

Effect of Huoxue Huayu decoction on limb swelling in the late stage of bone injury and its influence on motor function

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Abstract: To explore the therapeutic effect of Huoxue Huayu Decoction on limb swelling in the late stage of bone injury and its influence on motor function. Mainstream databases were searched by inputting the keywords "Huoxue Huayu Decoction" and "bone injury swelling". According to the research scope, 13 articles with a total of 1414 patients were screened out and divided into an observation group (n=707 cases) and a control group (n=707). The clinical effects, degree of limb swelling, recovery of motor function and incidence of adverse reactions of the two groups of patients treated with traditional Chinese medicine Huoxue Huayu Decoction and western medicine respectively in the treatment of limb swelling in the late stage of fracture were compared and analyzed. The clinical efficacy of the observation group was significant. The motor function score (VAS), limb swelling elimination time, hospitalization time, motor function recovery and adverse reaction incidence of the observation group were significantly better than those of the control group. The traditional Chinese medicine Huoxue Huayu Decoction is effective for limb swelling in the late stage of bone injury. It can relieve pain, reduce hospitalization time and has high drug safety.

Keywords: Huoxue Huayu Decoction, limb swelling in the late stage of bone injury, VAS score, motor function

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INTRODUCTION

After bone injury, the human body's skeletal structure is destroyed, resulting in abnormal motor function of the affected limb. At the same time, due to vascular damage and obstructed blood flow, local microcirculation disorders occur in the affected limb, leading to limb swelling and pain (Lei Zhang, 2021). Limb swelling often occurs in the late stage of bone injury. If it is not treated in time, it will cause complications such as osteofascial space syndrome, which seriously affects the motor function of the limb. The clinical manifestations are pain and swelling of the affected limb, followed by muscle spasms, necrosis and even thrombosis due to obstructed blood flow (Qinsheng Wang *et al.*, 2019). Traditional Chinese medicine believes that "evil enters the body and causes qi deficiency". Injury to the tendons and bones can cause damage to blood function, resulting in insufficient body fluid and blood and disharmony of the internal organs (Yun Li and Hongmin Li 2022). Limb swelling belongs to the category of "blood stasis" in traditional Chinese medicine. It is mainly caused by blood stasis, stagnation of body fluid, heat toxicity and qi stagnation in the body after bone injury. Therefore, the treatment should be based on the principle of promoting blood circulation and removing blood stasis, unblocking meridians and activating collaterals (Xiaopeng Pan, 2024). Clinical studies have shown that traditional Chinese medicine plays an important role in the prognosis of fractures. Through traditional Chinese medicine treatment and supplemented by professional orthopedic care measures, it can effectively restore limb function,

reduce swelling and pain and promote limb recovery (Jianmo Chen and Yilong Ling, 2019). This study searched for relevant literature on the use of Huoxue Huayu Decoction to treat limb swelling in the late stage of bone injury through databases, knowledge websites and library official websites. It sorted out the current status of the use of Huoxue Huayu Decoction in the treatment of limb swelling in the late stage of fracture, explored new ideas for the research on the rehabilitation of fracture patients and provided a certain theoretical basis and reference basis for the TCM intervention treatment of fracture patients.

MATERIALS AND METHODS

Literature search

Using the search terms "Huoxue Huayu Decoction" and "bone injury and swelling", search for relevant literature on the Cochrane Library, Google, CNKI, Weipu and Wanfang databases for research. The deadline is January 2024. The publication time of the literature is from January 2010 to January 2024. A total of 13 articles and 1414 case patients were included, including 782 males and 632 females. Age ranged from 29 to 75 years old, with an average age of (52.5±5.5) years; duration of disease ranged from 7 to 32 days, with an average duration of (20.5±4.5) days. Among them, 353 were injured by car accidents, 296 were injured by accidents, 242 were injured by falling from high altitude, 196 were injured by stepping on the stairs, 172 were injured by heavy objects, 89 were injured by falling, 34 were injured by mechanical blows and 32 were injured by other trauma. Selection criteria: RCT data published in regular publications; consistent with the diagnosis of limb

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swelling in the late stages of bone injury; exclusion criteria: animal testing; review, Meta analysis. 1414 patients were divided into observation group (n=707) and control group (n=707). There was no significant difference in basic information between the two groups.

Literature screening and data selection

The detected literature will be screened by the research team members and if there are any opinions, the team members will jointly study and decide; if there is insufficient data, the corresponding author can be consulted. The selected documents include general information and clinical study characteristics.

Literature evaluation: Conduct risk of bias assessment based on the Cochrane tool and evaluate the quality of the literature, including randomization, allocation concealment, blinding, attrition and selective reporting of results. If there is a possibility of bias, it is divided into levels I, II and III according to the possibility. Level I is the lowest bias and level III is the highest bias. Conflicts of opinion will be resolved through consultation among members of the research team.

