



An Analysis of the Treatment of Knee Osteoarthritis with Three-Dimensional Model

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Abstract: Knee osteoarthritis (KOA) is a common degenerative bone and joint disease. Its pathogenesis is based on the deficiency of liver, spleen and kidney, and marked by exogenous wind-cold dampness. According to the pathogenesis and overall concept, Professor Li Zhibin has created a three-dimensional model for the treatment of knee osteoarthritis, that is, the organic combination of internal Chinese medicine, external hot compress and exercise therapy. This article will explore Professor Li Zhibin's treatment of knee osteoarthritis with "three-dimensional model" theory, in order to provide a new direction for the treatment of knee osteoarthritis in the future.

Keywords: knee osteoarthritis, three-dimensional model, thinking analysis

1. Introduction

Knee osteoarthritis (KOA), also known as degenerative knee arthropathy, is a common senile degenerative disease in orthopedic clinic. The main clinical manifestations were the wear of the cartilage surface of the knee joint and the hyperplasia and sclerosis of subchondral bone. In the early stage, it was mostly joint swelling and pain, and in the later stage, due to cartilage wear, abnormal force lines of lower limbs, and the formation of hyperplasia osteophytes along the knee joints, joint stiffness, pain, deformity and mobility disorders were caused. According to literature reports, the prevalence rate of KOA in China is about 8.1% [1], and females are higher than males. Among them, KOA patients in people over 50 years old account for 28.7%, the prevalence of KOA in people over 60 years old is close to 50%, and the prevalence of KOA in people over 75 years old is as high as 80% [2]. With the advent of China's aging society, the incidence of KOA is on the rise, and it is expected that the incidence will increase to 18.6% in 10 years [3]. Therefore, it is an urgent problem to seek effective treatment for KOA.

Traditional Chinese medicine classifies KOA into the category of "bone impediment" according to its clinical symptoms and signs [4]. The core of pathogenesis is the deficiency of liver, spleen and kidney, and the invasion of external evil as the standard. In "Zhang's Yitong", "Knee pain is all due to deficiency of liver and kidney, and deficiency causes wind cold and dampness attack", it is pointed out that the disease occurs under the premise of deficiency of liver and kidney combined with invasion of external evil [5]. Synopsis of the Golden Chamber contains the name of "calendar period" and similar symptoms such as "joint dysphoria and dysphoria without flexion and extension". It is believed that external evil invades the muscles, bones and joints, causing difficulties in walking and symptoms such as limited knee flexion and extension [6]. "The Five viscera generation" notes: "The spleen is the main transport of the essence of water and grain, in order to produce muscle." It shows that if the spleen and stomach transport is abnormal and the muscles and bones lose their nourishment, the muscles will atrophy, the muscle strength will decline, and the motor function will decline [7]. In addition, "standing for a long time hurts bones and walking for a long time hurts tendons" indicates that long-term chronic strain will cause and aggravate KOA [8]. Therefore, Professor Li Zhibin believes that: this disease is often the deficiency of liver, spleen and kidney, vein qi and blood disconnection as internal causes, wind cold dampness, trauma, phlegm and blood stasis mutual obstruction of the muscles as external causes. The deficiency of liver, spleen and kidney, the prolonged labor of external pathogens depleting blood and damaging tendons, the internal vacuity and external pathogens are more likely to be mixed with nostalgia, resulting in Qi and blood stasis and obstruction of muscles and veins [9]. The disease is prolonged and difficult to cure, with internal deficiency and external evil superimposed on each other, the disease is located in the knee and bone, involving the liver, spleen and kidney.

2. Overview of KOA in 3D mode therapy

The treatment of knee osteoarthritis with Chinese and western medicine has obvious curative effect, but from the analysis

of the current clinical treatment status, it can not be solved by a single treatment mode to improve the clinical symptoms of patients, improve the quality of life, enhance joint stability and other problems. Three-dimensional mode treatment of KOA for Professor Li Zhibin engaged in orthopaedic clinical and scientific research work for many years, intended to achieve internal and external treatment of KOA, the combination of static and static, restore the balance of muscles and bones, limbs harmony. Based on the pathogenesis and overall concept of KOA, Professor Li established patient self-management as the center, combining daily exercise (practice), Chinese herbal medicine hot compress (external treatment), and oral Chinese medicine (internal treatment) to create a treatment model with traditional Chinese medicine characteristics. The concept of three-dimensional mode treatment can effectively avoid the shortcomings of treatment, integrate the advantages of single treatment, start from the whole body drug and the local drug of the knee joint at the same time, treatment based on syndrome differentiation, internal and external repair, combination of static and static, and combine three different treatment methods of internal administration + external application + exercise therapy to treat KOA, providing a multi-dimensional treatment mode for the treatment of KOA. And through the objective evaluation of clinical efficacy has achieved remarkable results. Of course, Professor Li also believes that in the early stage, three-dimensional integrated therapy is mainly used, and in the late stage, minimally invasive surgery is used to remove foreign bodies in the joint cavity, correct the force line, and even take total knee arthroplasty as the main, supplemented by three-dimensional integrated therapy.

