et.al. CLEC-2 Prevents Accumulation and Retention of Inflammatory Macrophages During Murine Peritonitis[J/OL]. *Frontiers in Immunology*, 2021, 12: 693974.

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Establishment and Verification of a Nomogram for Predicting the Risk of Hip Fracture in Osteoporotic Population Based on Blood Biochemical Indicators and Hip Bone Characteristics

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Abstract: Objective: It is to identify risk factors for hip fractures in osteoporotic patients, and based on these risk factors, a nomogram for predicting the risk of hip fractures in osteoporotic populations was established and validated. **Methods:** From the Donghua database of the Affiliated Hospital of Chengde Medical College, the general information and data of osteoporosis patients with a clear history of trauma who underwent double hip joint anteroposterior examination and blood biochemical examination from June 2019 to June 2020 were collected and screened. The clinical data were randomly divided into a training group and a verification group by R software. Univariate and multivariate logistic regression were used to determine the independent risk factors of hip fracture risk in the osteoporotic population, and a nomogram was established according to the independent risk factors. Then verification of it was conducted. **Results:** Of the 398 researchers studied, 258 (64.8%) were diagnosed with hip fractures, with the independent risk factors of age, serum calcium concentration, average femoral neck length, femoral shaft average diameter, and femoral average cortical thickness for HF in OP patients. The area under the curve (AUC) of the nomogram for predicting HF in OP patients was 0.998 and 0.990 in the training group and validation group, respectively. The calibration curve reflects the good consistency between the prediction results and the model, and the clinical decision-making. The curve reflects the higher clinical value of the nomogram. **Conclusion:** The nomogram established according to the independent risk factors of patients could accurately predict the risk of HF in OP patients. Clinicians can use this model to provide evidence for individualized diagnosis and treatment of patients and improving treatment plans.

Keywords: Nomogram; Osteoporosis; Hip Fracture; Risk Factors

Introduction

The incidence of osteoporosis (OP) is on the rise as the population ages and life expectancy increases^[1]. Around the world, the prevalence of OP is approximately 21.7%^[2]. Osteoporotic fractures, also known as fragility fractures, are the most common complication of OP. In the United States, about 50% of women and 20% of men with OP will develop fragility fractures^[3]. Hip fractures have the highest morbidity, mortality and costs of all osteoporotic fractures^[4]. With the development of drugs and the maturity of surgical techniques, the treatment of HF has achieved great progress, and the incidence of HF tends to be stable.^[5] However, the high disability rate and high mortality rate of HF are still a major challenge to clinicians and patients. At present, there are as many as 48 tools for fracture prediction in the world^[6], and most of them are predicted based on bone density measured by dual-energy X-ray absorptiometry (DXA) or quantitative CT. However, due to the popularity of equipment, primary medical units^[7] cannot make accurate and effective predictions. In recent years, more and more studies have shown that bone morphology is closely related to fractures^[8, 9]. In addition, blood biochemical indicators have also been confirmed by many scholars to be related to fracture risk^[10, 11]. The nomogram is a widely used tool for predicting disease onset and prognosis^[12]. With the help of the nomogram, clinicians can obtain accurate evaluation values based on the clinical characteristics of each patient, to assess the risk of clinical events, and to

formulate individualized coping strategies. The purpose of this study is to identify the risk factors of HF by analyzing the hip joint geometry and blood biochemical examination of the patients, and establish a nomogram to evaluate the risk of HF according to the risk factors.

Materials and methods

Selection criteria

From June 2019 to January 2022, the clinical data of the OP population who received double hip alignment examination and blood biochemical examination in the Affiliated Hospital of Chengde Medical College due to trauma were collected retrospectively, and the following variables were recorded: gender, age, mean femoral neck length (MFNL), mean femoral shaft diameter (MFSD), mean femoral cortical thickness (MFCT), cholesterol (CHOL), triglycerides (TG), low-density lipoprotein cholesterol, (LDL), high-density lipoprotein cholesterol (HDL), serum calcium (Ca), serum magnesium (Mg), serum Inorganic phosphorus (IP).

Patients included in the study were determined based on the following criteria. Inclusion criteria: 1. Patients diagnosed with osteoporosis (American Association of Clinical Endocrinologists/American College of Endocrinology Clinical Practice Guidelines for the Diagnosis and Treatment of Postmenopausal Osteoporosis-2020 Update^[13] was used as its diagnostic criteria). 2. Clarify the history of hip wounds; with clear consciousness, can cooperate for the examination and clinical data collection; 3. In double hip joint position, standard X-ray^[14] was used, with the elimination criteria as follows: 1. High energy damage, pathological fracture; 2. Severe liver and kidney dysfunction or long-term use of related drugs affecting bone absorption.

Morphological parameter measurement of femur

The DR digital X-ray photography system (Siemens A032011 in the Netherlands) was used to conduct standard anteroposterior plain film examinations on both hip joints, then imported the qualified plain films into the image processing and measurement softening medical image archiving and transmission system software, and quoted the software that came with it. In the measurement procedures, two experienced observers independently measured FNL, FSD, FCT (In HF patients, the healthy side was measured). Taking the femoral head as a circle, the software's built-in circle tool was used to determine the boundary of the femoral head, arbitrarily determining four points on the circle, then choosing two as a group, connecting these two points respectively, and find out their vertical intersection point of the bisector and the perpendicular bisector is the center of the femoral head. Use the straight line tool of the software to determine the shortest distance of the femoral neck. Half of the shortest distance of the femoral neck is the center of the femoral neck. Draw a line segment connecting the center of the femur and the center of the femoral neck and extend it to the midline of the femoral neck.

FNL: Draw the central axis of the femoral shaft, draw a straight line perpendicular to the central axis of the femur at the place that 2 cm away from the junction of the lower border of the lesser trochanter and the cortex of the femur, and measure the distance between the line and the intersection point of the cortex on both sides of the femoral shaft. This distance is the diameter of the femoral shaft FNL.

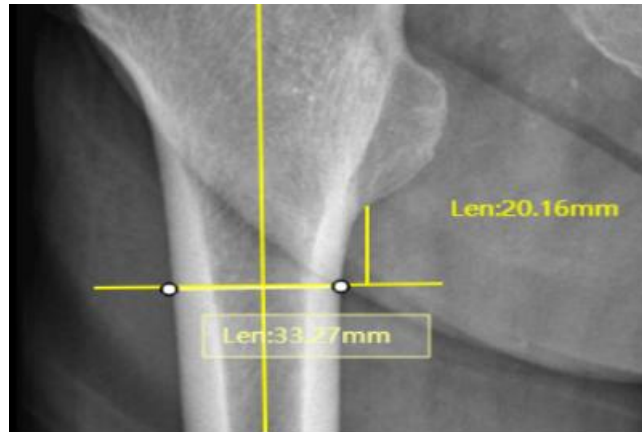


Figure 1: Measuring Femoral Shaft Diameter

FSD: Draw the central axis of the femoral neck, respectively as the central axis of the femoral shaft and the central axis of the femoral neck, and measure the distance from the intersection of the two extension lines to the center of the femoral head.

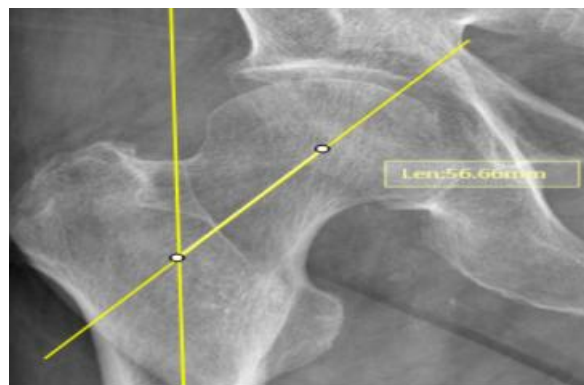


Figure 2: Measuring femoral neck length

FCT: Draw a straight line perpendicular to the central axis of the femoral shaft 5 cm away from the intersection of the lower edge of the lesser trochanter with the cortex of the femur, measure the distance between the line and the intersection point of the lateral cortex on both sides of the femoral shaft, and measure the distance between the straight line and the medial cortex on both sides of the femoral shaft. Combining the distance of the intersecting point, the difference between the above two lengths is the thickness of the femoral cortex.

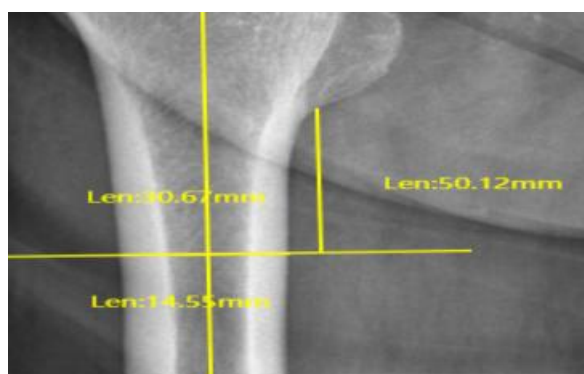


Figure 3: Measurement of Femoral Cortical Thickness

Data analysis and model building

The population included in the study was randomly divided into a training group and a verification group at a ratio of 7:3, and statistical analysis was performed using software IBM SPSS 27.0 and R4.03. Means and standard deviations were used for comparison, and the t-tests on two independent samples were used for comparison, and the difference was considered statistically significant with $p < 0.05$. Univariate logistic regression analysis was used to screen risk factors for hip fracture (Enter method), and these risk factors were incorporated into multivariate logistic regression analysis (Enter method) to screen out independent risk factors associated with hip fracture. Use multiple R packages to draw nomograms, calibration plots, ROC curves and DCA plots to evaluate the performance of predictive models.

