Original Article
Clinical effect of warm needle penetration in treating knee osteoarthritis

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Abstract: Objective: Our aim was to explore the clinical effect of warm needle penetration in treating knee osteoarthritis. Methods: We randomly divided 118 patients with knee osteoarthritis into the observation group (n=59) and the control group (n=59). The observation group was treated with warm needle penetration combined with western medicine therapy, and the control group was only given western medicine therapy. The clinical effective rate, Visual analogue scale pain score, knee joint score, Western Ontario and McMaster Universities osteoarthritis index and subjective satisfaction were observed and compared between the two groups. Results: The clinical effective rate, knee joint score and subjective satisfaction rate were higher (all P<0.05), while the Visual analogue scale pain score and Western Ontario and McMaster Universities osteoarthritis indices score were lower in the observation group than in the control group (both P<0.05). Conclusion: Warm needle penetration can ameliorate the efficiency of treatment, reduce pain, and improve the range of knee joint motion and subjective satisfaction of patients with knee osteoarthritis.

Keywords: Knee osteoarthritis, warm needle penetration, clinical effective rate, knee joint score, subjective satisfaction

Introduction

Knee osteoarthritis, also known as deformable knee arthritis and it is a common degenerative disease of the knee joint. Its pathological changes mainly include articular cartilage degeneration with osteophytes formation by reactive proliferation of the articular margin and cartilage, which ultimately destroys the articular surface of the knee joint. It is one of the common chronic non-inflammatory joint diseases seen in the elderly [1-4]. Current studies have confirmed that knee osteoarthritis more commonly occurs in the elderly, and it is associated with cartilage oligomeric matrix proteins and inflammatory factors (e.g., tumor necrosis factor-α and matrix metalloproteinases). Its incidence increases with age without difference between gender, but is higher in women than in men over 65 years of age (70% vs. 60%) [5, 6].

In the aging population of people over 50 years in China, the incidence of knee osteoarthritis is close to 15%. In mild cases, it causes joint pain, limited activity, and joint swelling and deformation, while it can cause loss of walking function in severe cases. Studies have unveiled that the associated disability rate is greater than 50%. With the aggravation of population aging in China, its incidence is also increasing annually, which shows that knee arthritis is one of the major degenerative diseases affecting the health of the elderly population in China [7-10]. Currently, there is no relevant specific treatment, so it is important to improve the treatment of knee osteoarthritis for a better quality of life (QoL) of patients [11]. The main treatment principles incorporate relieving pain, improving joint function for a better QoL and delaying disease progression. The methods for actual clinical use include drug and surgical intervention. However, both treatments can make patients additive to a certain degree, thereby reducing the clinical effect [12-15]. The current international guidelines mainly recommend exercise therapy, which can also achieve

clinical treatment goals such as pain relief, and improvement of knee joint function and QoL. Meanwhile, the advantages of having lower risk of side effects and less cost make exercise therapy more acceptable for patients compared with treatment. Nevertheless, advocating foreign guidelines to domestic patients without adaption will affect the execution to a certain extent, due to differences in education and living habits [16].

Also, traditional Chinese medicine (TCM) obtains favorable results in treating osteoarthritis. Warm needle penetration is reported to exert a good effect in the knee joint but with limited indicators [17]. Based on research findings, we comprehensively evaluated the application value of warm needle penetration in treating knee osteoarthritis regarding the clinical effect, knee joint score and subjective satisfaction, so as to provide more evidence-based data for improving the research and treatment in this area.

Materials and methods

General data

A total of 118 patients with knee osteoarthritis receiving treatment in our hospital from January 2019 to January 2020 were selected and randomly divided into the observation group (n=59; 89 knees) and the control group (n=59; 77 knees). Patients were included if they were diagnosed with knee osteoarthritis according to the clinical and radiological diagnostic criteria issued by the American College of Rheumatology [18]. Were aged ≤80 years; had an initial onset of unilateral knee osteoarthritis; were classified as Kellgren and Lawrence Grade II or below. Patients were excluded if they had limb disability; were combined with tumor, severe cardiovascular and cerebrovascular diseases, acute knee sprain, rheumatoid arthritis, and nervous system diseases; were allergic to the specified drugs. All the subjects gave informed consent and signed the consent form, and this study was approved by the Ethics Committee of our hospital.

