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SURGICAL TREATMENT OF TALUS FRACTURES: ANATOMIC AND FUNCTIONAL RESULTS

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ABSTRACT

Fractures of the talus are rare and serious and represent a therapeutic challenge for the surgeon. We report a retrospective study of 16 cases of talar fractures treated surgically over a period of 6 years. The objective of our work is to show the peculiarities of this fracture and to report the anatomical and functional results of our study in order to establish therapeutic conclusions. The approach was anterointernal in 75% of cases. The overall results were excellent in 31% of the cases. Complications from these fractures are dominated by bone necrosis and osteoarthritis.

KEYWORDS: Talus, fracture, bone necrosis, ankle, surgical treatment.

INTRODUCTION

The talus or talus is a particular bone by virtue of its complex morphology, its multiple articular relationships, its precarious vascularization, its deep location and its role in the transmission of forces and in the dynamics of the foot.

Astragalus fractures are rare, accounting for 3% to 5% of ankle fractures and only 0.1% to 0.85% of all fractures.

Diagnosis has become easier and easier with the use of CT scans.

The goal of treatment is to restore ankle function and minimize the risk of avascular necrosis and osteoarthritis of the talus.

The objective of our work is to show the peculiarities of this fracture and to report the anatomical and functional results of our study in order to establish therapeutic conclusions.

MATERIALS AND METHODS

This is a retrospective study of 16 cases of talus fractures treated surgically in the orthopedics department of Chu Ibn Rochd in Casablanca over a period of 6 years.

The average age of our patients was 32 years with extremes ranging from 14 years to 70 years).

The male sex was dominant, with a sex ratio of 3/1. Astragalus fractures were found on the right in 75% of cases.

Road accidents and accidents at work were the most frequent causes of these fractures. Two cases presented with a stage II skin opening according to the GUSTILLO classification.

The standard x-ray was taken and the associated bone lesions made it possible to better define the fracture in all patients, to make the diagnosis of the talus fracture (Figure 1) and to look for a dislocation or other associated lesions.

Computed tomography performed in 10 cases was effective in making the diagnosis (comminution, displacement, chondral lesions and associated subluxation).

The talus fracture was total in 10 cases, ie 63%, and fragmented in 6 cases, ie 37%.

Six patients had a talar dome fracture, eight patients had transverse fractures and two patients had a comminuted fracture (Figure 2, Table 1).

Regarding the associated lesions, a dislocated subtalar fracture was found in five cases, two patients had an associated calcaneal fracture.

The time between hospitalization and the therapeutic act varied between 24 hours and 3 days with an average of 2 days.

All of our patients received surgical treatment.

Two main approaches were used: the antero-internal approach used in 12 cases and the postero-internal approach in 4 cases.

Screwing was the most used method of osteosynthesis in our series with 13 cases (figure 3). Pinning was performed in 2 cases and tibiotarsal arthrodesis was performed in only one case.

In the postoperative period, immobilization in a cast by a leg and foot splint was performed for all of our patients for 4 to 6 weeks with total discharge.

All patients underwent muscle building rehabilitation. Recovery of range of motion in the ankle and the subtalar joint, with weight bearing was started from the 6th week.

RESULTS

The mean follow-up was 21 months with extremes ranging from 10 months to 5 years.

To evaluate the results of our series we have adopted the GAY and EVRARD criteria already used by WITVOET.

Regardless of the type of treatment, the overall results were as follows: Excellent in 5 cases (31%), good in 6 cases (37%), fair in 2 cases (12%), poor in 3 cases (20%).

Overall, the results were satisfactory in 68% of cases and unsatisfactory in 32% of cases.

Comparing surgical techniques, better results were observed with screwing compared to other surgical methods, this can be explained by the simplicity of the fractures that benefited from screwing compared to other fractures that were comminuted.

In our series, we had two superficial septic complications which progressed well under antibiotic therapy.

In the long term, we had only one case of vicious callus, two cases of primary osteoarthritis and 4 cases of aseptic necrosis of the talus, ie 25% of cases, two of which were already in the osteoarthritis stage.

Figure 1: Standard x-ray showing an osteochondral fracture of the talar domeg.

Figure 2: Computed tomography section showing a comminuted talus fracture.

Figure 3: Screwing the talus via the postero-internal approach.

Table I: Distribution of talus fractures.

