ULTRASONOGRAPHIC MEASUREMENT OF THE EFFECT OF PHYSICAL TRAINING ON LIGAMENT INJURIES

MEDIÇÃO ULTRASSONOGRÁFICA DO EFEITO DO TREINAMENTO FÍSICO NAS LESÕES LIGAMENTARES

MEDICIÓN ECOGRÁFICA DEL EFECTO DEL ENTRENAMIENTO FÍSICO EN LAS LESIONES DE LIGAMENTOS

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ABSTRACT

Introduction: The ankle joint is the most load-bearing joint of the human body. The health consciousness of people is increasing day by day, the probability of ankle sports injuries is also increasing. Objective: Analyze the applying sports medicine ultrasound value to rehabilitate anterior talofibular tendon injury. Methods: Seventy-two patients with anterior talofibular injury in a particular hospital were divided into control and observation groups to observe the effect of recovery, recovery time, and degree of ligament injury during rehabilitation treatment. Results: In the observation group, the complete recovery rate was 91.67%, incomplete recovery (8.33%), recovery time was (2.36±0.9) months. The complete recovery rate of the control group is (77.78%), the incomplete recovery (22.2%), the recovery time (3.58±0.42) months. Patients in the experimental group had a higher grade of ligament injury III than those in the control group during each rehabilitation period; the difference was statistically significant (P<0.05). Conclusions: Sports medical ultrasound can determine the degree of anterior talofibular ligament rupture after injury, providing a basis for the clinical formulation of the treatment plan. ***Evidence Level II; Therapeutic Studies - Investigating the result.***

Keywords: Endoscopic Ultrasound-Guided Fine Needle Aspiration; Rehabilitation; Lateral Ligament, Ankle.

RESUMO

Introdução: A articulação do tornozelo é a articulação do corpo humano que mais suporta carga. A consciência da saúde das pessoas está aumentando de dia para dia, a probabilidade de lesões esportivas no tornozelo também está aumentando. Objetivo: Analisar o valor de aplicação do ultra-som de medicina esportiva para a reabilitação de lesão no tendão talofibular anterior. Métodos: Setenta e dois pacientes com lesão talofibular anterior em um determinado hospital foram divididos em grupos de controle e observação para observar o efeito da recuperação, o tempo de recuperação e o grau de lesão ligamentar durante o tratamento da reabilitação. Resultados: No grupo de observação, a taxa de recuperação completa foi de 91,67%, a recuperação incompleta (8,33%), o tempo de recuperação foi de (2,36±0,9) meses. A taxa de recuperação completa do grupo de controle é de (77,78%), a recuperação incompleta (22,2%), o tempo de recuperação (3,58±0,42) meses. Os pacientes do grupo experimental tiveram maior grau de lesão ligamentar III do que os do grupo controle durante cada período de reabilitação, a diferença foi estatisticamente significativa (P<0,05). Conclusões: A ultra-sonografia médica esportiva pode determinar o grau de ruptura do ligamento talofibular anterior após a lesão, fornecendo uma base para a formulação clínica do plano de tratamento. ***Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.***

Descritores: *Aspiração por Agulha Fina Guiada por Ultrassom Endoscópico; Reabilitação; Ligamentos Laterais do Tornozelo.*

RESUMEN

Introducción: La articulación del tobillo es la que más carga soporta del cuerpo humano. La conciencia de la salud de las personas aumenta día a día, la probabilidad de lesiones deportivas en el tobillo también aumenta. Objetivo: Analizar el valor de la aplicación de ultrasonidos en medicina deportiva para la rehabilitación de la lesión del tendón talofibular anterior. Métodos: Setenta y dos pacientes con lesión talofibular anterior en un hospital particular fueron divididos en grupos de control y de observación para observar el efecto de la recuperación, el tiempo de recuperación y el grado de lesión del ligamento durante el tratamiento de rehabilitación. Resultados: En el grupo de observación, la tasa de recuperación completa fue del 91,67%, la recuperación incompleta (8,33%), el tiempo de recuperación fue de (2,36±0,9) meses. La tasa de recuperación completa del grupo de control fue (77,78%), la recuperación incompleta (22,2%), el tiempo de recuperación (3,58±0,42) meses. Los pacientes del grupo experimental tuvieron un mayor grado de lesión del ligamento III que el grupo de control durante cada periodo de rehabilitación, la diferencia fue estadísticamente significativa (P<0,05). Conclusiones: La ecografía médico-deportiva puede determinar el grado de rotura del ligamento talofibular anterior tras la lesión, proporcionando una base para la formulación clínica del plan de tratamiento. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Biopsia por Aspiración con Aguja Fina Guiada por Ultrasonido Endoscópico; Rehabilitación; Ligamentos Laterales del Tobillo.*