Treatment methods

Control group: Western medicine therapy: Patients were given meloxicam (Yangtze River Pharmaceutical Group, Jiangsu) for routine treatment at a dose of 7.5 mg/day in both groups. The medicine was administered with boiled water after meals for a one-week course of treatment, with a rest of 3 days between courses.

Observation group: Warm needle penetration based on western medicine therapy: The main acupoints were Neixiyan (EX-LE4) and Waixiyan (EX-LE5), Dubi (ST 35), Sanyinjiao (SP 6), Yanglingquan (GB 34), Xuehai (SP 10), Geshu (BL 17), Heding (EX-LE2), and Zusanli (ST 36) acupoints. As for the main operation process, the patients were in a sitting position with the knee in 90° flexion or in supine position with the knee in 120° flexion after routine disinfection of surgical drape article. The appropriate needle, whose diameter is 0.3 mm and length is 50 mm or 75 mm, was selected according to the degree of muscle relaxation. The needle was inserted in a forward and reverse direction from Waixiyan to Neixiyan acupoints, with the insertion depth of 20-30 mm. The manipulations of lifting, inserting and twisting were conducted for 1 minute, with the swelling sensation of local knee joints as the standard. For acupoints in clinical addition and subtraction use, moxa-burning was performed for about 20 minutes after the soreness sensation occurred, and the needle was removed after moxa-burning. Furthermore, the treatment was performed once daily, with ten times as a course and a rest of one week between courses. All the patients were treated with three courses of treatment.

Outcome measures

Main outcomes: Criteria for clinical treatment outcome: "Cured" indicates disappearance of symptoms and signs with flexion and extension range of motion from 0° to 135°; "Markedly effective" shows basic disappearance of symptoms and occasional pain, with joint flexion and extension range of motion from 0° to 135°; "Effective" represents improvement of symptoms, pain during walking, and limited joint motion. "Ineffective" reveals no significant improvement of symptoms [19]. Clinical effective rate = (cured + markedly effective + effective cases)/total number of cases * 100%.

Secondary outcomes: Western Ontario and McMaster Universities (WOMAC) osteoarthritis index was used for joint function evaluation

Table 1. Comparison of baseline data

Category	Observation group (n=59)	Control group (n=59)	t/χ²	P
Age (years)	72.4±12.3	73.0±11.9	0.318	0.751
Gender (male/female)	37/22	31/28	0.868	0.352
Course of disease (month)	23.4±2.7	24.0±3.3	1.288	0.200
Hypertension	11	14	0.686	0.407
Diabetes mellitus	6	8	0.317	0.573

Table 2. Comparison of clinical effective rate (n, %)

Group	Clinical treatment outcome			
	Cured	Markedly effective	Effective	Ineffective
Observation group	48 (53.93)	30 (33.70)	6 (6.74)	5 (5.63)
Control group	23 (29.87)	37 (48.05)	3 (3.90)	14 (18.18)
χ²	5.249			
P	0.022			

Figure 1. Comparison of pain assessment. Compared with pre-treatment, ***P<0.001; compared with the control group after treatment, #P<0.05. VAS: Visual analogue scale.

[20]. Visual analogue scale (VAS) was applied to assess the preoperative and postoperative pain in both groups, which was graded as no pain (0 point), mild pain (1-3 points), moderate pain (4-6 points), severe pain (7-9 points), and acute severe pain (10 points) [18, 21]. Additionally, the subjective satisfaction of the patients was investigated by questionnaires. Overall satisfaction rate = (very satisfied + satisfied + fair cases)/total number of cases * 100%.

