Epidemiological profile of talus fractures attended in a tertiary referral hospital for trauma

Perfil epidemiológico das fraturas do tálus atendidas em hospital de referência terciário em trauma

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ABSTRACT

Objective: To analyze the epidemiological characteristics of patients with talus fracture assisted at a tertiary referral hospital for trauma. **Methods:** Retrospective analysis of medical records of patients treated at an emergency department for orthopedic trauma and diagnosed with talus fracture from January 2014 to June 2015. All the medical records were analyzed and the following parameters were verified: patient's profile, risk factors, fracture characteristics, mechanism of injury, relationship of trauma to work, means of arrival at the emergency department, treatment data and hospital stay. **Results:** Men were more affected than women, at a ratio of 4.8:1. The most common mechanism of injury was fall from a height. The most frequent type of fracture was fracture of the talar processes, followed by fracture of the talar body. Of the 35 cases, 11 were open fractures at the time of presentation; 74.2% had other associated fractures. The average time between the trauma and the definitive surgery was 3.22 days, and the mean hospital stay for patients with surgically treated fractures was 13.7 days. **Conclusion:** Fracture of the talus was more common in the region of the talar processes and occurred more frequently in young male patients who sustained high-energy trauma.

Keywords:
Talus/injuries; Tarsal bones/epidemiology; Tarsal bones/injuries; Fractures, bone/epidemiology

RESUMO

Objetivo: Analisar as características dos indivíduos e das lesões encontradas em pacientes com fraturas de tálus. **Métodos:** Análise retrospectiva de prontuários de pacientes atendidos em um pronto-socorro de referência em trauma ortopédico em um hospital terciário e com diagnóstico de fratura do tálus, no período de janeiro de 2014 a junho de 2015. Foram inclusos todos os prontuários analisados e foram verificadas as características associadas ao perfil do paciente, fatores de risco, características da fratura, mecanismo do trauma, relação do trauma com o trabalho, meio de acesso ao pronto-socorro, dados do tratamento e tempo de internação hospitalar. **Resultados:** Os homens foram mais afetados do que as mulheres, com uma relação de 4,8:1. O mecanismo de trauma mais frequente foi a queda de altura. O tipo de fratura mais frequente foi a de processos talares, seguida pelas fraturas do corpo do tálus. Dos 35 casos, 11 eram fraturas expostas no momento da apresentação e 74,2% apresentavam outras fraturas associadas. O tempo médio entre o trauma e a cirurgia definitiva foi de 3,22 dias enquanto o tempo médio de permanência hospitalar foi de 13,7 dias nas fraturas cirúrgicas. **Conclusão:** A fratura do tálus foi mais comum na região dos processos talares e mais frequente em jovens do sexo masculino vítimas de trauma de alta energia.

Descritores:
Tálus/lesões; Ossos do tarso/epidemiologia; Ossos do tarso/lesões; Fraturas ósseas/epidemiologia

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INTRODUCTION

Talus fractures are uncommon, accounting for less than 1% of all fractures and approximately 3 to 6% of foot fractures.[1] They are injuries typically caused by high-energy trauma and represent a treatment challenge even for experienced orthopedists.[2] Surgical treatment of talus fractures is challenging because of the unique anatomy of this bone, the rate of complications involved with severe functional limitation, the extensive variability of fracture patterns, and the crucial role of this bone in lower limb functionality.[3] In recent decades there has been an advance in surgical techniques and in knowledge of the biology of bone repair and blood supply to the talus, providing a better overview of this type of fracture.

The diagnosis is initially performed by radiographic evaluation, which includes an ankle series (anteroposterior, lateral and mortise) and a foot series (anteroposterior, lateral and oblique). The Canale and Kelly view[4,5] allows clear visualization of the talar neck. Moreover, the true lateral view of the subtalar joint and the oblique view of the talus provide additional information about the fracture.[6] Computed tomography plays an important role in the diagnosis of talus fractures, as it is able to detect fractures that are hard to spot in common radiographs and provides a clear view of the articular congruence of the talus, contributing to surgical planning.[7]

Talus fractures are commonly described and classified by their location: head, neck, body and processes.

The two most commonly used classifications are those of Hawkins[8] used to classify talar neck fractures, and the AO classification.[9] Treatment and prognosis vary depending on the site and the type of fracture.

