

Progress in acupuncture and moxibustion treatment of different pattern types of knee osteoarthritis

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Abstract: Knee osteoarthritis is a common bone and joint disease worldwide. Acupuncture is widely used in the treatment of knee osteoarthritis and has Acupuncture is a unique treatment technique in Chinese medicine that has been used for osteoarthritis for thousands of years. It is by far acupuncture treatment of knee osteoarthritis is still an effective method with good curative effect, simple and easy operation, and it is worth noting that acupuncture and moxibustion treatment also requires treatment based on pattern differentiation. After reading the relevant literature on acupuncture treatment of osteoarthritis of the knee in recent years, we found that the vast majority of the current literature review is only related to the different methods of acupuncture treatment of osteoarthritis of the knee, while the summarization of the treatment of different patterns of KOA is lacking. This article summarizes the acupuncture treatment of different patterns of knee osteoarthritis in recent years, and provides ideas and references for the further standardized treatment of KOA in the clinic.

Keywords: knee osteoarthritis; pattern differentiation; mechanism; progress

1. Introduction

Knee osteoarthritis (KOA) is a chronic degenerative joint disease caused by damage to the cartilage, synovium, ligaments and muscles surrounding the knee joint, resulting in painful stiffness, swelling and deformity, and limited motor function [1]. It is the most common chronic degenerative joint disease worldwide, and is also an important cause of reduced quality of life in middle-aged and elderly people, often triggered by age, high body mass index, biomechanical changes, genetic and biological factors, as well as external factors such as trauma, weight bearing, and the influence of the surrounding humid environment [2,3]. The total prevalence of KOA in China is about 18%, with a prevalence of 19% in women and 11% in men, and a higher prevalence in the central-eastern, southwestern and northwestern regions in different geographic areas, probably related to climatic conditions and weight-bearing exertion [4].

The chronic recurrent pain caused by KOA is an important cause of reduced quality of life for patients, and NSAIDs can only relieve local symptoms but not delay the disease process. When opioid painkillers are taken excessively over a long period of time, there are serious side effects of addiction and memory loss [5]. In the case of joint cavity injection, the disease is prone to recurrence, and the side effects on joint cartilage and joint fluid are greater. As early as the "Yellow Emperor's Inner Canon", there is: "pain in the knee, to the staff of the sharp round needle hair and between, needle as big as yak, prick the knee no doubt", acupuncture for the treatment of osteoarthritis of the knee has a long history, and can be extended to this day, indicating that the efficacy is better, and "Zhong zang jing - on impediment disease- thirty-third Thirty-three [6]. It is said that "impediment disease, the wind, cold, summer and dampness in the human their pulse, pattern, the method of treatment, each has its own differences", through the diagnosis and treatment, the treatment of KOA cannot be limited to local swelling, pain and other symptoms, should identify the different types of evidence, clear corresponding meridians and The treatment of KOA should not be limited to localized swelling and pain, but should identify the different pattern types, clarify Pathologic changes of corresponding channels and network vessels and internal organs, select the corresponding acupuncture points, and determine the treatment plan in accordance with the pattern type. Acupuncture and moxibustion treatment should follow the principles of the "Yellow Emperor's Inner Canon": selection of distant points is "Treating lower body

disease through the upper body"; to select the points from the remote area is "The channels are passed by, the main treatment is reached"; to select the points from the local area is "The acupoints are located, the main treatment is reached". The combination of these methods can enhance the meridian effect of the acupoints.