Methods

In this study, 707 cases in the control group were given basic clinical treatment and western medicine therapy: traction therapy was given after trauma fixation, the affected limb was raised and 20% mannitol was intravenously dripped, 250mL/time, once/day. 707 cases in the observation group were given oral treatment of Huoxue Huayu Decoction, which consisted of 8 g each of *Angelica sinensis*, *Rhizoma Lulutong* and *Herba Zedoariae*, 10g each of *Bupleurum*, *Carthamus tinctorius*, and *Radix Aucklandiae*, 12g each of *Radix Paeoniae Rubra* and *Rhizoma Chuanxiong*, 15g each of *Rhizoma Alismatis*, *Rhizoma Sappani* and *Pericarpium Citri Reticulatae* and the dosage of the medicine was adjusted according to the severity of the disease. If there is swelling in the upper limbs, add cinnamon twig and angelica root; if there is swelling in the lower limbs, add *Achyranthes bidentata* and *Angelica dahurica*; if there is more qi stagnation, add *Citrus aurantium* and *Cyperus rotundus*; if there is severe blood stasis, add *Panax notoginseng* powder; if there is constipation, add Glauber's salt, *Magnolia officinalis* and *Cannabis sativa* seed; add warm water to the medicine and boil it for 30 minutes, then take 300ml of the juice and take it in two doses, one in the morning and one in the evening, for a course of 7 days. At the same time, massage the swollen area every day, gently at first and then gradually increase the strength. Time: Massage twice a day, 20 to 30 minutes each time, until the affected area becomes hot.

Observation and evaluation indicators

Efficacy evaluation

Significantly effective: After treatment, the swelling of the affected limb is less than 0.2cm and completely subsides within 3 days; effective: The swelling is 0.3 to

0.8 cm and subsides within 3 to 6 days; ineffective: The swelling does not change or continues to worsen (Weiyu Zhong, 2021).

Total effective rate = (significantly effective + effective) / total number of cases × 100%.

Limb swelling index and pain assessment

According to the "Guidelines for Clinical Research of New Chinese Medicines", the efficacy of the drug was assessed after treatment (Songtu Zhang, 2020). No swelling of the affected limb was graded as 0; slight swelling of the affected limb skin, with slight skin wrinkles, was graded as I; slight skin wrinkles and swelling >2 cm was graded as II; tension blisters on the affected limb were graded as III. VAS was used to assess pain index, which was divided into 0 to 10 levels, the better the score, the more pain the patient is experiencing.

Motor function index

Observe the motor function of the affected limb and the time of callus growth.

Adverse reactions

Observe the incidence of adverse reactions in the two groups of patients.

STATISTICAL ANALYSIS

Analyze using SPSS 23.0 professional software, using t or χ^2 test. P < 0.05 was considered statistically significant.

RESULTS

Comparison of drug efficacy between the two groups

The effects of the two drugs are shown in table 1.

Comparison of pain scores and swelling elimination time between the two groups of patients

After medication, there were significant differences in VAS scores, swelling elimination time and length of hospitalization between the two groups (P<0.05) (table 2).

Comparison of swelling degree between the two groups of patients

Comparison of swelling grades between the two groups of patients after medication (table 3).

Recovery from bone injuries in the two groups of patients

After medication, the bone injury recovery of the two groups of patients is shown in table 4. Comparison of bone injury recovery of the two groups of patients ($\bar{x} \pm s$)

Comparison of complication rates between the two groups

The results of this study show that the safety of drugs in both groups is high. It can also be found that the safety of drugs in the observation group is higher than that in the control group (table 5).

Table 1: Comparison of the effects of the two drugs. (n/%)

Group	N	Effective	Efficient	Invalid	Total effective rate
Observation Group	707	551(77.94)	132(18.67)	24(3.39)	683(96.61)
Control group	707	421(59.55)	108(15.27)	178(25.18)	529(74.82)
χ^2		537.227	534.289	734.379	26.438
<i>P</i>		0.000	0.000	0.000	0.001

Table 2: Comparison of pain scores, swelling elimination time and hospitalization time between the two groups ($\bar{x}\pm s$)

Group	N	VAS pain score (points)	Swelling elimination time (d)	Length of hospital stay (d)
Observation Group	707	1.68 \pm 1.46	3.16 \pm 0.46	6.24 \pm 5.16
Control group	707	5.12 \pm 1.37	7.12 \pm 0.52	12.10 \pm 5.02
<i>t</i>		9.354	29.254	10.823
<i>P</i>		0.001	0.001	0.001

Table 3: Comparison of swelling grades between the two groups of patients (n/%)