Talar head fractures are among the least common, accounting for only 10% of all talus fractures. These fractures are usually the result of crush or shear injuries.[1]

Talar neck fractures are the most frequent, corresponding to approximately 50% of all talus fractures.[1] It is widely accepted that the most common mechanism of talus fracture is dorsiflexion.[1]

There are few studies in the national literature reporting epidemiological data on talus fractures. Fonseca Filho et al.[10] studied 52 talus fractures from February 1972 to March 1995. They concluded that talus fractures occur most frequently in young male adults, are usually closed and unilateral, are more common in the neck and body region, and that the ipsilateral medial malleolar fracture is the most common associated injury, present in 21.2% of cases.

Sakaki et al.[11] studied 23 cases and showed that men were more affected than women, at a ratio of 4.8:1. The most common mechanism of injury was traffic accident followed by fall from a height. The most common type of fracture was that of the talar neck, with 17 cases. Of the 23 cases, 7 had peritalar dislocation at the time of presentation, 4 had an open fracture and 11 had other associated fractures. The average time between the trauma and the definitive treatment was 6 days, while the mean hospital stay was 11 days.

The primary purpose of this study is to contribute to the evaluation of the epidemiological characteristics of patients who have sustained a talus fracture and are being treated in a tertiary care hospital.

OBJECTIVE

To analyze the characteristics of individuals and of lesions found in patients with talus fractures.

METHODS

Retrospective analysis of the medical records of patients treated in an emergency department for orthopedic trauma and diagnosed with a talus fracture from January 2014 to June 2015. All patients with a suspected talus fracture, or with an actual radiographic diagnosis of talus fracture, underwent computed tomography as a routine procedure in this department. Following a detailed review of the foot and ankle CT scans performed in the department, 36 acute talus fractures were identified. The parameters analyzed were: age, sex, mechanism of injury (fall from a height, motorcycle accident, auto accident, others, including gunshot wound); place where the injury occurred (work, home, road/street, others); laterality of the fracture, associated trauma (musculoskeletal, traumatic brain injury, thoracic trauma, abdominal trauma, others); associated fractures; exposure; fracture type; treatment performed (conservative, percutaneous surgery, open reduction and internal fixation, others, including complete talectomy); time between trauma and definitive surgical treatment; length of hospital stay; issuance of work-related accident report, and whether the patient sought treatment on their own initiative or were referred. The review of the medical records and the analysis of the scans were performed by two third-year orthopedic surgery residents independently, and interpretation discrepancies were discussed with orthopedists specialized in foot and ankle surgery.

This study was approved by the Institutional Review Board (IRB).

RESULTS

Thirty-six talus fractures were identified and 1 patient was excluded due to transfer to a private healthcare facility.

Of the 35 patients evaluated, the ratio between men and women was 4.8:1 (29 men). The average age was 36.2 years, ranging from 6 to 71 years (Figure 1), with only one skeletally immature patient (6 years of age).

Upon analyzing the mechanism of injury, fall from one level to another was found to be the most common mechanism with 19 cases (54.2%), followed by motorcycle accidents with 6 cases (17.1%) and auto accidents with 2 cases (5.7%). Other mechanisms found were gunshot wounds (one case), sports trauma and torsional trauma (Figure 2).

The most common location of injury occurrence was the road/street (17 cases, 48.5%). Accidents in the home corresponded to 14.28% (five cases) and workplace accidents to 17.1% (six cases).

Twenty percent of cases occurred elsewhere. Of the 35 cases, 16 sought treatment at the department on their own initiative and 19 were brought in by ambulance following referral. Work-related accident reports were issued in 12 of the 35 cases.

The most commonly affected side was the right side, with 22 cases (62.85%). Open fractures corresponded to 31.42% of the fractures (11 cases), and all the fractures were classified according to Gustillo et al.[12] with a score of 3A given by the orthopedic surgeon who carried out the initial evaluation.

Regarding the site of the talus fracture, 14 were of the talar processes (40%), 12 of the body (34.28%), 5 of the neck (14.28%), and 4 of the head of the talus (11.42%), (Figure 3). Seventeen fractures were treated conservatively (48.57%) and 18 (51.42%) underwent surgery. Of the patients who underwent surgical treatment, eight (22.8%) underwent open reduction and internal fixation, one (2.8%) had percutaneous surgery, one (2.8%) had minimally invasive surgery, one (2.8%) a complete talectomy and seven (20%) underwent other procedures, such as external fixation and surgical debridement (Figure 4). The average waiting time for definitive surgery was 3.22 days, ranging from zero to 19 days.

