



ELSEVIER

Management of Fifth Metatarsal Fracture and Refracture in Athletes

Kenneth J. Hunt, MD,* Michael J. Reiter, MD,* Derek P. Axibal, MD,* and Kevin Varner, MD†

Fractures of the proximal fifth metatarsal are very common in active individuals and elite athletes. Fractures may occur from a number of mechanisms, but inversion and twisting injuries are some of the most common causes. True Jones fractures are at the metaphyseal-diaphyseal junction and enter the fourth-fifth intermetatarsal articulation. Fractures in that area are at risk of delayed union or non-union, which can be extremely detrimental in elite athletes, because of the poor blood supply which results in a watershed area. Treatment recommendations depend on fracture location and acuity, as well as patient factors. Non-operative management can be successful, however delayed union and non-union may occur. Surgical stabilization of true Jones fractures is recommended in athletes and results in a low number of complications and a higher and more rapid rate of union much compared to non-operative methods. Overall, the treatment methods of fifth metatarsal fractures depend on a multitude of factors, however athletes benefit from more aggressive treatment regimens that result in high rates of union in less time. Oper Tech Orthop ■■■■-■■■ © 2018 Elsevier Inc. All rights reserved.

KEYWORDS JONES fracture, fifth metatarsal base fracture, bone stress injury, bone graft

Introduction

Fractures of the fifth metatarsal are a common foot injury that may occur with a variety of injuries and has a multitude of treatment modalities. These fractures can occur from a variety of mechanisms including direct blows, crush injuries, and inversion or twisting injuries which may lead to fractures of the metatarsal base, diaphysis, neck, and head. The most common cause of proximal fifth metatarsal fractures are inversion and twisting injuries and are also common in patients with hindfoot varus.^{1,2} Many cases occur with a mechanism that is less than expected for a fracture, suggesting that a pre-existing stress fracture is likely present. True Jones fractures, or fractures at the metaphyseal-diaphyseal junction of the fifth metatarsal which extends into the fourth-fifth metatarsal articulation, have a relatively high rate of delayed union or non-union with non-operative treatment. The advantages of

surgical fixation over non-operative treatment have been well-documented.^{3,4}

A contributing factor to delayed union or non-union is the tenuous blood supply to this region. Small proximal and distal metaphyseal branches contribute to the ends of the bone. A nutrient artery enters near the middle third and courses proximal and distal with a watershed at the proximal metaphyseal-diaphyseal junction between the two.⁵ Painful non-union or delayed union are unacceptable in all patients, but especially in high performance athletes, whose careers are dependent on being extremely active. Multiple studies have shown high rates of success with operative treatment of Jones fractures in athletes.^{2,6-8} Lareau demonstrated union rates of 100% and a return to play time of 8-10 weeks in NFL players.⁶ The focus of this chapter will be on proximal fifth metatarsal base fractures and the treatment of these injuries specifically in athletes.

Epidemiology of Fifth Metatarsal Fractures in Athletes

Fractures of the fifth metatarsal are very common injuries in athletes. In the general population, at a large urban or suburban

*Department of Orthopaedic Surgery, University of Colorado School of Medicine, Aurora, CO.

†Department of Orthopedics, Houston Methodist Hospital, Houston, TX. Address reprint requests to Kenneth J. Hunt, MD, Department of Orthopaedic Surgery, University of Colorado School of Medicine, 2631 E 17th Avenue, Room 4508, Aurora, CO 80045. E-mail: kenneth.j.hunt@ucdenver.edu

single institution, 1275 patients were found to have fifth metatarsal fractures over a 5-year period, with 14% of those being true Jones fractures.¹ From 2004-2009, a review of the NFL combine data for a single team noted a rate of 3.42% in potential professional prospects.⁷ Another study noted that over 10 seasons at a single NCAA division I football program, open reduction internal fixation was seventh most common surgical procedure performed.⁹ Other than football, these fractures are commonly seen in basketball, soccer, and runners.⁸