Result

Baseline characteristics

According to the inclusion and exclusion criteria, a total of 398 patients in the Donghua System of the Affiliated Hospital of Chengde Medical College met the inclusion criteria for this experiment. Results: 172 male patients, 226 female patients; 87 patients under 60 years old; 125 patients between 60-69 years old; 86 patients between 70-79 years old; 80-89 years old were included 86 cases and 14 cases of patients over 90 years old. Using "R" analysis software, according to the ratio of 7:3, they were randomly divided into a training group and a verification group. The training group included 280 patients, 182 of whom had HF, and the verification group included 198 patients, of which 76 had HF. Comparing the general data of the training group and the verification group, there was no statistically significant difference in clinical characteristics ($p > 0.05$). See Table 1 for details

| Variables | | Total (n=398) | group train (n=280) | group validation (n=118) | <i>p</i> |
|-----------|--------|-----------------------|-----------------------|--------------------------|----------|
| Sex ,n(%) | Female | 226(56.784) | 160(57.143) | 66(55.932) | 0.824 |
| | Male | 172(43.216) | 120(42.857) | 52(44.068) | |
| FCT | | 15.100[13.950,16.360] | 15.210[13.960,16.440] | 14.860[13.880,16.060] | 0.26 |
| FSD | | 30.140[28.060,32.340] | 30.040[27.970,32.080] | 30.420[28.340,32.790] | 0.149 |
| FNL | | 49.780[46.230,52.860] | 49.890[46.580,53.030] | 49.570[46.000,52.250] | 0.499 |
| Mg | | 0.860[0.820,0.920] | 0.860[0.820,0.920] | 0.860[0.800,0.910] | 0.258 |
| Ca | | 2.230[2.140,2.310] | 2.230[2.140,2.310] | 2.230[2.140,2.320] | 0.699 |
| HDLc | | 1.140[0.940,1.330] | 1.150[0.940,1.330] | 1.120[0.960,1.330] | 0.549 |
| LDLc | | 2.410[1.850,2.960] | 2.410[1.820,2.920] | 2.480[1.930,3.020] | 0.239 |
| TG | | 1.220[0.890,1.700] | 1.220[0.870,1.690] | 1.320[0.970,1.760] | 0.228 |
| CHOL | | 4.150[3.480,4.840] | 4.120[3.420,4.780] | 4.210[3.560,4.970] | 0.304 |
| Age | | 68.000[60.000,80.000] | 68.000[60.000,79.000] | 67.000[60.000,80.000] | 0.823 |

Table 1 Comparison of general data between the training group and the verification group

Risk factors for hip fractures

In the training set (280 patients), there were 182 patients with HF and 98 patients without HF. Through single factor logistic regression, it was found that gender, age, CHOL, TG, LDL, Ca, MFNL, MFSD, and MFCT were compared between the two groups, and the differences were statistically significant ($p < 0.05$), which were related to the occurrence of HF in the

osteoporotic population. Risk factors; Multivariate logistic regression analysis showed that gender, age, Ca, MFNL, MFSD, and MFCT were independent risk factors for hip fractures. See Table 2 for details.

| Variables | | Univariate analysis | | | Multivariate analysis | | |
|-----------|--------|---------------------|--------------|---------|-----------------------|-----------------|---------|
| | | OR | 95%CI | p-value | OR | 95%CI | p-value |
| Sex | Female | | | | | | |
| | Male | 0.356 | 0.215, 0.591 | <0.01 | 0.001 | 0-0.373 | 0.022 |
| FCT | | 0.32 | 0.243-0.420 | <0.01 | 0.095 | 0.016-0.563 | 0.01 |
| FSD | | 2.531 | 2.021-3.169 | <0.01 | 27.889 | 2.028-383.526 | 0.013 |
| FNL | | 1.089 | 1.567-2.088 | <0.01 | 1.753 | 1.049-2.931 | 0.032 |
| Mg | | 6.287 | 0.428-92.304 | 0.177 | | | |
| Ca | | 0.2 | 0.03-0.150 | <0.01 | 0.005 | 0-0.997 | 0.05 |
| HDLc | | 1.875 | 0.889-3.952 | 0.097 | | | |
| LDLc | | 0.443 | 0.316-0.620 | <0.01 | 0.002 | 0-2.045 | 0.078 |
| TG | | 0.625 | 0.447-0.874 | 0.05 | 0.152 | 0.013-1.796 | 0.135 |
| CHOL | | 0.606 | 0.471-0.781 | <0.01 | 36.894 | 0.134-10177.986 | 0.208 |
| Age | | 1.12 | 1.207 | <0.01 | 1.314 | 1.097-1.574 | 0.03 |

Table 2: Comparison of univariate and multivariate analyzes of all variables based on HF

Development and validation of nomograms

According to the logistic regression analysis, 6 independent risk factors related to the risk of HF in OP patients were identified, and a nomogram for predicting the risk of HF in patients with osteoporosis was constructed, as shown in Figure 4; at the same time, a forest plot was established according to the risk of HF, as shown in Figure 5; the discriminative power of the prediction model is evaluated by drawing the ROC curve. The AUC values of the training group and the verification group were 0.998 and 0.992, respectively, which proved that the nomogram model had good discriminative power, see Figure 6; the calibration curve showed that the model predicts the OP The risk of hip fractures of patients was in good agreement with the actual risk, as shown in Figure 7; the DCA curve showed that the nomogram provided a good prediction model for assessing the risk of hip fractures, which may have high clinical application significance. See Figure 8.

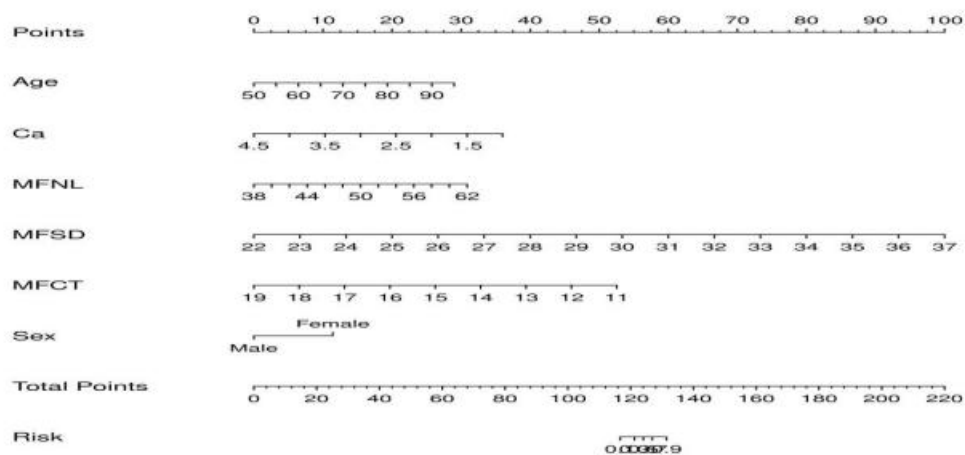


Figure 4: Nomogram developed in this study to predict hip fracture risk in patients with moderate OP ($p < 0.05$)

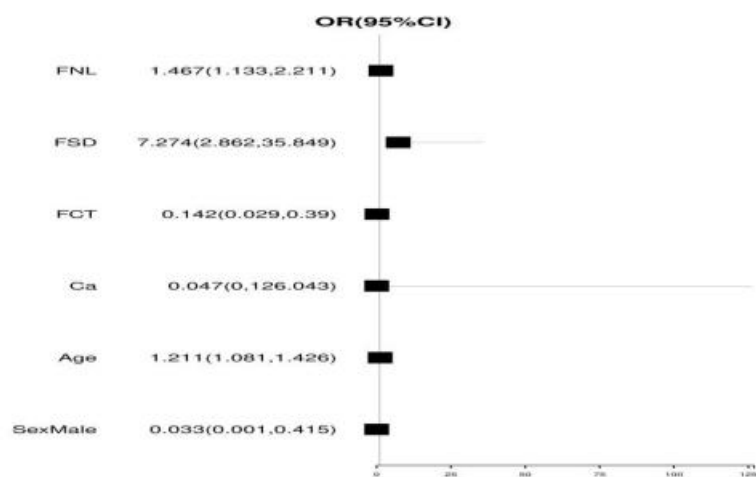


Figure 5: Forest plot. Using multivariate logistic regression analysis to describe the effect of different risk factors in predicting the occurrence of hip fracture

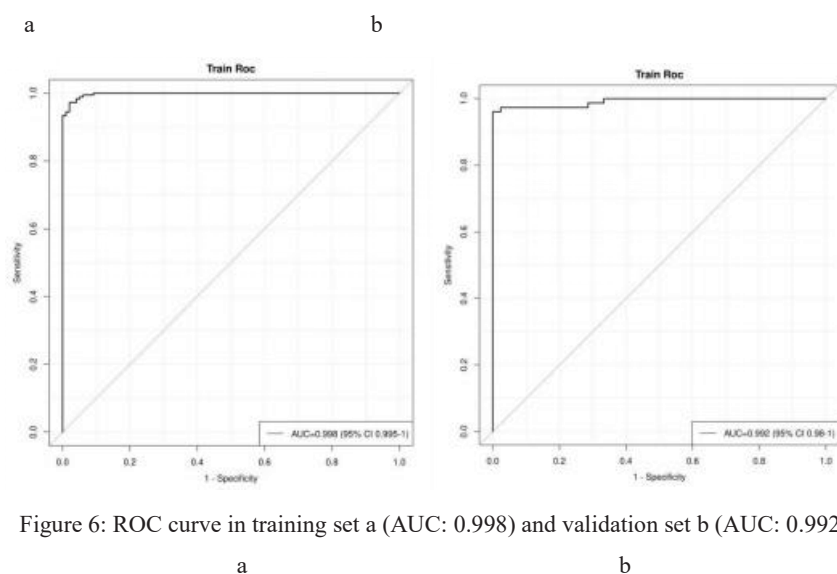


Figure 6: ROC curve in training set a (AUC: 0.998) and validation set b (AUC: 0.992)

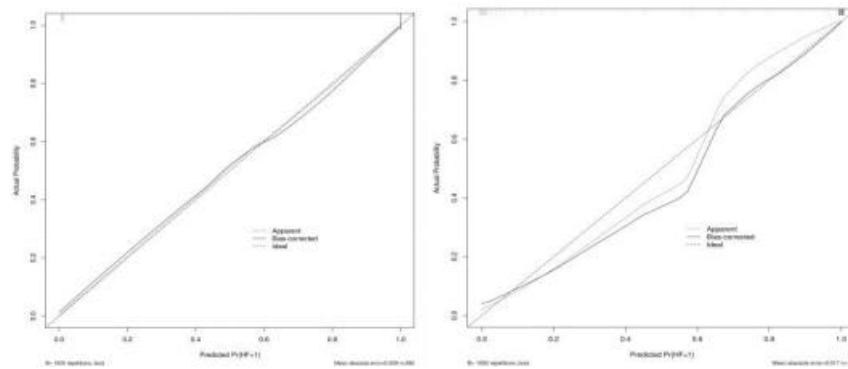


Figure 7: Calibration curves, training set (a) and validation set (b).

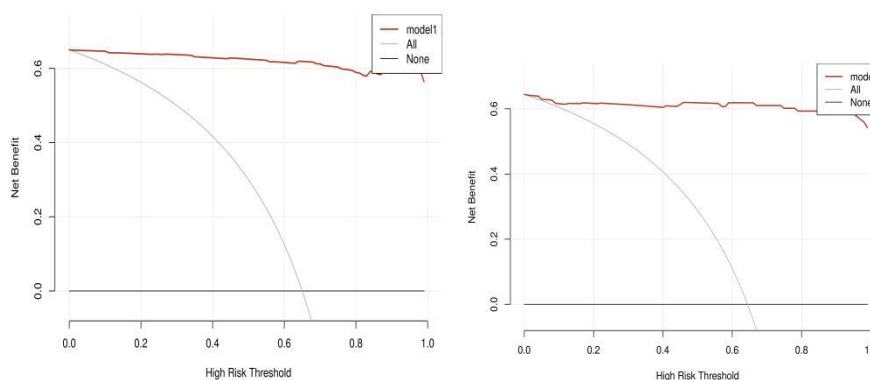


Figure 8: DCA curve. In training set (a) and validation set (b)

Discussion

With the ageing of the global population, OP has become a common disease, and HF is its most common and serious complication, which will significantly increase the social cost^[15] and seriously affect the function and life of patients. The study by Olalla Guzon-Illescas et al. showed that the overall survival rate decreased after the diagnosis of HF^[16]. At present, studies in many countries have shown that preventive drug therapy can effectively reduce the incidence of HF^[17]. Therefore, early prevention has become the consensus of researchers and clinical workers, so it is very meaningful to establish an effective risk prediction model. In our study, we analyzed the data of 398 patients with HF and identified age, gender, MFSD, MFNL, MFCT, as risk factors independently associated with HF, on this basis, we constructed A nomogram of HF risk in the elderly population, validated by related models. Through this nomogram, clinicians can identify the risk of HF in patients, which provide guidance for preventive measures for fractures.

