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Effects of different doses of heparin - encapsulated solution on coagulation mechanism in elderly patients with cardiac surgery

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Abstract: **Objective**: To investigate the effect of different doses of heparin-encapsulated liquid on the coagulation mechanism of elderly patients with cardiac surgery using superficial venous indwelling needle, and to select safe and effective dose of heparin-sealing fluid for elderly patients without increasing cardiac load. **Methods**: Select the use of superficial venous catheter in the heart of the coagulation function of normal elderly patients with 100 cases were randomly divided into two groups, respectively using heparin saline solution 5mL (containing heparin 62.5U / mL), 3mL (containing heparin 50.0U / mL) for indwelling needle tube, carry out before catheterization and disable heparin tube solution 24h prothrombin time (PTT), activated partial thromboplastin time (APTT), fibrinogen (Fg), and observe for any signs of bleeding (such as skin, mucous membrane with or without bleeding), while recording the retention time of indwelling needle. **Results**: There were no significant differences in PT, APTT and Fg between the two different doses of heparin tube (P> 0.05). There was no significant difference in the number of days between the two different doses of heparin sealed fluid and the retention time of indwelling needle (P <0.05). **Conclusion:** It is safe and reliable to use the above different dose of heparin sealed fluid in elderly patients with normal cardiac coagulation mechanism. Indwelling needle sealing with a small dose of low concentration of heparin sodium dilution is better, both to reduce the burden on the heart, save time, and will not affect the coagulation function.

Key words: heparin; elderly; coagulation mechanism; intravenous indwelling needle; cardiac surgery

Intravenous indwelling needle has been widely used in clinical practice because of its advantages of reducing vascular injury, alleviating the pain of the patients, facilitating the treatment and rescue. Sealing technology is an important part

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of the effective application of indwelling needle[1]. At present, there are many studies on the sealing fluid, but there are few studies on the effect of heparin sealing fluid on the coagulation mechanism in elderly patients with cardiac surgery. Cardiovascular surgery elderly patients are common; often need preoperative anticoagulant, anti-inflammatory, expansion crown, cardiac, diuretic, nutritional myocardium and other drug treatment. Those critically ill patients because of rapid changes in condition and medication complexities, at any time there are intravenous drugs such as nitroglycerin, dopamine and other drugs intravenous micro pump pumped in the case of sudden changes so that rapid administering of drug delivery and time saving for the rescue is enhanced; so intravenous indwelling needle in cardiac surgery is particularly widespread. However, patients with cardiac surgery in order to reduce the burden of the heart is usually required to strictly control the amount of change due to the condition changes, complex medication, often need to seal many times. Then for anticoagulant therapy patients, how to minimize the use of heparin sodium to achieve the best sealing effect at the same time ensuring the safety of coagulation is the purpose of our study. To this end, we designed two different doses, the concentration of heparin sodium sealing fluid, to observe whether or not they impact on coagulation mechanism and retention time of indwelling needle research methods are reported as below.

1. Objects and methods

1.1. Object

Observation object selection September 2013 - September 2014 admitted to our hospital cardiac surgery and the use of superficial venous indwelling needle in elderly patients in 100 cases, excluding coagulation disorders, hemorrhagic disease cases, aged 57 to 88 years (69 years old ± 16 years old). Were randomly divided into two groups, the observation group of 50 cases, the control group of 50 cases, the patients in the gender, age, education and other aspects of the difference was not statistically significant, the study object is in line with research design. In this study, both patients and the attending physician were informed consent given.

1.2 Methods

(1) Materials used: Tianjin Biochemical Pharmaceutical Factory production of heparin sodium injection 12500U (2mL); The United States BD company's 22G Vialon indwelling needle and 3M's production of transparent sterile applicator, 5mL syringe, 100mL saline; Japan-East Asia company's CA-50 semi-automatic blood coagulation instrument.

(2) Sealing method: After the end of daily infusion, nurses in charge will apply a concentration of 62.5U / mL heparin dilution 5mL for sealing to the control group. Sealing method: After the end of infusion, close the regulator of the infusion device; remove the needle from the heparin cap. After iodophor disinfection of heparin cap, use a syringe to extract the sealed liquid 5mL, directly pierce the syringe into the heparin capsules. Initially, administer slow injection of 3mL sealed liquid, push out the remaining liquid and finally pull the needle out. Infusion speed should be slow to reduce the impact on the blood vessel wall; let the lumen be filled with sealed liquid. After pulling out the needle, clamp the indwelling needle extension tube to achieve positive pressure sealing tube. During re-infusion, use iodophor disinfection heparin cap and then the conventional liquid; if it is a special drug, first use 3mL saline tube and then connected to the liquid. After the end of daily infusion, nurses in charge will apply a concentration of 50U / mL heparin dilution 3mL for sealing to the observation group. Sealing method: After the end of infusion, close the regulator of the infusion device; remove the needle from the heparin cap. After iodophor disinfection of heparin cap, use a syringe to extract the sealed liquid 3mL, directly pierce the syringe into the heparin capsules. Initially administer slow injection of 2mL sealed liquid, push out the remaining liquid and finally pull the needle out. Follow the rest of the sealing step according to the control group. The nurses will fill out the registration form carefully after each closure.