2. Mechanism of acupuncture for KOA

Acupuncture is one of the effective physical treatments for KOA pain. Acupuncture can effectively slow down cartilage and subchondral bone lesions^[7]. Acupuncture has a bidirectional regulatory effect, accelerating the production of conversion growth factor and insulin growth factor^[8]. In addition, acupuncture can slow down the development of knee osteoarthritis by improving synovial function, maintaining synovial fluid composition, and preventing inflammatory factors caused by synovial lesions from destroying joint cartilage. Acupuncture has the effect of regulating the expression of relevant inflammatory factors, inhibiting the expression of inflammatory factors such as interleukin-1, interleukin-6^[9]. Inhibiting the expression of inflammatory factors such as interleukin-1, interleukin-6, tumor necrosis factor- α , regulates the inflammatory microenvironment in the joint cavity of KOA, thus reducing the symptoms of redness, swelling and pain in KOA joints^[10]. Acupuncture can also reduce the pain state of KOA patients by regulating the secretion of central analgesic neurotransmitters such as endogenous opioid peptides, 5-hydroxytryptamine, and acetylcholine^[11], inhibiting the ascending conduction system of spino-thalamic tract, and promoting the descending inhibitory system to play the role of analgesic effect^[12]. In addition, acupuncture activates the somatic innervation, autonomic nervous system and central nervous system, changes the peripheral blood flow rate and accelerates local blood circulation to treat KOA^[13]. Some scholars believe that acupuncture treatment of KOA may be the result of acupuncture's ability to relieve muscle and fascia spasm, improve muscle balance, and restore the normal biomechanics of the knee joint^[14].

3. Acupuncture treatment for different pattern types of KOA

3.1. Liver-kidney depletion pattern

Liver-kidney depletion pattern is common in the remission period or recovery period, mainly manifested as vague pain in the joint area, accompanied by imp aching lumbus and knees and the pain worsens after exertion^[15,16]. Liver stores blood and governs the sinews, kidney stores essence and governs the bones. If liver and kidney are deficient, both essence and blood will be deficient, and sinew and bone will not be moistened, prolonged illness leads to loss of harmony of the network vessel, which will lead to wilting pattern. and in the "Complete Book of Ancient and Modern Medicine", it is said that "weakness of kidney energy, wind, cold and dampness in the three channels of spleen, liver and kidney, stopping in the legs and knees"^[17]. Liver-kidney depletion is the main internal cause of osteoarthritis in the knees of middle-aged and elderly people, and on the basis of liver-kidney depletion, it is easy to suffer from evil due to defense qi vacuity resulting in recurrence of KOA and difficult to heal. Shi Yaowu^[18] et al. selected the Outer and Inner Eye of the Knee, the Ah shi points, the Wei-Zhong point, the Knee Yang-Guan point, and the He-Ding point for general acupuncture, and combined with the Network-Quickening Pain-Relieving unguentum, and after four weeks of treatment, the patient's symptoms of pain and morning stiffness were significantly reduced. Liu Shuru^[19] et al. based on the efficacy of the Yong-Quan point of the kidney channel in tonifying the kidney ay and replenish essence and marrow, plus the warming and tonifying effect of moxibustion, moxibustion was applied to the Yong-Quan point to fill the essence in the kidney and promote the operation of the kidney channel, together with the warm acupuncture treatment at the Outer and Inner Eye of the Knee, Leg Three Li and Suspended Bell points, three times a week for six weeks, resulting in a total effective rate of 93.3%, with a significant decrease in the level of pro-inflammatory mediators in the blood and effective relief of pain and stiffness. Chen Yingyao^[20] applied warm acupuncture to the meeting point of the bone Great Shuttle and the Leg Three Li according to the theory of the four seas, Upper and lower Great Hollow points of the stomach channel of foot Yang Ming. After four courses of treatment, it was found that the efficacy was better than that of the regular acupuncture points and recurrence was reduced. Yangming channel is a channel with much qi and blood, and warm acupuncture points on Yangming channel are beneficial to supplement qi and blood to moisten the joints and sinews, while the bone meeting of the eight meeting points of Great Shuttle is also useful for regulating qi and blood and strengthening tendons and bones.

