

Clinical research on the short-term efficacy of massaging quadriceps for knee osteoarthritis

推拿股四头肌为主治疗膝骨性关节炎近期疗效的临床研究

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Abstract

Objective: To observe the short-term efficacy of massaging quadriceps on knee osteoarthritis (KOA).

Methods: Totally 30 KOA patients were enrolled and treated mainly with massaging quadriceps, 20 min for each session, once a day, 2 weeks as a treatment course, and for 2 courses in total. After treatment, the changes of visual analogue scale (VAS) and Western Ontario and McMaster Universities osteoarthritis index (WOMAC) were observed.

Result: The VAS and WOMAC scores dropped after treatment, with a statistically significant difference ($P < 0.01$). After a course of treatment, the recovery rate was 33.3% and the total effective rate was 86.7%; after 2 courses, the recovery rate was 60.0% and the total effect rate was 96.7%.

Conclusion: Massaging quadriceps can alleviate pain, improve the function of knee joint, and produce a significant short-term efficacy in treating KOA.

Keywords: Tuina; Massage; Osteoarthritis, Knee; Patellofemoral Pain Syndrome; Pain Measurement; Quadriceps Muscle

【摘要】目的: 观察推拿股四头肌为主治疗膝骨关节炎(knee osteoarthritis, KOA)的近期临床疗效。**方法:** 共纳入30例KOA患者,予以推拿股四头肌为主治疗,每次20 min,每日1次,2星期为1个疗程,共治疗2个疗程。观察治疗后疼痛视觉模拟量表(visual analogue scale, VAS)评分及西安大略与麦克马斯特大学骨关节炎指数(Western Ontario and McMaster Universities osteoarthritis index, WOMAC)变化。**结果:** 治疗后VAS及WOMAC评分均明显下降,与治疗前有统计学差异($P < 0.01$)。治疗1个疗程后,治愈率33.3%,总有效率86.7%;治疗2个疗程后,治愈率60.0%,总有效率96.7%。**结论:** 推拿股四头肌为主治疗KOA能够减轻疼痛,改善膝关节功能,近期疗效显著。

【关键词】 推拿; 按摩; 骨关节炎, 膝; 髌股疼痛综合征; 疼痛评价; 股四头肌

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Knee osteoarthritis (KOA) is a common chronic joint disease, and its main lesions are degenerative cartilage and secondary hyperosteoecy. The pain and knee-joint dysfunction caused by KOA make patients suffer greatly^[1]. The weakness of quadriceps muscle is a characteristic symptom of KOA, and it's found that the quadriceps strength of patients suffer from KOA is 10%-60% lower^[2-3]. The change of muscle strength, especially lower quadriceps strength is significant in KOA disease^[4]. At present, main treatment methods for KOA are surgery, medication and non-medication therapy. As a traditional Chinese medicine (TCM) treatment, tuina has become a common conservative therapy in clinic for KOA. It has an obvious treatment effect, little side effect, and is easy to be accepted by patients. We treated KOA with massaging the quadriceps, and now the report is as follows.

1 Clinical Data

1.1 Diagnostic criteria

Diagnostic criteria of Western medicine referred to the KOA diagnostic criteria recommended by American College of Rheumatology (ACR) in 1995^[5]: ① knee pain in most of the days in a month (more than half a month); ② X-ray examination shows that there is osteophyte around joint; ③ inflammatory synovial fluid [clear, viscous, and white blood cell (WBC) $< 20 \times 10^9/L$; meet 2 of them] in articular cavity; ④ can't examine the synovial fluid, age ≥ 40 years old; ⑤ morning stiffness ≤ 30 min; ⑥ clicking sounds when move the joint.

When meeting ①② or ①③⑤⑥ or ①④⑤⑥, it can be diagnosed as KOA.

TCM diagnostic criteria referred to Bi-Impediment syndrome of bone in the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese Medicine*^[6]: joint pain, may be coupled with swelling, local red and swollen may be

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found, limited joint range of motion, and clicking sounds or crepitation when the joint moves.

1.2 Inclusion criteria

Met the above diagnostic criteria; 40-75 years old, sex unlimited; not using drugs or other treatments in the latest week; willing to take part in this study and having signed the informed consent.

1.3 Exclusion criteria

Against the inclusion criteria; knee tumor, ligament or meniscus injury, or tuberculosis of knee joint; with serious primary diseases involving cardiac, hepatic, nephritic or hemopoietic system, or psychosis; not treated in accordance with this research, using other TCM or Western medicine treatments without permission; those whose therapeutic efficacy cannot be judged or those with incomplete data.

1.4 Statistical analysis

The statistical analysis was performed by the SPSS 17.0 version statistical software. The *t*-test was used for comparison of measurement data before and after treatment. $P < 0.05$ indicated a statistical significance.

1.5 Cases resources

Totally 30 patients were recruited from the Tuina Department, Traditional Chinese Medicine Hospital of Xinjiang Uygur Autonomous Region between October 2014 and April 2015, including 13 men and 17 women. Their ages ranged from 42 to 73 years old, averaged at 54.3 years old, and the disease duration was from 2 months to 10 years, averaged at 3.2 years.

2 Therapeutic Methods

Releasing manipulations: The patient took a supine position, unbent the knee joint, with a soft pillow under the popliteal fossa. Rou-kneading and Gun-rolling manipulations were used to relax the quadriceps, for about 5 min (Figure 1).