3. Guidance of KOA treatment in 3D mode

3.1 KOA TCM syndrome differentiation and internal treatment

In clinical patients are often treated with knee pain, and traditional Chinese medicine believes that pain is mostly caused by "abnormal pain" and (or) "undignified pain". At the same time, based on the theory of "spleen main meat, liver main tendon, kidney main bone", the treatment is based on tonifying and taking into account the relaxation of tendons and activating collateral. Old and weak, acquired spleen water valley transport weakened, insufficient supply of essence and blood, loss of qi and blood, so the clinical application of nourishing liver and kidney, strong tendons and bones, qi nourishing blood and spleen, etc. to treat the knee arbi disease caused by "pain". Old age, work and rest imbalance leads to deficiency of the body, emptiness of the Cou, coupled with the lack of liver, spleen and kidney, the lack of Qi and blood essence of the bones, easy to wind cold and damp heat and other external evils caused by meridian obstruction. Long illness dark depletion of essence blood, resulting in qi stagnation blood stasis, so clinical use of Qufeng dispelling cold dedampness, Shu tendons Tongluo removing blood stasis and other treatment to treat "not through the pain" caused by knee arthralgia disease. The doctors of the past dynasties have their own unique views on the research of knee arthralgia. On the basis of determining the method of syndrome differentiation and treatment, drugs and dosages change with the syndrome according to the main disease and disease at the time of treatment. The clinical effect of taking traditional Chinese medicine in the treatment of KOA is worthy of affirmation, which is equivalent to that of Western medicine, but also has the advantages of little toxic and side effects.

3.2 KOA TCM external treatment

On the basis of syndrome differentiation, TCM hot compress is mainly based on herbs that are sweet and warm. After steaming or boiling, the hot ironing package is placed on the diseased part to accelerate local circulation and reduce joint cavity pressure [10]. Hot compress is often used to choose sinsweet-warm Chinese medicine, the combination of medicinal warmth and heat, open the skin and promote the absorption of hot compress parts of the drug. Studies have shown that long-term local hot compress sensitizes local acupoints and stimulates the body's immune factors, which can reduce the excitability of nerve endings, destroy the formed pathological reflex, accelerate blood flow, reduce the accumulation of local inflammatory factors [11], and achieve the role of promoting blood circulation and removing blood stasis, warming the muscles, dispelling wind and clearing collages and dispelling cold.

3.3 KOA exercise therapy

KOA tends to occur in middle-aged and elderly people, causing different degrees of muscle atrophy and muscle strength decline due to their own reasons, with the progress of KOA, daily activities are reduced, and the peripheral muscle group appears apraxia atrophy, muscle strength decline and other clinical symptoms are further aggravated. Domestic and foreign studies have confirmed that simple exercise or exercise-assisted treatment of KOA has significant curative effect [12]. Exercise therapy can not only improve joint function, but also relieve pain. The exercise-based three-dimensional therapy can significantly reduce the symptoms of joint pain in KOA patients, and has a direct effect on improving the function of the affected joint and improving the quality of life.

