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Open Reduction and Internal Fixation of a Pediatric Talar Body Fracture using a Medial Malleolar Osteotomy – A Case Report

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Learning Point of the Article:

Medial malleolar osteotomy with smooth K-wire fixation appears to be a safe method for gaining access to the talus when required for reduction and/or fixation of pediatric talus fractures.

Abstract

Introduction: Talus fracture injuries are rare and most literature pertains to fractures in skeletally mature adults. It is unusual for pediatric talus fractures to be treated operatively and is normally treated with immobilization. The location of the talus fracture required a medial malleolar osteotomy to facilitate exposure and reduction, which was fixed with temporary smooth K-wires. The authors were unable to identify a previous description of this technique in the literature.

Case Report: An 11-year-old female was referred to our hospital due to polytraumatic injuries sustained in a roll-over MVC. A displaced fracture of the talus body was present. Due to the fracture location, a medial malleolar osteotomy was required for exposure. An open reduction and internal fixation was performed using subchondral minifragment screws under general anesthesia. The patient healed uneventfully, regained a normal gait and full, pain-free range of motion.

Conclusions: Medial malleolar osteotomy with smooth K-wire fixation appears to be a safe method for gaining access to the talus when required for reduction and/or fixation of pediatric talus fractures.

Keywords: Adolescent, talus fracture, osteotomy.

Introduction

The talus is the most superior bone of the foot. It has a trapezoidal-shaped upper surface that articulates with the tibia and fibula to form the ankle joint. Body weight is transferred from the tibia to the talus then on to the calcaneus (heel bone) which distributes the weight to the ground. Talus fracture injuries are rare and most literature pertains to fractures in skeletally mature adults [1]. The injury may be less common in children due to the cartilaginous nature of the talus in children, and thus, the incidence of pediatric talus fractures is approximately a fifth of the adult fracture rate [2]. Most talus fractures occur in the talar neck, with only 13–23% of them occurring in the body of the talus [3]. Furthermore, it is unusual for pediatric talus fractures to be treated operatively and is normally treated with immobilization [4], however, occasionally severe displacements are treated with internal fixation. These fractures are often caused by a significant axial load on a dorsiflexed foot [4].

Case Report

This case involves an 11-year-old female who was a restrained, backseat passenger in a motor vehicle rollover. On EMS arrival, the patient was found hanging partially out of the back, driver side window. The patient was noted to be tachycardic and hypotensive with a subarachnoid hemorrhage, internal carotid artery dissection. In addition, there were multiple skeletal injuries, including an open Type 3 supracondylar humerus

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Author's Photo Gallery

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Figure 1: Computed radiological images of the patient left ankle injury. (a) Lateral radiograph of talar body fracture, (b) anteroposterior view radiograph of talar body fracture, (c) parasagittal view of talar body fracture, (d) axial view of talar body fracture.

fracture that was treated urgently, right meta-diaphyseal distal tibia and fibula fractures. There was initially no report of left ankle or foot injury, and the preliminary radiographs were read as negative for fracture. Subsequently, however, the patient reported persistent pain in the left ankle, and a computed tomography (CT) scan was ordered, identifying a displaced left talar body fracture (Fig. 1). The CT scan revealed that the body of the talus was comminuted and was dislocated posteriorly relative to the subtalar joint. There was also considerable impaction between the calcaneus and the talar body. Due to displacement, surgery was indicated, and due to the posterior location of the fracture line and need for an anatomic reduction with rigid fixation would necessitate medial malleolar osteotomy.

The patient was positioned in the supine position, placed under general anesthesia with neuromuscular blockade and pre-operative antibiotics were administered. The left leg was fitted with a tourniquet and a medial incision centered between and paralleling the anterior tibial and posterior tibial tendons was utilized. As anticipated, it was apparent that a medial malleolar osteotomy would be required. The physis was located with the fluoroscope, and the osteotomy was performed distal to the physis using an oscillating saw and completed with an osteotome.

The patient's talar body was in a posteriorly dislocated position and initial attempts to reduce this through simple manipulation

Figure 2: Computed radiological images of the left ankle intraoperative after osteotomy. (a) Fixation of talar body through medial malleolar osteotomy, (b) anteroposterior view fluoroscopic image of fixation of medial malleolar osteotomy, (c) lateral fluoroscopic image of fixation of medial malleolar osteotomy.

Figure 3: Computed radiological images of patient left ankle at 5 months post-surgery. (a) Canale view of healed talar body fracture, (b) anteroposterior view of healed talar body fracture and healed medial malleolar osteotomy.

was unsuccessful, therefore, a 3.2 mm Steinmann pin was placed through the calcaneus to allow for direct longitudinal distraction. A periosteal elevator was placed between the posterior facet of the calcaneus and the talus, and the talar body was levered back into position. With the talar body dislocation reduced, the fracture reduction was fine-tuned and K-wired, and 2.4 and 2.0 mm counter sunk lag screws were then placed for final fixation (Fig. 2).

Before closing the wound, the medial malleolar osteotomy was reduced. The incision was re-approximated and a percutaneously placed smooth 2.4 mm K-wire was used to neutralize the osteotomy. Once the skin was closed, a second 2.4 mm K-wire was placed in a parallel fashion. These were driven across the physis to engage the lateral cortex of the tibia. The tips were left protruding and were removed 3 weeks post-surgery (Fig. 3). The patient was placed in a short leg splint for 3 weeks, then changed to a controlled ankle movement boot and allowed onto weight-bearing as tolerated at 6 weeks.

Discussion

Talus fractures are uncommon, making up less than one percent of all fractures [4]. Fractures of the talar body are typically caused by anterior subluxation of the talus relative to the tibia with simultaneous axial load [5].

The scarcity of pediatric talus injuries is likely due to the cartilaginous nature of the talus in growing children, allowing it to absorb greater stress [6], the talus has been reported to require twice the force to fracture when compared to the other tarsal bones [7]. In a comparison of talus fractures of children

younger than 12 years and those of adolescents older than 12 years, adolescents were shown to present with more severe fractures compared with children [8]. Talus fractures are usually high-energy injuries and are often associated with polytraumatized patients [1], as in this case.

This patient had a significantly displaced fracture/dislocation [9], requiring open reduction and internal fixation to restore ankle and subtalar joint congruity. Talar dislocations require an even greater force and are likely coupled with comminuted fractures, leading to displacement.

The medial malleolar osteotomy was indicated in concordance with the anteromedial incision to extend the field of view [10] and gain access to the fractured talus [11]. Since the talar body was both dislocated posteriorly and had a posterior fracture line, the osteotomy of medial malleolus was necessary to gain access to reduce the fracture and place rigid fixation. Otherwise, the fracture would have been impossible to repair due to the posterior location of the fracture lines and the trajectory required for screw fixation.

Conclusions

This patient case describes a relatively rare injury to the talar body in an 11-year-old female with multitraumas. The location of the talus fracture required a medial malleolar osteotomy to facilitate exposure and reduction, which was fixed with temporary smooth K-wires. We were unable to identify previous description of this technique in the literature.

Clinical Message

To the best of our knowledge, this is the first publication describing this technique in an adolescent with a talus fracture. In a case, where the talar body was both dislocated posteriorly and had a posterior fracture line, the osteotomy of medial malleolus was necessary to gain access to reduce the fracture and place rigid fixation resulting with a successful outcome.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's parents have given their consent for patient images and other clinical information to be reported in the journal. The patient's parents understand that his names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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