Computer Fraud and Security
ISSN (online): 1873-7056

Key Data Collection and Research on Improving the Health Status of Volleyball Players

Lanfang Li
Physical Education Institute, Huainan Nommal University, Huainan, China

Abstract:
Introduction: The disease of the end of the patellar tendon, also known as "jumping knee", is one of the common causes of prepatellar pain

Objectives: This study aims to investigate the clinical observation on the effect of shock wave therapy on volleyball players' patellar tendon terminal disease.

Methods: Both groups of athletes were involved in one knee. 33 patients in SWT group, including 30 males and 3 females, aged from 22 to 24 years old, with an average age of 23 years and a course of 3 to 5 months. 37 cases in the control group were treated with brace fixation and ion-electroosmosis therapy, including 32 males and 5 females, aged from 21 to 25 years, with an average age of 24 years, and the course of disease was 3 to 6 months. There was no significant difference in age, sex and course of disease between the two groups (P>0.05), which was comparable. There were 46 cases in ESWT group, including 43 males and 3 females. The age ranged from 23 to 29 years, with an average of 25 years. The course of disease was 1 month to 2 years; 36 cases in the control group were treated with physical factor therapy, including 32 males and 6 females, aged 21-27 years with an average of 24 years, and the course of disease was 2 months to 2 years. There was no significant difference between the two groups in terms of age, gender, course of disease, pain score and MRI stage (P>0.05).

Results: Both groups of athletes received a 12 month clinical evaluation. There was no significant difference in scores between the two groups before treatment (P>0.05). At 1,3,12 months after treatment, VAS pain score, VISA score and RM score were significantly improved compared with those before operation (P<0.05); SWT group was superior to the control group (P<0.05). The therapeutic effect of EWST group was significantly different from that of physical group. According to the joint function recovery and VAS pain score, the treatment effect in ESWT group was significantly lower than that in physical group after treatment (P<0.05). During follow-up, only 2 patients in ESWT group recurred, while 7 patients in physical group recurred. The recurrence rate in physical group was significantly higher than that in EWST group.

Conclusions: In volleyball or basketball players, carbon terminal disease is more common, with a incidence rate of 34.6% - 41.3%. A number of clinical studies have shown that ESWT is effective in the treatment of muscular dystrophy. Peers and other patients compared the clinical effects of surgical treatment and ESWT treatment for the terminal cluster disease. The results showed that: after 6 months of follow-up, the VAS pain scores of the two groups of patients were significantly improved compared with those before surgery, but the patients in the operation group needed braking for an average of 6.1 weeks after surgery, while the patients in the ESWT group did not need braking after treatment. Therefore, compared with surgical treatment, the early quality of life of patients treated with ESWT was higher.

Keywords: patellar tendon terminal disease; athletes; shock wave therapy,Key Data Collection

INTRODUCTION

The disease of the end of the patellar tendon, also known as "jumping knee", is one of the common causes of prepatellar pain [1]. The main cause is the biomechanical disorder of the patellofemoral joint, resulting in subluxation or tilt of the patella, and excessive concentration and wear of the pressure on the lateral patellofemoral facet joint [2-3]. As a result, the cartilage on the patellofemoral joint surface is edematous, softened, and then fragmented. After the cartilage gradually falls off, the exposed bone is hyperplastic and sclerotic [4-6]. It is a common chronic sports injury, which seriously affects the normal training and competition of athletes. Therefore, early diagnosis and effective treatment should be taken to prevent it from developing into patellofemoral arthritis. shock wave therapy (SWT) was used for the treatment of chronic patellar tendon terminal disease since the mid-1980s, and then gradually popularized [7-10]. Now, the clinical research data are reported as follows..

OBJECTIVES

This study aims to investigate the clinical observation on the effect of shock wave therapy on volleyball players' patellar tendon terminal disease.