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INTRODUCTION

In sports injuries, the incidence of ankle sprains is relatively high. According to reports, the number of ankle injuries in the United States has reached 23,000 cases per day, and a large part of them will relapse again.[1] Description of related research articles, the recurrence rate of ankle sprains is over half, reach 56%~74%. The most common clinical case of ankle joint injury is a foot fracture, anterior talofibular ligament injury is one of the most common ligament injuries in ankle joint injuries.[2] Once the athlete is injured, after a period of conservative recuperation, rehabilitation training must be on the agenda. If the rehabilitation training is not carried out in time, easy to cause ankle joint instability, and then cause femoral cartilage damage, repeated sprains, traumatic arthritis or chronic pain, in severe cases, you may even be unable to exercise for a long time, in severe cases, it can even cause disability.[3] This study performed sports medicine ultrasound examinations on patients with anterior talofibular ligament injuries at different stages of rehabilitation, provide real-time reference for the formulation of rehabilitation plans, to explore the clinical application value of sports medicine ultrasound in the rehabilitation of anterior talofibular ligament injury.[4-5]

METHOD

General information

72 patients with ATFL injury who underwent rehabilitation in a hospital were selected for the study. Selection criteria: (1) All are consistent with the ATFL injury clinical diagnosis criteria, have a history of trauma, accompanied by plantar flexion and foot varus injury; There is pain; The local swelling range exceeds 4 cm; The result of the front drawer test was negative. (2) The general condition is good, and there is no serious organic disease. (3) All voluntarily participated in this research and signed relevant written explanations. (4) Get the approval of the hospital ethics committee. There were no significant differences between the two groups in terms of age, gender, lesion location, and post-injury visit time (P>0.05), can be analyzed and compared. (Table 1)

METHOD

Both groups received rehabilitation treatment. Methods include: 1. Ankle mobilization. 30min/time, 1 time/d, 30 times is a course of treatment, according to the patient's specific condition, 2 to 3 courses of treatment are carried out, and the manipulation is mainly 3 to 4 grades. 2. Rehabilitation training. For surgical patients, the affected limb should be raised after the operation, and cold compresses should be applied to the ankle joint, 2 times/d, for 35 consecutive days.[6] (3) Computer IF treatment. 2 times/d, mainly exercise the function of tibialis anterior muscle and gastrocnemius muscle. In addition, high-power shortwave and pulse magnetic therapy can also be performed, electric weight loss gait therapy and air pressure therapy, etc., 1 to 2 times per day. In the control group, the treatment plan was adjusted accordingly based on the feedback and clinical examination of the patients during the rehabilitation process.[7]

Statistical analysis

Statistical analysis was performed with SPSS18.0 software. The measurement data adopts x-±s, and the t test is performed. Counting data is expressed as a percentage, perform x2 inspection. P<0.05 indicates that the difference is statistically significant.

RESULTS

Compare the rehabilitation effects of the two groups

The rehabilitation effect of the observation group was better than that of the control group (P<0.05). (Figure 1)

Comparing the recovery time of the two groups

The recovery time of the observation group was (2.36±0.29) months, the recovery time of the control group was (3.58±0.42) months, the difference was significant (t=14.342, P<0.05).

The classification of ligament injury in different stages of rehabilitation treatment in the two groups

After 1, 2, and 3 months of rehabilitation, the classification of ligament injury in the observation group was better than that in the control group (P<0.05). (Tables 2, 3 and 4)

DISCUSSION

Large inversion activities, the posterior part of the talus enters the fork-shaped joint socket, etc., which are all causes of the injury of the anterior talofibular ligament, improper treatment of this disease can cause

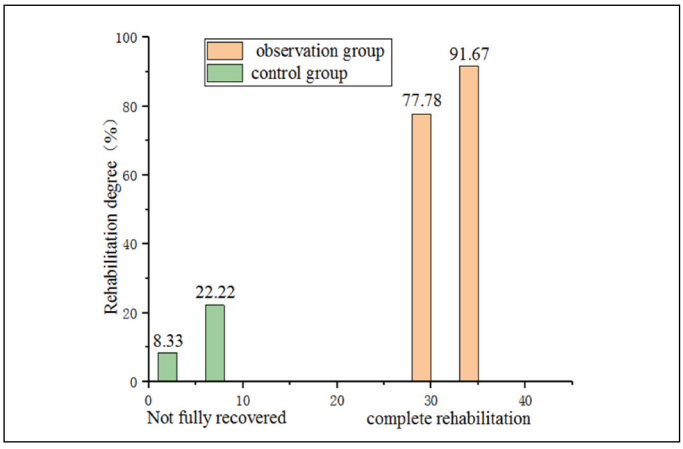

Figure 1. Comparison of rehabilitation effects between the two groups.

Table 2. Classification of ligament injury in the two groups during 1 month of rehabilitation treatment [n(%)].

