SIGNIFICANCE OF ULTRASOUND IN THE DIAGNOSIS AND TREATMENT OF ACHILLES TENDON RUPTURE

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Abstract: The aim of this study is to show the importance of ultrasound method in the diagnosis of Achilles tendon rupture, the choice of method of treatment and monitoring of treatment using the same method.

Material and methods: Between 1999 and 2009, 134 patients with Achilles tendon rupture were referred to our Clinic. 66 patients (with a mean age of 38 years) were treated with surgical suture followed by plaster immobilization for a period of 8 weeks. 68 patients (with a mean age of 42 years) were treated conservatively with plaster immobilization for a period of 8 weeks. The follow-up in both groups of patients was 2 years.

Results: During the clinical and ultrasound monitoring of the patients it was proved that repeated rupture of the same tendon occurs on average within 12 months. Return to sports activities showed in 57% of the conservatively treated patients and in 55% of surgically treated patients. The patients with Achilles tendon rupture were treated at our Clinic with previously standardized protocol which, besides the clinical examination, used the ultrasound method.

Summary: Ultrasound examination is a very important method in the diagnosis and the choice of the method of treatment, as well as in the evaluation of results in patients with Achilles tendon rupture, either in operative or conservative treatment.

Key words: Achilles tendon rupture, treatment, ultrasound method.

Introduction

Achilles tendon rupture is a relatively common sports and work injury. It often appears at an age between 30 and 50, with a range of appearance of 10 to 37 per 100,000 persons [5, 8, 12].
Achilles tendon rupture may be partial or complete. It may arise due to a sudden and forced dorsal flexion of the foot in an already strained Achilles tendon, due to a sudden dorsal flexion of the foot in a relaxed talocrural joint with a loose Achilles tendon, and due to a direct trauma of the tendon [3, 10].

The incidence of Achilles tendon rupture is due to sports activities, degenerative changes of the tendon, and the existence of a hypovascular region next to the insertion of the tendon to the calcaneus [4, 11, 14].

Treatment can be conservative or operative. The main reason for favouring one or the other method of treatment is based on the frequency of occurrence of the tendon rupture [1, 2, 9, 13].

The controversy exists because of the inequality of treatment protocols. At our clinic, patients with Achilles tendon rupture are treated surgically as well as conservatively, but according to a previously standardized protocol. Besides the clinical examination, the ultrasound method is used for the choice of method of treatment and for the follow-up of patients.

**Aim**

The purpose of this paper is to show the importance of the ultrasound method in the diagnosis of Achilles tendon rupture, the choice of method of treatment and monitoring of treatment using the same method.

**Material and methods**

This paper was prepared at the University Clinic for Orthopaedic Surgery, Medical Faculty, Ss. Cyril and Methodius University, Skopje. Patients with Achilles tendon rupture were used as test material in the period from 1999 to 2009. The patients were of both sexes and of various ages. They were divided into two groups. Group 1: patients treated conservatively, and group 2: patients treated operatively.

134 patients were analyzed over the period of 10 years. Out of the total number, 66 patients (50 men, 16 women) with a mean age of 37 ± 9.4 years were treated operatively. The remaining 68 (54 men, 14 women) were treated conservatively, the mean age of this group was 42 ± 12.0 years. We used the method of clinical examination and ultrasound investigation for assessment of partial or complete rupture of the Achilles tendon.

During the clinical examination a pitting is palpated at the site of the rupture proximally from the filiations of the tendon, and the foot can make dorsal flexion to a greater extent than normal. Thompson's test is positive.
patient lies on his stomach with his feet over the edge of a chair, making pressure on the *m. triceps surae*, while the healthy foot has a plantar flexion. When there is a rupture of the tendon the foot will not move. Also, when there is a complete rupture of the tendon tissues the patient cannot stand on his or her toes, but this sometimes happens when there is a partial rupture, too.