3.2. Yang vacuity and exuberant cold pattern

Yang vacuity and exuberant cold pattern KOA is mainly characterized by episodic pain in the knee joint, aggravated by cold, a pale white tongue, and a sunken and slow pulse [21]. Dissipate cold and free the channels and network vessels, In the clinic, more use of warm acupuncture, fire acupuncture and other therapies to dissipate cold and free the channels and network vessels, warm and supplement yang vacuity, the treatment is effective. Wu Shaofang [22] et al. believe that because the middle-aged and elderly people have insufficient qi and blood, yang is easily vacuity, and cold invasion leads to poor qi and blood stagnation in the local knee joint, resulting in pain, so the use of Professor Zheng Kui-shan's "warming acupuncture" to treat Yang vacuity and exuberant cold pattern KOA, acupuncture Guan-Yuan, Leg Three Li, Liver Transport, Kidney Transport, Blood Sea on the affected side, Liang-Qiu, Outer Eye of the Knee, Yin Ling Quan, Yang Ling Quan to invigorate yang qi, warm and dissipate congealing cold, The total effective rate was 95%. Wang Tingting [23] believes that yang vacuity cannot effectively promote the circulation of qi and blood, then sinews and vessels deprived of nourishment and become painful; congealing cold makes the qi and blood blocked and the sinews and vessels obstruction. Therefore, warm acupuncture was used to treat KOA patients with Yang vacuity and exuberant cold pattern, together with oral glucosamine hydrochloride capsules to promote cartilage repair, and after treatment, osteoprotegerin levels were higher than before treatment, matrix metalloproteinase-3 levels and osteoarthritis index were reduced, and symptoms were significantly improved. In addition, the fire-heat effect of fire acupuncture has also been used to stimulate yang qi to promote the operation of qi and blood, warming the channels and freeing the vessels. Wei Zhenglin [21] et al. used fire acupuncture to acupuncture the affected side of YinLingQuan, Ah shi points, YangLingQuan, and Leg Three Li, combined with Chinese medicine and hot medicinal compress therapy, the efficiency reached 94.28%. Mao Zhen et al. [24] used heat-sensitive moxibustion together with the acupuncture method which can secure the root and free the network vessels to treat Yang vacuity and exuberant cold pattern KOA, selected bilateral Tai-Xi acupuncture points, bilateral pain-sensitive points around the knee joint acupuncture obtained Qi, and then retained the needle for 30 min, the total efficiency reached 96.7%, and the patients' joint pain improved more obviously. Fan Chunlan [25] et al. performed fire acupuncture on the Outer and Inner Eye of the Knee and Leg Three Li, on the affected side according to the principle that "deficiency diseases are strengthened by fire, and cold diseases are dispersed by fire" and found that fire acupuncture was more effective than warm acupuncture in relieving joint pain after 4 weeks of treatment.

3.3. Pattern of dual vacuity of qi and blood

Pattern of dual vacuity of qi and blood KOA is less common in clinical practice, The main symptoms are joint pain and discomfort, weakness and soreness, accompanied by spontaneous sweating, dizziness, shortness of breath, a pale tongue and weak pulse. the pattern of dual vacuity of qi and blood KOA is usually treated mainly with oral Chinese medicine, such as Perfect Major Supplementation Decoction and Blood-Nourishing Decoction, which are used to tonify qi and blood to relieve pain, or auricular acupuncture to enhance the therapeutic effect. Huang Weijun [26] et al. used oral Perfect Major Supplementation Decoction combined with ear acupuncture using Wang Bu Liu Xing seeds to treat KOA with pattern of dual vacuity of qi and blood, and the ear point were selected according to the site of the lesion ipsilateral to the knee, ShenMen, sympathetic, subcortical, and bilateral spleen and stomach. The patient's clinical symptoms have improved significantly. Perfect Major Supplementation Decoction is a representative prescription for warming and supplementing qi and blood, and has been proven to have protective and restorative effects on cartilage tissue. Ear acupuncture is one of the characteristic therapies of acupuncture, with the characteristics of combining traditional medicine and modern holographic theory, and is closely related to channels and organs, regulating channels to relieve pain, and has a significant effect on tonifying qi and blood.