Group	N	Level 0	Level I	Level II	Level III
Observation Group	707	626(88.54)	48(6.79)	33(4.67)	0(0.00)
Control group	707	364(51.49)	236(33.38)	92(13.01)	15(2.12)
χ^2		525.5	104.922	25.624	14.844
<i>P</i>		0.000	0.000	0.000	0.000

Table 4: Comparison of bone injury recovery of the two groups of patients ($\bar{x}\pm s$)

Group	N	Motor function recovery time	Callus growth time
Observation Group	707	14.52 \pm 2.21	15.72 \pm 2.14
Control group	707	23.25 \pm 3.15	25.57 \pm 2.81
<i>t</i>		60.324	74.1503
<i>P</i>		0.000	0.000

Table 5: Comparison of drug safety between the two groups (n/%)

Group	N	Incision infection	Poor wound healing	Muscle cramps	Thrombus	Pressure ulcers	Total number of cases
Observation Group	707	3(0.42)	9(1.27)	7(0.99)	2(0.29)	0(0.00)	21(2.97)
Control group	707	13(1.84)	27(3.82)	36(5.09)	23(3.25)	9(1.27)	108(14.27)
χ^2		6.18	8.778	18.988	17.337	8.943	53.941
<i>P</i>		0.0129	0.0030	0.0000	0.000	0.002	0.000

DISCUSSION

Late-stage limb swelling is a common clinical bone injury disease. The mechanism of occurrence is due to inflammation of the surrounding tissues after bone injury, which releases a large number of inflammatory factors and cytokines, increases capillary permeability, ruptures small blood vessels inside (Chunpeng Zhao, 2019), blocks venous blood circulation and causes interstitial edema due to rapid expansion of the blood vessel wall, leading to extra vasation of fluid in the veins and causing soft tissue swelling. Clinical manifestations include disappearance of skin lines and tension blisters on the affected limbs. As the disease worsens, abnormal blood supply and oxygen supply appear, and the intensified inflammatory response further leads to muscle spasm and necrosis, with a high disability rate in clinical practice (Leibin Fang *et al.*,

2024). Swelling of the affected limb after fracture surgery not only causes severe pain and discomfort, affecting fracture recovery (Mingxiang Xing, 2023), but also easily causes infection and pressure sores, seriously affecting motor function, and causing great inconvenience and pain to patients (Yongsheng Wu, 2022). Therefore, it is necessary to strengthen treatment in the late stage of bone injury and adopt scientific and rigorous treatment measures to effectively promote recovery after fracture. Clinical treatment of limb swelling after bone injury mainly adopts Western medicine such as anti-inflammatory, analgesic, blood circulation improvement and dehydration. Western medicine has a good effect on improving blood circulation and limb swelling of the affected limb and restoring limb function. However, due to the short duration of action of Western medicine, recurrence is prone to occur after discontinuation of

medication (luyin Lu, 2021). Moreover, although dehydration drugs such as mannitol and sodium aescinate injection can improve local edema, they cannot effectively improve congestion and pain symptoms (Benhai Wang, 2022). In addition, due to individual differences, the treatment effect is not significant.

The theory of traditional Chinese medicine believes that after bone injury due to various reasons, the body will experience poor Qi movement, blocked veins, and trigger a series of symptoms such as swelling of the injured limb, pain, and functional obstruction, which will further aggravate blood stasis, Qi stagnation and poor blood movement. However, damage to the tendons and veins will aggravate swelling, leading to edema and pain (Xiaolong Dong, 2019) and even adverse consequences such as necrosis and disability of the affected limb (Gaoming Pan, 2019). Orthopedic injuries fall into the category of "broken bones and tendon injuries", which include damage to the muscles and veins of the affected limb, qi stagnation and blood stasis, and poor circulation of qi and blood. The main principles of traditional Chinese medicine treatment are to reduce swelling, relieve pain, stimulate the menstrual flow, activate blood circulation, and remove blood stasis. Huoxue Huayu Decoction is a blood-regulating agent that has the effects of promoting blood circulation and removing blood stasis, promoting qi and relieving pain, diuresis and reducing swelling. Therefore, it is beneficial to the treatment of limb swelling after bone injuries (Hong Ye, 2019). Its mechanism of action: The anticoagulant effect of the traditional Chinese medicine Huoxue Huayu Decoction can effectively restore the normal blood supply to the limbs in the late stage of fracture, repair the damaged vascular endothelium and restore blood supply, thereby reducing the accumulation of fat cells in the bone marrow cavity and reducing the pressure within the limbs. In the prescription of activating blood circulation and removing blood stasis, safflower has the effects of promoting blood circulation and dispersing blood stasis, regulating menstruation and activating collaterals, anti-inflammatory and analgesic, especially for stasis, swelling and pain caused by bruises; Angelica sinensis and Bupleurum can nourish qi and relieve pain. Hepatic effects, especially Angelica sinensis polysaccharide, which can promote the production of hemoglobin and red blood cells, can effectively improve the body's hematopoietic function (Zhiping Huang, 2019) and therefore has good blood-enriching, activating, menstrual-regulating and analgesic effects; red peony root can obviously clear away heat, cool blood, activate blood and eliminate pain. It has the effect of blood stasis; Ligusticum chuanxiong has high efficacy in activating blood and promoting qi, dispelling wind and relieving pain (Weihong LAN, 2019). It can effectively sort out the body's qi and blood and has a good effect on blood stasis and qi stagnation and pain syndrome; Zelanthus and Passepartout can dispel wind,