Classification

The term “Jones fracture,” can be confusing because over time a variety of fracture patterns of the base of the fifth proximal metatarsal have been referred to as Jones fractures since the fracture was described by Sir Robert Jones. The most well-known classification scheme breaks the proximal metatarsal into 3 zones. Fracture in zone 1 are of the proximal tuberosity and are an avulsion of the peroneus brevis tendon. Zone 2 fractures are at the metaphyseal-diaphyseal junction and enter the fourth-fifth metatarsal articulation. Zone 3 fractures are distal to this and in the diaphysis proximally.^{10,11} The most common vernacular assigns the term “Jones Fracture” to zone 2 fractures in this classification system. Other classification systems include the Torg classification system, which looks at acuity of fractures and their healing potential. Type 1 fractures are acute fractures with clean edges, type 2 fractures are indicative of a delayed union with intramedullary sclerosis and widened fracture lines, and type 3 fractures are non-unions with complete sclerosis of the intramedullary canal.^{12,13}

Evaluation and Risk Factors

A common belief by many surgeons about Jones fractures is that there is probably a chronic stress event that precedes many acute fractures.¹⁴ Many of these fractures do have a stress component which weakens the bone prior to fracture. This can be evident in an injury mechanism that applies a much lower load than would ordinarily fracture the fifth metatarsal, and the presence of sclerosis at the fracture site, suggesting a preceding bone stress injury. Some patients are more predisposed to these types of fractures because of the biomechanics of their foot motion in relation to the position that their foot and ankle assume while bearing weight. Raiken et al reported on 21 fractures of the fifth metatarsal, which were treated with open reduction internal fixation. In this cohort, 85% of these patients had radiographic evidence of hindfoot varus. They reported a 100% union rate with surgical stabilization and no refractures within their follow-up, averaged 49 months. They recommended lateral heel wedge and forefoot post inserts to neutralize the hindfoot varus and decrease the stress amongst the lateral column.² In O'Malley et al's³ series, 50% of NBA players with fractures also had metatarsus adductus on radiographic examination.

Conservative vs Surgical Treatment

Most fractures of the fifth metatarsal, including Jones fractures will heal without surgical treatment. However, the requirement for prolonged non-weight-bearing and an unacceptably high non-union and refracture rates associated with non-operative treatment has led to a strong trend toward surgical management in the majority of athletes. Roche and Calder⁴ performed a meta-analysis of 26 papers evaluating outcomes of Jones fractures. They found that 96% of surgically treated Jones fractures went on to complete healing, whereas the union rate in non-operatively treated fractures was 76%. Moreover, in treatment of Jones fracture non-unions, 44% treated non-operatively went on to heal, compared to 97% treated operatively.⁴

Surgical Techniques

Surgical treatment of fifth metatarsal base refractures are generally performed as an outpatient procedure. A popliteal fossa block, ankle block, spinal or general anesthesia may be used. The authors prefer general anesthesia to mitigate risk, though small, of nerve complications with regional anesthesia. The patient is positioned supine on the operating table with a bolster underneath the ipsilateral buttock in order to increase exposure to the lateral aspect of the foot. A tourniquet may be placed, but often times is only inflated if necessary. Fluoroscopy will be used to assist with fracture reduction, screw length, hardware starting point, and fracture site compression. Therefore, it is recommended to drape the entire limb to enable flexion of the knee in order to allow imaging of the foot.

Revision Technique (Screw)

In the case of non-union or refracture after operative treatment, biologic augmentation in combination with a larger screw should be implemented (Fig. 1A and 1B).

A single incision may be used: the previous incision is extended distally with the dorsolateral approach. However, this author prefers a two-incision approach (using the previous incision along with a dorsolateral approach directly over the fracture site).¹⁵ The peroneus brevis and sural nerve should be protected. The hardware is removed. In the case of a broken screw, the distal segment of the broken hardware can be removed through the fracture site. With attention paid to the fracture site, the periosteum is elevated small plantar and dorsal flaps. The fracture site is thoroughly debrided with a curette, and the proximal and distal bone ends are drilled with a small diameter K-wire (Figs. 2, 3, and 4).

Using a soft-tissue guide, appropriate sized reaming is slowly performed starting at or one size below the previously inserted screw (in reverse so it functions as a reamer). Successive reaming occurs in 1 mm increments at least one screw size larger than the previously inserted screw. It is recommended to advance the drill between forward and reverse, to prevent

Download English Version:

<https://daneshyari.com/en/article/8801769>

Download Persian Version:

<https://daneshyari.com/article/8801769>

[Daneshyari.com](https://daneshyari.com)