3.4. Cold-damp obstruction pattern

The main symptom of cold-damp obstruction pattern is pain, heavy or swollen joints in the face of cold, the secondary symptom is heavy pain in the waist and body, fear of cold, pale tongue with slimy white fur, soggy and moderate pulse [16]. In the "Zhang's YI TONG", "the knee is the house of sinew, so knee pain is always due to liver and kidney depletion, and wind-cold-damp disease invade the body because of deficiency". So the acupuncture treatment of cold-damp obstruction pattern knee osteoarthritis should favor the warming the channels and dissipating cold, freeing the network vessels to relieve pain, supplemented by fortifying the spleen and supplement the kidneys. Warm Acupuncture

[14] is a common method for the treatment of KOA. The combination of acupuncture and moxibustion is more effective than ordinary acupuncture in warming the channels and dissipating cold, freeing the network vessels and relieving pain. Warm acupuncture is particularly suitable for pain and impediment caused by cold and dampness, and is combined with Coix Decoction [27] for KOA to strengthen the function of eliminating dampness and diffusing impediment and relieving pain; or with Impediment-Alleviating Decoction [28] to strengthen the function of eliminating dampness, freeing the network vessels, and relieving pain; or with Duhuo Jisheng Tang [29] to internally nourish liver and kidney in order to support right and dispel evil, and externally with warm acupuncture to strengthen the therapeutic effect. Milli-fire needling is also used [9,30], the combination of acupuncture and high heat stimulation can induce sterile inflammation, improve local blood circulation, accelerate tissue metabolism and repair around the knee joint and promote the healing of KOA. In addition, Yuan Yundong [31] et al. used a special acupuncture method to treat KOA with cold and damp impediment according to the theory of "open and close pivot" in the "Yellow Emperor's Inner Canon" and the theory of "treating yin for yang disease, yang for yin disease, and treating upper body disease through the lower body, treating lower body disease through the upper body". After pattern identifying, the efficacy of acupuncture is significantly better than that of local acupuncture when the relevant points are selected on the channels of the affected lower limb and the opposite upper limb. The key to the LingShu open and close acupuncture method is to identify and treat the local meridians and at the same time focus on the overall balance of yin and yang, so the efficacy is better.

3.5. Pattern of blood stasis and qi stagnation

Blood stasis and qi stagnation can be caused by post-traumatic injury, mainly due to tingling pain in the joints, fixed pain and stiffness of the limbs, unfavorable flexion and extension, pain not relieved after rest, or pain aggravated at night, dull purple tongue or petechiae, astringent pulse [16,32]. The Yellow Emperor's Inner Canon states that "the function of the channels is to move the qi and blood, to construct yin and defensive yang, to moisten the sinew and bone, and to disinhibit the joints." Acupuncture is effective in unblocking the qi and blood of the channels and is used to treat blood stasis and qi stagnation pattern KOA with definite effect. Qiu Jianqing et al. [33] used acupuncture combined with cupping exercise therapy for the treatment of KOA with blood stasis and qi stagnation. After general acupuncture, cupping was performed at Blood Sea, Yinlingquan, Liang-Qiu, Feng-Shi, and Ahshi points, and the patient was instructed to perform active exercises such as slow and large flexion and extension, abduction and adduction, etc. After three courses of treatment, the joint pain was effectively improved, and the inflammatory component in the joint fluid was reduced, and the joint effusion content was significantly reduced. The total effective rate reached 94.4%. Wu Weibin [34] et al. concluded that the use of "Compound supplementation and drainage manipulation" for the treatment of KOA with qi stagnation and blood stasis is desirable for better efficacy, taking the Outer and Inner Eye of the Knee on the affected side, through the right and left, forward and reverse direction of the traveling needle manipulation for 30 seconds, retaining the needle for 20 minutes to strengthen the local stimulation, but also to strengthen the analgesic effect, the total efficiency reached 94.3%, joint stiffness and joint pain symptoms were effectively improved. Li Yanjie [35] et al. used ultrasound-guided acupuncture on the affected side of the Blood Sea to quicken the blood and dispel stasis, Liang-Qiu point to soothe the sinews and relieve pain, together with alternating hot and cold moxibustion to improve local circulation, and joint effusion and synovial hyperplasia were effectively improved and vascular endothelial growth factor levels were significantly reduced after a total of 15 treatments.