4. Analysis on the treatment of KOA in 3D mode

4.1 3D mode internal governance

Based on the analysis of a large number of clinical drug data in the past 10 years, Professor Li fully considered drug efficacy indications, compatibility relationship, sex and taste normalization; The empirical formula was summarized, and its drug composition was as follows: curcuma 10g, frankincense 5g, Epimedium 15g, Angelica 12g, Achyranthes 12g, and Wilingia 10g. This formula has the effects of activating blood circulation, removing stasis and clearing collaterals, tonifying liver and kidney and strengthening muscles and bones, expelling wind and removing dampness and relieving pain. According to modern pharmacological analysis, this prescription can alleviate inflammatory infiltration, improve bone metabolism, inhibit bone destruction and promote cartilage repair, and provide comprehensive treatment for knee osteoarthritis from multiple aspects, with certain relief effects on knee articular cartilage and pain discomfort [13]. The medium herba medium returns to liver and kidney channel, which has the effect of dispelling rheumatism, tonifying kidney and warming Yang, and strengthening muscles and bones. Modern pharmacological studies show that Epimedium has anti-inflammatory properties and improves the ability of cartilage repair [14]. Its component icariin: ① can promote the proliferation of chondrocytes, quickly and effectively repair cartilage wear; ② Can inhibit the degradation of cartilage extracellular matrix, thereby delaying the degeneration; ③ It can inhibit the reaction of inflammatory factors and relieve the pain symptoms of KOA [15]. The biological processes of icariin in the treatment of KOA mainly include the regulation of inflammatory response, collagen catabolism and extracellular matrix degradation, and play a role in alleviating KOA through a series of processes [16]. Turmeric has the effect of promoting qi and releasing collaterals, promoting blood circulation and relieving pain. Its main component is curcumin. Studies have found that curcumin can inhibit the activation of NF- κ B signaling pathway by reducing the expression of IL-1, IL-6, PGEs, TNF- α , etc., so as to impede the release of inflammatory factors, thus playing an anti-inflammatory and immunomodulatory role [17]. At the same time, it can also improve bone metabolism, inhibit bone absorption and bone destruction, so as to achieve the purpose of anti-osteoporosis [18]. Turmeric extract is as effective as paracetamol in reducing pain and other symptoms of knee osteoarthritis, and has been found to be even more effective in lowering CRP [19]. Frankincense removing stasis and fixing pain, Qi detumescence, sex warm taste hard, heart liver meridian; Frankincense can inhibit both acute and chronic inflammation and weaken peripheral chemical stimulation to achieve analgesia [20]. Majeed et al. [21] found that frankincense extract could improve knee swelling in patients with KOA, prevent osteophytogenesis, and reduce serum CRP level, thus relieving knee pain and stiffness. Treating wind-cold-damp bi pain, qi and blood deficiency, Qi and blood stagnation, etc., Angelica has warm taste, sweet and xin, and can regulate the liver, spleen and heart channel. The effective components of Angelica have strong antioxidant, immune regulation and pain threshold improvement [22]. Its main component Angelica polysaccharide can be used to treat a variety of inflammation [23]. Apoptosis of chondrocytes is a key step in the occurrence and development of KOA. XU C et al. [24] found that angelica polysaccharide has a protective effect on the apoptosis of chondrocytes. Achyranthes achyranthes can warm up the liver and kidney, strengthen the muscles and bones, promote blood circulation, flatness taste bitter glycolic acid, return to the liver and kidney meridian; Studies have shown that achyranthes ranthes can achieve the purpose of treating KOA by reducing the accumulation of local inflammatory factors, anti-oxidative stress, reducing bone destruction and inhibiting bone resorption [25]. The main active ingredient of achyranthes ranthes is total saponins, which can not only inhibit the expression of pro-inflammatory factors and apoptosis of chondrocytes, but also inhibit the degradation of cartilage matrix and promote the proliferation of chondrocytes, thus playing a role in the treatment of KOA [26]. In addition, Xu et al. [27] found that its component, achyranin saponin, had a protective effect on the inflammation and apoptosis of chondrocytes induced by interleukin-1 β . Weiling fairy is a common drug for the treatment of BI syndrome, some doctors call it "essential medicine for pain relief", it has the effect of dispelling wind dampness, connecting vein, stopping bi pain, and it is warm and salty; Modern pharmacological studies show that Wilingia has significant effects on reducing the accumulation of inflammatory mediators, improving local edema and relieving pain [28]. In addition, it was also found that Wilingia has the effect of protecting cartilage, anti-inflammatory and analgesic, and has a significant effect on the treatment of KOA [29]. In terms of anti-inflammatory and analgesic effects, Dilshare et al. [30] found that its mechanism of action is mainly to inhibit the production of pro-inflammatory mediations nitric oxide (NO) and prostaglandin E2 (PGE2).

4.2 3D mode external governance

Professor Li gave local hot compress to the knee joint with hot compress powder. Old Chinese medicine Zhu Xinggong ancestral ancestral recipe "hot compress medicine" treatment of orthopedics diseases has nearly a hundred years of history, the effect is outstanding, our hospital national famous old Chinese medicine professor Li Kanyin in Zhu Lao "hot compress medicine" based on the summary of the treatment of osteoarthopathy experience. Our hospital has confirmed through long-

