

Research Progress in Conservative Treatment of Osteoarthritis in Traditional Chinese and Western Medicine

Dongqiang Cai^{1,a}, Jianjun Dang^{2,*}

¹*Shaanxi University of Chinese Medicine, Xi'an, Shaanxi, 712046, China*

²*Shaanxi Provincial Hospital of Traditional Chinese Medicine, Xi'an, Shaanxi, 710003, China*
^a282561641@qq.com

**Corresponding author: dang6@126.com*

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Abstract: Osteoarthritis is a common clinical chronic and progressive joint disease, which is often characterized by joint swelling and pain, deformity and dysfunction. At present, the treatment lacks targeted and specific drugs, often supporting symptomatic treatment, conservative treatment as the primary in the early and middle stages, there are many treatments, which can be roughly divided into Western medicine and traditional Chinese medicine, this article reviews Western medicine, traditional Chinese medicine, and integrated traditional Chinese and Western medicine for clinical reference.

1. Introduction

Osteoarthritis (OA) is a chronic degenerative disease characterized by the apoptosis of chondrocytes, destruction of articular cartilage, accompanied by inflammatory changes of synovium of joint and other major pathological changes. It is often manifested by swelling, pain and deformity of joints, joint muscle contracture and joint activity disorders, etc^[1,2].

The production and progression of OA is an extremely complex pathological process, and it is currently believed that when joints are affected by a variety of external factors, cell tissues and immune cells in the body continuously secrete a variety of inflammatory factors including interleukin, tumor necrosis factor, etc^[3]. After the continuous stimulation of these inflammatory factors, the content of proteases such as MMPs, ADAM, and ADAMTS in the serum continues to increase, causing damage to the articular cartilage or other tissues around the cartilage, and eventually leading to inflammatory lesions in the joints^[4]. For the treatment of OA, there is a lack of specific and targeted drugs in the clinic, and most of them are mainly aimed at eliminating clinical symptoms, alleviating joint pain, and improving the quality of life of patients. At present, there are many kinds of treatment, which can be generally divided into two types: Western medicine and Chinese medicine.

2. Physical therapy

With the rise of rehabilitation medicine, physical therapy such as microwave, ultrasound, infrared, magnetic therapy, electrotherapy and laser biomodulation therapy (HPL-PBMT) are widely used. Because it has the effect of improving circulation, relieving symptoms and regulating local metabolism, it can effectively reduce joint pain and improve affected joint function in the treatment of OA, and its clinical application rate is getting higher and higher, and significant clinical results have been achieved. William Todd Penberthy et al^[5] found that 1064 nm wavelength in the treatment of knee arthritis, joint pain, bone density, joint cartilage thickness, ROM have significantly improved, even if the treatment is stopped, the patient's pain can still be controlled for a long time afterwards.

3. Western medical treatment

OA is a combination of factors, so that the joint cartilage is destroyed, synovial membrane inflammatory lesions, accompanied by bone anabolic disorders, resulting in local pain, swelling, limited movement and other uncomfortable symptoms, persistent pain is the main reason for the patient's medical treatment^[6].

3.1 Oral and topical therapy

According to the guidelines, oral nonsteroidal anti-inflammatory drugs (NSAIDs), antidepressants, opioids, etc. are often recommended to improve the pain of patients^[7]. For the early and middle stages of OA, NSAIDs can effectively improve pain symptoms. Its mechanism of action is mainly by inhibiting the synthesis of prostaglandins and reducing the content of inflammatory factors in serum to exert anti-inflammatory and analgesic effects^[8]. However, long-term use can cause adverse reactions in the digestive tract and cardiovascular system, and topical drugs can be considered for patients with gastrointestinal and cardiovascular diseases. Studies^[9] found no significant difference in total response rate between topical and oral diclofenac sodium and a higher safety profile. For chronic long-term pain, adjunctive antidepressants such as duloxetine may be considered to relieve musculoskeletal pain^[10]. Tramadol is an atypical opioid analgesic that relieves many types of pain, including OA^[11]. However, because of its addictive nature, it is not recommended in clinical use. The progression of OA is often accompanied by damage to articular cartilage, and chondroitin protective drugs such as sulfuric acid/glucosamine hydrochloride and chondroitin sulfate can maintain the viscosity of synovial fluid in the affected joint at a certain level, so that the intra-articular cartilage is protected from inflammatory factors, and long-term application can effectively delay the OA process^[12]. In addition, glucosamine sulfate and diacerein can inhibit the activities of enzymes such as collagenase, stromelysin, phospholipase A2 to control inflammation and promote the repair of joint cartilage matrix^[13,14]. Recent studies have shown that metformin can also be used in the diagnosis and treatment of OA, by increasing the level of anti-inflammatory factor IL-10 in serum and reducing the content of inflammatory factors IL-6 and TNF- α , effectively alleviating arthritic symptoms^[15]. In the development of OA, osteoclasts are activated to cause bone destruction, and even manifest as osteoporosis, and drugs such as bisphosphonates and vitamin D are often used to inhibit bone resorption and improve bone transformation, and improve the bone quality of patients. For example, [⁹⁹Tc] methylenediphosphonate can effectively reduce the content of MMP-3, TNF- α and other inflammatory factors in serum, protect joint cartilage from collagenase damage, and promote the proliferation of osteoblasts to improve bone metabolism^[16].