During the ultrasound examination of the longitudinal section, interruption of the continuity of the fibres is clearly shown, and among them there is an echogenic defect – haematoma, while on the cross section an echogenic defect is seen – haematoma without the presence of tissue of the tendon itself (Figure 1). Dynamic examination of the different degrees of plantar flexion of the foot is of particular importance when the possibility of touching the broken parts of the tendon can be seen. This determines the position of the foot in conservative treatment with plaster immobilization. This method has been used in monitoring the success of treatment by tracking the change of tendon structure and thickness, no matter if the treatment was conservative or operative.

![Figure 1 – Ultrasound view of Achilles tendon rupture](image)

The surgical treatment consisted of an open surgical repair of the Achilles tendon. All surgical interventions were performed with a regional spinal anaesthesia. All patients had a medial longitudinal incision. Suturing according to the technique of Bunnell was performed, using Vicryl or PDS threads (Figure 2). Postoperatively, plaster immobilization in plantar flexion was done immediately for a period of two weeks. After that, redressment with plaster was done for another 6 weeks postoperatively.

Conservative treatment consists of plaster immobilization of the ankle in plantar flexion. Plantar flexion decreases gradually over a period of 8 weeks.

In both types of treatment sports activities were not allowed for a period of three months. The protocol has not been changed over a period of 10 years. The Medical Register (report) for all patients was an outline of: age, sex, cause of rupture, time spent from the beginning of sport activity to rupture, treatment
(in operative treatment – incision, suture, complications associated with the operation), duration of immobilization, rerupture, sports activity before and after the rupture, and the satisfaction and expectations of patients.

Results

The average age of the patients was 40 years. In 92% of them the injury occurred during sport activities, most often when playing football or basketball. The greatest percentage of ruptures (63%) of the Achilles tendon occurred 20 minutes from the beginning of the sports activity. In 98 patients the rupture was on the left lower limb. Ruptures were found more frequently in males (3 : 1) compared to females.

Patients who were treated conservatively underwent plaster immobilization immediately, while in group 2 the operative intervention was conducted within a period of 24–48 hours after the incident. All 134 patients were subjected to our protocol and were examined clinically and by ultrasound technique before the method of treatment and monitoring up to the moment of its completion was decided on. In the 68 patients in Group 1 ultrasound findings proved an incomplete rupture although, according to Thompson’s method, the test was positive in a larger number of patients (62). The standing-on-tiptoe test was positive in 32 patients, which indicated the importance of the ultrasound method when making a decision for conservative treatment.
During the ultrasound examination of group 2, all patients had a complete rupture of the tendon. The clinical examination, which included the positive Thompson's test and the stand-on-tiptoe test, was positive in 66 patients for both tests, which showed that the ultrasound method was an excellent and proper indication for operative treatment. During the follow-up of patients it was proved by clinical and ultrasound examinations that repeated tendon rupture occurred in average within 12 months. Re-rupture was seen in 7 patients in group 1 and in 2 patients in group 2. They were treated operatively. 8 patients from group 2 had postoperative complications, 3 patients had thrombophlebitis, 1 patient had an algodystrophic syndrome on the same foot, 2 of them had superficial infection, and 2 patients was had impaired sensibility in the field of n. suralis.

In the first group of patients there were 4 patients where 2 of them had complications such as thrombophlebitis and 2 who had an algodystrophic syndrome on the same side. All patients with complications from both groups were treated properly and on time. Return to sports activities was shown in 57% of the patients in group 1 and in 55% of the patients in group 2. All patients expected faster healing and beginning of normal activities. Patients with a complete rupture had no choice in respect of the method of treatment. Patients who had an incomplete rupture were informed of the possibility of treatment and its duration. In both types of treatment the application of plaster immobilization was of the same duration, because the patients respected the opinion of the orthopaedic surgeon.

Discussion

During the last decades there have been randomized studies that evaluated the results of conservative and operative treatment of Achilles tendon rupture. Our retrospective study showed no significant differences in functional outcomes and complications after the conservative and operative method of treatment, but showed a significance for the application of the protocol for indication of the method of treatment and for the follow-up of patients with acute rupture of the Achilles tendon.