The hospital stay of the surgical patients ranged from 3 to 93 days, averaging 13.7 days. Of the patients who were treated conservatively, nine remained in hospital for various reasons, such as associated trauma and inadequate soft

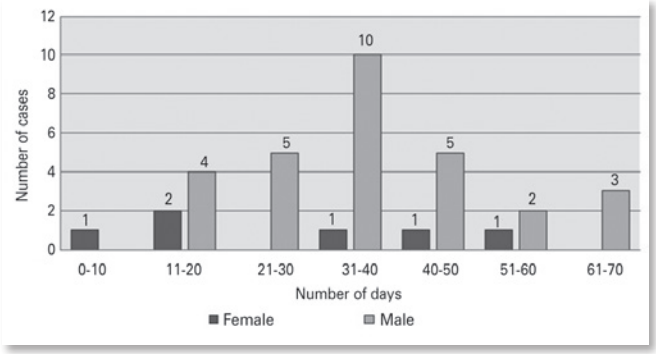

Figure 1 | Age and sex.

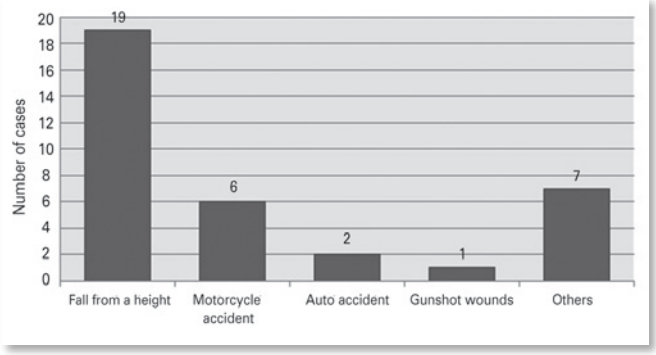

Figure 2 | Mechanism of injury.

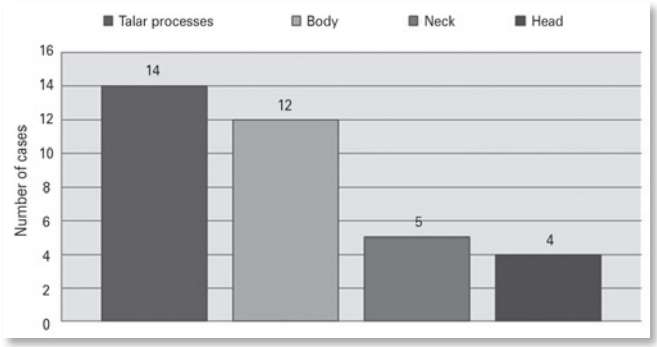

Figure 3 | Fracture site.

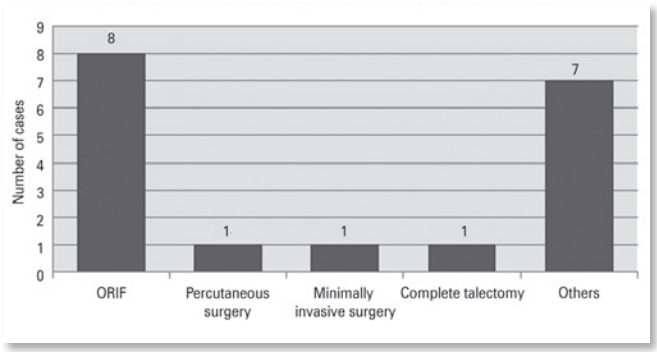

Figure 4 | Surgical procedure performed.

tissue conditions. The average hospital stay of these patients was 3.52 days, ranging from 1 to 30 days (Figure 5).

Of the 35 patients evaluated, only 6 (17.14%) had an isolated fracture of the talus. Most were victims of multiple trauma. In the initial evaluation, seven presented with traumatic brain injuries, ten with thoracic trauma and four with abdominal trauma. Regarding associated fractures, ipsilateral calcaneal fracture predominated in 7 (20%) of the 35 cases, and lateral malleolus in 6 (17.14%) cases. Figure 6 shows the associated fractures. Only five (14.28%) patients had no associated fractures. Of the 35 cases analyzed, 9 (25.71%) presented with peritalar dislocation associated with the fracture, 2 (5.71%) presented with tibiotarsal dislocation and only 1 (2.8%) with isolated talonavicular dislocation.