Fragility fractures occur in people over 50 years old. In our study, age is an independent risk factor for HF, which is consistent with the conclusions of most researchers^[18]. Decreased intensity, while we considered increased underlying disease and decreased physical activity, also made age a risk factor for developing HF. In addition, the gender (female) is an independent risk factor for HF, and estrogen plays an important role in the balance of bone metabolism. It can stimulate the proliferation and differentiation of osteoblasts, promote the apoptosis of osteoclasts, and maintain the balance in the bone microenvironment, to protect bone tissues, and the decline of estrogen levels after women enter menopause leads to the destruction of the balance of bone microenvironment, which leads to an increased risk of fractures^[19]. We believe that women can use estrogen supplements in real time after menopause, which can effectively reduce fractures risk^[20]; Ca is an independent risk factor for HF, Ca is an important substance to maintain bone remodeling and promote bone formation, and is an important nutrient for bones. In this study, the decrease in Ca leads to an increased risk of HF. Calcium

supplementation may be needed in due course, but high-dose calcium supplementation may lead to increased cardiovascular risk^[21]. Therefore, regular and systematic use of calcium supplementation is the safest and most effective way to reduce the risk of HF.

Due to the reduction of bone mass and bone quality in the human body, the bone strength is reduced. Among them, the bone quality is mainly affected by the geometric properties and material properties of the bone. Some studies have shown that^[22], the geometric changes of the hip joint can be a decisive factor for whether the fracture occurs or not, and the reason is consistent with the mechanics. The femoral neck is an important anatomical tissue connecting the femoral head and the femoral shaft. According to geometric mechanics, if the moment arm is too long, it is easy to break when it is subjected to a small force (such as a low-energy injury such as a fall). Therefore, the shape of the femoral neck that is too long may lead to HF, the direction of the trabecular bone in the femoral neck is different^[23], and the high shear force is also an important internal cause of HF. Cortical bone is an important supporting tissue for bone. During the aging process, the pores in the cortex increase, while the bone quality decreases, the bone strength decreases, which makes fractures prone to occur. Therefore, with the decrease of FCT, the risk of HF increases; the transition zone, as an important connection between the femoral head and the femoral shaft, is prone to fracture, and the diameter of the femoral shaft measured at this site is related to the risk of fracture, which may be related to the cortical changes in the transition zone. Osteogenesis, FSD increases with aging in compensation^[24]. Due to the presence of osteoporosis in patients, the femoral medullary cavity expands, which leads to the cortex in this area gets thinner, then the load capacity of the bone is reduced and is prone to fractures. In addition, whether different blood lipid levels can affect fractures is controversial. Wang Yanmao^[25] and some other scientists believed that different blood lipid levels had a strong correlation with fractures, but in this study, it was found that CHOL, TG, LDL, HDL and other indicators were not independent risk factors for HF. It is consistent with the research results of M Tohidi et al.^[26] This still requires further research on the understanding of physiology, pathways, etc.

Insufficiency of this study: first, this study is a retrospective study, and there is a certain selection bias; second, in addition, the sample size was small and the case source was single, and large samples from other databases are still needed for research verification; third, in this study, the research item included was not sufficient, where it only included some morphological indicators and biochemical indicators, and other parameters such as material science should be further added. However, this study still provides help for primary hospitals to predict and prevent HF.

Conclusion

Age, gender, FSD, FNL, and FCT are risk factors independently associated with HF. A nomogram model was constructed based on these risk factors. This model can be used to predict the risk of HF in OP patients. Based on this nomogram, it can be used as references by clinicians in helping patients make wiser prevention and treatment options.

References

- [1] Clynes MA, Harvey NC, Curtis EM, Fuggle NR, Dennison EM, Cooper C, The epidemiology of osteoporosis. *British medical bulletin* 2020, 133(1):105-117.
- [2] Salari N, Darvishi N, Bartina Y, Larti M, Kiaei A, Hemmati M, Shohaimi S, Mohammadi M, Global prevalence of osteoporosis among the world older adults: a comprehensive systematic review and meta-analysis. *Journal of orthopaedic surgery and research* 2021, 16(1):669.
- [3] Porter JL, Varacallo M, Osteoporosis. In: StatPearls. edn. Treasure Island (FL): StatPearls Publishing Copyright © 2022, StatPearls Publishing LLC.; 2022.
- [4] Wáng YXJ, Fragility fracture prevalence among elderly Chinese is no more than half of that of elderly Caucasians. *Quantitative imaging in medicine and surgery* 2022, 12(2):874-881.
- [5] Curtis EM, Moon RJ, Harvey NC, Cooper C: The impact of fragility fracture and approaches to osteoporosis risk assessment worldwide. *Bone* 2017, 104:29-38.

- [6] El-Hajj Fuleihan G, Chakhtoura M, Cauley JA, Chamoun N: Worldwide Fracture Prediction. *Journal of clinical densitometry : the official journal of the International Society for Clinical Densitometry* 2017, 20(3):397-424.
- [7] Perry L, Malkin R: Effectiveness of medical equipment donations to improve health systems: how much medical equipment is broken in the developing world? *Medical & biological engineering & computing* 2011, 49(7):719-722.
- [8] Aldieri A, Terzini M, Audenino AL, Bignardi C, Morbiducci U: Combining shape and intensity dxa-based statistical approaches for osteoporotic HIP fracture risk assessment. *Computers in biology and medicine* 2020, 127:104093.
- [9] Senra AR, Carvalho DR, da Silva MR, Sousa AN, Torres J: Proximal femur geometry: a major predictor of proximal femur fracture subtypes. *Hip international: the journal of clinical and experimental research on hip pathology and therapy* 2022, 11207000221129785.
- [10] Barzilay JI, Buzkova P, Kuller LH, Cauley JA, Fink HA, Sheets K, Robbins JA, Carbone LD, Elam RE, Mukamal KJ: The Association of Lipids and Lipoproteins with Hip Fracture Risk: The Cardiovascular Health Study. *The American journal of medicine* 2022, 135(9):1101-1108.e1101.
- [11] Song Y, Xu L, Jin X, Chen D, Jin X, Xu G: Effect of calcium and magnesium on inflammatory cytokines in accidentally multiple fracture adults: A short-term follow-up. *Medicine* 2022, 101(1):e28538.
- [12] Balachandran VP, Gonen M, Smith JJ, DeMatteo RP: Nomograms in oncology: more than meets the eye. *The Lancet Oncology* 2015, 16(4):e173-180.
- [13] Watts NB, Camacho PM, Lewiecki EM, Petak SM: American Association of Clinical Endocrinologists/American College of Endocrinology Clinical Practice Guidelines for the Diagnosis and Treatment of Postmenopausal Osteoporosis-2020 Update. *Endocrine practice : official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists* 2021, 27(4):379-380.
- [14] Fajar JK, Taufan T, Syarif M, Azharuddin A: Hip geometry and femoral neck fractures: A meta-analysis. *Journal of orthopaedic translation* 2018, 13:1-6.
- [15] Rinonapoli G, Ruggiero C, Meccariello L, Bisaccia M, Ceccarini P, Caraffa A: Osteoporosis in Men: A Review of an Underestimated Bone Condition. *International journal of molecular sciences* 2021, 22(4).
- [16] Guzon-Illescas O, Perez Fernandez E, Crespi Villarias N, Quirós Donate FJ, Peña M, Alonso-Blas C, García-Vadillo A, Mazzucchelli R: Mortality after osteoporotic hip fracture: incidence, trends, and associated factors. *Journal of orthopaedic surgery and research* 2019, 14(1):203.
- [17] LeBoff MS, Greenspan SL, Insogna KL, Lewiecki EM, Saag KG, Singer AJ, Siris ES: The clinician's guide to prevention and treatment of osteoporosis. *Osteoporosis international : a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA* 2022, 33(10):2049-2102.
- [18] Simunovic N, Devereaux PJ, Sprague S, Guyatt GH, Schemitsch E, Debeer J, Bhandari M: Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. *CMAJ : Canadian Medical Association journal*, 2010, 182(15):1609-1616.
- [19] Li L, Zhao X, Yang X, Tang X, Liu M: Dynamic hip screws versus cannulated screws for femoral neck fractures: a systematic review and meta-analysis. *Journal of orthopaedic surgery and research* 2020, 15(1):352.
- [20] Fracture fixation in the operative management of hip fractures (FAITH): an international, multicentre, randomised controlled trial. *Lancet (London, England)* 2017, 389(10078):1519-1527.
- [21] Bartels S, Kristensen TB, Gjertsen JE, Frihagen F, Rogmark C, Dolatowski FC, Figved W, Benth J, Utvåg SE, Total Hip Arthroplasty Leads to Better Results After Low-Energy Displaced Femoral Neck Fracture in Patients Aged 55 to 70 Years: A Randomized Controlled Multicenter Trial Comparing Internal Fixation and Total Hip Arthroplasty. *The Journal of bone and joint surgery American volume* 2022, 104(15):1341-1351.
- [22] Rotem G, Sharfman ZT, Rath E, Gold A, Rachevsky G, Steinberg E, Drexler M, Haviv B, Amar E, Does hip morphology correlate with proximal femoral fracture type? *Hip international: the journal of clinical and experimental research on hip pathology and therapy* 2020, 30(5):629-634.

- [23] Zhu X, Mei J, Ni M, Jia G, Liu S, Dai Y, Zhang Y, [General anatomy and image reconstruction analysis of the proximal femoral trabecular structures]. Chinese journal of reparative and reconstructive surgery 2019, 33(10):1254-1259.
- [24] Hu ZS, Liu XL, Zhang YZ, Comparison of Proximal Femoral Geometry and Risk Factors between Femoral Neck Fractures and Femoral Intertrochanteric Fractures in an Elderly Chinese Population. Chinese medical journal 2018, 131(21): 2524-2530.
- [25] Wang Y, Dai J, Zhong W, Hu C, Lu S, Chai Y, Association between Serum Cholesterol Level and Osteoporotic Fractures. Frontiers in endocrinology 2018, 9:30.
- [26] Tohidi M, Barzegar N, Hasheminia M, Azizi F, Hadaegh F, Association of different lipid measures with incident bone fractures: Tehran lipid and glucose study. Postgraduate medicine 2022, 134(3):326-332.