Statistical analysis

Data analyses were performed with the SPSS 22.0 software. The measurement data were expressed as mean ± standard deviation ($\overline{x}$ ± sd). Independent sample t-test was applied for the comparison between the two groups, and paired samples t-test was used for the comparison within the same group. Chi-square test (χ^2 test) was adopted as to the enumeration data expressed as the percentage (n/%). *P* values of less than 0.05 were regarded as statistically significant.

Results

Comparison of baseline data

There was no significant difference in age, gender, disease course and complications between the two groups (all P>0.05), suggesting the two groups were comparable, as shown in **Table 1**.

Comparison of clinical treatment outcomes

The clinical effective rate in the observation group was higher than that in the control group (P<0.05), preliminarily indicating that warm needle penetration can enhance the clinical treatment outcomes. See **Table 2**.

Comparison of pain assessment

Before treatment, no significant difference was identified in VAS pain scores between the two groups. After treatment, the VAS pain scores were decreased in both groups (P<0.001), while the observation group revealed a better score than the control group (P<0.05). See **Figure 1**.

Comparison of knee joint score and WOMAC score

Before treatment, no significant difference was found regarding knee joint score and WOMAC score between the two groups (P>0.05). After two weeks of treatment, the knee joint scores in both groups were increased, while the

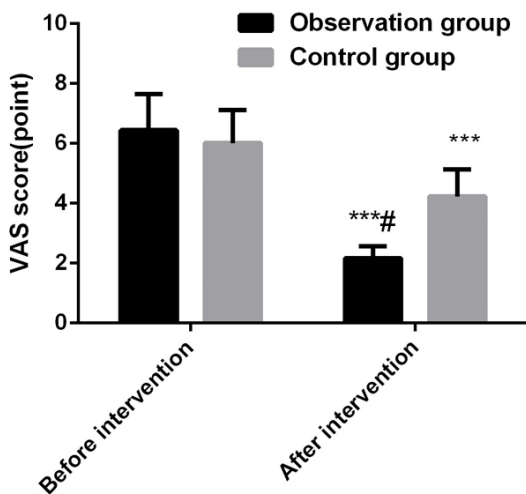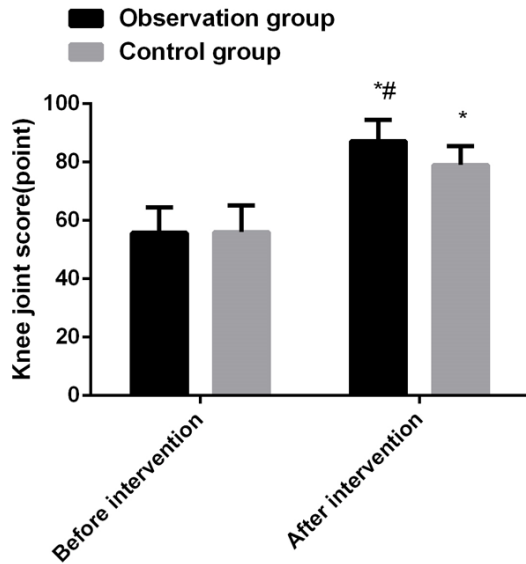Figure 2. Comparison of knee joint score. Compared with pre-treatment, *P<0.05; compared with the control group after treatment, #P<0.05.

Figure 3. Comparison of WOMAC osteoarthritis index score. Compared with pre-treatment, *P<0.05; compared with the control group after treatment, #P<0.05. WOMAC: Western Ontario and McMaster Universities.

WOMAC scores were decreased as compared with those before treatment. What's more, the knee joint scores were higher, while the WOMAC scores were lower in the observation group than in the control group (both P<0.05), preliminarily demonstrating that warm needle penetration can improve the joint function of patients. See **Figures 2**, **3**.

Comparison of subjective satisfaction

The subjective satisfaction rate of the observation group was higher than that of the control group (91.01% vs. 77.93%, P<0.05), indicating that warm needle penetration can strengthen the clinical treatment satisfaction of patients. See **Table 3**.

