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Case report

Isolated, displaced, talar body fracture: a case report and literature review

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Abstract. Talar body fractures are uncommon fractures of the foot and its management results to be very hard due to retrograde vascularization and wide articular cartilage coverage of talar surface, which could easily lead to poor functional outcomes, avascular osteonecrosis and early post traumatic arthritis. We describe a case of displaced, vertical, talar body fracture in a 41-year-old patient treated with reduction and fixation by talar anteromedial approach coupled to medial malleolar osteotomy to better expose the fracture. Our literature review has found few studies, in addition with a low level of statistical evidence. We advocate for more studies with a bigger sample and with a design of randomized control trials. (www.actabiomedica.it)

Key words: talar, body, fracture, displaced, foot

Introduction

Talus is the second biggest bone of the foot and it is essential for the function of ankle, subtalar and tarsal joints; it can be divided in 5 parts: neck, head, body, lateral and posterior processes.

Fractures of talus represent 0.3% of all fractures, 3.4 % if we consider only feet fractures; moreover, talar body fractures account for 20% of all talar fractures.

High energy trauma in which a rotational force is combined with plantar flexion movement is the most frequent injury mechanism (1).

Two important features need to be carefully known, because they affect the management of talar fracture: 70-80% of its surface is covered by articular cartilage and vascularization is retrograde.

Vascularization is ensured for the most part by branches of tarsal canal artery, followed by branches of sinus tarsi artery and deltoid branches of the posterior tibial artery (2).

Clinical evaluation and X-rays can be sometimes sufficient to make the diagnosis, however CT scan is almost always necessary, in order to better characterize the fracture, to make the right decision between conservative and surgical treatment and to prepare a correct preoperative plan. In fact, while non-displaced fracture can be treated conservatively, displaced ones need a surgical intervention (3).

Talar body fractures have different classifications, but these classifications usually do not help in making treatment choices or in predicting the outcome (4). The commonly used Sneppen's classification divides these fractures into five types on the basis of anatomic location (5): type A, transchondral or osteochondral (compression fracture); type B, coronal shear; type C, sagittal shear; type D, posterior tubercle; type E, lateral tubercle; type F, crush fractures.

Many surgical approaches have been studied to reach the fracture site, minimizing the risk of soft tissue damage; the most commonly used is the anteromedial one, in which the skin incision is performed dorsally medial to the tendon of tibialis anterior in line with the first ray. In the anterolateral approach, the skin incision is made between the tibia and the

fibula, lateral to extensor digitorum longus in line with the fourth ray. Posterolateral approach provides a skin incision lateral to Achilles tendon, between peroneal muscles and flexor hallucis (2).

Because of its specific anatomy and vascularization, talar fractures often lead to post traumatic complications, such as avascular osteonecrosis, osteoarthritis, malunion, delayed union, axial deformity, chronic pain, loss of joint function (1).

In our work a case of a vertical displaced talar body fracture in a 41-year-old patient treated with lag screws and review of the literature of similar cases is presented.

Case report

This case involves a 41-year-old patient who came to emergency service in February 2021 after acute ankle sprain on his left side. At clinical examination, the subject could not bear on his left lower limb, suffering from ankle and rearfoot pain, huge ankle oedema and high limitation of ankle mobility; tactile sensitivity was preserved, and the foot did not present sign of hypovascularisation.

Preliminary X-rays (Figure 1) showed a displaced talar body fracture, so a CT-scan (Figures 2-4) was performed, in order to better characterize this injury. The CT-scan confirmed the initial diagnosis, that is a displaced, comminuted, vertical talar body fracture. Based on the aforementioned criteria, this type of fracture can be classified as a type B-C. CT-scan also allowed us to plan surgical operation.

Once the preoperative planning was performed, and before acquiring written surgical consent, all possible intraoperative and postoperative risks were explained to the patient.

The fracture was initially stabilized with a cast half-boot and subsequently reduced in operation room and fixed with 2 lag screws (Figures 5-8).

The patient was positioned in supine position in spinal anesthesia with tourniquet at the root of left lower limb.

We chose a talar anteromedial approach coupled to medial malleolar osteotomy to better expose the fracture; we put two screws in the medial malleolus, then we inserted a K-wire perpendicular to these screws as an axial guideline for the osteotomy. Then we removed screws, we performed the osteotomy, and the malleolus was overturned inferiorly.

Bone fragments were reduced with reduction clamps and K-wires, then were fixed with two lag screws of 40 mm (Progrescrew Episurgical).

After that, medial malleolar osteotomy was fixed with two lag screws. The stability of the synthesis and the mobility of the ankle were checked; the tourniquet was removed, and we performed a layer-by-layer closure. A cast was positioned, and no weight bearing was allowed for 4 weeks.

Subsequently, the patient was allowed progressive weight bearing until full weight bearing was achieved after 2 months. No sports were allowed for 3 months.

X-rays and clinical evaluations were performed after 1 month, 3 months, 6 months and 12 months (Figures 9, 10).