(3) Removal of indwelling needle standard, plugging standard: with heparin sodium dilution after sealing the next

infusion is divided into smooth, blocked. When administering the next infusion of the liquid normal speed is smooth; liquid input <10 ~ 15 drops / min for the blockage. When the indwelling parts were discovered to be red, swollen, pain and phlebitis occurred, immediately remove the intravenous indwelling needle, replace the puncture site.

(4) Detection method: 2 groups of patients before catheterization, disable the heparin tube closed 24h after the extraction of venous blood, check the prothrombin time (PT), activated partial thromboplastin time (APTT), fibrinogen (Fg)

(5) Statistical methods: this study uses SPSS13.0 software, measurement data expressed as mean ± standard deviation (x ± s), using t test; the rank data were analyzed using rank sum test.

2. Results

(1) The effect of two different doses of heparin-encapsulated fluid on coagulation mechanism in elderly patients with cardiac surgery using indwelling needle (see Table 1)

Table1 2 different doses of heparin sealant fluid on the elderly patients with coagulation mechanism (x ± s)

Group	No. of cases	Before the stay			After 24 hours		
		PT（s）	APTT（s）	Fg（g/L）	PT（s）	APTT（s）	Fg（g/L）
Control	50	12.95±1.03	29.94±2.69	3.48±0.52	12.79±0.98	29.14±2.07	3.33±0.46
Observation	50	12.73±1.04	29.45±2.09	3.37±0.58	12.55±0.97	29.08±2.64	2.28±0.39

There was no significant difference in PT, APTT and Fg between the two groups at different doses of heparin sealed fluid after 24h administering (P> 0.05). There were no cases of bleeding tendency in the clinical observation.

(2) Comparison of the number of days for two different doses of heparin sealant fluid seal (see Table 2)

Table 2 Effects of two different doses of heparin seal fluid on indwelling time

Group	Concentration（U/mL）	No. of Cases	Stay time（d）	t	p
Observation gr	50	50	3.6±1.28	0.047	>0.05
Control group	62.5	50	3.3±1.37		

There was no significant difference in the number of indwelling teeth between the two groups using different doses of heparin sealed tube (P> 0.05).

3. Discussions

Intravenous indwelling needle is widely used in clinical practice because it can reduce the pain caused by daily puncture and can be easily infused at any time. Heparin is a commonly used anticoagulant, is an acidic mucopolysaccharide with a strong negative charge of the physical and chemical properties, can interfere with many aspects of hemagglutination process: mainly through the combination with antithrombin Ⅲ, thereby enhancing the inhibitory effect on activated

coagulation factors. Inhibition of platelet aggregation and destruction, hinder the formation of coagulation-activated enzymes, prevent thrombinogen into thrombin; inhibition of thrombin, inhibit fibrinogen into fibrin, in vivo, in vitro have strong anticoagulant effect. Clinical use of small doses of heparin to prevent venous thrombosis, the effect is satisfactory, and safer, it was routinely used for intravenous catheterization[2]. Data show that elderly people over the age of 60 use of heparin after the increase in the incidence of bleeding, especially in female patients, for unknown reasons, may be due to abnormal hemorheology in the elderly, blood viscosity and coagulation significantly higher than the young people[3]. The heart surgical vein indwelling needle application is particularly widespread especially common among the elderly patients. In order to reduce the burden on the patients' heart the amount applied is strictly controlled. Because of the complexities of the underlying conditions, there is a need to carry out sealing many times over. However it will be better if sealing effect is attained with a minimum use of sealed Fluid. For anticoagulant therapy patients, it will be a safer option to reduce the use of heparin sodium solution which has coagulation properties[4-6]. To this end, we designed two different doses of heparin sealed liquid, not only the dose is small the concentration is also within the safe range. The control group registered a reading of 312.5U heparin entering the body, while the observation group registered a lesser amount of 150U. Clinical observation shows that the two groups of patients were not prone bleeding. PT, APTT, Fg before indwelling, there was no statistically significant difference between the two groups 24 hours after removal of needle. Therefore, we believe that intravenous indwelling needle with the above dose concentration of heparin sealed fluid for coagulation mechanism of normal elderly patients with cardiac surgery is safe and reliable; there is no need to monitor the coagulation function, and it will not cause damage to the human body. This study shows that there are no statistically significant differences in the number of days between the two different doses of heparin-retaining fluid and the retention time of the indwelling needle, but the elderly undergoing cardiac surgery should choose different sealing fluids depending on the condition. For patients who need to control the amount of intake and anticoagulation therapy, the use of low concentrations of low dose of sealing fluid is more conducive to the treatment and recovery of the patients concerned[7].

Conclusion

In this study, we examined the use of intravenous indwelling needle in elderly patients with cardiac surgery in our hospital. By comparing two different concentrations and doses of heparin dilution for intravenous indwelling tube, after been treated with heparin (PTT), activated partial thromboplastin time (APTT) and fibrinogen (Fg) were measured for 24 hours, and the number of days left was recorded. The data were statistically analyzed to show that the two groups of intravenous indentation there was no significant difference in the number of days of indwelling. And in order to minimize the impact of heparin on coagulation function and as far as possible not to increase the burden on the heart for the elderly patients, the use of low concentrations of low-dose sealed liquid is not only conducive to the treatment and recovery but also help to reduce the incidence of complications.

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