Joint topical medicine is to change the traditional oral method, make the drug into transdermal patch, balm ointment and other dosage forms, directly act on the joint surface, through local skin

infiltration directly to the clinic, effectively avoid the first-pass effect and reduce the occurrence of gastrointestinal, cardiovascular and other adverse reactions. Studies have found that topical buprenorphine transdermal patches can effectively reduce local pain symptoms and obtain satisfactory analgesic effects for the treatment of persistent musculoskeletal pain above moderate^[17]. Babu plaster is a plaster made by mixing herbal extracts with a suitable hydrophilic matrix. Indomethacin babu ointment is a new type of babu ointment, which has significant analgesic and anti-inflammatory effects, and can effectively avoid gastrointestinal damage, and has a good therapeutic effect on osteoarthritis^[18].

3.2 Joint injection of drug treatment

Joint injection is to inject drugs directly into the joint cavity through the syringe, so that the blood concentration in the joint is kept at a high level, and joint injection of glucocorticoids, HA, ozone, etc. is often used to reduce joint swelling and pain, restore joint activity. Glucocorticoids are mediated by glucocorticoid receptors, inhibit the expression of inflammatory factors and proteases in the inflammatory process, interrupt the inflammatory signaling pathway^[19], and can effectively modify joint pain in the short term^[20], but long-term unreasonable application will lead to cartilage destruction, hypertension, osteoporosis and other adverse reactions^[21]. Sodium hyaluronate can significantly reduce the levels of inflammatory factors such as TNF- α and IL-1 β in serum, improve synovial inflammatory symptoms, and effectively relieve joint pain^[22]. Joint injection of medical ozone mainly relies on the strong oxidation of ozone to inhibit the release of inflammatory factors, reduce cartilage damage and promote cartilage repair, and improve the body's ability to scavenge free radicals to relieve arthritic symptoms^[23].

3.3 Biologics therapy

Traditional drug treatment is often accompanied by high gastrointestinal harm and cartilage damage, with the rise of biological therapy in recent years, people have gradually turned their treatment regimens to biological agents, such as PRP, nerve growth factor antibody therapy, mesenchymal stem cell therapy, inflammatory factor targeted therapy and gene therapy, etc. have achieved significant clinical results. PRP is an autologous plasma preparation containing large amounts of platelets containing large amounts of cytokines such as platelet-derived growth factor, transforming growth factor- β , epidermal growth factor, etc^[24]. Activated platelets can reduce the inflammatory effect of some cytokines in the OA process, which mainly acts on vasoconstriction and immune response in the inflammatory process, and has a good promoting effect on the regeneration of blood vessels and some tissues^[25,26]. In addition, the combination of HA and PRP (HA-PRP) can have beneficial synergistic effects for OA treatment^[27]. Mesenchymal stem cells (MSCs) have multiple tissue sources in the body, and for the treatment of OA, they are often extracted and applied from bone marrow, umbilical cord, fat, synovial membrane and other tissues^[28]. The treatment of OA by MSCs is mainly derived from the paracrine effect of exosomes^[29]. MSCs from different sources are not thought to differ significantly in the treatment of OA^[30]. Nerve Growth Factor (NGF) is ubiquitous in various tissues and organs of the body, and clinical data have shown that significantly increased NGF levels have been detected in the synovial fluid of patients with various types of arthritis, including KOA^[31]. Simultaneous topical injection of NGF can significantly cause pain and hyperalgesia in animals and humans^[32], so NFG is considered to be the main mediator of pain in the pathogenesis of osteoarthritis^[33]. It was found that the use of NGF antibodies on KOA mice could significantly and effectively reduce abnormal angiogenesis in subchondral bone, inhibit the expression of inflammatory factors, and improve pain symptoms^[34]. Therefore, NGF as a targeted target may be another therapeutic direction, and the anti-NGF drugs

Tanezumab and Fasinumab are currently undergoing phase III clinical trials for osteoarthritis ^[35].

