

Analysis of therapeutic effect of extracorporeal shock wave on tennis elbow

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Abstract: Extracorporeal shock wave therapy plays an important role in the prevention and treatment of musculoskeletal diseases due to its advantages of convenient operation, safety, high efficiency and no drug intervention. In recent years, extracorporeal shock wave therapy has been widely used in the treatment of external humeral epicondylitis, such as through extracorporeal shock wave combined with ultrashort wave therapy and other physical factors. As people become more accepting of exercise, the frequency of some musculoskeletal disorders is also increasing. For such diseases, the effect of drug treatment is often reflected in the alleviation of symptoms, and the radical cure of the disease is not obvious. Under this premise, the advantages of the physical factor therapy approach appear. By performing extracorporeal shock wave therapy, the pain can be relieved in a short period of time, and the patient's normal activities and symptoms can be significantly improved after the treatment cycle.

Keywords: Extracorporeal Shock Wave; Tennis Elbow; External Humerus Epicondylitis

1. Concept of tennis elbow

1.1 The origin of the name tennis elbow

Tennis elbow is another name for humeral epicondylitis, a common musculoskeletal disorder. This disease is also known as humeroradial joint bursitis, humeroradial periostitis is also a clinical name for him. The above is the name of Western medicine, in Chinese medicine, tennis elbow is called "arm impediment"^[1]. External humerus epicondylitis first entered people's field of vision is because of tennis players, many tennis players have pain in the external humerus epicondyle, so it is called tennis elbow.

1.2 Concept of external humeral epicondylitis

The pain site of external humerus epicondylitis is located on the lateral side of the elbow joint, where the extensor muscle of the forearm starts. It is a disease caused by chronic fasciitis in the common extensor tendon of the forearm^[2]. On the one hand, the patient presented with pain on the external epicondyle of the humerus, and on the other hand, the patient presented with significant discomfort when performing gripping movements, wrist extension movements, and combined movements. Tennis, table tennis, badminton and other sports require the athlete to grasp the hand at the same time to stretch the wrist joint. The most classic action is reflected in the backhand stroke, which needs to be completed in a short time, such as grasping, wrist extension, acceleration, power and other actions. Repeated operations of this kind tend to increase the load on the extensor carpi radialis short, resulting in injury and tearing. This is also the cause of the currently widely recognized external humeral epicondylitis^[3].

2. Research status of external humeral epicondylitis

With the in-depth study, people found that although the humerus epicondylitis is called tennis elbow, but the incidence of the population is not limited to tennis players. Many people who work in handicrafts have a higher incidence of tennis elbow^[4]. Moreover, there is anatomical evidence that humerus epicondylitis is not an inflammation in the traditional sense, but a degenerative disease caused by tendon damage and other reasons. In addition, the disease course of external humeral epicondylitis is long and the onset is slow. The tendon is subjected to heavy load for a long time, resulting in injury, which gradually accumulates over time, and calcium salt deposit may exist^[5]. After reaching a certain level, symptoms of gripping, wrist extension, forearm rotation, and external epicondyle tenderness of the humerus are shown. Tennis elbow has a certain degree of self-healing, some patients can be cured without treatment, but there are still a considerable

number of patients with persistent disease, need systematic treatment, such as drug therapy, physical therapy, etc., more serious patients also need surgical treatment ^[6].

3.Extracorporeal shock wave therapy

3.1 Working principle of extracorporeal shock wave

Extracorporeal shock wave is a kind of mechanical pulse pressure wave, which converts the energetic and dynamic characteristic pulse sound wave into the airway pressure type shock wave through the device ^[7]. During the treatment process, the probe of the device needs to be attached to the patient's skin through a certain medium, so that the shock wave can be better transmitted, and prevent the shock wave from being unable to be transmitted due to the probe being empty, resulting in damage to the device. Since extracorporeal shock wave therapy only needs to fit closely with the treatment site in the treatment process, it is not invasive treatment, and it has little damage to its own tissues in the treatment process, and its safety is guaranteed. And the operation of the equipment is rapid and efficient, and the effect is rapid. It is widely used in the design of departments related to musculoskeletal diseases, such as rehabilitation departments ^[8].

3.2 Therapeutic effects of extracorporeal shock wave

At present, extracorporeal shock wave has been widely used by domestic and foreign researchers in the treatment of shoulder periarthritis, humerus epicondylitis, plantar fasciitis and other diseases ^[9], but there is no exact conclusion on its therapeutic mechanism. Professor Huang Guozhi ^[10] believes that the treatment principle is mainly reflected in the following three aspects. First, mechanical stress effect. Therapeutic high energy shock waves exert different forces on different tissues, which is mainly due to the different density of different tissues. Because this difference in force can loosen the adhesive tissue, the fundamental treatment of musculoskeletal diseases. Second, the piezoelectric effect. Piezoelectric effect refers to the effect of high energy shock wave on the body. Due to the pressure action of the shock wave, the potential of neurons at the treatment site changes, thus affecting the transmission of nerve impulse and achieving the analgesic effect ^[11]. Third, cavitation effect. Cavitation effect means that under the action of shock wave, part of the cell membrane at the treatment site is destroyed, changing the environment here, and releasing factors that promote tissue repair and anti-inflammatory and analgesic pain. Fourth, nerve blocking effect. The stimulation of pain receptors at the treatment site by high-energy shock wave can raise the threshold value, and the intuitive clinical response is that patients report significant pain relief after treatment.

