

# Clinical efficacy and pharmaco-economic analysis of xiaozhong zhitong decoction on preventing deep venous thrombosis in major orthopaedic operation

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**Abstract:** The clinical efficacy and pharmacoeconomics of Xiaozhong Zhitong Decoction on preventing deep venous thrombosis in major orthopaedic operation are observed and analyzed. The 160 patients who are implemented major orthopaedic operation in our hospital are selected as the subjects, which are randomly divided into research group applying Xiaozhong Zhitong decoction and reference group using low molecular heparin with same cases in each group for observing their treatment efficacy and analyzing pharmacoeconomics. Through observing and comparing the rate of deep venous thrombosis in two groups, the results show that study group is significantly lower than reference group with  $p < 0.05$ . The incidence of adverse reactions in study group is significantly lower than that of reference group with  $P < 0.05$ ; after observing the postoperative quality of life and analyzing cost-effectiveness in two groups, it shows that study group has more significant advantage than reference group with  $p < 0.05$ . The Xiaozhong Zhitong decoction has a better clinical effect on preventing deep venous thrombosis in major orthopaedic operation with higher safety and reliability and has a better cost effect ratio at the same time.

**Keywords:** Xiaozhong zhitong decoction, major orthopaedic operation, deep venous thrombosis, pharmacoeconomics.

## INTRODUCTION

Orthopaedics department is one of the most common departments in major hospitals, which mainly studies the anatomy, physiology and pathology of skeletal muscle system as well as develops drug use, surgery and physical methods (Qu, *et al.*, 2013; Wang, *et al.*, 2015) with the change of times and society, there have been significant changes in style of injuries in orthopaedics. For example, bone tuberculosis, osteomyelitis, polio and other diseases are significantly reduced, while traffic accident injuries are significantly increased. The change in styles of injury in orthopaedics requires that the orthopaedics should keep pace with times. Major orthopaedic operation is an important way to treat orthopaedic patients.

Deep venous thrombosis is a common complication in major orthopaedic operations. Deep venous thrombosis (as shown in fig. 1) refers to the abnormal coagulation of blood in deep vein, which is a disorder of venous reflux disease of the lower extremities. Most of the thrombosis occurs in braking state, especially in major orthopaedic operation. Pathogenic factors include slow blood flow, venous wall injury and hypercoagulability (Zhang, Yang, 2016). After thrombus formation, most of thrombus will diffuse into the trunk of deep vein of the whole limb (as shown in fig. 2) except a few of thrombus can ablate by themselves or be limited to the site. If it is not timely diagnosed and treated, a large proportion of thrombus will

evolve into sequela of thrombosis, which will affect patient's life quality for a long time (Martinod, *et al.*, 2013). The study analyzes the clinical efficacy and pharmacoeconomics of Xiaozhong Zhitong decoction on preventing deep venous thrombosis in major orthopaedic operation, which provides valuable reference for practical treatment. The content of the report is shown below.

## MATERIALS AND METHODS

### General Materials

The 160 patients who had undergone major orthopaedic operations in Affiliated Hospital of Qingdao University from August 2014 to December 2017 were selected as the study subjects. The selected patients and relatives signed the informed consent before treatment. All patients were diagnosed by clinical examination including 52 patients accepting artificial hip replacement due to necrosis in femoral head or osteoarthritis in hip joint, 65 patients accepting artificial knee replacement due to osteoarthritis in knee joint and 43 patients accepting internal fixation due to fracture around the hip. At the same time, patients have signed the informed consent of our hospital. The patients were randomly divided into research group and control group, each containing 80 cases. Among them, there were 45 males and 35 females in research group, the oldest being 80 years old and the youngest being 40 years old with average age being (56.8 + 3.5) years old. There were 48 males and 32 females in control group, the oldest being 78 years old and the youngest being 42 years old

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with average age being (58.9 + 2.6) years old. By comparing the data of two groups, the results show that there is a comparability with  $p > 0.05$ .