Figure 1. Preliminary x-rays: latero-lateral projection.

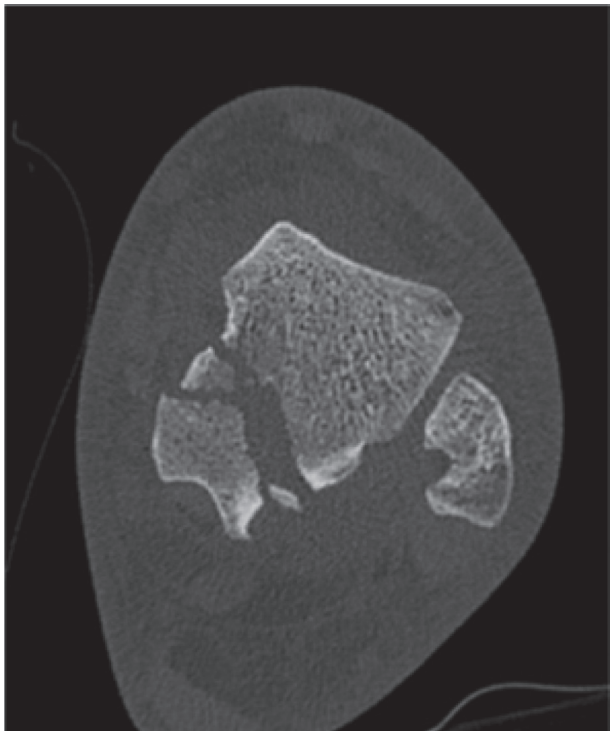

Figure 2. Preliminary CT-scan: axial.

Figure 3. Preliminary CT-scan: coronal.

Figure 4. Preliminary CT-scan: sagittal.

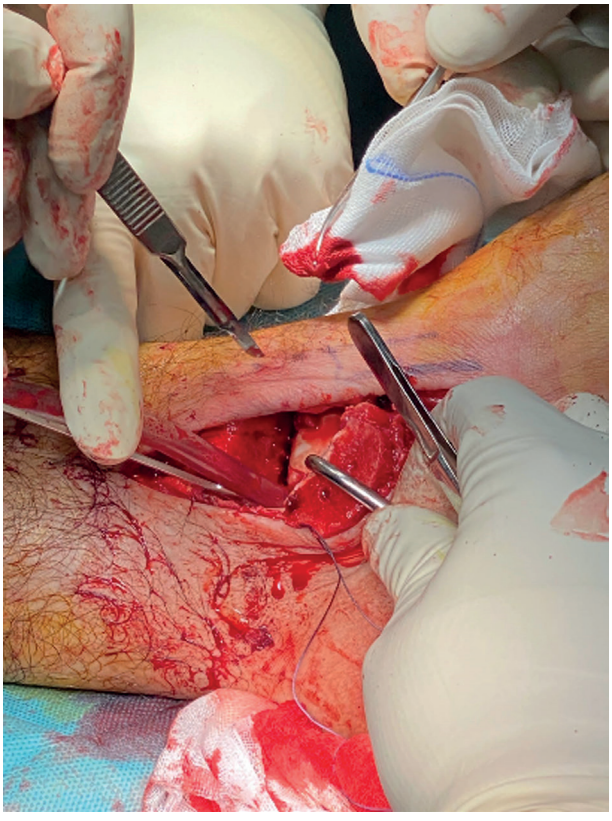

Figure 5. Intraoperative image: medial malleolar osteotomy.

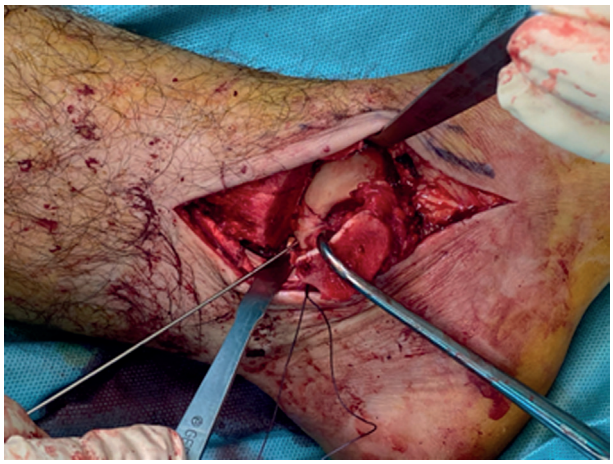

Figure 6. Intraoperative image: bone fragments reduction.

In the last evaluation (12 months) no signs of post traumatic complications were observed, the active range of motion was 10° of dorsiflexion and 50° of plantar flexion without pain and the patient had an American Foot & Ankle Score (AOFAS) of 85 (Figures 11, 12).

Discussion

Talar body fractures are uncommon fractures of the foot; however, their management results to be very hard due to retrograde vascularization and wide articular cartilage coverage of talar surface, which could easily lead to poor functional outcomes, avascular osteonecrosis and early post traumatic arthritis.