analgesia and TCM research has proven that passepartout contains betulinic acid and gallic acid. These ingredients can greatly reduce the permeability of capillaries, effectively inhibit the secretion of inflammatory mediators, thereby reducing the symptoms of limb swelling; hematoxylin It has a good effect on reducing swelling and relieving pain and is effective in treating bruises, fractures, stasis, carbuncles, and blood stagnation. Woody scent can regulate qi and strengthen the spleen, dry dampness and resolve phlegm. Woody scent can regulate Qi, guide stagnation and relieve pain. Tangerine peel can regulate qi and strengthen the spleen and Achyrantes bidentata can diuretic, relieve stranguria, relieve joint pain, remove blood stasis and stimulate menstruation. The combined application of the above drugs can achieve the effects of replenishing qi and activating blood circulation, dissipating blood stasis, analgesia, dispersing dampness and diuresis, and has a significant effect on limb swelling in the later stages of bone injury (Bo Wu, 2019). Modern pharmacological research has proven that the active ingredients in Huoxue Huayu Decoction can relieve vasospasm, reduce blood viscosity, improve local blood flow, inhibit the exudation of inflammatory substances and have good anti-inflammatory and analgesic effects (Tiantia Wang and Yuqi Xia, 2021). It can also enhance the permeability of capillaries, promote the dissolution of fibrin (Xishuang Cui, 2019) and reduce swelling after bone injury. In view of this, incorporating Huoxue Huayu Decoction into this study can further demonstrate its clinical effect on limb swelling in the late stage of bone injury.

Massage is a commonly used treatment method in traditional Chinese medicine. According to the meridian theory of traditional Chinese medicine, massage can adjust and sort out the relationship between meridians, acupoints and internal organs. During the oral administration of traditional Chinese medicine decoction, combined with massage techniques, it can effectively open the meridians, relax muscles and relax muscles and activate collaterals. It has the effect of improving blood circulation in swollen limb tissues and unblocking collaterals and removing blood stasis (Wanshan Wu, 2020). Jingli Wang (Jingli Wang, 2021) studied 120 patients with limb swelling after fracture, using Huoxue Huayu decoction and massage techniques. In this study, the drug effectiveness of the observation group was significantly higher than that of the control group. Benhai Wang (Benhai Wang, 2022) concluded in his study that patients who used Huoxue Huayu Decoction had better VAS scores, swelling disappearance symptoms and length of hospitalization than other drugs. Qing Zhou (Qing Zhou, 2023) studied 134 patients with late-stage swelling after fracture. After treatment with Huoxuehuayu decoction, the observation group had lower motor function recovery time and callus growth time than the control group. The incidence of adverse reactions was

2.38%, which was also significantly lower. 14.29% of the control group. This study compared the clinical data of 1414 patients and showed that the treatment effectiveness of the observation group was significantly better than that of the control group, and in terms of VAS score, swelling disappearance, hospitalization time, motor function recovery time, callus growth time and incidence of adverse reactions, the observation group was significantly better than the control group. The results in both groups were significantly lower than those in the control group, indicating that the application of Huoxue Huayu Decoction combined with massage techniques to treat patients with limb swelling in the later stages of bone injury can effectively reduce the pain of the affected limb, shorten the disappearance time of swelling and hospitalization time and promote bone callus Recovery of growth and motor functions, low incidence of adverse reactions and high clinical safety.

In summary, this paper can draw the following conclusion: Giving the Chinese medicine Huoxue Huayu Decoction to patients with limb swelling in the late stage of fracture and using Chinese medicine massage techniques for auxiliary treatment can effectively relieve pain and swelling, greatly shorten the disappearance of swelling and hospitalization time and effectively promote the recovery of motor function of the affected limb, improve the quality of life of patients, with significant clinical effects and is suitable for clinical promotion and application. Although Huoxue Huayu Decoction has a good therapeutic effect, this article did not study the problem of swelling in the late stage of bone injury treated with traditional Chinese medicine. In future research, three group comparison studies can be conducted, including traditional Chinese medicine + western medicine, western medicine, and traditional Chinese medicine, to make the conclusion more scientific.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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