4. Traditional Chinese medicine treatment

In the understanding of diseases in traditional Chinese medicine, there is no name for "osteoarthritis", and exploring its pathogenesis and clinical symptoms belongs to the category of "paralysis" and "bone paralysis" in the medicine of the motherland. The Nei Jing records: "The wind and cold and the three qi are mixed together, and they are paralyzed." "Suwen Long Thorn Festival Theory": "The disease is in the bone, the bone is heavy, the bone marrow is sore, the cold is cold, and the name is bone paralysis." The "Health Treasure Guide" proposed: "The elderly have long pain in the waist and knees, traction less abdomen and two feet, cannot bear to walk, the pulse of the odd meridian, subordinate to the liver and kidneys." "Successive generations of doctors have different opinions on bone paralysis, but its pathogenesis is mainly attributed to the deficiency of liver and kidney qi and blood, and the external invasion of wind, cold, humidity and heat, and the disease is based on false standards.

4.1 Traditional Chinese medicine for internal treatment

For OA prescription drugs, there is currently no unified clinical standard, differentiation treatment, addition and subtraction with evidence is the core of TCM internal treatment, according to the etiology of OA, each family is divided into different symptom types, clinical use of different drugs to add and subtract, all have achieved significant curative effects. Li Fanbing^[36]For the treatment of KOA, the principle of deficiency replenishment is implemented, based on liver and kidney deficiency, it is divided into three types: qi and blood deficiency, cold and wet obstruction, and humid heat flow injection. Zhu Yuelan^[37] added or subtracted drugs for the treatment of OA from four aspects: (1) nourishing the liver and kidneys, activating blood circulation and removing stasis: Fang Zhong often added Chinese medicines that replenish kidney and blood, such as bone crushing, continuity, chicken blood vine, etc.; (2) Dispel wind and cold, dehumidify and circulate: often add weed, sea tung bark, Qin Jiao; (3) Relieve liver depression, clear the mind and calm the mind: Fang Zhong often adds calamus, tulip, etc.; (4) Strengthen the spleen and protect the stomach: often add sand kernels. According to the etiology and pathogenesis of KOA, Su Xinping^[38] divided it into 5 types: cold and wet type, humid heat type, cold and hot inclusion type, phlegm and stasis interconnected type, and liver and kidney deficiency type, respectively, the application of solitary parasitic soup plus and minus, Xuanbi soup plus and minus, solitary parasitic soup/Xuanbi soup supplemented by cold medicine, Pain relief and bone strengthening soup, solitary parasitic soup combined with six flavors of dihuang soup plus and minus.

4.2 External treatment of traditional Chinese medicine

Traditional Chinese medicine patch treatment has the effect of protecting cartilage tissue and reducing synovial inflammation. Dong Zeshun^[39] found that the topical acupuncture point application of warm menstrual blood circulation traditional Chinese medicine to treat KOA can effectively improve local swelling and pain of joints, limited activity function and other symptoms, while avoiding side effects such as gastrointestinal discomfort caused by traditional oral drugs. Medicinal fumigation is through the continuous smoking of the affected area through the hot soup of Chinese medicine, through the blood of Chinese herbal medicine combined with physical warmth, play the role of temperature and cold, blood circulation^[40], Zou Kun et al^[41] Through the exploration of the law of KOA medication, it was found that the most used traditional Chinese medicines are through-bone grass, safflower, and tendon grass, and it is recommended to use sea tong peel as the

main side to smoke and wash to treat knee osteoarthritis, taking into account the heart, spleen and kidney while treating the liver as the key.