Qualitative Study on Nutrition and Immune-Mediated Adverse Events in Patients with Hepatocellular Carcinoma Immunotherapy in Hainan Province

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Abstract: Objective To gain an in-depth understanding of the nutritional and immune adverse event perceptions and needs of immunotherapy patients with hepatocellular carcinoma in Hainan province, with the aim of providing a basis for developing a model for the full management of adverse event symptoms and nutrition in immunotherapy patients with hepatocellular carcinoma. Methods Using the phenomenological research method in qualitative research, 13 immunotherapy patients with hepatocellular carcinoma were interviewed in depth in a semi-structured manner, and the interview data were analyzed by the Colaizzi's 7-step method on phenomenological data with the Nvivo10 software. Result Four themes were summarized: multiple factors to undernutrition; adverse event of immune; ignorance the correlation of immune adverse event and nutrition; the way to acquiring nutrition and immune adverse event was diverse; timely, professional data-based and continuous guidance was needed. Conclusion Despite the adverse event of immunotherapy patients with hepatocellular carcinoma, we should pay attention to the nutritional needs and the treatment of adverse immune events in physiological, social, psychological and environmental aspects, to achieve a multi-form educational intervention mode with self-management and establish a feasible high-quality, efficient and sustainable whole-course management mode.

Keywords: Hepatocellular Carcinoma; Immunotherapy; Nutrition; Immune-Mediated Adverse Events; Qualitative Study

Introduction

In China, liver cancer is mostly secondary to chronic viral cirrhosis and alcoholic liver disease, which can cause serious impairment of liver function and impair protein synthesis and degradation, directly affecting the metabolism of nutrients in the body and leading to malnutrition in patients, who are often accompanied by gastrointestinal symptoms such as nausea, vomiting and loss of appetite, resulting in weight loss and wasting, further aggravating malnutrition in patients. Immunotherapy is currently an effective method of palliative and translational treatment^[1]. Studies have shown that albumin and prognostic nutritional indices decreased significantly in patients in the immunotherapy disease progression group, suggesting that immunotherapy can alter the nutritional and metabolic status of patients with advanced hepatocellular carcinoma and that nutritional indices are significantly correlated with prognosis, therefore, attention should be paid to the nutritional and metabolic status of patients with immunotherapy^[2-3]. The long-term benefits of immunotherapy in patients with hepatocellular carcinoma are accompanied by the risk of malnutrition and the occurrence of immune-related adverse events. In a Meta-analysis, the common immune-related adverse events in 425 patients were rash 47 (11%), hypothyroidism 35 (8.2%), hepatitis 24 (5.6%), hyperthyroidism 21 (4.9%), adrenal insulin deficiency 17 (4%), pneumonia 15 (3.5%) and colitis 11 (2.6%)^[4], while severe immune adverse reactions require different nutritional and symptom management depending on the degree of gastrointestinal symptoms and liver and renal function of the patient, in addition to hormonal

therapy and adjustment of the dose of immune agent drugs.

As there is still a lack of research on immune adverse events and nutritional support for immunotherapy patients with hepatocellular carcinoma in China and abroad, and the new challenge of immunotherapy is when to initiate nutritional support, what nutritional agents to choose and how to develop nutritional regimens to mitigate immune responses, and there is a lack of research on the knowledge and needs of immune adverse events and nutritional-related factors among immunotherapy patients with hepatocellular carcinoma. Therefore, this paper uses a qualitative study to understand the immune adverse events and nutritional knowledge and beliefs of immunotherapy patients in Hainan Province, with a view to providing a reference for the development of a model for the management of nutrition and immune adverse events in immunotherapy patients with liver cancer.

1. Subjects and methods

1.1 Study subjects

A purposive sampling method was used to select inpatients from a tertiary care hospital in Hainan Province from April to June 2022 as interview subjects. Inclusion criteria: ① age ≥ 18 years old; ② liver cancer patients receiving immunotherapy; ③ literacy level primary school or above; ④ clarity of their condition; ⑤ informed consent. Exclusion criteria: (i) severe confusion, confusion, cognitive impairment; (ii) inability to communicate verbally. The sample was determined on the basis of "saturation" and "adequacy" of the data. A total of 13 patients were interviewed, coded P1-P13, aged 48-74 years, with a mean age of 61.07 ± 7.68 years; see Table 1 for details.

Table 1 General information of the interviewed patients (n=13)

| Number | Gender | Age | Education level | Home location | Monthly income (RMB) | How medical expenses are paid |
|--------|--------|-----|--------------------------------|---------------|----------------------|----------------------------------|
| P1 | Men | 55 | Junior/Junior High School | City | ≥ 5000 | Public funding/medical insurance |
| P2 | Men | 64 | Bachelor's degree and above | City | ≥ 5000 | Public funding/medical insurance |
| P3 | Female | 68 | Bachelor's degree and above | City | ≥ 5000 | Public funding/medical insurance |
| P4 | Men | 60 | Bachelor's degree and above | City | ≥ 5000 | Public funding/medical insurance |
| P5 | Female | 62 | Junior/Junior High School | City | 1000-3000 | Public funding/medical insurance |
| P6 | Men | 68 | Specialties | County | 1000-3000 | Public funding/medical insurance |
| P7 | Female | 74 | Junior/Junior High School | City | 1000-3000 | Public funding/medical insurance |
| P8 | Female | 64 | High School / Secondary School | City | 3000-5000 | Self-financed |
| P9 | Men | 68 | High School / Secondary School | Rural | < 1000 | Rural cooperative medical care |
| P10 | Female | 48 | Junior/Junior High School | County | 1000-3000 | Public funding/medical insurance |
| P11 | Female | 50 | Junior/Junior High School | Rural | 1000-3000 | Rural cooperative medical care |
| P12 | Men | 58 | Specialties | City | 3000-5000 | Public funding/medical insurance |
| P13 | Men | 55 | High School / Secondary School | County | 3000-5000 | Public funding/medical insurance |

1.2 Methodology

1.2.1 Study design

A semi-structured interview was used to collect data, using the phenomenological research method in qualitative research as the methodological basis. An interview outline was drawn up before the interview, focusing on the perception of immune adverse events and nutrition-related factors in immune patients with hepatocellular carcinoma, and two patients were pre-interviewed to revise the interview outline, which was finalised to include: ① What kind of adverse effects do you currently know about immunotherapy? ② What do you think are the causes of nutritional deficiencies? ③ What do you think is the relationship between immune adverse events and nutrition? ④ What would you do if you encountered nutritional problems? ⑤ What would you do in the event of an immune adverse event? ⑥ What kind of help would you like to receive from medical staff regarding adverse immune events and nutrition?

1.2.2 Method of data collection

Through one-to-one interviews, the study participants were informed of the purpose, method and content before the interview, and the need for field notes and recordings was explained; they undertook to sign the informed consent form with code instead of name and confidentiality of information; the three researchers underwent rigorous training before the interview and established good cooperation to ensure a reasonable division of labour in listening, questioning and recording; the researchers had good interviewing skills to The location was the meeting room of each department, in a relaxed, quiet and comfortable environment. The interviews were conducted in a relaxed, quiet and comfortable environment, avoiding the busy hours of the departments and were conducted between 16:00 and 17:00 daily.

1.2.3 Data analysis and quality control

After the interviews were completed, the audio recordings were transcribed verbatim in a timely manner and the non-verbal behaviour of the interviewees and the basic personal information they provided were recorded. Each interviewee's transcript was sequenced in order from P1-P13 and a separate file was created. The analysis of the data was carried out throughout the data collection and the two were inseparable at the same time. During the analysis of the interview material, Colaizzi's 7-step method for analysing phenomenological material was used, and the material was imported and managed with the help of NVivo 10.0 software. During the analysis of the material, the researcher repeatedly listened to and read the original transcripts of the conversations to identify the commonalities that were the subject of this study.

2. Results

2.1 Theme 1: Factors associated with undernutrition are multiple

Most patients perceived malnutrition as a result of physical discomfort caused by the disease itself and reduced eating, or as a result of worsening chronic illnesses such as high blood glucose, hypertension and lipids due to fear of not eating properly. p1: "Mainly liver and gallbladder disease causing fear of eating more, poor appetite after immunotherapy, and slightly reduced appetite during the last fever." P6: "Because of diabetes, I don't know how to control my diet, my wife will only cook me good food according to my preference. p8: "Diabetes, afraid to eat anything, once I eat, I get high." P10: "High blood pressure and blood lipids, and high blood sugar. Taking medicines to lower blood pressure, blood lipids and blood sugar, I can't eat for meals. You can only drink porridge, and when you drink porridge, your blood sugar is high again." P11: "I don't dare to eat when my blood pressure is high." P12: "Individuals do not absorb well." P13: "Abdominal pain doesn't want to eat."

Psychological aspects Patients also perceived negative emotions such as anxiety and resistance due to the tumour as a cause of malnutrition. p5: "The condition is stressful and I don't want to eat because I don't feel well." P10: "Don't like to eat, don't want to eat."

Environmental aspects Different generations, geographical areas and changes in the eating environment can have an impact on malnutrition. p2: "I am from Guizhou and the food in or around the canteen is not good. Your canteen is light, but there is a lot of soy sauce and there is no way to choose too much in terms of food variety, which does not suit my appetite, and I don't want to eat even more when the weather is sultry." P5: "I don't want to eat in the canteen." P9: "People of our era experienced hunger and hardship in the 1960s, when there was not enough to eat and malnutrition. Now times are better and there is a big change from the old life, yet we can't eat because of illness. People in the countryside don't have as much knowledge, they don't eat scientifically, they eat whatever they want according to their appetite, and they can't do with a light diet."

Social support As a result of social policies, a large proportion of patients are now cared for by only children or chaperones. p5: "The children are busy with work and the chaperones they hire do not take good care of them." P10: "The food the child cooks is not to their liking."

2.2 Theme 2: Immune adverse events and nutritional correlates not attended

Nutrition is important for health P9: "It is important to supplement nutrition when people are old and have high blood lipids that block the blood vessels in the brain and cause paralysis in one limb." P10: "Apart from the disease itself, it is the effect of immunotherapy drugs. If you have bad nutrition, you will be in poor health."

Belief that malnutrition is not related to adverse immunotherapy events P2: "Not knowing what the adverse immune reactions are, let alone how to tell, if there are adverse immune events and malnutrition, it is the medication that is causing them." P7: "Malnutrition is caused by the disease itself and has nothing to do with immunotherapy." P11: "I don't know what immunotherapy adverse events are and I don't care about nutrition, we Hainan people are different from you, we locals think that if you are sick you can't eat hairy food, hairy food is seafood, fish, beef and mutton, etc., just have some thin porridge."

2.3 Theme 3: Inconsistent approaches to proactive access to knowledge about immune adverse events and nutrition

Correct way of acquiring knowledge about immunotherapy adverse events and nutrition Some patients with high literacy level would acquire knowledge about immunotherapy adverse events and nutrition through books, newspapers, etc. P1: "We read the newspapers Health News and Hainan Medical News by ourselves." P3: "We often read books dedicated to nutrition, the most interesting ones are newspapers: there are Life Times, Hainan Daily, Haikou Daily, Hainan Special Zone Newspaper, Happy Elderly, Happy Elderly, etc., all about how to see a doctor and what to eat. Read the nutritional knowledge yourself and don't be deceived by the outside health care products and some advertisements that cheat the elderly. Immunotherapy adverse events on the red spots that grow on the body, at first I don't know thought it was some skin disease, looking for dermatology said it was capillary hyperplasia."

Prefer a more visual and imaginative way of acquiring knowledge Most prefer a more visual and imaginative way of acquiring knowledge through mobile phones such as Baidu, TV and videos. p2: "Check mobile phones." P7: "Will look up which foods are suitable for liver cancer patients' diet online." P8: "Directly Baidu, including nutrition and condition, and then ask the doctor what can and cannot be eaten." P6: "What I like most is watching TV." P13: "TV, videos, the more direct kind of understanding."

