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Bosworth Plasty: Experience of the Orthopedical and Traumatological Department of Ibn Sina Hospital, Rabat

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Abstract **Original Research Article**

The old rupture of the calcaneal tendon can be explained by a lack of knowledge of the initial diagnosis, an ultrasound falsely reassuring or after the failure of an initial treatment. Before the third week, the direct suture is frequently possible. The chronic rupture is between the third week and the third month. Calcaneal tendon lengthening techniques can then be indicated if the loss of substance, which exceeds 2.5 cm. After three months, tendon retraction requires tendon reconstruction or transfer for treat the old break. A surgical indication can be justified in case of pain, instability or when autonomy may be compromised in the elderly subject. Many surgical techniques have been described. They use tendon transfers, autografts or synthetic ligaments. The repair technique using a reversal aponeurosis of the triceps sural was popularized by Bosworth.

Keywords: Tendon-Rupture-Chronic-Pain-Thompson.

INTRODUCTION

Chronic lesions of the Achilles tendon often result from an initially neglected rupture or from poorly conducted conservative or surgical treatment. They are manifested by a lengthening of the tendon and a loss of force in propulsion. Chronic inflammation frequently accompanies defective scarring. The patient complains of swelling around the ankle and the tendon on exertion with mechanical pain. The functional impairment depends on the anatomopathologic nature of the lesion, but also on the functional demands of the patient. In most cases, the diagnosis is easy to make by an anamnesis including a history of the trauma and a well-conducted clinical examination.

The treatment of a chronic rupture depends above all on the patient's discomfort and functional demands. Conservative treatment with heeled insoles and physiotherapeutic rehabilitation can be attempted initially. If this fails, surgical treatment is required. There are many surgical techniques.

The Bosworth plasty or proximal reversal flap is one of the techniques described for the treatment of Achilles tendon old ruptures. It ensures good tendon healing and allows the resumption of activities.

We report the results of this technique in eight patients, including two sports patients, followed and treated in the orthopedic and traumatological surgery department of the Ibn Sina University Hospital Center in Rabat.

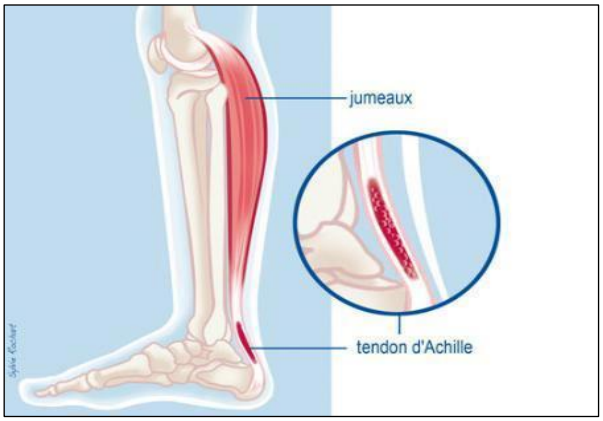

Figure 1: Anatomy of the native Achilles tendon

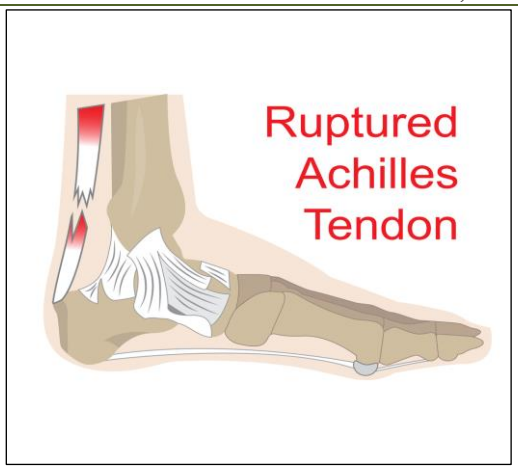

Figure 2: Rupture of Achilles tendon

MATERIEL AND METHODS

This retrospective study includes 8 men with an average age of 28 years (18 years - 40 years), operated between January 2020 and November 2021, over a period of 1 year and 10 months in the Traumatology-Orthopedics Department of Ibn Sina Hospital in Rabat. Two patients were amateur athletes in basketball and football.