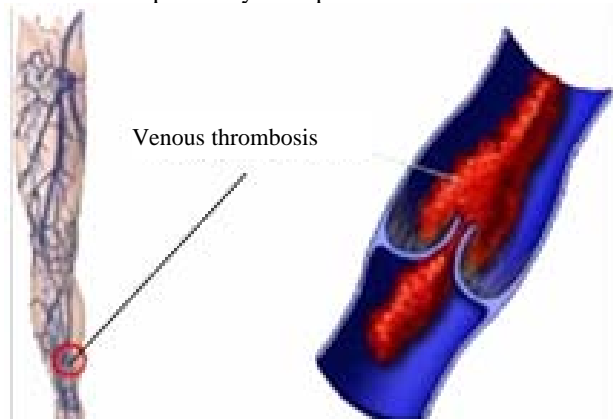


Fig. 1: Deep Venous Thrombosis

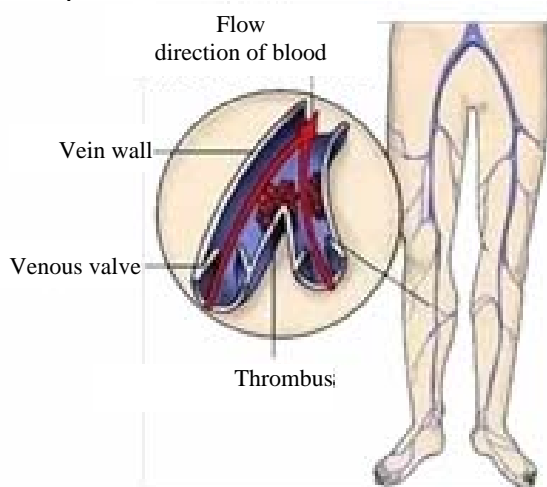


Fig. 2: Trunk of Deep Vein

### Method

First, treatment before the operation, the patients in research group and control group were examined from entering into hospital to pre-operation, including blood routine, basic biochemical indexes, blood rheology, electrocardiogram, coagulation analysis, D- two polymer and color ultrasound doppler examination for two lower extremities and so on. At the same time, antibiotic therapy as well as routine treatment such as maintaining acidolysis balance and water electrolyte balance were conducted, who did not take drugs (other than test) drugs that can affect fibrinolysis and function of blood coagulation and platelet.

Secondly, all patients were operated by the same group of doctors, with routine operation and way of anaesthesia being combined spinal epidural anaesthesia. Finally, different ways of preventing and treating deep venous thrombosis were taken after the operation. The control group received subcutaneous injection of low molecular heparin, while the research group took Xiaozhong

Zhitong decoction. The patients in control group were given subcutaneous injection of low molecular heparin with rule of 5000 units. After the operation, the injection was conducted two times a day with two weeks of continuous treatment. The Chinese medicine of Xiaozhong Zhitong decoction in research group is composed: 10g of angelica, 10g of coix seed, 10g of Lonicera rattan, 10g of cypress, 15g of radix paeoniae rubra, 6g of ground beetles and 3g of Calamitas urinae hominis, respectively. Boiling them according to this prescription, one dose a day with two times a day. Taking it 12 hours after the operation with two weeks of continuous medication as a complete course.

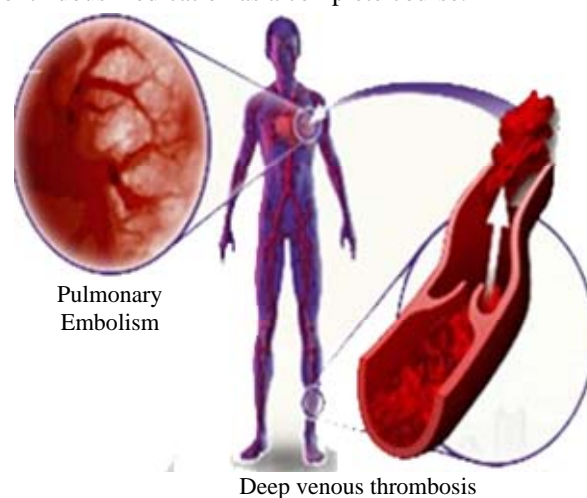


Fig. 3: Photo of Pulmonary Embolism

### Observational index

After the operation, the patient's state was monitored to check whether there was the problem of deep venous thrombosis or the symptoms and signs of the complications; moreover, both lower extremities were examined by color doppler ultrasound at 1 day before the operation and 3, 14 and 30 days after the operation. If these symptoms appear, examination and diagnosis will be timely conducted (Wilson *et al.*, 2013); At the same time, incidence of adverse reaction of the patients was counted; the health status questionnaire (SF-36) was adopted to record the grading of patient's life quality; the health economic analysis was carried out to record the direct cost of patients in whole treatment stage, including the cost of diagnosis and treatment, medicine and the examination. The cost effectiveness analysis was carried out to exclude the cost of other treatments.