Total fracture of talus	Number of cases	% of total talus fractures.	% of the whole talus fractures.
Transverse fractures	8	80%	50%
Comminuted fractures	2	20%	13%
Sagittal fractures	0	0%	0%

DISCUSSION

Fractures of the talus are rare and serious.[1,2] The risk of failing to recognize a recent fracture of the talus is greater the more the fracture is fragmented and not displaced, giving a moderate clinical expression. They most commonly affect young adult males and occur as part of high energy trauma.

The violence of the trauma necessary to create a fracture of the talus explains the frequency of the associated lesions.

The principle of the initial treatment of talar fractures, as with all fractures and in particular joint fractures, is to achieve anatomical reduction in the hope of immediate functional recovery and the prevention of secondary complications.[3]

The vascular peculiarity of astragalus, like that of the femoral head and the tarsal scaphoid, also explains the frequency of post-traumatic necrosis and induces certain specific therapies and requires urgent reduction.[4]

It should be emphasized, possibly on the need for the reduction in extreme urgency of the large displacements in order to avoid the cutaneous necrosis underlined by the displaced posterior body fragment.[5]

The surgical approach of talus fractures addresses failures and insufficiencies of orthopedic reduction attempts as well as open fractures.[5,6] The preferred approaches are antero-internal, away from the vascular pedicles, or postero-external according to TRILLAT.[7]

Arthroscopic control of the reduction and percutaneous screwing is undoubtedly a way forward. The risk of secondary displacement despite osteosynthesis, should most often lead to compression by a cast boot which has the advantage of fixing the ankle at a right angle and generally leaving the knee free.

Talectomy or astragalectomy, which was for a long time the treatment of choice, is currently almost abandoned due to its poor functional results and the significant risk of painful instability.[8]

Currently, it is preferred to have tibio-talo-talar arthrodesis straight away or even triple tibio-talo-calcaneal arthritis if the fracture is comminuted; the fragments of the comminuted fracture of the talus then serve as bone grafts.[9]

The secondary course is dominated by the risk of displacement and infectious complications.

The anteromedial route is the route of choice, allowing exposure of the entire medial part of the head and neck of the talus and ensuring anatomical reduction with a minimum of devascularization.[6,9]

The postero-internal approach is also used, but little practiced, it provides great stability by the antero-post screwing but it exposes the risk of penetration of the screws into the subtalar joint and the sinus of the tarsus.

Equine positioning of the foot helps to reduce the fracture, with the help of a spatula slipped into the fracture site to lift the body off the talus.[10]

Once the reduction is obtained, it is maintained by a pin, but this does not constitute the definitive mode of fixation of the fracture. Indeed, even by adding a second anti-rotatory pin, this method of osteosynthesis does not allow a compressive effect to be obtained and compared experimentally with screwing by SWANSON, it appears 3 to 4 times less resistant. It is therefore essential to synthesize the fracture with a large fragment spongy screw whose entry point is located at the junction of the neck and the cartilage of the talar head slightly inside the middle of the neck, currently we can use the screws of 'HERBERT to large fragments.

Osteosynthesis is usually ensured by means of one or two cancellous screws with a diameter of 4.5, 3.5 or 2.7 mm. Screws are used in non-comminuted fractures requiring compression in the focus. In comminuted fractures, the most commonly used have a diameter of 3.5 or 2.7 mm, just having a non-compressive fixing effect to prevent shortening of the talus.[2]

Internal fixation with 2.0 Kirschner wires provides less ankle stability, and poorer functional results compared to screw osteosynthesis, it must be combined with an external fixator or a cast boot.

Diagnostic and therapeutic arthroscopy remains a method of the future, but we have no cases in our series.

Prosthetic ankle replacement has become a reliable and reproducible procedure, but which nevertheless remains difficult and requires a long learning and a good habit of ankle surgery; therefore we must remain cautious about its indication. It should be reserved for osteoarthritis or advanced osteonecrosis.

Arthrodesis can involve the T-A tibiotarsal joints, the S-A subtalar joints and the M-T mid-tarsal joints, taken alone or in combination with one or both others.

In the long term, four complications make the severity of these fractures and are in ascending order: Bone necrosis, osteoarthritis, consolidation disorders and algodystrophy.

CONCLUSION

Fractures of the talus remain rare fractures. They are serious because they occur in young active subjects, on a bearing and poorly vascularized bone and technical difficulty, as well as the risk rate of avascular necrosis. Long-term sequelae remain frequent. The treatment of these fractures is always a challenge for the surgeon, but this treatment has evolved a lot with medical technology.

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