All the patients were treated by a repair of the Achilles tendon according to KRACKOW reinforced by a BOSWORTH plasty with a strip of proximal calcaneal tendon.

The patients were evaluated on the postoperative course, the clinical evolution and on the AOFAS (American Orthopedic Foot and Ankle Society) score. The maximum possible score is 100 points.

AOFAS Ankle-Hindfoot Scale

Patient Name: _____
Patient MRN: _____
Date: _____

I. Pain (40 points)

☐ None	+40
☐ Mild, occasional	+30
☐ Moderate, daily	+20
☐ Severe, almost always present	+0

II. Function (50 points)

Activity limitations, support requirements

☐ No limitations, no support	+10
☐ No limitation of daily activities, limitations of recreational activities, no support	+7
☐ Limited daily and recreational activities, cane	+4
☐ Severe limitation of daily and recreational activities, walker, crutches, wheelchair, brace	+0

Maximum walking distance, blocks

☐ Greater than six	+5
☐ Four-six	+4
☐ One-three	+2
☐ Less than one	+0

Walking surfaces

☐ No difficulty on any surface	+5
☐ Some difficulty on uneven terrain, stairs, inclines, ladders	+3
☐ Severe difficulty on uneven terrain, stairs, inclines, ladders	+0

Gait abnormality

☐ None, slight	+8
☐ Obvious	+4
☐ Marked	+0

Sagittal motion (flexion plus extension)

☐ Normal or mild restriction (30° or more)	+8
☐ Moderate restriction (15° - 29°)	+4
☐ Severe restriction (less than 15°)	+0

Hindfoot motion (inversion plus eversion)

☐ Normal or mild restriction (75% - 100% normal)	+6
☐ Moderate restriction (25% - 74% normal)	+3
☐ Marked restriction (less than 25% of normal)	+0

Ankle-hindfoot stability (anteroposterior, varus-valgus)

☐ Stable	+8
☐ Definitely unstable	+0

III. Alignment (10 points)

☐ Good, plantigrade foot, ankle-hindfoot well aligned	+10
☐ Fair, plantigrade foot, some degree of ankle-hindfoot malalignment observed, no symptoms	+5
☐ Poor, nonplantigrade foot, severe malalignment, symptoms	+0

IV. Total Score (100 points):

_____ Pain Points +
_____ Function Points +
_____ Alignment Points =

_____ Total Points/100 points

Figure 3: AOFAS Ankle-Hind foot scale

RESULTS

The postoperative AOFAS score was on average 90 (85–90). The resumption of sport was without problem for our two sports patients. No cases of skin necrosis, superficial sepsis or skin disunity were reported.

Postoperative care was marked by immobilization with an anterior equinus foot splint for 3 weeks, then a 90° foot splint for 3 more weeks, as well as long passive and then active rehabilitation for 6 months. Tendon healing was achieved in all patients, without skin complications.

Figure 4: Clinical image of an Achilles tendon rupture

Figure 5: Clinical image of the Bosworth plasty

Figure 6: Clinical image of the Bosworth plasty

DISCUSSION

The eight patients followed in consultation generally recovered their initial functions after 6 to 10 months post-op. The two athletic patients resumed their sports after 8 months post-op.

It is clear that this reinforcement technique, although previously described, aims to consolidate the direct suture and may be indicated in cases of chronic tendinopathy with excision of the degenerative zone.

This is a reliable technique in the management of old Achilles tendon ruptures even if it can pose the problem of precise adjustment of the length of the Achilles tendon and the volume effect of the reversal zone.

Nevertheless, the results obtained were only possible with good preoperative planning and an adequate surgical procedure including rigorous asepsis and postoperative antibiotic prophylaxis, followed by immobilization for 6 weeks and long rehabilitation.

The intervention took place in ventral decubitus under tourniquet pneumatic. The "physiological" equinus on the contralateral side was recorded using a goniometer. The distal approach was posteromedial and ran up the midline, centered on the rupture zone. Skin, subcutaneous tissue and the tendon sheath were incised in a single plan.