3.6. Damp-heat obstruction pattern

Damp-heat obstruction pattern KOA is mainly characterized by redness and swelling of the joints, pain and heaviness, a red tongue with slimy yellow fur, and slippery pulse [16,32]. In the Zhongzangjing [6], it is believed that the evil of summer (heat) and dampness in the four seasons can lead to damp-heat impediment, or the patient's physique has depressed heat, and external sensation of wind, cold and dampness into the interior causes impediment, therefore, the KOA of damp-heat obstruction pattern should be based on removing damp-heat and freeing the channels and network vessels. Zhang E'yun [36] et al. concluded that although KOA of the deficiency and cold type is currently predominant in clinical practice, the treatment of damp-heat obstruction pattern KOA should also be taken seriously. Therefore, acupuncture was performed on the Outer and Inner Eye of the Knee, Blood Sea, Liang-Qiu, ch'i yang kuan and Qu-Quan points of patients with damp-heat obstruction pattern KOA, and the acupuncture was followed by the application of heat-extracting medicine paste for 2 h. After a total of 2 courses of

treatment, the efficacy was better than that of acupuncture alone or oral western medicine, and the pain was significantly reduced. Wang Kezhan [37] et al. concluded that the composition in Mysterious Four Decoction has the effect of disinhibiting dampness and clearing heat, strengthening sinew and bone, which is effective in the treatment of damp-heat impediment, and the analgesic effect of wrist and ankle acupuncture can significantly relieve the pain of damp-heat obstruction pattern KOA, the patient's joint function was effectively improved and pain was reduced. In addition, Yang Haimei et al. [38] suggested that external treatment for damp-heat KOA, without side effects such as gastrointestinal discomfort, could use the homemade topical agent "traumatology yellow water", which has the effect of clearing heat and dampness, anti-inflammatory and pain relief, and combined with compressing auricular points with analgesic effect for damp-heat type KOA, with traumatology yellow water soaked in wet gauze applied to the knee joint, and ear acupuncture points are applied with Wang Bu Liu Xing seed adhesive tape to bilateral sympathetic, subcortical and Shen Men. After a total of 4 weeks of treatment, the total effective rate reached 95%, and the patient's symptoms such as joint redness, swelling and pain were significantly reduced, and the function of knee joint movement was significantly improved compared with before.

4. Conclusions

KOA in Chinese medicine is "impediment", "bone impediment", "impediment of the sinew", "bone wilting", often manifested as bone pain, heaviness, joint constriction and contracture, resulting in unfavorable flexion and extension cannot walk for a long time [39]. KOA is mostly based on the use of warm acupuncture, fire acupuncture, moxibustion and other strong warming power, the treatment of wind, cold and dampness. And other obstruction caused by solid evil is mainly used the method of clarification, such as milli-needle diarrhea, knife needle therapy, etc.

By reviewing a large amount of relevant literature, it is found that there are not many studies on the identification and typing treatment of KOA by acupuncture, and although the guidelines set out the identification and pattern reference, the identification and pattern in the clinic is not uniform and controversial. There are now a large number of basic studies on pattern and imaging evidence to prove the necessity and effectiveness of acupuncture treatment of KOA from the perspective of modern medicine. And the basic principle of Chinese medicine treatment disease is pattern identification as the basis for determining treatment. It is important to pay attention to the accuracy of pattern of KOA, which is the premise and basis of Chinese medicine to achieve the exact efficacy, through the pattern identification, so that the choice of therapy is clearer, thus improving the efficiency of acupuncture treatment and patient satisfaction with acupuncture therapy. In addition, it is found that the clinical does not pay attention to the staging of KOA, but the staging identification is more conducive to clinicians to grasp the priority of the patient's condition and determine a more appropriate treatment plan, which should be paid attention to.

In conclusion, acupuncture is effective in the treatment of KOA and can effectively relieve the clinical symptoms of patients with each pattern of KOA. However, in clinical diagnosis and treatment, we should pay attention to the individual assessment of the different patterns and stages of KOA so as to identify and treat the most suitable acupuncture treatment method for patients, in order to slow down the progress of the disease, reduce the physical and psychological pain of patients, and improve their quality of life.

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