We describe a case of displaced, vertical, talar body fracture in a 41-year-old patient, due to an accidental fall from a ladder, fixed with 2 lag screws. In the last evaluation (12 months) no signs of post traumatic complications were observed. Concerning the choice of surgical approach, we opted for a talar anteromedial approach coupled to medial malleolar osteotomy because the more comminuted portion was located in the posteromedial site (6). Furthermore, in accordance with the literature (Table 1), the medial transmalleolar approach is not as deleterious to syndesmosis as the lateral transmalleolar approach is (7, 8). This case report emphasizes the importance of performing proper preoperative planning to better define the type of injury and, therefore, to choose the most correct surgical approach for the specific type of patient.

Figure 7. Post-operative x-rays: antero-posterior projection.

Kumar Sen et al (9) retrospectively analyzed 8 patients with displaced talar body fractures, caused by high-energy trauma, all surgically treated. They described poor functional outcomes at an average follow up of 5 years, with 75% of patients which had developed arthritis and 50% of them which had suffered from avascular osteonecrosis.

Ebraheim et al (10) retrospectively analyzed 19 patients with displaced talar body fractures, caused by high-energy trauma, all surgical treated. According to AFOS, they found almost good functional outcomes at an average follow up of 18 months only in 10 patients; moreover, in this cohort, 11 patients developed ankle arthritis, 6 subtalar arthritis and 7 avascular osteonecrosis.

Figure 8. Post-operative x-rays: latero-lateral projection.

Patra et al (11) described a case of displaced talar body fracture associated to talar dislocation in a 21-year-old patient after a road traffic accident. The patient was treated with lag screws, K-wires and external fixators. K-wire and external fixator were removed after 6 weeks, and the patient started assisted weight bearing after 3 months. After 6 months osteonecrosis or osteoarthritis were not detected at the X-rays evaluation, but there was a limitation in the range of motion of the ankle.

Lahrach et al (12) described a case of displaced talar body fracture associated to medial malleolar fracture in a 52-year-old patient after motor vehicle accident. The patient was treated with two talar lag screws and two medial malleolar lag screws. A cast was positioned for 6 weeks, and full weight bearing was allowed after 3 months. After 6 months osteonecrosis or osteoarthritis were not detected at the X-rays evaluation and the function was recovered.

Moger et al (13) described a case of displaced talar body fracture associated to medial malleolar fracture in

Figure 9. X-ray at 12 months: antero-posterior projection.

Figure 10. X-ray at 12 months: latero-lateral projection.

Figure 11. Clinical evaluation at 12 months: maximum dorsiflexion.

Figure 12. Clinical evaluation at 12 months: maximum plantar flexion.

Table 1. Literature review.

Article	Type of study	N. patients	Follow up	Result
Kumar Sen et al (9)	Retrospective	8	5 years	Poor functional outcomes: 75% of patients develop arthritis and 50% avascular osteonecrosis
Ebraheim et al (10)	Retrospective	19	18 months	According to AFOS, there was almost good functional outcomes only in 10 patients; moreover 11 patients developed ankle arthritis, 6 subtalar arthritis and 7 avascular osteonecrosis
Patra et al (11)	Case report	1	6 months	No complication detected, but there was a limitation in the mobility of the ankle
Lahrach et al (12)	Case report	1	6 months	No complication detected; the function was recovered
Moger et al (13)	Case report	1	6 months	There were signs of early arthritic process and a limitation in the ankle mobility
English et al (14)	Case report	1	-	The child had fully recovered
Bhatia et al (15)	Case report	1	1 year	The child had a good functional outcome despite a mild varus of 5° and a minimal step in talar dome

a 30-year-old patient after a motor vehicle accident. The patient was treated with two talar lag screws and two medial malleolar lag screws. A cast was positioned for 6 weeks, and full weight bearing was allowed after 3 months. After 6 months osteonecrosis was not detected at the X-rays evaluation, but they found signs of early arthritic process and there was a limitation in the ankle mobility.

English et al (14) presented a case of displaced talar body fracture in a 11-year-old child after a motor vehicle rollover. The patient was surgically treated with lag screws and the cast was removed after 3 weeks; progressive weight bearing was allowed after 6 weeks, and the child had fully recovered.

Bhatia et al (15) presented a case of a 13-year-old girl child who sustained a Type IV Salter–Harris injury of distal tibial physis along with a displaced vertical (sagittal) type fracture of the talus body after being hit by a car. The patient was surgically treated with K-wires and the cast was removed after 6 weeks as well as the wires from tibia; the talus wires were removed at 8 weeks. The child had a good functional outcome despite a mild varus of 5° and a minimal step in talar dome were noted at 1 year follow-up.

Conclusion

Talar body fractures are challenging for surgeons, due to anatomically features of this bone and its key role in many foot joints. Our literature review has found few studies, in addition with a low level of statistical evidence. We advocate for more studies with a bigger sample and with a design of randomized control trials.

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Ethic Committee: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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