Acquiring relevant knowledge through non-professional channels Some patients did not take an active approach or the pathway came from non-professional sources such as information networks and advertisements which may lead to biased knowledge. p5: "Advertisements, health products, taking nutrients, nutritional powders and so on every day." P12: "Haven't bothered to find out. Relying on common sense, have tried to look up information from my phone but didn't do it and felt

that the knowledge online was not always suitable for me." P9: "People in rural areas don't have that much knowledge and don't eat scientifically." P11: "Just eat less, don't eat greasy, just eat simple, used to eat everything, now they are afraid to eat."

2.4 Theme 4: Desire for timely, professional, quantitative and continuing guidance

Trust in medical staff Patients were mostly willing to accept and trust interventions from medical people regarding the amount and structure of their diet during their stay in hospital. p1: "I did not have surgery because I was old. Doctors and nurses would advise to eat small meals and easy to digest foods and hopefully advise what you can and cannot eat." P9: "I definitely listened to the doctor during my stay in hospital, I quit smoking when the doctor told me to do so. Eat whatever the doctor says, eat a diet low in fat and light, no chicken, duck, pork skin or offal. Red meat: less beef, lamb and pork, chicken, duck and goose is more white meat." P12: "There were told to eat a light diet and not to eat greasy, spicy or stimulating foods, but not so stereotypically precise as to how much, and if there was a basis for a nutritional plan developed after the experiment, would definitely follow their instructions."

Not receiving long-term guidance A minority of patients felt that the disease was a long-term process and did not need dietary guidance. P8: "What is there to guide on diet, even if you get guidance in the hospital, you still have to do it yourself after discharge, the nurses in your old home can come to your home, Hainan does not, you still have to come to the hospital to adjust your medication and infusion."

Health education can improve patient satisfaction There is high satisfaction with various forms of health education in the unit. P4: "We came here to listen to the leaders' lectures at least 2 times, after we got up in the afternoon, this time is more free for everyone to go over and listen. The leaders give us lectures on what to pay attention to and what nutritious food to eat for oncology patients, and also what to pay attention to for hepatobiliary disease. I thought this was very good, and I could also ask any questions I wanted to ask. You can sit and chat with the director about the disease, about nutrition, and you can explain and answer questions freely. If there is a recipe for the week, what is the best thing to eat for breakfast and dinner. Nowadays the patients are somewhat literate, even if they are not, the children know and will explain to the patients what to eat and what not to eat."

Simple content of in-hospital preaching The workload of medical staff, little time for preaching, generalised content, lack of attention and policies prevented patients from receiving timely, accurate, professional and quantitative nutritional guidance. P2: "The doctor thinks nutrition is okay, so he talks less about it." P5: "We all look it up online and then we can ask the doctor. The doctors and nurses are busy flying, so we will go by our knowledge and hopefully make nutrition charts that tell us what to eat and how much to eat." P6: "The doctor will tell to eat some fish and beef. Eat better in the morning, drink milk and eat bread, eat rice at lunchtime, eat more vegetables, no sweets or porridge, and control blood sugar." P7: "The doctor would also tell us about diet and recovery, that we had to eat meat, and that it was all nutrition if we could eat it anyway so that the protein could keep up." P11: "Just eat less, no greasy food, just simple food, I used to eat it all, but now I don't dare to eat it." P13: "I hope to spread knowledge of what an immune adverse event is, preferably with a diagram we can read and understand, how to go about self-care and then tell us the amount and structure of food we need to eat."

3. Discussion

3.1 Multidimensional focus on immune adverse events and nutrition-related factors in immunotherapy patients with liver cancer in Hainan Province

The average level of dietary knowledge and attitudes among Chinese adults is low and correlates with urban-rural differences, literacy, age and work status [5]. In recent years, many guidelines for nutritional support of oncology patients have been issued at home and abroad, giving recommendations on nutritional screening, nutritional interventions and immune nutrients, etc. The European Society for Clinical Nutrition and Metabolism (ESPEN) published a guideline on cancer Nutrition guidelines for patients state that psychosocial support, nutritional screening, increased calorie intake, increased protein intake and enhanced immune nutrition for oncology patients may improve their overall survival and reduce complications. Early identification of immune-related adverse events and corresponding management decisions need to be actively explored to achieve a state of immune homeostasis in the body [7], whereas in this study, patients were not sufficiently concerned about immune adverse events and malnutrition, and similarly did not focus on immunotherapy adverse events and nutritional correlates, and the study yielded nutritional correlates including physical, psychological, environmental and social support. This suggests that clinical staff should pay attention to the nutritional status of patients, care for their eating experience, correct unhealthy eating behaviours, assess patients as a whole in terms of their physiological, psychological, environmental and social support domains, and instruct patients on the prevention and management of adverse immune therapy events, in addition to educating them on the nutritional aspects of adverse immune therapy events and improving interventions. Monitor changes in patient knowledge, behaviour and attitudes to improve adverse event symptoms and nutritional status and improve quality of life.

Physiologically: With the gradual spread of immunotherapy for hepatocellular carcinoma, nutritional management is important for active support and symptomatic treatment of the immune phase, while nutritional support for drug non-response is beginning to receive attention: ① Diarrhoea is one of the most common manifestations of irAE, especially after anti-CTLA-4 monotherapy, and some patients may also be combined with other GI symptoms such as abdominal pain, blood in stool, vomiting and even intestinal perforation. In addition to hormonal therapy and dose adjustment of ICI medication, nutritional management needs to be tailored to the degree of gastrointestinal symptoms. (ii) Immune-related hepatitis is also one of the common immune adverse events. If abnormal liver function occurs, patients are advised to follow a light diet and monitor liver function and bilirubin indicators. (iii) Endocrine system disorders (e.g. changes in thyroid function, pituitary inflammation, type 1 diabetes) require appropriate dietary modification according to the altered nutritional metabolism caused by endocrine hormone disorders. ④ Cardiotoxic reactions, for patients who develop cardiotoxic reactions such as heart failure, arrhythmias and myocarditis, patients need to be finely monitored and fluid intake managed according to their cardiac function and fluid in/out balance management requirements. Patient-reported outcomes [8-9] have been shown to better reflect patient experience and perceptions and facilitate improved reporting and treatment of adverse events. The psychometric characteristics of the tool, the intended purpose of the study, and the impact characteristics of the intervention should be weighed [10], and a tool containing patient history combined with nutritional status should be used to assess current needs for immunotherapy patients with hepatocellular carcinoma and those who have experienced adverse events for nutrients, such as protein, energy, vitamins, minerals, etc., to develop inpatient recipes for matters

Psychologically: we take the initiative to provide psychological counselling, understand the needs, disease burden and concerns of patients, provide health education, especially on diet, and help patients to change their loss of appetite due to the disease, so as to avoid their psychological care being taken lightly and affecting the outcome of the disease; environmentally: Hainan Province is the only island in China with a tropical marine monsoon climate, where islanders are exposed to high temperature, high humidity, strong ultraviolet light and high thyroid secretion all year round. The islanders are always in a state of high temperature, high humidity, strong ultraviolet rays and thyroid secretion, with high labour intensity and energy consumption. Providing an inpatient environment with appropriate temperature and humidity for immunotherapy patients with liver cancer improves the inpatient experience, while the backward level of knowledge related to immunotherapy and nutrition among some local Hainan residents, coupled with the limitations of the hospital meal preparation system, affects the way patients eat and their experience. Therefore, there is a need to expedite the establishment of hospital meal allocation centres and a la carte meal service systems that meet the realities of Hainan Province, making every effort to offer a variety

of types of cuisine and provide food choices with good organoleptic properties to meet the needs of patients with different dietary habits and promote their dietary health and development. At the same time, under the guidance of the medical staff, patients with non-Hainanese dietary habits are encouraged to allow their families to prepare daily meals according to their dietary preferences, improve their nutritional levels and give immune nutrition when necessary^[11].

Social support: Combine nutrition, psychology, public health, health promotion and other multidisciplinary collaboration to set up a nutrition support and symptom management group for liver cancer patients, providing them with professional, individualised guidance on nutrition knowledge, immune adverse event self-care and emergency management to improve their early warning of adverse events and malnutrition. Establish effective family and social support systems using the environment, peer support, community, health care institutions, social groups, government and media campaigns.

3.2 A multiform educational intervention model targeting self-management

Patients in this study were proactive in acquiring knowledge about adverse immune events and nutrition, but some patients lacked professionalism and accuracy in the way they acquired knowledge. Patients were eager to receive professional and quantitative guidance. Therefore, health workers can organise multi-modal health education, such as lectures on relevant knowledge, watching health education video clips, distributing health education booklets, using interactive online information, "317 nursing"^[11] and telephone follow-up monitoring. The content of the education was repeated to emphasise the importance in order to improve patient compliance, focusing on the skills training of health care workers while strengthening the ability of patients and carers to care for themselves. Given that healthcare workers' instruction has a direct impact on patient compliance, healthcare workers should take the initiative to carry out education on immunological adverse events and nutrition and incorporate this into their routine work. Teaching should be intuitive, vivid, visual and easy to understand, and should continue throughout the hospital stay rather than being a formality. Evidence-based, structured treatment and education models for patient self-management can be used to improve patients' knowledge, attitudes and behaviours^[12-13] and to adopt the right approaches, methods and methods for addressing health problems in the context of adverse immunotherapy events and nutrition.

3.3 Establishing a model for full symptom and nutritional management

Patients undergoing immunotherapy for liver cancer are also at risk of malnutrition, immunotoxic reactions and concomitant symptoms such as nausea, vomiting and abdominal pain, which severely affect their quality of life. Most patients in this study mentioned that they did not know how to eat due to co-morbidities such as hypertension, hyperglycaemia and hyperlipidaemia, and were afraid to eat more, which could aggravate their risk of malnutrition. At the same time, hospitals lack uniform standards in the management of symptoms and nutrition of immunotherapy patients with liver cancer. The establishment of a health management model involving hospitals, patients, families and communities should be accelerated, information technology should be introduced, self-management health electronic files should be established using big data, and refined service modules for immune-related adverse events and nutritional interventions for immunotherapy patients with liver cancer should be developed with the help of information platforms to form self-management and The information platform will be used to develop a module for the refinement of immune-related adverse events and nutritional interventions for immunotherapy patients with liver cancer.

Therefore, based on the three-level diagnosis of hepatocellular carcinoma malnutrition^[15] and patient-reported outcomes, a full nutrition and symptom management programme for immunotherapy patients with hepatocellular carcinoma was constructed, with comprehensive nutrition knowledge education and symptom intervention guidance implemented in the four segments of screening and assessment, diagnosis, support and monitoring and follow-up, based on the multi-team collaboration of doctors, dieticians and pharmacists, and with reference to the five-step treatment protocol for malnutrition^[16] and the China Clinical Society of Oncology (CSCO) Guidelines for the Management of Toxicity Associated with Immune Checkpoint Inhibitors 2021^[17], especially for patients with adverse immune reactions, consult with oncologists and

dietitians to form a specialist immunotherapy care and nutrition support plan, observe quantitative outcomes such as physical examination, laboratory data and ancillary tests, and also combine patient-reported outcomes to understand patients' quality of life and symptoms, etc. The qualitative results of the main complaints, prevention-oriented, optimised prevention and control strategies, promotion, disease prevention and control management system, with the goal of effectively controlling health risk factors, thus improving the nutritional status of patients with mid- to late-stage immunotherapy, early detection of adverse symptoms, improving patients' clinical outcomes, reducing medical costs, improving the quality of care, and promoting effective clinical practice of immunotherapy for liver cancer.