Figure 1. Releasing manipulations

Point pressure: An-pressed and Rou-kneaded Futu (ST 32), Liangqiu (ST 34), Xuehai (SP 10), Heding

(EX-LE 2), Neixiyan (EX-LE 4), Dubi (ST 35), and Yanglingquan (GB 34), for about 3 min (Figure 2).



Figure 2. Point pressure

Chan-vibrating manipulation: Put the heel of hand on quadriceps femoris near the patella, Tui-pushed and Rou-kneaded softly, and then performed Chan-vibrating manipulation, for about 4 min (Figure 3).



Figure 3. Chan-vibrating manipulation

Na-grasping and Rou-kneading manipulations: Na-grasped and Rou-kneaded the quadriceps femoris, especially on the joint of patella and quadriceps femoris, for about 5 min; then Ca-rubbed the knee joint till it became hot (Figure 4).



Figure 4. Na-grasping and Rou-kneading manipulations

Releasing the hamstring muscles: The patient took a prone position. The doctor released the hamstring muscles of leg, popliteal fossa and triceps surae by the heel of the hand, for about 3 min. Then manipulations were then finished (Figure 5).



Figure 5. Releasing the hamstring muscles

3 Observation of Therapeutic Efficacy

3.1 Criteria of therapeutic efficacy

In accordance with the criteria of therapeutic efficacy of KOA in the *Guiding Principles for Clinical Study of New Chinese Medicines*^[7].

Recovery: Clinical symptoms were gone, and the function of knee joint returned to normal.

Marked effect: Clinical symptoms and knee joint function were significantly improved.

Effective: Some of the clinical symptoms were improved or disappeared, and the knee joint function was basically recovered.

Invalid: No significant change of clinical symptoms and signs after treatment.

3.2 Treatment results

3.2.1 Comparison of visual analogue scale (VAS) and Western Ontario and McMaster Universities osteoarthritis index (WOMAC) scores

After treatment, the VAS and WOMAC scores were significantly different from those before treatment (both $P < 0.01$). It indicates that massaging quadriceps femoris can help to release the pain and improve the function of joint (Table 1).

Table 1. Comparison of VAS, WOMAC scores before and after treatment ($\bar{x} \pm s$, point)

Item	Before treatment	Course 1	Course 2
VAS	6.28±1.53	4.48±1.11 ¹⁾	3.64±1.13 ¹⁾
WOMAC	45.30±7.53	35.53±5.20 ¹⁾	30.93±7.12 ¹⁾

Note: Compared with before treatment, 1) $P < 0.01$

3.2.2 Clinical effect

After a course of treatment, in the 30 cases, 10 cases

got cured, 10 cases got marked effect, 6 cases showed effective and 4 cases failed, and the recovery rate was 33.3% and the total effective rate was 86.7%. After two courses of treatment, 18 cases got cured, 9 cases got marked effect, 2 cases showed effective and 1 case failed, and the recovery rate was 60.0% and the total effective rate was 96.7%.

4 Discussion

Atrophy of quadriceps femoris plays an important role in the pathogenesis of KOA. The function state of quadriceps femoris is a key factor affecting the degree of the knee joint regression and the improvement of lower limbs function. It's been confirmed that the functional performance of KOA patients is closely related to the function of knee extension muscles, but its relation with hamstring muscles is undefined^[8]. Therefore, the key for KOA to recover is to strengthen the quadriceps femoris and improve the stability of knee joint. Hyperosteoarthritis of primary degenerative KOA is irreversible, but the TCM tuina (therapeutic massage) can significantly improve the clinical symptoms and signs. Study shows that tuina can improve the symptoms of KOA patients, as well as the muscle force and work^[9].

In TCM, KOA belongs to 'Bi-Impediment syndrome' or 'knee pain'. According to the muscle-region theory, major muscle regions around the knee are the muscle regions of Foot Yangming. Through the clinical researches, Wang CH, *et al* found that KOA patients suffering from damaged Foot Yangming muscle region accounted for the largest proportion^[10]. The single damaged Foot Yangming muscle region occupies 31.37%, and the complex one occupies 67.65%. Regarding the top 10 distribution locations of lesions, 6 of them belong to Yangming muscle region, because the knee is majorly surrounded by the Foot Yangming muscle region. Foot Yangming muscle region mainly distributes on the front side of thigh and around the knee, in charge of the knee extension movement, which involves rectus femoris, vastus intermedius and vastus lateralis, and so on^[11-14]. Hence, in this research, we focused on massaging quadriceps femoris, plus acupressure at local points, such as Dubi (ST 35), Liangqiu (ST 34), Xuehai (SP 10), Hedong (EX-LE 2), and Neixiyan (EX-LE 4), mainly for stimulating the quadriceps femoris^[15-18]. The study showed that the VAS and WOMAC scores were significantly reduced after treatment ($P < 0.01$). It indicates that massaging the quadriceps femoris can relieve pain and improve knee function in KOA patients. However, there are still some shortcomings in this research, such as small sample size, lack of a reasonable control group, and no long-term follow-up visit. Thus, these problems should be addressed in future studies by adopting a large sample

size, multicenter randomized controlled methods, and conducting a long term follow-up visit.

In a word, massaging quadriceps femoris is effective in treating KOA and is worth to be popularized in clinic.

Conflict of Interest

There was no potential conflict of interest in this article.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in this study.

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