term clinical observation that hot compress powder has significant efficacy in the treatment of osteoarthopathy, especially in the medium and long term, which can avoid long-term oral adverse reactions of Western drugs, and has obvious advantages such as a wide range of clinical indications [31-34]. The whole recipe is composed of 15 traditional Chinese medicines and mixed with medicine and vinegar. It has the functions of activating blood circulation, removing blood stasis, removing cold, removing dampness and relieving pain, reinforcing liver and kidney and strengthening muscles and bones. Its therapeutic effect is that hyperthermia itself can accelerate local blood circulation, and the combination of drug power and heat can accelerate local metabolism and microcirculation [35]. It can also promote the absorption of local inflammation, and the heated drugs can be further absorbed through the cou of the opening, so as to achieve anti-inflammatory and repair of articular cartilage and other effects [36]. Specific drug composition: Safflower, Mugwort leaf, unique life, prickly pepper, bone grass, stretching-sinew grass, grass aconite, Sichuan aconite, Liu Zhinu, Sichuan rhizome, Sichuan achyranthes, dried ginger; The above-mentioned Chinese medicine should be wrapped in powder and soaked with medicinal vinegar before steaming. Medicinal vinegar not only has the effect of introducing channels into the liver, but also promotes the absorption of drugs by the skin, and enhances the efficacy of drugs in promoting blood circulation, dispersing blood stasis, relieving swelling and pain, and nourishing the liver and kidney [37]. Usage: Wet the hot pack with its own medicine vinegar and place it on the steamer for 30min, then wrap it with a towel and place it on the affected area for hot compress, 40-50 min each time, twice a day, 15d is a treatment course, each pack can use 3d.

4.3 Three-dimensional mode of movement therapy

Exercise therapy exercise prescription is formulated with reference to rehabilitation of knee osteoarthritis in Practical Osteology [38]. (1) quadriceps iso-length training: a. ask the patient to lie on his back, straighten and lift the lower limb on the affected side, so that the affected limb and the bed form an Angle of about 30°, persist for 5-10 seconds or put it down when the muscle acid is sleepy, repeat the exercise 10 times/group, 10 groups a day, morning and evening exercises; b. Ask the patient to lie on his back or sit, straighten the knee on the affected side, and do back extension and plantar flexion of the ankle joint to the maximum extent, each back extension and plantar flexion as a group, the time is 5-10 seconds or relax after the muscle expansion, 10 times/group, 10 groups a day, divided into morning and evening exercises. (2) quadriceps isotensional training: the patient's knee flexion is 90° on the bed side, the feet are off the ground, the healthy lower limb is placed above the affected lower limb, and the patient is told to straighten the knee joint for 5-10 seconds or until the muscle is tired, and then the healthy side is squeezed down to the maximum Angle of the affected lower limb flexion, 10 times/group, 10 groups a day, morning and evening exercises. (3) hamstring isometric training: ask the patient to lie in a prone position, bend the knee to the maximum extent, tighten the thigh muscle group for about 10 seconds, 10 times/group, 10 groups a day, in the morning and evening. Rest for 30 seconds between the above exercise groups. Professor Li believes that quadriceps isometric training is static, non-weight bearing training, with zero pressure on the joint surface, and typical actions are straight leg elevation and ankle pump exercises. This method has a weak effect on improving knee mobility, and is more suitable for knee joints in the early stage. Quadriceps isotonic training, patients generally take a sitting position, exercise joint motion resistance movement, can effectively improve joint motion, for chronic period accompanied by joint stiffness is more suitable. The hamstring muscle training is mainly based on isometric training, which takes the prone position and bends the knee joint to the center, so that the hamstring muscle is tense and contracted and the flexor muscle is enhanced. Therefore, synchronous training of the quadriceps and hamstring muscles can promote local blood flow, inhibit inflammatory exudation of surrounding tissues, reduce synovial inflammation, gradually increase muscle fiber and muscle volume, improve muscle toughness and endurance, recover atrophied muscles, and increase static and dynamic stability of the knee joint and improve joint motion [39].

5. Summary

KOA has now seriously troubled the daily life of the elderly, for patients who have not yet reached the surgical indication, it is recommended to use traditional Chinese medicine timely treatment. Professor Li believes that its onset is closely related to the liver, spleen and kidney, coupled with external evil interference, so the clinical delay is not cured. Professor Li, according to his many years of clinical experience and the previous thought and theory, believes that the clinical use of a single method to treat its curative effect is not significant, and easy to relapse, so he puts forward the guiding idea of three-dimensional mode, that is, the combination of whole and local treatment. After treatment, the knee pain was greatly improved, the knee function was gradually restored, and the majority of patients achieved a good effect, delaying the progress of the disease, and providing a new idea for the treatment of KOA. Of course, there are also shortcomings in the treatment of KOA with three-dimensional mode: ① three-dimensional mode therapy only has a significant effect on early and middle KOA patients; ② Topical hot compress powder needs to be operated by patients themselves, and patients

may have errors in the operation process, which affects its efficacy; In addition, the hot compress also needs the patient's own skin condition is good; ③Functional exercise requires patients to adhere to it for a long time, so the patient compliance requirements are high.

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