METHODS

Data and Methods 1

Retrospective analysis of the clinical data of volleyball players in the sports department who received non operative conservative treatment in the physiotherapy department of the affiliated hospital due to patellar tendon terminal disease from March 2008 to April 2009, according to the different treatment methods, they were divided into simple SWT treatment group (SWT group) and treatment group (control group) using brace fixation and iontophoresis therapy. Inclusion criteria of study objects: The medical history, physical examination and MRI results were consistent with the diagnosis of patellar tendon terminal disease; The rest, NSAIDs and other treatment measures were ineffective; There were moderate and severe pain symptoms between patellar tendon and patella; The resistance pain of knee extension was positive. Exclusion criteria: rheumatoid arthritis; Systemic polyarthritis; Local infection; Tumor disease; ≤ 18 years old, knee osteoarthritis; Previous operation history of knee joint disease; Previous history of peri knee fractures.

Both groups of athletes were involved in one knee. 33 patients in SWT group, including 30 males and 3 females, aged from 22 to 24 years, with an average age of 23 years and a course of 3 to 5 months; 37 cases in the control group were treated with brace fixation and ion-electroosmosis therapy, including 32 males and 5 females, aged from 21 to 25 years, with an average age of 24 years, and the course of disease was 3 to 6 months. There was no significant difference in age, sex and course of disease between the two groups (P>0.05), which was comparable.

The athletes treated with SwT are all operated by the same doctor with rich experience in treatment. The SwT equipment used is the SwissDolorClast system (Swiss EMS company). The athletes take a sitting position and bend their knees 90 ° when receiving treatment. The ultrasonic gel was applied to the skin at the lower pole of the patella and the end of the patellar tendon, and 2000 shock waves were given each time. The energy flow density was 0.18 mJ/mm2, and the frequency was 10 s-1. Starting from the most obvious part of the pain, the treatment was carried out from front to back. The treatment radius was 4-5 cm, and the treatment time was 5-10 minutes. After the treatment, the doctor evaluated the local swelling and hematoma of the athletes, told them not to take other treatment measures within 3 months, allowed the athletes to immediately bear weight and move the knee joints, and suggested to avoid jumping activities within 1 week. The patients were treated every 6 days for 5 consecutive times. In the control group, the low-frequency modulated medium frequency current of 50-100 Hz was used to implement ion electroosmosis in the patellar tendon. The drug was hydrocortisone solution for 20 minutes each time. After treatment, the affected limb was fixed with a brace once a week for 4 consecutive weeks.

Before treatment and 1, 3 and 12 months after treatment, the treatment effect of the two groups of athletes was evaluated with visual analog scale (VAS) pain score, Victorian institute of sports assessment (VISA) score and Roles Maudsley (RM) score.

SPSS 13.0 software was used for statistical processing of data. The measurement data are expressed in mean ± standard deviation, and the counting data are expressed in rate. Student t test or $\chi 2$ test were used to compare the data between groups; The inspection level is taken on both sides $\alpha = 0.05$.

Data and Methods 2

Retrospective analysis was made on the clinical data of 82 patients with patellar tendon end disease who received non operative conservative treatment in the rehabilitation department of our hospital. They were divided into simple ESWT treatment group and physical factor treatment group according to different treatment methods. All 82 patients met the Diagnostic Criteria for TCM Diseases issued by the State Administration of Traditional Chinese Medicine. All patients had exercised for more than 3 years, and the course of disease was 1 month to 2 years. All patients suffered from unilateral pain, including jumping pain, squatting pain or running pain. Examination: The patellar tip and the end of the patellar tendon had obvious tenderness, and a few patients had patellar tendon thickening and knee extension to resist pain; Exclusion criteria: patients with rheumatoid arthritis,

local infection, tumor disease, and previous surgery history of knee joint disease. Both groups were involved in one knee. There were 46 cases in ESWT group, including 43 males and 3 females. The age ranged from 23 to 29 years, with an average of 25 years. The course of disease was 1 month to 2 years; 36 cases in the control group were treated with physical factor therapy, including 32 males and 6 females, aged 21-27 years with an average of 24 years, and the course of disease was 2 months to 2 years. There was no significant difference between the two groups in terms of age, gender, course of disease, pain score and MRl stage ($p>0.05$).