DISCUSSION

As a retrospective analysis of primary care records, one of the negative points was the lack of data referring to the acute late-onset of the patients evaluated. The medical records were analyzed by two third-year orthopedic surgery residents, which could give rise to interobserver discordance, mainly regarding the classification of the fractures.

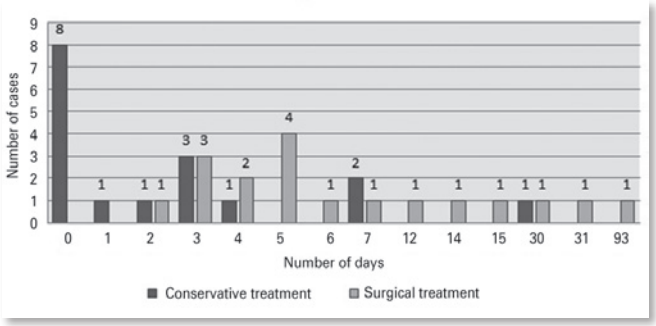

Figure 5 | Length of hospital stay.

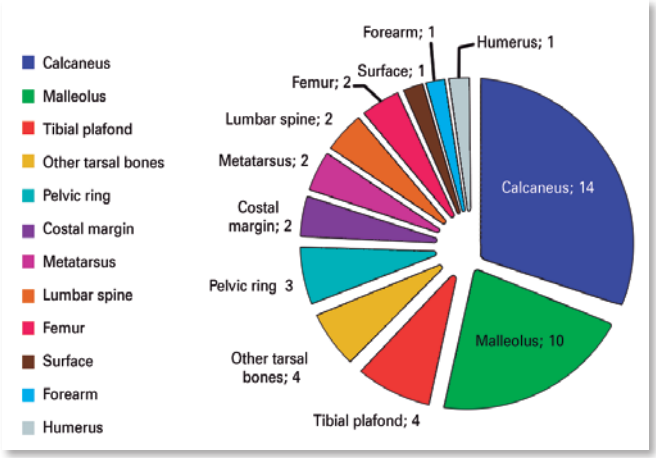

Figure 6 | Associated fractures.

Most of the fractures found were of talar processes, followed by fractures of the talar body. This finding does not match the data gathered by Summers et al.,[1] according to whom the neck fracture is the second most common type, only ranking below fractures of the talar processes.

In comparison to the studies by Fonseca Filho[10] et al. and Sakaki et al.[11] in which the ratio of men to women was 4.8:1 and 2.9:1, respectively, we observed a similar ratio of 4.8:1. Regarding the patients' age, the average age was 36.2 years, while Fonseca e Filho et al.[10] refer to an average of 30.2 and Sakaki et al.,[11] to an average of 30.4 years. Although there are differences in values, the prevalence remains higher in young men. Its importance lies in the fact that these individuals are fully active at work. The case of a 6-year-old girl with a bilateral calcaneal fracture and a left-sided talar body fracture is noteworthy. Tarsal bone fractures are uncommon in children, accounting for only 1% of childhood fractures.[13]

Falls from a height predominated as the mechanism of injury (19 patients) vs. traffic accidents (8 patients). In the studies by Fonseca Filho et al.[10] and Sakaki et al.,[11] the most common mechanism of injury was traffic accidents, followed by falls from a height. Despite the discrepant data, both are high-energy traumas and serve to plan preventive measures and the use of protective equipment for motorcyclists and individuals working at height. One case of a gunshot wound in the talus merits special attention as this mechanism is unusual due to the location of the talar bone.

All the patients who received surgical treatment in our review had fractures or associated peritalar dislocation. Nevertheless, our average time to definitive treatment was 3.22 days, shorter than the 6 days reported by Sakaki et al.,[11] where only 47.8% presented with associated fractures. The association of peritalar dislocation was very close between the two studies; 30.4% in the study by Sakaki et al.[11] versus 25.7% in this study.

Most of the patients presented with associated trauma (82.8%), since talus fractures, especially those of the neck and body, are caused by high-energy mechanisms. A relevant fact in this study is that, of the 17 patients with fractures treated conservatively, 10 required hospitalization (average hospital stay of 3.52 days). This was due to the associated trauma and the soft tissue conditions of the affected limb.

Another fact that reflects the high energy of the trauma needed to cause a talus fracture is the number of patients who had associated fractures: 74.2% (26 patients). A significant number of patients had more than one associated fracture. Among the associated fractures, ipsilateral calcaneal fracture predominated with seven cases (20%). All of the patients treated surgically had an associated peritalar dislocation or fracture.