### STATISTIC ANALYSIS

The statistical analysis software was SPSS21.0. The measurement data was expressed in a mean number  $\pm$  average number ( $\bar{x} \pm s$ ) and group comparison was carried out by t test. The count data was expressed in natural number (n) and percentage (%), with  $X^2$  used for

**Table 1:** Comparison of incidence of deep venous thrombosis between two groups [n (%)]

Group	Case number	Case of deep venous thrombosis (n)	Incidence of deep venous thrombosis (%)
Control group	80	12	15.00
Research group	80	4	5.00
X <sup>2</sup>			8.56
P			<0.05

**Table 2:** Comparison of incidence of adverse reaction between two groups [n (%)]

Group	Case number	Mouth hematoma	Ecchymosis	Reaction in digestive tract	Incidence of adverse reaction
Control group	80	4	6	3	13(16.25)
Research group	80	0	3	0	3(3.75)
X <sup>2</sup>					12.18
P					<0.05

**Table 3:** Comparison of life quality after operation between the two groups ( $\bar{x} \pm s$ )

Group	Case number	Physiological function	Psychological function	Social function	Total life quality
Research group	80	0.97±0.32	1.30±0.52	1.29±0.15	4.81±0.55
Control group	80	0.43±0.29	1.01±0.05	0.82±0.23	3.26±1.20
t		3.58	5.31	5.09	8.36
P		<0.05	<0.05	<0.05	<0.05

intergroup comparison. When  $P < 0.05$ , the intergroup difference was of statistical value.

## RESULTS

### *Comparison of incidence of deep venous thrombosis between two groups*

As shown in table 1, all patients were subjected to a 3-month follow-up examination. In research group, there were a total of 4 patients with deep vein thrombosis, while there were 12 cases in control group. The incidence of deep venous thrombosis in research group was lower than that of control group,  $p < 0.05$ .

### *Comparison of incidence of adverse reaction between two groups*

As shown in the following table 2, the incidence of adverse reaction in research group was significantly lower than that of control group and the difference was of statistical significance,  $p < 0.05$ .

### *Comparison of life quality after operation between the two groups*

As is shown in following table 3, through comparing the scores of physiological function, psychological function, social function and life quality between two groups, the results showed that research group was significantly superior to control group in all indexes,  $p < 0.05$ .

### *Cost-effectiveness analysis in preventing deep venous thrombosis between the two groups*

The average cost in preventing deep venous thrombosis for research group was 170.2 US \$, while that for control

group was 248.3 US \$. According to the formula of cost-effectiveness analysis, the final cost in research group was 360.8 and that in control group was 2271.5, indicating that the research group was significantly less than control group.

## DISCUSSION

The major orthopedic operation mainly involves artificial replacement of hip joint and artificial replacement of knee joint. After the operation, a common problem is venous thromboembolism, which can lead to patients' death in perioperative period. In addition, some patients may have pulmonary embolism (as shown in fig. 3), resulting in very serious consequences. Studies have shown that the main cases of deep venous thrombosis include blood hypercoagulability, vascular endothelial damage and slow venous reflux and so on (Wang, *et al.*, 2014; Xie, *et al.*, 2016).

Aspirin, dextran and dipyridamole are often used in preventing deep venous thrombosis in major orthopaedic operation. However, the clinical application of these drugs does not have a good effect on preventing deep venous thrombosis, so they have not been used as preventative drugs for sole application (Gui *et al.*, 2017; Galanaud *et al.*, 2013). When low dose of ordinary heparin and Hua Falin are used, the problem of severe bleeding and bleeding complications will be relatively improved, so the monitoring of coagulation function must be strengthened. When low molecular heparin (LMWH) is used in preventing deep venous thrombosis, although it can have

a good effect with less side effects, it also has a risk of bleeding and at the same time, the price is high.

In recent years, traditional Chinese medicine therapy has become an important development. Chinese medicine treatment can be used with lower and higher safety (Simsek, *et al.*, 2014). After major orthopaedic operation, patients have problems of blood spills, blood stasis and wet deposition. The pathogenesis of this disease is Qi (energy) stagnation and blood stasis, so the basic principle of treatment is to activate blood circulation and dissipate blood stasis as well as relieve swelling and relieve pain. In this study, Xiaozhong Zhitong decoction composition includes cortex phellodendri, honeysuckle stem, radix paeoniae rubra, semen coicis and angelica sinensis and so on. The Xiaozhong Zhitong decoction can improve blood viscosity and microcirculation, promote blood flow and accelerate blood circulation, and then block the problem of deep venous thrombosis caused by slow venous blood flow which has remarkable effect.

By observing and comparing the rate of deep vein thrombosis in the two groups, the results showed that the research group was significantly lower than the control group,  $p < 0.05$ ; The incidence of adverse reactions in the research group was significantly lower than that in the control group,  $p < 0.05$ . After observation of postoperative quality of life and cost-effectiveness analysis of patients in the two groups, the advantages of the research group were more significant than those of the control group,  $p < 0.05$ . This fully demonstrates that using Xiaozhong Zhitong decoction to prevent deep venous thrombosis in major orthopaedic surgery has better clinical efficacy and higher safety and reliability.

## CONCLUSION

To sum up, Xiaozhong Zhitong decoction has better clinical efficacy, higher safety and reliability and better cost effect ratio in preventing and treating deep venous thrombosis in major orthopaedics operation. Therefore, it is of great significance to be popularized and applied in clinics.

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