4.3 Non-drug treatment

Acupuncture has the unique advantages of simple operation, safety, economy and few adverse reactions. Including milli needle, electroacupuncture, fire acupuncture, warm acupuncture and so on. Studies have found that acupuncture has a significant inhibitory effect on the expression of inflammatory factors, thereby protecting joint cartilage, improving local microenvironment, effectively alleviating arthritis symptoms, and improving patient signs^[42]. Traditional Chinese medicine believes that "if you do not pass, it is pain", Tuina has the effects of channeling meridians, regulating muscles and bones, removing blood stasis, etc., in the process of pain conduction, Tuina can not only activate the descending pain inhibition system, accelerate metabolism, reduce the concentration of inflammatory substances in the joints, but also increase the level of β -endorphins and other substances in the serum by regulating the body's release of endogenous morphine-like substances, and play an analgesic effect, thereby relieving the symptoms of pain locally^[43]. Exercise has long been considered an important factor in maintaining healthy bones, muscles, and joints, and traditional (resistance, aerobic and flexible) and non-traditional (tai chi, yoga, and water sports) exercises have been shown to be effective in treating knee and hip osteoarthritis^[44]. For example, Song Jiulong et al^[45] studied the therapeutic effect of Tai Chi on knee osteoarthritis and found that modified Tai Chi as a rehabilitation training method can significantly improve the strength and fatigue tolerance of patients, enhance the function of lower limbs and cardiorespiratory endurance of patients, and have no obvious adverse reactions.

5. Integrated traditional Chinese and Western medicine treatment

Conservative treatment is the first choice for bone and joint treatment, traditional Chinese and Western medicine have their own characteristics, and exploring the combination of traditional Chinese and Western medicine for the diagnosis and treatment of osteoarthritis is one of the hot spots in scientific research and clinical research in China, which has been widely used in clinical practice and has achieved significant curative effects. Sun Jingtao et al.^[46] divided 67 patients with KOA into treatment group and control group, the treatment group was treated with non-steroidal anti-inflammatory drugs combined with decoction ros é four-substance soup, and the control group was treated with non-steroidal anti-inflammatory drugs, the results showed that ros é four-object decoction combined with non-steroidal anti-inflammatory drugs could relieve joint pain and improve the quality of life of patients. He Junyuan^[47] randomly divided 120 patients with KOA into control group and treatment group, the control group joint injection combined with glucosamine oral, the treatment group used joint injection combined with traditional Chinese medicine fumigation, the results of the study showed that the use of joint injection hyaluronic acid combined with traditional Chinese medicine fumigation can improve the treatment effect, improve the knee function of patients, and the clinical application value is significant. Pang Qingmin^[48] randomly divided 100 patients with KOA into control group and observation group, the control group was treated with oral celecoxib, and the observation group was treated with warm acupuncture on the basis of the control group, and the results showed that warm acupuncture combined with celecoxib had better effect in reducing inflammatory factor levels and improving joint function. Tian Xiaojun^[49] randomly divided 80 patients with rheumatic and wet knee osteoarthritis into control group and observation group, the control group was treated with PRP, and the observation group was treated with PRP plus solitary parasitic decoction, and the results showed that the use of PRP combined with solitary parasitic decoction for the treatment of rheumatic and wet parasitic KOA

had a better effect on reducing inflammation, alleviating joint pain, and improving joint function, and had high safety. Zheng Rugeng et al^[50] divided OA patients into observation group and control group, the control group was treated with diclofenac sodium, and the observation group was treated with acupuncture, kidney and blood nourishment combined with diclofenac sodium, and the results found that acupuncture, kidney and blood tonic combined with diclofenac sodium had a high overall effective rate in the treatment of osteoarthritis, which could significantly improve its clinical symptoms, reduce the levels of inflammatory factors IL-1 β , hs-CRP and MMP-1 and MMP3 in joint fluid, and significantly inhibit the progression of the disease, which is worth applying.

6. Prospects and shortcomings

Currently, the drugs commonly used in the diagnosis and treatment of clinical OA are mainly to relieve clinical symptoms and delay the course of the disease, but the toxic side effects such as gastrointestinal tract, cardiovascular and liver damage cannot be avoided. Joint injection of cortisol and HA can only relieve joint pain symptoms in the short term, but the long-term effect is not significant. The research of biological agents and their application rate in clinical practice have gradually increased, but it is difficult to adhere to long-term drug use because they cannot afford the expensive treatment costs. Traditional Chinese medicine has unique advantages in the treatment of OA, but due to the complexity of drug composition and the uncertainty of specific therapeutic substances, traditional Chinese medicine is limited in clinical diagnosis and treatment. Therefore, in the clinical treatment of OA, it should not be limited to one kind of medicine or one kind of treatment, but should combine Chinese and Western medicine effectively in order to achieve better clinical effect.

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