4. Summary

Improving the quality of life of liver cancer patients has now become one of the three major endpoint goals (survival, treatment toxicity, and healthy quality of life) for evaluating cancer outcomes. This study used a qualitative study to understand immune adverse events and nutritional perceptions and needs of liver cancer immunotherapy patients through in-depth interviews. It is suggested that the management in hospitals should not only focus on symptom management of immune adverse events in immunotherapy patients with liver cancer, but also focus on the nutritional needs of this group of patients in the region in a multidimensional way, including physical, social, psychological, environmental and health promotion, with a multiform educational intervention model aimed at achieving self-management of skills, to establish a feasible, high-quality, efficient and sustainable model of full nutrition and symptom management to advance oncology rehabilitation^[18] and the construction and management practices of nutrition clinics and wards in order to improve the level of medical services in the FCT.

References

- [1] Jiang J, Hu ZQ, Chen G, et al. Advances in translational therapy for primary liver cancer[J]. Journal of Clinical Hepatobiliary Diseases, 2020, 36(08): 1870-1873.
- [2] Jiang Y, Tu X, Zhang X, et al. Nutrition and metabolism status alteration in advanced hepatocellular carcinoma patients treated with anti-PD-1 immunotherapy[J]. Supportive Care in Cancer, 2020, 28(6): 1-11.
- [3] Zhang XY, Lin C, Rui MY, et al. Correlation of prognosis and nutritional factors in patients with recurrent/metastatic head and neck squamous cell carcinoma treated with pabrizumab[J]. Chinese Oncology Clinics, 2022, 49(17): 892-896.
- [4] Wen W, Zhang Y, Zhang H, et al. Clinical outcomes of PD-1/PD-L1 inhibitors in patients with advanced hepatocellular carcinoma: a systematic review and meta-analysis[J]. Journal of Cancer Research and Clinical Oncology, 2022: 1-10.
- [5] Li YJ, Zhang FY, Wan TL, et al. Analysis of current dietary knowledge and attitudes and factors influencing dietary knowledge literacy among Chinese people aged ≥18 years[J]. China Public Health, 2019, 35(09): 1267-1270.
- [6] Ja A, Pb B, Vb C, et al. ESPEN guidelines on nutrition in cancer patients[J]. Clinical Nutrition, 2017, 36(1): 11-48.
- [7] Wu HL, Niu XK, Xiong Y, et al. Current status and research progress of immunotherapy for hepatocellular liver cancer[J]. Chinese Journal of Immunology, 2021.
- [8] Tang Y. A study of supportive care needs and quality of life based on patient-reported outcomes in gynecologic cancer chemotherapy [D]. Lanzhou University, 2018.
- [9] Zhu R, Huang QM, Cai TT, et al. Progress in the application of patient-reported outcome measurement information system in different oncology care[J]. Journal of Continuing Nurse Education, 2021, 36(05): 405-408.
- [10] Song LJ, Ma XJ, Wu XY, et al. Current status of patient-reported outcome assessment tools for targeted drug skin adverse events[J]. World TCM, 2021, 16(13): 5.
- [11] Huang Y, Xie M, Wang JW. Immunonutrition in radiotherapy of gastrointestinal malignancies[J]. Electronic Journal of Tumor Metabolism and Nutrition, 2022, 9(04): 524-529.

- [12] Xu L, Zhang JW, Ge ZX. Evaluation of the effect of "317 nursing" WeChat health education assistant in elderly patients with chronic obstructive pulmonary disease[J]. Journal of Nursing Practice, 2019, 34(10): 890-894.
- [13] Jiang XM, Hao JY, Chen Y, et al. Development of a structured treatment and education curriculum for glycemic management of diabetic patients on peritoneal dialysis[J]. China Nursing Management, 2019, 19(02): 269-275.
- [14] Wang XL. Study on the application of exercise self-management based on patient-reported outcomes in patients with first-ever ischemic stroke[D]. Huzhou Normal University, 2020.
- [15] Tang CQ. Nutritional screening tools and evaluation tools for tertiary diagnosis of malnutrition in primary liver cancer[J]. Electronic Journal of Oncology Metabolism and Nutrition, 2019, 6(01): 120-124.
- [16] Shi HP, Xu HX, Li SY, et al. Five-step treatment of malnutrition[J]. Electronic Journal of Oncology Metabolism and Nutrition, 2015, 15(1): 29-33.
- [17] Zhao J, Su CH. Interpretation of the CSCO Guidelines for the Management of Toxicity Associated with Immune Checkpoint Inhibitors: Comparison of the NCCN Guidelines for the Management of Toxicity Associated with Immunotherapy[J]. Journal of Practical Oncology, 2020, 35(01): 11-15.
- [18] Liu LH, Li WR, Tian HM, et al. Practice and effectiveness of oncology rehabilitation nursing clinic in the development of oncology specialty nursing[J]. China Nursing Management, 2021, 21(02): 167-171.
- [Fund Project] This work was supported by the healthy department of Hainan province (ID number: 22A200123).
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The Key Role of Hyperuricemia in Oxidative Stress, Inflammatory Response, and Endothelial Dysfunction

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Abstract: Uric acid is the end product of purine metabolism in humans. A growing body of experimental and clinical evidence suggests that hyperuricemia has pathogenic effects in vivo such as inducing oxidative stress, promoting inflammatory responses, and causing endothelial dysfunction, and is involved in affecting systemic inflammatory responses and hemodynamics by a variety of mechanisms. This review will provide an overview of the role of hyperuricemia in oxidative stress, inflammatory response, and endothelial dysfunction.

Keywords: Hyperuricemia; Oxidative Stress; Inflammation; Endothelial Dysfunction

Introduction

Uric acid is an end product of purine metabolism and is produced by 80% of the body's cellular metabolism and 20% is obtained from food. Most uric acid is excreted by the kidneys (65-75%) and the intestine (25-35%)^[1]. Uric acid in body fluids is a potent antioxidant, scavenging monomeric oxygen and free radicals, and is estimated to account for approximately 50% of the total antioxidant capacity of human biological fluids^[2]. Intracellular uric acid, on the other hand, is pro-oxidant and can lead to oxidative stress, induce inflammatory responses with causing endothelial dysfunction, which can lead to cardiovascular disease and kidney disease^[3, 4]. In addition, due to the low solubility of uric acid in water, once the concentration of uric acid exceeds 6.5 mg/dL, urate crystals are precipitated and may be deposited in joints, kidneys and other tissues, which can lead to tissue damage^[5].

Hyperuricemia is clinically defined as blood uric acid levels of ≥ 7 mg/dL (420 $\mu\text{mol/L}$) in men and postmenopausal women and ≥ 6 mg/dL (360 $\mu\text{mol/L}$) in premenopausal women^[6].

1. Pathogenesis of hyperuricemia

Hyperuricemia is caused by an imbalance in the production and excretion of uric acid. High purine diet, increased purine metabolism and excessive alcohol consumption contribute to increased uric acid production. Massive cellular damage in tumor lysis syndrome, which promotes nucleic acid metabolism, is also responsible for increased uric acid production^[7]. Other rare causes of acute hyperuricemia include seizures, rhabdomyolysis, and excessive exercise. Considering that purine intake and its excretion in the gastrointestinal tract are fairly constant in most individuals, serum uric acid concentration depends to a large extent on endogenous purine production and its renal excretion, while the renal excretion of uric acid depends on glomerular filtration and subsequent tubular reabsorption, influenced by renal function and intrarenal hemodynamics^[8].

2. Oxidative stress induced by hyperuricemia

Once transported into cells, uric acid becomes a pro-oxidant, which increases the production of reactive oxygen species (ROS), including superoxide anion (O_2^-), H_2O_2 , and 8-isoprostane^[9, 10]. Many studies have shown that oxidative stress

caused by hyperuricemia affects several organs and systems, including the heart and kidneys ^[11]. Pathologically, oxidative stress associated with hyperuricemia leads to DNA damage, oxidation and inactivation of enzymes, production of inflammatory cytokines, and apoptosis ^[12]. Mitochondria in renal tubular epithelial cells (TEC) may be severely damaged by oxidative stress, and antioxidants are beneficial for the recovery of endothelial function, such as reduced glutathione ^[13]. Another important source of ROS is NADPH oxidase. It has been found that uric acid stimulates ROS synthesis via NADPH oxidase in various cells, such as adipocytes, vascular smooth muscle cells and vascular endothelial cells ^[14].

In conclusion, hyperuricemia-mediated oxidative stress directly damages multiple organs and systems, especially the kidney, and is therefore a biotherapeutic target for uric acid-induced kidney injury.

3. Hyperuricemia promotes inflammatory response

Recent in vivo and in vitro studies have shown that UA stimulates the release of early inflammatory response factors IL-1, IL-6, and IL-8 by binding to cellular NF- κ B (nuclear factor) receptors, which subsequently causes a systemic cascade of inflammatory responses leading to systemic multi-organ failure ^[15]. In addition, basic studies have found that soluble UA activates the secretion of IL-1 β from NLRP3 inflammatory vesicles in macrophages and stimulates the release of CXCL12 and HMGB1 from renal tubular epithelial cells ^[16, 17]. HMGB1 amplifies the inflammatory response through multiple pathways, including promoting the secretion of pro-inflammatory cytokines by monocytes, the expression of adhesion molecules, and inflammatory cell infiltration ^[18]. When uric acid levels exceed 6.8 mg/dl, urate crystals can form, which can be deposited in the joint cavity to stimulate the expression of inflammatory factor TNF- α by joint cavity monocytes and synovial cells ^[16], and also directly in the vascular wall leading to inflammatory responses and endothelial damage, which in turn cause activation of neutrophils and platelets and release of inflammatory cytokines, chemokines, and adhesion molecules, which contribute to the development of cardiovascular diseases ^[19].

4. Endothelial cell dysfunction due to hyperuricemia

Endothelial cells can secrete a variety of vasoactive substances involved in the regulation of blood vessels and blood circulation, which can be classified according to their function as vasodilators, vasoconstrictors and other vasoactive factors. Examples include nitric oxide (NO), prostacyclin, endothelin, angiotensin, antithrombin III and fibrinogen activator ^[20]. Also endothelial cells can sense changes in blood flow signals through membrane receptors and regulate blood flow dynamics. There is growing evidence that uric acid affects endothelial function by downregulating NO production and endothelial-type nitric oxide synthase (eNOS) activity, thereby decreasing NO bioavailability ^[21]. Serum endothelin-1 (ET-1) mainly acts in the cardiovascular system, and studies have shown that hyperuricemia elevates ET-1 levels and decreases NO levels, leading to vascular endothelial dysfunction, which is closely associated with cardiovascular diseases such as atherosclerosis and hypertension ^[22].