Discussion

Knee arthritis is a common chronic progressive disease of the joints in orthopedics, clinically characterized by a high disability rate. The symptoms including pain and joint stiffness seriously decrease the QoL of patients [22]. In our study, we showed that the WOMAC score, clinical effective rate and VAS pain score of the observation group were higher than those of the control group. VAS pain score and WOMAC score are the main indicators for evaluating the clinical symptoms of patients, which can accurately reflect the changes of clinical symptoms
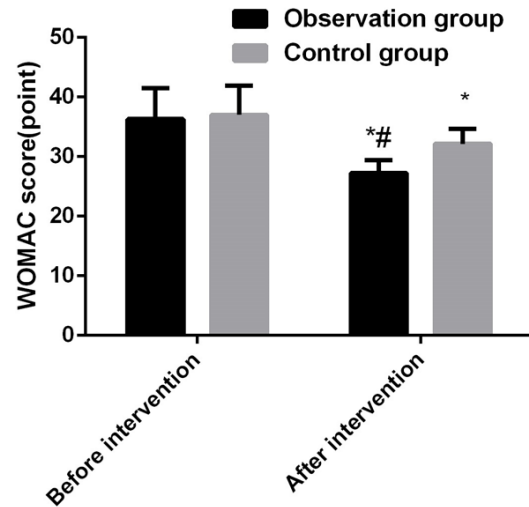
before and after treatment. The VAS pain score and WOMAC score were better in the observation group than in the control group. The results suggest that warm needle penetration as an adjuvant therapy combined with non-steroidal drugs can improve the clinical symptoms of knee arthritis, supporting the conclusions of previous studies [23].

At present, TCM believes that osteoarthritis belongs to the category of Bi syndrome (arthralgia syndrome). As to its etiology, poor Qi circulation caused by vein damage, or poor Qi-blood circulation resulting from deficiency of liver, spleen and kidney leads to obstruction of meridians. Then the symptoms further result in loss of nutrition of the knee joint and accessory tissues, finally causing knee joint degeneration and continuous development [24]. Warm needle penetration is a method of manufacturing the acupuncture and moxibustion needle, which have advantages of less acupoints, convenient operation, and strong acupuncture sensation. As to its mechanism of action, the burning of Chinese Mugwort Leaf exerts effects of activating meridians and eliminating cold pathogens. Combined with acupuncture at Liangqiu, Heding, Neixiyan and Waixiyan acupoints, it promotes blood circulation around the knee joint and improves the local internal environment, relaxes the mus-

Table 3. Comparison of subjective satisfaction

Group	Very satisfied	Satisfied	Moderate	Dissatisfied	Overall satisfaction rate
Observation group	46	24	11	8	81/89
Control group	32	18	10	17	60/77
χ^2			4.553		
P			0.033		

cles, and alleviates the inflammatory response to reduce or even eliminate pain. Also, it can actively promote recovery of the function of the quadriceps femoris muscle, which further helps achieve recovery of knee joint activity, and improves the clinical symptoms and treatment efficacy. The results are related to favorable treatment effects of warm needling penetration, which are consistent with the previous studies [25, 26].

Treatment satisfaction is a main basis for assessing the medical care. A previous study revealed that warm needle penetration combined with western medicine promoted satisfaction with treatment [27]. In consistent with that, our study demonstrated that the clinical symptoms were actively alleviated via the combined therapy in the observation group, which enhanced the subjective satisfaction of the patients.

The limitations of this study are as follows: First, the subjects are limited to K-L grade II and below, with relatively mild lesions; the clinical effect for patients with severe knee arthritis needs to be improved. Second, this is a single-center study with few samples, which requires multi-center studies with larger sample sizes to perfect clinical validation. Third, the clinical data were collected synchronously, and only correlation analysis was performed, so prospective or nested case-control studies are needed to clarify the causal relationship. Fourth, relevant imaging indicators are also an important supplement to improve the effect of warm needling penetration in the treatment of knee osteoarthritis.

To sum up, warm needle penetration combined with drug therapy can relieve pain, promote treatment outcomes and knee joint function, ultimately facilitating subjective satisfaction with treatment, which can assist in the clinical treatment of knee osteoarthritis.

Disclosure of conflict of interest

None.

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