The scar tissue was not excised but left in place in continuity with the healthy tissue then detached of the peritendinous sheath. After identifying the healthy proximal and distal areas of the calcaneal tendon, a plastic surgery in Z was performed, shortening the fibrosis. This fibrous stake was left open in the middle, and each of its extremities ended in a healthy tendinous zone.

The size of the area to be filled in the center of the stake was precisely measured. The graft was taken from the central third of the triceps aponeurosis then transposed in the center of the area to be filled without reversal.

The suture was made in the fibrous framework, and at the level healthy tendinous areas. The equinus was restored compared to the opposite side. If the area to be filled was close to insertion, the graft was fixed in a trench to obtain bone-tendon healing.

The hemostasis was careful and the closure on three levels by separate points with drainage.

The immobilization consisted of a resin-coated equine boot of 20◦ not taking the knee, for six weeks without support, relayed by a removable brace with adjustable equinus. Equinus was gradually reduced over six weeks.

Support was possible as soon as the orthosis reached the position 90◦, two and a half months postoperatively. Reeducation active began in the third postoperative month, including muscle-building work.

Figure 7: Athlete with the classic symptomatology of an Achilles tendon rupture

Figure 8: Pain in the localization of the Achilles tendon

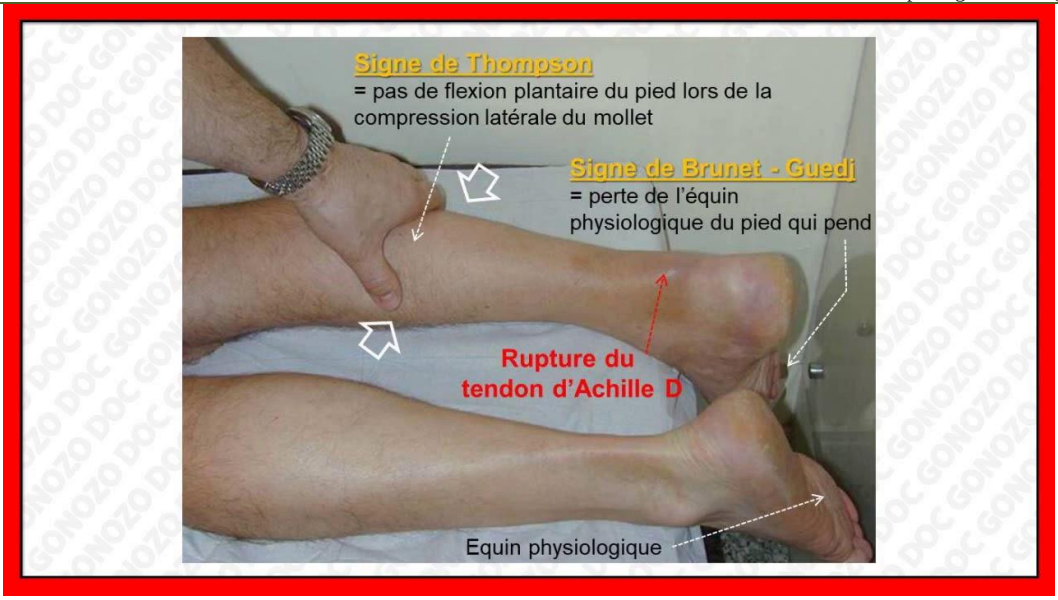

Figure 9: Explication of Thompson and Brunet-Guedj signs

CONCLUSION

The Bosworth plasty is still an excellent technique in the treatment of old ruptures of the Achilles tendon, ensuring good healing of the tendon and a return to sport.

It can also be indicated in case of acute rupture of this tendon, in the case for example of a high-level athlete.

Old ruptures of the calcaneal tendon pose the problem of their therapeutic care. The flap free of triceps aponeurosis preserves the muscles of the foot and ankle and allows the filling of loss of substance of variable size including extensive defects.

The absence of reversal of the graft suppresses the effect volume, which could reduce the skin risk. The good functional results come from the restitution of the tendinous volume and its length guaranteeing strength propulsion. Complications appear to be related to age, and the authors recommend the greatest caution after 65 years. Intratendinous abnormalities detected on postoperative MRIs are frequent and could be interpreted such as tendon scar changes not correlated to the final functional result. A longer-term MRI and isokinetic study recoil must supplement these works.

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