Uric acid induces endothelial dysfunction through multiple pathways, and targeted therapy can improve endothelial dysfunction ^[23].

Summary and Outlook

Hyperuricemia can stimulate intracellular reactive oxygen species synthesis and induce oxidative stress through multiple mechanisms, promote the development of local or systemic inflammation through multiple pathways, and affect vascular endothelial function primarily through downregulation of NO production and eNOS activity. In contrast, the role of elevated blood uric acid in other inflammation-related diseases and whether uric acid-lowering therapy improves clinical outcomes require rigorous clinical studies to be designed to verify.

References

- [1] Chinese Medical Association, Chinese Medical Journals Publishing House, Chinese Society of General Practice,

Chinese Association of Gout Study, et al. Guideline for primary care of gout and hyperuricemia (2019) [J] Chinese Journal of General Practitioners, 2020, 19(4): 293-303.

[2] Alvarez-Lario B, Maccaron-Vicente J: Is there anything good in uric acid? QJ Med 2011; 104: 1015–1024.

[3] Nakagawa T, Kang DH, Feig D, et al. Un-earthing uric acid: an ancient factor with re-cently found significance in renal and cardio-vascular disease [J]. Kidney Int, 2006, 69 (10): 1722-1725.

[4] Johnson RJ, Kang DH, Feig D, et al. Is there a pathogenetic role for uric acid in hyper-tension and cardiovascular and renal disease? [J]. Hypertension, 2003, 41 (6): 1183-1190.

[5] Wang H., Zhang H., Sun L., Guo W. Roles of hyperuricemia in metabolic syndrome and cardiac-kidney-vascular system diseases. American Journal of Translational Research. 2018, 10(9): 2749–2763.

[6] Komori H., Yamada K., Tamai I. Hyperuricemia enhances intracellular urate accumulation via down-regulation of cell-surface BCRP/ABCG2 expression in vascular endothelial cells. Biochimica et Biophysica Acta (BBA) - Biomembranes. 2018;1860(5):973–980.

[7] Ngo JS., Ho MHM. Evaluation of rasburicase use in the Fraser Health Authority: a retrospective review. The Canadian Journal of Hospital Pharmacy. 2019; 72(4): 311–319.

[8] Zhou X, Matavelli L, Frohlich ED, Uric acid: its relationship to renal hemodynamics and the renal renin-angiotensin system. Curr Hypert Rep 2006; 8: 120-124.

[9] Yu MA, Sanchez-Lozada LG, Johnson RJ, Kang DH. Oxidative stress with an activation of the renin-angiotensin system in human vascular endothelial cells as a novel mechanism of uric acid-induced endothelial dysfunction. Journal of Hypertension. 2010;28(6):1234-1242.

[10] Roumeliotis S., Roumeliotis A., Dounousi E., Eleftheriadis T., Liakopoulos V. Dietary antioxidant supplements and uric acid in chronic kidney disease: a review. Nutrients. 2019;11(8):p. 1911.

[11] Doehner W., Schoene N., Rauchhaus M., et al. Effects of xanthine oxidase inhibition with allopurinol on endothelial function and peripheral blood flow in hyperuricemic patients with chronic heart failure: results from 2 placebo-controlled studies. Circulation. 2002; 105(22): 2619–2624.

[12] Yang L., Chang B., Guo Y., Wu X., Liu L. The role of oxidative stress-mediated apoptosis in the pathogenesis of uric acid nephropathy. Renal Failure. 2019; 41(1): 616-622.

[13] Sánchez-Lozada LG., Lanasa MA., Cristóbal-García M., et al. Uric acid- induced endothelial dysfunction is associated with mitochondrial alterations and decreased intracellular ATP concentrations. Nephron Experimental Nephrology. 2013; 121(3-4): e71-e78.

[14] Kadowaki D., Sakaguchi S., Miyamoto Y., et al. Direct radical scavenging activity of benzbromarone provides beneficial antioxidant properties for hyperuricemia treatment. Biological & Pharmaceutical Bulletin. 2015; 38(3): 487– 492.

[15] Lu WJ et al. “Uric Acid Produces an Inflammatory Response through Activation of NF-κB in the Hypothalamus: Implications for the Pathogenesis of Metabolic Disorders.” Scientific reports vol. 5 12144. 16 Jul. 2015.

[16] Kim S. M., Lee S. H., Kim Y. G., et al. Hyperuricemia-induced NLRP3 activation of macrophages contributes to the progression of diabetic nephropathy. American Journal of Physiology-Renal Physiology. 2015;308(9):F993–F1003.

[17] Rabadi MM., Kuo MC., Ghaly T., et al. Interaction between uric acid and HMGB1 translocation and release from endothelial cells. American Journal of Physiology-Renal Physiology. 2012;302(6):F730–F741.

[18] Choe JY., Choi CH., Park KY., Kim SK. High-mobility group box 1 is responsible for mono- sodium urate crystal-induced inflammation in human U937 macrophages. Biochemical and Biophysical Research Communications. 2018; 503(4): 3248-3255.

[19] Iribarren C, Folsom AR, Eckfeldt JH, McGovern PG, Nieto FJ. Correlates of uric acid and its association with asymptomatic carotid atherosclerosis: the ARIC Study.

[20] WANG Y, BAO X. Effects of uric acid on endothelial dysfunction in early chronic kidney disease and its mechanisms [J]. Eur J Med Res, 2013, 18:26.

[21] Li P., Zhang L., Zhang M., Zhou C., Lin N. Uric acid enhances PKC-dependent eNOS phosphorylation and mediates cellular ER stress: a mechanism for uric acid-induced endothelial dysfunction. *International Journal of Molecular Medicine*. 2016; 37(4): 989–997.

[22] Kanellis J, Watanabe S, Li JH, Kang DH, Li P, Nakagawa T, Wamsley A, Sheikh-Hamad D, Lan HY, Feng L, Johnson RJ. Uric acid stimulates monocyte chemoattractant protein-1 production in vascular smooth muscle cells via mitogen-activated protein kinase and cyclooxygenase-2. *Hypertension*. 2003 Jun; 41(6):1287-93.

[23] Long CL., Qin XC., Pan ZY., et al. Activation of ATP-sensitive potassium channels protects vascular endothelial cells from hypertension and renal injury induced by hyperuricemia. *Journal of Hypertension*. 2008; 26(12):2326-2338.

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The Value of Internal Fixation Through Surgical Dislocation of Hip Joint in the Treatment of Pipkin Fracture

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Abstract: **Objective:** To observe the effect of clinical treatment of patients with Pipkin fracture according to surgical dislocation of hip joint internal fixation. **Methods:** According to the form of comparative treatment, 50 patients with Pipkin fracture admitted to our hospital from March 2011 to August 2022 were selected as the object, and randomly divided into control group (25 cases, treated with conventional scheme) and observation group (25 cases, treated with surgical dislocation of hip joint internal fixation). Analyze the recovery of the two groups of patients. **Results:** The observation group has advantages in comparing the amount of intraoperative bleeding, operation time, fracture healing time and hospitalization time between the two groups ($P < 0.05$). Compared with the Harris score of the hip joint after operation between the two groups, there is no difference before operation, but the observation group has advantages after operation ($P < 0.05$). **Conclusion:** The treatment of patients with Pipkin fracture according to the internal fixation operation of surgical dislocation of the hip joint can effectively improve the surgical effect of this part of patients, and can promote the recovery of joint function of patients as soon as possible after operation.

Keywords: Pipkin Fracture; Internal Fixation Via Surgical Dislocation of Hip Joint; Rehabilitation

Introduction

Pipkin fracture is the most common type of fracture in clinical practice. Femoral head fracture combined with dislocation fracture of the hip joint is the main feature of this part of patients, and there are certain difficulties in treatment. Moreover, this type of fracture will increase the probability of patients with avascular necrosis of the femoral head, and also increase the incidence of complications such as osteoarthritis. In the process of surgical treatment for this part of patients, it is more necessary to select the best surgical scheme to promote the rapid recovery of the function of the patient's hip joint [1-2]. According to the internal fixation of surgical dislocation of the hip joint, the treatment of this part of patients will be rapidly applied in clinical practice. This study focuses on the analysis of the specific value of this surgical scheme.

1. Data and methods

1.1 General information

According to the form of comparative treatment, 50 patients with Pipkin fracture admitted to our hospital from March 2011 to August 2022 were selected as the subjects, and randomly divided into the control group (25 cases, treated with conventional scheme) and the observation group (25 cases, treated with internal fixation of surgical dislocation of hip joint). In terms of patient composition, there were 16 males and 9 females in the control group, aged between 43 and 78, with an average of (62.34 ± 1.74) . There were 15 males and 10 females in the observation group, aged between 42 and 77, with an average of (61.02 ± 1.88) . Compare the basic data of the two groups, $P > 0.05$.

1.2 Method

The patients in the control group were treated according to the conventional open reduction and internal fixation operation. The surgical incision was selected above the fracture site of the patient, and the intraoperative anesthesia was intravenous general anesthesia. The subcutaneous tissue was separated layer by layer, and the tissue fracture site was fully exposed. Then the fracture site was cleaned, the joint capsule was repaired, and after the reduction, the absorbable screw was selected for internal fixation, and the C-arm machine was used to evaluate the accuracy of the reduction. During the surgical treatment, the observation group was treated according to the internal fixation of the surgical dislocation of the hip joint. The intraoperative body position was selected as the healthy side lying position, the surgical site was routinely disinfected, and the subcutaneous tissue was cut layer by layer according to the Ganz approach, so that the fracture end was preserved, and the gluteus minor muscle and the greater trochanter were treated. Separation of fulcrum, etc. to promote joint capsule filling. Divide the exposure and perform "T" at the joint capsule Type B incision is used to observe the fracture displacement of the patient. Combined with the specific characteristics of the fracture site of the patient, operations such as adduction and external rotation and traction are carried out, and targeted treatment is carried out for the joint cavity and acetabulum of the patient. If the patient has acetabulum fracture, it is necessary to fix the femoral head fracture. Accurately clean up the blood stasis and residual soft tissue at the fracture site. Absorbable screws are selected to fix the femoral head, and the acetabulum is treated after ensuring satisfactory reduction and fixation. The surgical cavity is cleaned with physiological saline, the joint capsule is sutured, the large trochanter is fixed with cortical bone screws, and the surgical opening is sutured according to conventional techniques. The two groups of patients are subject to conventional negative pressure drainage after operation. And near anti-infection treatment.

1.3 Observation indicators

During the study, the intraoperative bleeding volume, operation time, fracture healing time and hospitalization time of the two groups need to be counted, and the Harris score of the hip joint of the patients during the operation should be counted, and the evaluation should be made before the operation, 1 week, 2 weeks and 3 weeks after the operation.

1.4 Statistical methods

In this study, all data were processed according to SPSS20.0, and the measurement data were expressed according to the mean \pm standard deviation. T test showed that $P < 0.05$ was statistically significant.

2. Results

2.1 Comparison of surgical indexes between the two groups

Compared with the amount of intraoperative bleeding, operation time, fracture healing time and hospitalization time of the two groups, the observation group had advantages ($P < 0.05$), as shown in Table 1 below.