4. Effect of extracorporeal shock wave on external humeral epicondylitis

In the Chinese Guidelines for Extracorporeal Shock Wave Therapy for Osteomuscular Diseases (2023 edition) ^[12], it is clearly pointed out that extracorporeal shock wave therapy for external humeral epicondylitis is A grade A recommendation, and its evidence level reaches 1a. Therefore, the use of extracorporeal shock wave in the treatment of external humeral epicondylitis has theoretical basis. Hong Xiping et al. ^[13] conducted extracorporeal shock wave therapy for 1 to 3 times on 18 patients with external humeral epicondylitis, and the frequency, number of shocks and the number of shock wave therapy were determined according to the actual conditions of the patients. After the treatment, the effective rate of the treatment reached 94.4%. The effect of extracorporeal shock wave therapy is rapid and long-lasting. Li Fulin et al. ^[14] followed up patients who underwent extracorporeal shock wave therapy for external humerus epicondylitis and patients who underwent block therapy, and the long-term follow-up results showed that both treatments had therapeutic effects on external humerus epicondylitis. However, the short and medium follow-up showed that the mode of using extracorporeal shock wave therapy was superior to the mode of using block therapy in terms of the duration of treatment effect and the probability of disease recurrence. Qiao Baoguang et al. ^[15] intended to study whether extracorporeal shock wave pressure had an impact on the treatment of the external epigondyle of humerus. They divided the pressure into three medium levels of 1.2.3bar and divided the patients into groups based on this, and compared the treatment effect, pain score and adverse reactions of the three groups of patients. It was found that the treatment effect of 2bar pressure on patients was significantly better than that of the other two groups. This study focused on extracorporeal shock wave pressure, and due to the equipment and sample size, it was not possible to further refine the pressure range more suitable for the treatment of external humeral epicondylitis. However, it is

also beneficial to further study the therapeutic effect of extracorporeal shock wave.

5. Summary and prospect

With the development of research and application, extracorporeal shock wave therapy has become one of the preferred options for the treatment of musculoskeletal diseases. For patients with external humeral epicondylitis, extracorporeal shock wave therapy can relieve pain and release adhesions. However, the frequency of extracorporeal shock wave therapy and the time interval before multiple treatments still need to be supported by a large amount of experimental data. And extracorporeal shock wave therapy can be combined with other treatment methods, such as combined exercise rehabilitation training, intramuscular adhesive treatment and so on.

References

- [1] External humeral epicondylitis [J]. *Rheumatology and Arthritis*,2013,2(03):77-78. (in Chinese)
- [1] DU Xinru, Han Ziyu, Xu Enduo et al. Up outside humerus condyle inflammation causes anatomic studies [J]. *Chinese journal of clinical anatomy*, 1992 (01) : 6-8 + 75. DOI: 10.13418 / j.i SSN. 1001-165 - x. 1992.01.003.
- [2] Substitute flight; Xiang Ming. Advances in etiology and pathogenesis of external epicondylitis of humerus [J].*Chinese Journal of Shoulder and Elbow Surgery Electronic*,2017,5(02):142-144.
- [3] Li Zhi-yao, Zhang Lei. New progress in tennis elbow research [J].*Journal of Bone and Injury in China*,2011,24(11):969-972. (in Chinese)
- [4] Liu Dongxu.The research progress of tennis elbow treatment [J].*Journal of contemporary sports science and technology*, 2022, 12 (14) : 154-158. The DOI: 10.16655 / j.carol carroll nki. 2095-2813.2202-1579-8524.
- [5] Dong Qiyuan, Yang Yuping. Anatomic study on etiology of tennis elbow [J]. *Chinese Journal of Minimally Invasive Surgery*,2017,17(09):841-843+849. (in Chinese)
- [6] Expert consensus of extracorporeal shock wave therapy for osteomuscular diseases[J].*Chinese Journal of Frontiers in Medicine (Electronic edition)*,2014,6(06):170-177. (in Chinese)
- [7] Xing G Y. The past, present and future of shockwave medicine [J]. *Chinese Journal of Frontiers in Medicine (electronic edition)*,2014,6(06):1-2+6. (in Chinese)
- [9] Gong Xuan, Wang Qian, Lin Junbin. Visualization analysis of research progress in extracorporeal shock wave therapy for pain [J]. *Journal of Tissue Engineering Research*, 2019,28(11):1749-1755. (in Chinese)
- [10] Huang Guozhi. Progress of extracorporeal shockwave therapy for painful diseases of bone and joint[J].*Chinese Journal of Rehabilitation Medicine*,2004(06):74-76. (in Chinese)
- [11] Wang Yongzhao, Zhou Yun, Wu Jianxian. Research progress of extracorporeal shock wave therapy for musculoskeletal pain [J]. *Chinese Journal of Clinicians (Electronic edition)*,2017,11(07):1216-1220. (in Chinese)
- [12] Liang Haojun, Jia Haiguang, Zhu Junyu, et al. Chinese Guidelines for extracorporeal shock wave therapy for osteomuscular diseases (2023 edition)[J]. *Chinese Journal of Frontiers in Medicine (electronic edition)*,2023,15(09):1-20. (in Chinese)
- [13] Hong Xiping,Chen Lijin, LAN Linyou et al.Clinical observation of extracorporeal shock wave in the treatment of external humeral epicondylitis [J]. *Zhejiang Trauma Surgery*,2011,16(02):243-244.
- [14] LI Fulin, Huang Yu, Yin Dong, et al. Evaluation of extracorporeal shockwave therapy for external humeral epicondylitis: a short-medium follow-up [J]. *Journal of Practical Medicine*,20,36(24):3369-3372.
- [15] Qiao Baoguang,Soar;,Wang Haifeng;,Chen Qiaoyan;,Zhang Yan,Zhao Huan; Miao Shaohua. Clinical study of extracorporeal shock wave with different pressure in the treatment of external humeral epicondylitis [J]. *Chinese Journal of Pain Medicine*,2019,25(11):850-853.