



Effect of low molecular weight heparin in combined with Shuxuetong in preventing the post-traumatic deep venous thrombosis

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ABSTRACT

Objective: To observe the effect of low molecular weight heparin in combined with Shuxuetong in preventing the post-traumatic deep venous thrombosis (DVT). **Methods:** A total of 120 patients with post-traumatic DVT who were admitted in our hospital from February, 2014 to February, 2015 were included in the study and divided into the treatment group and the control group with 60 cases in each group according to different treatment protocols. The patients in the treatment group were given subcutaneous injection of low molecular weight heparin calcium and intravenous drip of Shuxuetong, while the patients in the control group were only given subcutaneous injection of low molecular weight heparin calcium. The changes of swelling degrees and coagulation indicators of the affected limb before and after treatment, and the clinical efficacy in the two groups were compared. **Results:** The total effective rate in the treatment group was significantly higher than that in the control group. The mean range of the perimeter 15cm above and below the bilateral knee joints after treatment in the treatment group was significantly lower than that in the control group. The shrinking rate of the mean range of the perimeter of the bilateral limbs in the treatment group was significantly higher than that in the control group. The comparison of PT, APTT, FIB, and INR before treatment between the two groups was not statistically significant. PT, APTT, and INR after treatment in the treatment group were significantly higher than those in the control group, while FIB was significantly lower than that in the control group. **Conclusions:** The low molecular weight heparin in combined with Shuxuetong can effectively prevent the post-traumatic DVT, with no requirement of monitoring of the bleeding tendency and safety.

1. Introduction

Deep venous thrombosis (DVT), a commonly severe case of traumatic orthopedics, refers to that the blood is abnormally coagulated in the deep venous cavity, resulting in the venous cavity block and the retardation of blood reflux[1–3]. The thrombus detachment of DVT can give rise to pulmonary embolism (PE), and severely threaten the patients' life and health[4]. It is reported that[5] about 60% patients with trauma have DVT, which successfully turns the research attention to the prevention of post-traumatic DVT. The post-traumatic DVT is a combined result of various

factors, with main pathological characteristics of vascular wall damage, venous stasis, and blood in a hyper-coagulation state, and main clinical treatments of anti-coagulation, thrombolysis, surgical thrombectomy, and inferior vena cava filter gauze placement, which have their own advantages and disadvantages[6]. Shuxuetong injection is a Miking anti-thrombosis drug, and is mainly applied in the treatment of cardiovascular and cerebrovascular diseases and diabetes, but the report on its treatment of post-traumatic DVT is less. The study is aimed to observe the effect of low molecular weight heparin in combined with Shuxuetong in preventing DVT.

2. Materials and methods

2.1. Clinical materials

A total of 120 patients with post-traumatic DVT who were admitted in our hospital from February, 2014 to February, 2015

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were included in the study, among which 55 were male, and 45 were female; aged from 27 to 66 years old, with an average age of (52.8±4.7) years old, and average weight of (60.3±3.6) kg; 47 had left limb affected, and 73 had right limb affected; 31 had central type of embolism, 64 had peripheral type, and 25 had mixed type. All the patients were hospitalized due to trauma, and DVT occurred in the treatment process. The color Doppler ultrasound examination results showed that low echo or no echo was inside the venous cavity, the cavity could be pressed, a small amount of blood flow signal or completely no blood flow signal was detected in the embolism segment of veins, or the frequency spectrum was not changed with the breathing. Those who were merged with malignant tumors, craniocerebral injury, cerebrovascular diseases, sever liver, kidney, and heart dysfunction, and hemorrhagic diseases were excluded from the study.

2.2. Methods

The patients were divided into the treatment group and the control group with 60 cases in each group according to different treatment protocols. The patients in the two groups were given bed rest, affected limb elevated to 30, low-fat, high-protein, and high-vitamin diets, bowels keeping open, antibiotics, and detumescence drugs. The patients in the treatment group were given subcutaneous injection of low molecular weight heparin calcium and intravenous drip of Shuxuetong. Methods: low molecular weight heparin calcium (produced by Shenzheng Saibaoer Biological Pharmaceutical Co. Ltd., Approval No. H20060191), subcutaneous injection of 4 100 U, twice a day; Shuxuetong injection (Mudanjiang Youbo Pharmaceutical Co. Ltd., Approval No. Z20010100) 8 mL+0.9% sodium chloride solution 250 mL, once a day. The patients in the control group were only given subcutaneous injection of low molecular weight heparin calcium, and the dosage and usage were the same as the treatment group. Two-week treatment or complete recanalization of the thrombus was regarded as the observation termination.

2.3. Observation indicators

The swelling degrees of the affected limb (the perimeter range 15 cm above and below the bilateral knee joints) before and after treatment, and the changes of coagulation indicators (PT, APTT, FIB, and INR) in the two groups were recorded. The efficacy criteria were formulated according to the swelling degree and B ultrasound examination results[7]: cured: perimeter range of the bilateral limbs in a same level<0.50 cm, pain in the affected limb disappeared, B ultrasound showed most recanalization or complete recanalization of the veins; excellent: perimeter range of the bilateral limbs in a same level from 0.50 to 2.00 cm, pain in the affected limb was alleviated, B ultrasound showed bilateral circulation or partial recanalization;

invalid: perimeter range of the bilateral limbs in a same level >2.00 cm, no change of pain in the affected limb, B ultrasound showed no vascular recanalization.