Table 1 Comparison of surgical indexes between the two groups ($\bar{x} \pm s$)

| Groups | Number of cases | Intraoperative bleeding volume (ml) | Operation time(min) | Fracture healing time (week) | Hospital stay (d) |
|-------------------|-----------------|-------------------------------------|---------------------|------------------------------|-------------------|
| Observation group | 30 | 152.54 \pm 23.34 | 61.62 \pm 4.24 | 11.12 \pm 1.14 | 12.32 \pm 2.11 |
| Control group | 30 | 172.56 \pm 33.22 | 72.21 \pm 5.13 | 13.51 \pm 1.13 | 16.12 \pm 2.12 |
| <i>t</i> | - | 13.425 | 15.2425 | 13.141 | 10.725 |
| P | - | 0.001 | 0.001 | 0.001 | 0.001 |

2.2 Comparison of hip joint function scores between the two groups

Comparing the Harris score of the hip joint between the two groups after operation, there was no difference before operation, but the observation group had advantages after operation ($P<0.05$), as shown in Table 2 below.

Table 2 Comparison of hip joint function scores between the two groups ($\bar{x} \pm s$)

| Groups | Number of cases | Preoperative | 1 week after operation | 2 weeks after operation | 3 weeks after operation |
|-------------------|-----------------|--------------|------------------------|-------------------------|-------------------------|
| Observation group | 30 | 55.05±1.34 | 65.02±1.63 | 76.12±2.11 | 88.42±1.86 |
| Control group | 30 | 55.56±1.22 | 59.21±2.01 | 64.25±2.43 | 73.24±2.14 |
| <i>t</i> | - | 1.242 | 11.252 | 13.425 | 14.725 |
| P | - | 0.801 | 0.001 | 0.001 | 0.001 |

3. Discussion

Pipkin fracture has always maintained a high incidence in clinical practice, and under the influence of frequent traffic accidents and other factors, the number of patients in this part has a significant trend of increase. It is a relatively difficult fracture type, and it takes a long time for patients to recover. In the process of conventional open reduction and internal fixation surgery, the purpose of treatment and reduction of the fracture end is achieved by fully exposing the fracture site and carrying out operations such as reduction [3-4]. However, the trauma caused to patients during the surgery is large, and the recovery time after surgery is long.

The internal fixation of this part of patients according to the surgical dislocation of the hip joint approach has been rapidly implemented in clinical practice. Under the effect of this surgical scheme, the patient's femoral head and acetabular fracture can be more intuitively displayed. In addition, the summary of the surgical approach process will cause less loss to the deep branch of the medial femoral circumflex artery of the patient, and the treatment in accordance with the stepped osteotomy technology during the operation can effectively ensure the anatomical reduction position, increase the contact area, and more conducive to the fixation of the fracture site and promote the healing [5]. In the process of internal fixation with screws, embedding the screw head into the medial side of the cartilage of the femoral head can avoid the acetabular cartilage injury of patients in the process of postoperative activities, reduce the incidence of iatrogenic arthritis and other complications, and facilitate the recovery of hip joint function. In this study, the observation group was treated according to the surgical dislocation of the hip joint approach internal fixation. Compared with conventional surgery, the surgical treatment can reduce the trauma caused to patients during the operation, shorten the patient's hospitalization time, accelerate the fracture healing speed, and promote the rapid improvement of hip joint function to ensure the comprehensive effect of surgical treatment.

In conclusion, the treatment of patients with Pipkin fracture can be given priority to the internal fixation of surgical dislocation of hip joint.

References

- [1] Zhou YS, He JD, Li BL. Treatment of Pipkin Fracture by Internal Fixation Through Surgical Dislocation of Hip Joint [J]. *Chinese Journal of Bone and Joint Injury*, 2022, 37 (06): 602-604.
- [2] Zhao WJ, Wei RY, Wang Y. Comparison of Clinical Effects between the S-P Approach and the Ganz Approach in the

Treatment of Pipkin Fracture [J]. *Clinical Medical Research and Practice*, 2021,6 (26): 83-85.

[3] Xiao B, Cao ZY, He AY. Surgical Effect of 17 Cases of Pipkin Fracture [J]. *Journal of Central South University (Medical Edition)*, 2019, 44 (12): 1391-1396.

[4] Wang X, Yin D, Jin XY. Surgical Dislocation of Hip Joint for Treatment of Pipkin IV Femoral Head Fracture [J]. *Chinese Journal of Bone and Joint Surgery*, 2019, 12 (06): 464-467.

[5] Dong G, Dong XL, Peng L. Clinical Effect Analysis of Surgical Dislocation of Hip joint in the Treatment of Pipkin Fracture [J]. *Zhejiang Journal of Integrated Traditional Chinese and Western Medicine*, 2019, 29 (04): 313-316+352.

Discussion on the Construction and Teaching Models of Nursing Psychology in Affiliated Hospitals of Colleges and Universities

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Abstract: Currently, the significance of medical colleges and universities in our country is increasingly evident, particularly given the rapid escalation of aging demographics, the augmentation of patients visiting healthcare professionals, the proliferation of diseases, and the surging complexity of the curriculum for medical school students, upon whom the demands placed are exceedingly stringent. To address the problem, while learning classroom knowledge, it is crucial to expose students to real-life cases that they can scrutinize and analyze profoundly. The present teaching system of medical schools continues to encounter numerous predicaments and inconsistencies. In this article, we expound upon the relevant issues and offer some recommendations and strategies that we hope will provide useful insight.

Keywords: Affiliated Hospitals; Medical Students; Psychology Subjects; Teaching Models

Introduction.

Nursing psychology is a vital major in higher education that demands a high level of specialized knowledge, patience, and attentiveness to explore the intricate relationship between mental health and health disorders. Currently, China's specialized discipline of nursing psychology draws on medicine and science, assimilates vast knowledge, studies a plethora of issues, and gradually forms a relevant system. Nursing psychology courses are offered in colleges and universities throughout China, and the integration of nursing psychology curriculum has brought about challenges in the current medical teaching system. We believe that the psychology discipline and teaching models must be explored from diverse angles.

1. Contradictions in the teaching system of nursing psychology

1.1 The importance of the curriculum versus its marginal position

Nursing psychology is a significant course that is included in the professional physician examination in the medicine, which indicates that more and more people have realized the significance of the discipline. The curriculum covers physiological psychology and basic psychology, with complex and critical content, making it difficult for students to learn. Mastering this knowledge plays a vital role in promoting students' future career. Nursing psychology is a vast and complex course with many in-depth knowledge. Therefore, most schools will customize this as an elective course, with a limited number of hours, usually between 18 to 36 hours. Lack of lectures makes it more challenging for students to comprehend the discipline. Most medical students face demanding learning load, much greater than those of students in other majors. As a result, the time and energy they invest into this course is limited and insufficient.

1.2 High demands of nursing psychology on teachers versus their

professional limitations

Nursing psychology's course places strict demands for teachers, making the teaching process difficult. Since nursing

psychology originates as the object of philosophical research, or more precisely, human psychology, teaching this course would require both medical knowledge and psychology knowledge, the latter of which is often insufficient for many teachers in medical schools, leading to marginalization of this course. Nursing psychology involves both psychological and medical knowledge, which requires teachers to have patience and care when teaching. Currently, most teachers in schools usually have a medical background but lack psychological knowledge.

1.3 The concepts in nursing psychology versus the traditional teaching system

Nursing psychology has a strong humanistic touch, emphasizing students' centrality in the curriculum, requiring teachers to pay attention to students' central position when teaching. However, in many courses students are not encouraged to speak in the teaching process. Lack of time and space for learning leads to little communication and interaction, which affects students' psychology. Some students want to understand themselves but are afraid to expose their problems and defects, making it challenging to bring problems up to the teacher or show their individuality.

1.4 The school's need for psychology versus different institutional duties

Most medical schools teach psychological knowledge, paying attention to students' mental health, and emphasizing the teaching of basic psychological knowledge. This work is vital for every teacher to improve students' mental health education, ensuring their smoothness in life and work, and promoting their healthy growth. Although the course of psychology is the basis of all relevant majors, psychology is only considered in the most specialized places. Clinical medicine and other disciplines also need to participate in the promotion of psychology. The work of psychology set in clinical medical schools and other related departments in hospitals needs to be adapted to cater to the needs of different situations.

2. Measures related to the construction of nursing psychology curriculum system

Constructing nursing psychology requires a multifaceted approach and reasonable measures to achieve the desired results. The following measures are recommended:

2.1 Clarify the discipline's status and build the discipline system

Different disciplines have their own status. When medical students study psychology, they should also involve psychology knowledge to learn comprehensively and truly grasp the system of medicine. Teachers should pay attention to the transition between classroom knowledge to clinical practice, integrating career guidance and related skills. They should set different steps at different stages when teaching, avoiding repeated teaching and ensuring coherence.

2.2 Integration of Human Resources and Enrichment of Course Structure

The role of nursing psychology teachers is multifaceted, encompassing not only that of educators, but also those of physicians and psychological counselors. Therefore, teachers with medical backgrounds need to focus on learning psychology, a seemingly simple task, yet one that is challenging, particularly for those unfamiliar with the basics of learning psychology. Conversely, teachers without a medical background need to systematically learn the basic courses in accordance with the curriculum's requirements. Hence, schools should consider the diversity of teachers and the combination of clinical psychology and mental health education when selecting teachers for the course. The theoretical proficiency of teachers, as well as their extensive clinical experience, are crucial.

2.3 Various Methods of Teaching and Evaluation Reform

Most nursing psychology teachers believe that 54 hours of class time are sufficient, with the remainder of the time being utilized for student practice. Additionally, an increase in laboratory hours is recommended. Students should be provided with the chance to participate in hospital internships, where they can be exposed to numerous psychological aspects of patients, aiding them in learning to solve problems using different methods and means. Teachers must use a diverse range of teaching methods that aim to remind students of their life experiences, thus giving them a platform to showcase their motivation. During the internship or experiment process, teachers should guide students, and provide corrective assistance in case any issues arise. Evaluation methods should be diverse and varied, with the assessment approach being altered as per the lecture content and form, so that students may apply what they have learned to their daily lives.

Conclusion

In summary, today, as medicine becomes increasingly important, the status of nursing psychology as a course is also becoming higher and higher, occupying a greater proportion of medical school curricula. Until now, it is not only necessary to learn medicine well, but also to learn psychology well. Learning nursing psychology is to provide services to society and help patients out of their suffering, so both teachers and students should pay special attention to the development of the subject of nursing psychology, treating it as an important discipline. The entire process is filled with the content of nursing psychology from different aspects, and both sides should work from different directions, so that together they can improve the situation of students.

References

- [1] Overview of psychology discipline construction in Minnan Normal University [J]. Journal of Minnan Normal University (Philosophy and Social Science Edition), 2021, 35(03):2.
- [2] Huang L. Overview of the achievements of psychology discipline construction in Minnan Normal University [J]. Journal of Minnan Normal University (Philosophy and Social Science Edition), 2021, 35(03): 161.
- [3] Li YL. An analysis of the construction and development strategies of exercise psychology [J]. Prose Hundred (New Language Loose-leaf), 2019(12): 148.