All of the patients who presented with an open fracture (11 patients, 31.42%) had the degree of exposure classified by Gustillo et al.(12) as 3A. We found 17.4% open fractures In the study by Sakaki et al.[11], while in the study by Fonseca Filho et al.[10] we found 17.3%. This greater number of open fractures may be related to the abovementioned difference in terms of the mechanism of injury, and merits further investigation.

In the present study, 36 patients with talus fracture (including 1 patient who applied for a transfer after the fracture diagnosis) received primary care over a period of 18 months, with an average of two diagnoses per month. This number was much higher than that found by Sakaki et al.[11] (rate of 4.6 per year) and Fonseca Filho et al.[10] (average of 2.3 per year). One of the factors that explains this high number is the fact that the hospital where this study was conducted offers both tertiary and primary care, since 45% of the medical records evaluated belong to patients who arrived at the hospital after seeking treatment on their own initiative.

Occupational accidents with issuance of a work-related accident report were considered in 12 cases, although only 6 patients reported having experienced an accident at the workplace. This is due to the fact that road accidents are also considered occupational accidents.

Of the 18 patients treated surgically, the patient initially treated by complete talectomy due to intense fracture comminution without the possibility of fixation merits special emphasis. This patient did not undergo arthrodesis. None of the patients underwent amputation while receiving primary care.

CONCLUSION

The profile of patients with talus fractures treated at a referral hospital in trauma was: male, young adults who had sustained high-energy trauma, most of whom experienced trauma and associated fractures.

The most affected region of the talus was the talar processes, followed by the talar body. Associated peritalar dislocation predominated, and there were cases of tibiotarsal and talonavicular dislocations. The patients underwent conservative or surgical treatment.

The most common location of occurrence of the injury was the road/street. Open fractures were prevalent and the most affected side was the right side. Most of the patients were brought to the hospital by ambulance or sought treatment on their own initiative.

REFERENCES

1. Summers NJ, Murdoch MM. fractures of the talus: a comprehensive review. Clin Podiatr Med Surg. 2012;29(2):187-203.
2. Dodd A, Lefaivre KA. Outcomes of talar neck fractures: a systematic review and meta-analysis. J Orthop Trauma. 2015;29(5):210-5.
3. Murphy GA. Talar fractures. In: Campbell's, editor. Operative orthopaedics. Philadelphia: Mosby Elsevier; 2007. p. 4851-66.
4. Canale ST. Fractures of the neck of the talus. Orthopedics. 1990;13(10): 1105-15.
5. Canale ST, Kelly FB Jr. Fractures of the neck of the talus Long-term evaluation of seventy-one cases. J Bone Joint Surg Am. 1978;60(2): 143-56.
6. Ebraheim NA, Patil V, Frisch NC, Liu X. Diagnosis of medial tubercle fractures of the talar posterior process using oblique views. Injury. 2007;38(11):1313-7.
7. Chan G, Sanders DW, Yuan X, Jenkinson RJ, Willits K. Clinical accuracy of imaging techniques for talar neck malunion. J Orthop Trauma. 2008;22(6):415-8.
8. Hawkins LG. Fractures of the neck of the talus. J Bone Joint Surg Am. 1970;52(5):991-1002.
9. Fracture and dislocation compendium Orthopaedic Trauma Association Committee for Coding and Classification. J Orthop Trauma. 1996;10 (Suppl 1):v-ix, 1-154.
10. Fonseca Filho FF, Santin RAL, Ferreira RC, Sanmartin M, Guerra A. Epidemiological aspects of fractures of the talus. Rev Bras Ortop. 1996;31(6):481-4.
11. Sakaki MH, Saito GH, de Oliveira RG, Ortiz RT, Silva Jdos S, Fernandes TD, et al. Epidemiological study on talus fractures. Rev Bras Ortop. 2014;49(4):334-9.
12. Gustilo RB, Mendoza RM, Williams DN. Problems in the management of type III (severe) open fractures: a new classification of type III open fractures. J Trauma. 1984;24(8):742-6.
13. Sink EL, Flynn JM. Thoracolumbar spine and lower extremity fractures. In: Weinstein ST, Flynn JM. Lovell and Winter's pediatric orthopaedics. Philadelphia: Lipppincott Williams & Wilkins: 2014. p. 1819-22.