The patients treated with ESWT all had the same therapist to perform the treatment, and the Dolorelast scattering shock wave therapy machine made in Switzerland was used. The patients were all in supine position, and the coupling agent was applied to the skin at the lower end of the patella and the end of the patellar tendon. The 15 rnm treatment head was used to shock 3000 times per site with the tenderness point as the center, and the intensity was 1.5-2.8 Pa. After the treatment, the doctor evaluated the local hematoma and swelling, and instructed them not to exercise violently in the near future, once a week, and continuously treated for 5 times. The control group was treated with low-frequency modulated medium frequency current, ultrasound, ultrashort wave and other physical factors once a day for five consecutive weeks. The instructions of the two groups were the same after treatment.

RESULTS

Both groups of athletes received a 12 month clinical evaluation. There was no significant difference in scores between the two groups before treatment ($P>0.05$); At 1,3,12 months after treatment, VAS pain score, VISA score and RM score were significantly improved compared with those before operation ($P<0.05$); SwT group was superior to the control group ($P<0.05$). The specific data results of each clinical score are shown in Table 1-3.

Table 1. VAS pain score evaluation results of two groups

Group	n	Before treatment	1 month after treatment	3 months after treatment	12 months after treatment
SWT group	34	7.67±1.38	4.24±1.28	3.46±1.17	2.6±1.1
Control group	38	7.43±1.06	6.75±1.03	5.88±0.79	4.9±0.87
t		1. 011	8. 686	9.612	11. 141
P		0. 213	0.000	0.000	0.000

Table 2. VISA score evaluation results of the two groups

Group	n	Before treatment	1 month after treatment	3 months after treatment	12 months after treatment
SWT group	34	48.6±3.41	64.4±3.77	3.46±3.38	73.47±3.3
Control group	38	49.22±3.12	50.69±3.15	52.12±3.08	53.8±3.16
t		0.244	16.594	23.536	23.728
P		0.714	0.000	0.000	0.000

Table 3. RM score evaluation results of the two groups

Group	n	Before treatment	1 month after treatment	3 months after treatment	12 months after treatment
SWT group	34	4.1±0.02	2.51±0.24	2.19±0.37	2.0±0.25
Control group	38	4.1±0.02	3.27±0.18	2.88±0.28	2.56±0.16
t		0.001	12.852	8.227	9.612
P		1	0.000	0.000	0.000

Both groups of athletes did not show any aggravation of pain symptoms after treatment. Six months after treatment, 29 (87.9%) of 33 athletes in SWT group returned to the volleyball court completely; Only 20 (54.1%) of the 37 athletes in the control group returned to the volleyball court, with a statistically significant difference between the two groups ($\chi 2$=9.503, P=0.002). Twelve months after treatment, 33 athletes in SWT group returned to the volleyball court; Of the 37 athletes in the control group, only 26 (70.200) returned to the field, with a statistically significant difference between the two groups ($\chi 2$=11.640, P=0.001).

The therapeutic effect of EWST group was significantly different from that of physical group; According to the joint function recovery and VAS pain score, the treatment effect in ESWT group was significantly lower than that in physical group after treatment (P<0.05). During follow-up, only 2 patients in ESWT group recurred, while 7 patients in physical group recurred. The recurrence rate in physical group was significantly higher than that in EWST group. The results show that ESWT is obviously superior to other conventional conservative treatment methods in the treatment of tendinosis (Table 4-5).