Maffuli (1990), Rominger (1998), and Thermann (1989) indicated the problem of result comparison of their studies due to the lack of a corresponding protocol for subjective and objective evaluation of Achilles tendon rupture. These authors have pointed out the usefulness of ultrasound in monitoring patients with Achilles tendon rupture in the postoperative period.

The ratio between men and women in the world literature is 1.7 : 1 to 12 : 1. In our study this ratio was 3: 1. A rising incidence of Achilles tendon rup-
ture was observed between the third and fourth decades of life [3, 9, 13]. This incidence is compatible with the mean age of our patients (40 years). Rupture at this age can be explained by the fact that ageing contributes to histological changes of collagen in the Achilles tendon and to a reduction of vascularisation. [4, 10, 13] Wills and colleagues mention that sports activities are present in 74% of the patients, whereas in our study the percentage was 92%.

Salomao and co-workers confirm that the highest incidence of injury happens when playing football. In our study, Achilles tendon rupture occurred most often while playing football and basketball, 64% and 12% respectively, while in world literature, 60% occur while playing football. In all of them the mechanism of injury was indirect. The time required to return the patient to normal daily activities was from 10 to 12 weeks, similar to the literature.

The muscle-skeletal ultrasound technique can be used for determining the thickness of the tendon, the existence of a rupture and the extent of a rupture. This method is not expensive, there is no ionizing radiation and it is a reliable method when used by a skilled ultrasound expert [6, 7, 11].

Kahn and associates explained about 33% more complications in patients treated operatively (excluding re-rupture). Either in world literature [5, 9, 13] or in this study it was shown that patients treated conservatively have a higher percentage of re-ruptures, or three times more than the surgically-treated patients, but these patients have a minimal risk of other complications.

Conclusion

Ultrasound examination is a very important method in the diagnosis and in the choice of method of treatment, as well as in the evaluation of results in patients with Achilles tendon rupture, either in operative or conservative treatment. This paper shows that using this method and certainly using clinical examination, even the patients treated conservatively give good results in their follow-up. The same happens with the patients treated operatively. It was shown that this method is the deciding factor in choosing the method of treatment (either conservative or operative).

REFERENCES


Значењето на ехосонографијата при дијагностицирањето и третманот на руптура на Ахилова тетива

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Вовед: Целта на овој труд е да се прикаже важноста на ултразвучната метода при дијагностицирање на руптура на Ахиловата тетива, изборот на начинот на лекување и следење на лекувањето со помош на истата метода.

Материјал и методи: Во период од 1999 и 2009 година, 134 пациенти со руптура на Ахилова тетива беа реферирани на нашата Клиника. Третирани беа 66 пациенти (со средна возраст 38 години) со хируршки сутура прследена со гипсена имобилизација во траење од 8 недели, додека 68 пациенти (со средна возраст 42 години) се третираа конзервативно со гипсена имобилизација во траење од 8 недели. Каж двете групи средно време за следење на пациентите беше 2 години.

Резултати: При следењето на пациентите клинички и ехосонографски се покажа дека повторна руптура на истатата тетива во просек се јавува за време од 12 месеци. Враќање на спортските активности покажаа 57% конзервативно и 55% кaj хируршко третираниот пациенти. На нашата Клиника пациентите со руптура на Ахилова тетива се третираа со претходно стандардизиран протокол, кој покрај клиничкиот преглед ја користеше и ехосонографската метода.

Заклучок: Ехосонографијата е многу важна метода во дијагностиликата, изборот на начинот на лекувањето, како и евалуацијата на резултатите при третманот на пациентите со руптура на Ахиловата тетива, како при хируршкиот така и при конзервативниот начин на лекување.

Ключни зборови: руптура на Ахилова тетива, третман, ехосонографска метода.

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