Group	Rehabilitation treatment for 1 month			
	Level 0	Class I	Level II	Level III
Observation group	10 (27.78)	9 (16.67)	8 (22.22)	9 (16.67)
Control group	18 (50.00)	10 (27.78)	6 (16.67)	2 (5.55)
x2 value	10.387	3.570	0.983	6.261
P value	<0.05	>0.05	>0.05	<0.05

Table 3. The classification of ligament injury in the two groups after 2 months of rehabilitation treatment [n(%)].

Group	Rehabilitation treatment for 2 months			
	Level 0	Class I	Level II	Level III
Observation group	6 (16.67)	9 (25.00)	12 (33.33)	9 (25.00)
Control group	14 (38.89)	8 (22.22)	11 (30.56)	3 (8.33)
x2 value	12.305	0.214	0.176	10.004
P value	<0.05	>0.05	>0.05	<0.05

Table 1. Comparison of the general situation of the two groups.

Group	Number of cases	Age	Gender		Ankle joint		Visiting time after injury / h
			Man	Woman	Left	Right	
Observation group	36	28.69±8.35	22 (61.11)	14(38. 89)	15 (41.67)	21 (58.33)	10.30±3.25
Control group	36	28.70±8.32	20 (55.56)	16 (44.44)	14 (38.89)	22 (61.11)	10.32±3.21
Statistics		t=0.005	x2=0.634	x2=0.161	t=0.026		
P value		>0.05	>0.05	>0.05	>0.05		

Table 4. Classification of ligament injury in the two groups after 3 months of rehabilitation treatment [n(%)].

Group	Rehabilitation treatment for 3 months			
	Level 0	Class I	Level II	Level III
Observation group	1 (2.78)	8 (22.22)	10 (27.78)	17 (47.22)
Control group	7 (17.44)	12 (33.33)	8 (22.22)	9 (25.00)
x2 value	11.824	3.076	0.824	10.700
P value	<0.05	>0.05	>0.05	<0.05

ankle joints, there are problems such as instability and deformation of articular cartilage, increase the incidence of traumatic arthritis. From a clinical perspective, early diagnosis to confirm the degree of damage to the anterior talofibular ligament, it plays an important role in improving the effect of treatment and prognosis. Choose X-ray plain film, methods such as stress position X-ray plain film can only obtain some indirect information, unable to obtain direct evidence to clarify the extent of the patient's injury, MRI plays an important role in improving image resolution, however, this inspection method is expensive and cannot achieve dynamic monitoring . In this study, 91.67% of patients in the experimental group recovered completely than the control group 77.78% (P<0.05), regarding the comparison of the classification of ligament injury at different times of rehabilitation treatment, in this study, the experimental group had a very obvious effect after 2 months of rehabilitation, among them, level I accounted for 25.00%, grade II accounted for 33.33%, Grade III 25.00%, better than the control group (P<0.05), in the study, there were 60 patients in each of the experimental group and the control group, the degree of rehabilitation of the experimental group (91.67%) was significantly higher than that of the control group (77.78%).

The advantages are summarized as follows: (1) Able to judge the degree of ATFL tearing after the injury occurs, provide an important basis for clinical formulation of corresponding treatment plans. (2) It is an auxiliary means of dynamic observation, it can monitor the recovery of patients with ligament injury after conservative treatment, it is helpful to formulate sports rehabilitation plan. (3) In the process of rehabilitation of ATFL injured patients, regular review and guidance of rehabilitation shall be provided, can shorten the recovery time of the injured part of the patient, promote the early recovery of its ankle joint function. It is worth noting that, ultrasound diagnosis and physician experience, there is a big correlation between levels, after examining the affected side, need to be compared with the healthy side examination, according to ligament echo, thickness, continuity changes, comprehensive assessment of changes in ligament tension by scanning and dynamic scanning, after getting the final result.[8,9] This study found that, the rehabilitation effect of the observation group is better than that of the control group, the recovery time is shorter than the control group, the grade of ligament injury at 1, 2, and 3 months of rehabilitation treatment was better than that of the control group, it shows that carrying out sports medicine ultrasound examinations at different stages of rehabilitation can shorten the recovery time of patients, improve its rehabilitation effect, promote the recovery of its ligament damage.[10] The reason for the analysis may be ultrasound evaluation during rehabilitation treatment, can make timely judgments of ligament thickness, effusion volume and echo, etc., it can not only evaluate the effect of rehabilitation, but also guide the development of rehabilitation treatment.

CONCLUSION

This study used sports medicine ultrasound to observe whether the anterior talofibular ligament of the ankle joint was swollen and thickened, the internal structure and continuity are good or bad, whether there is a local effusion, changes in blood flow signals to diagnose the degree of ligament damage and evaluate the curative effect, the evaluation indicators are transformed into the depth of effusion and the thickness of the anterior talofibular ligament, etc, it also has the advantages of non-invasive, repeatable operation, and low price, it can be used as an auxiliary inspection method for anterior talofibular ligament injury and is worth learning.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. QS: writing and performing surgeries. JY: data analysis. JW: performing surgeries. YZ: article review and intellectual concept of the article.

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