2.4. Statistical analysis

SPSS 13.0 software was used for the statistical analysis. *Chi*-square test was used for the comparison of enumeration data, and *t* test was used for the comparison of measurement data. The results were expressed as mean ± SD. *P*<0.05 was regarded as statistically significant.

3. Results

3.1. Comparison of the clinical efficacy between the two groups

In the treatment group, after treatment, 28 (46.7%) were cured, 31 (51.7%) were effective, and 1 (1.7%) was invalid, and the total effective rate was 98.3%; in the control group, 23 (38.3%) were cured, 29 (48.3%) were effective, and 8 (13.3%) was invalid, and the total effective rate was 86.7%. The total effective rate in the treatment group was significantly higher than that in the control group (*P*<0.05).

3.2. Comparison of the swelling degree of the affected limb before and after treatment

The mean range of the perimeter 15 cm above and below the bilateral knee joints after treatment in the treatment group was significantly lower than that in the control group (*P*<0.05). The shrinking rate of the mean range of the perimeter of the bilateral limbs in the treatment group was significantly higher than that in the control group (*P*<0.05) (Table 1).

Table 1

The perimeter range of the bilateral limbs before and after treatment (cm).

Groups	<i>n</i>	Above the knee	Below the knee	Shrinking rate (%)
Treatment group	60	2.20±2.26*	1.31±0.62*	7.32±1.79*
Control group	60	4.03±2.33	3.15±1.73	5.71±1.91

**P*<0.05, when compared with the control group.

3.3. Comparison of the coagulation indicators before and after treatment

The comparison of PT, APTT, FIB, and INR before treatment between the two groups was not statistically significant (*P*>0.05). PT, APTT, and INR after treatment in the treatment group were significantly higher than those in the control group (*P*<0.05), while FIB was significantly lower than that in the control group (*P*<0.05) (Table 2).

Table 2

Comparison of the coagulation indicators before and after treatment.

Groups	n	PT (s)	APTT (s)	FIB (g/L)	INR	
Treatment	60	Before	10.86±1.43	27.21±2.90	4.01±1.52	1.18±0.27
		After	12.02±0.76*	34.51±1.68*	3.50±0.75*	1.30±0.22*
Control	60	Before	11.12±0.99	28.02±1.97	4.06±1.56	1.16±0.25
		After	11.76±0.64	31.64±1.91	3.85±1.26	1.23±0.23

* $P < 0.05$, when compared with the control group.

4. Discussion

DVT is a common complication of traumatic orthopedics in the clinic, mostly seen in the lower limbs, and is also a common reason for the death of traumatic patients, with different morbidity[8-10]. During the chronic stage of DVT, the distal deep venous valve will be involved due to the lower limb deep vein backflow obstruction, resulting in insufficiency and severely affecting the patients' prognosis[11]; therefore, how to effectively prevent the post-traumatic DVT is of great significance to the traumatic patients.

Currently, the treatment protocols of post-traumatic DVT are mainly taking recovering the lower limb deep vein blood flow unobstructed, preventing the pulmonary artery embolism, preserving the valve function, eliminating the thrombus, and preventing the recurrence as ideal goals[12]. Some scholars argue that[13] the anti-coagulation should be served as the basic treatment measure of DVT. The low molecular weight heparin is a common anti-coagulation drug, and not can only block the spreading of thrombus inside the deep venous cavity, but also are not easy to give rise to bleeding; therefore, it can be served as the first choice drug for the treatment of DVT[14,15]. Shuxuetong injection is made by extracting the effective components from the leech and earthworm through the modern biological extraction technology, with main components of hirudin and lumbrokinase, possesses a strong promoting circulation and removing stasis effect, can not only convert the fibrinogen to fibrin, but also activate the enzymes of coagulated blood, and block the active sites of thrombin to further prevent the platelet activation reaction induced by thrombin and hemostatic reaction catalyzed by thrombin, thus the goal of anti-coagulation is reached[16,17]. The results in the study showed that the total effective rate in the treatment group was significantly higher than that in the control group ($P < 0.05$), and the limb shrinking rate was significantly higher than that in the control group ($P < 0.05$), indicating that the combination of the two drugs can enhance the therapeutic effect and alleviate the clinical symptoms. Moreover, after treatment, in the treatment group, the coagulation state change was significant ($P < 0.05$), but not exceeding the normal range, suggesting that the combination of the two drugs can strengthen the thrombolysis, anti-coagulation, and expansion effects, reduce the vascular resistance, alleviate the clinical symptoms, and enhance the therapeutic effect. In conclusion, the low molecular weight heparin in combined with Shuxuetong can effectively prevent the post-traumatic DVT, with no requirement of monitoring of the bleeding tendency and safety.

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