Table IV. Comparison of VAS pain scores between two groups

Group	n	Before treatment	1 month after treatment	3 months after treatment	12 months after treatment
ESWT group	45	7.38±1.37	4.5±1.21	3.85±1.32	2.78±1.11
Physical group	37	7.69±1.09	6.27±0.09	5.5±0.78	5.02±0.93

Table V. Comparison of curative effects of different treatment methods

Group	n	Effective		Valid		Invalid	
		Number of cases	%	Number of cases	%	Number of cases	%
ESWT group	45	28	62%	13	29%	4	9%
Physical group	37	13	35%	17	46%	7	19%

DISCUSSION

Patellar tendon terminal disease is common among professional volleyball or basketball players, with a incidence rate of 31.9% - 44.6%. A variety of methods can be used for the treatment of patellar tendon terminal disease. In clinical practice, except for a few cases treated with arthroscopy or open surgery, most athletes often choose non surgical treatment. At present, the commonly used non surgical treatment measures include rest, application, non steroidal anti-inflammatory drugs, anchorage, platelet rich plasma injection and various physiotherapy measures. Although these methods have shown some clinical effects in the early stage of the disease, most of them lack the evidence support of clinical control studies.

A number of clinical studies have shown that SWT has a significant effect on muscular diseases. Peers et al. compared the clinical effects of surgical treatment (14 cases) and SWT (13 cases) for patellar tendon terminal disease. The results showed that the VISA score and VAS pain score of the two groups were significantly improved after 6 months of follow-up. However, the patients in the surgical treatment group needed complete immobilization of the affected limb for an average of 6.1 weeks after surgery, while the patients in the SWT group did not need immobilization after treatment, so the early quality of life was higher than that in the surgical treatment with SWT. In a recent randomized controlled clinical trial, ZwerVer et al. compared the clinical effects of SWT and placebo in the treatment of athletes with patellar tendon terminal disease in the season. The pain symptoms of athletes in the two groups were improved to some extent compared with those before treatment. However, 12 and 22 weeks after treatment, the observation showed that there was no statistically significant difference in VISA scores or VAS scores between athletes in the SWT group and those in the placebo group. However, as the author pointed out in the paper, in this study, all athletes were in the season, and the pain level before treatment was low, which did not affect the athletes to continue to engage in their own professional sports.

Therefore, the results of this study cannot confirm that SWT is an effective treatment for patellar tendon terminal disease. In this study, all athletes did not continue to participate in volleyball during the treatment period, and required to stop entering the stadium to participate in competitive activities, keep in touch and rest. Their VISA score before treatment was low and their pain level was high. After 6 months of follow-up after SWT treatment, most athletes can return to the volleyball court, and all of them will return to the court one year later. VAS pain score, VISA score and RM score have been greatly improved compared with those before treatment. It shows that SWT is an effective method in the non-surgical treatment of volleyball players' patellar tendon terminal disease.

Van Leeuwen et al. reviewed the clinical effect of SwT in 204 patients with patellar tendon terminal disease. The results showed that the overall treatment satisfaction of patients reached 90%. They believed that SWT was a safe and effective non-surgical treatment measure in relieving pain and promoting the recovery of patients' motor function. The data results of this study are similar to those of previous studies. All 34 volleyball players treated with SWT have shown good clinical efficacy, which is better than that of ion-electroosmosis combined with brace fixation. One year after SwT treatment, all athletes returned to the volleyball court, and all athletes did not experience any aggravation of pain symptoms during the treatment. The results show that SWT is a safe and effective method for the treatment of volleyball players' patellar tendon terminal disease, which is conducive to the athletes' return to the sports arena.

In volleyball or basketball players, carbon terminal disease is more common, with a incidence rate of 34.6% - 41.3%. A number of clinical studies have shown that ESWT is effective in the treatment of muscular dystrophy. Peers and other patients compared the clinical effects of surgical treatment and ESWT treatment for the terminal cluster disease. The results showed that: after 6 months of follow-up, the VAS pain scores of the two groups of patients were significantly improved compared with those before surgery, but the patients in the operation group needed braking for an average of 6.1 weeks after surgery, while the patients in the ESWT group did not need braking after treatment. Therefore, compared with surgical treatment, the early quality of life of patients treated with ESWT was higher.

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