

Fractures of the Base of the Fifth Metatarsal-A Review of 322 Patients

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Abstract: Fractures of the base of the fifth metatarsal are common injuries of the foot and it is important that a distinction is made between Jones' fractures and the more benign tuberosity fractures. Jones' fractures could be either acute fractures or stress fractures. It has previously been reported that stress fractures occur at an anatomic site more distal to that of acute fractures and this has been implicated as a reason for delayed union in these stress fractures. We conducted a retrospective study of 322 patients with fractures of the base of fifth metatarsal. This is one of the largest reported series of such fractures. Of these 288 were tuberosity fractures and 34 were Jones' fractures. The presence of stress-related features and the distance of the fracture site from the proximal tip of the metatarsal was measured for Jones' fractures. All avulsion fractures were managed symptomatically and non-operatively. They healed well in a mean follow-up period of 2 months and none required surgical intervention. The management of Jones' fractures varied depending on the surgeon whose care the patients were under. These fractures took longer to heal and only 14 out of 34 fractures healed using non-operative means in a mean follow-up period of 16 months. Four fractures required medullary curettage and bone grafting. Ten fractures had asymptomatic non-union and 6 were still under review. Statistical analyses showed that stress fractures do not occur at anatomically distinct locations to acute fractures. There was also no statistically significant correlation between distance from the proximal tip of the fifth metatarsal to the fracture site and union, or time to union. Tuberosity fractures, provided they are not significantly displaced, should be managed symptomatically. The treatment of choice for acute Jones' fractures is immobilization of the limb in a below-knee non-weight bearing plaster for 6 to 8 weeks. Jones' fractures with stress-related features may benefit from early surgery.

Key words: Foot fractures, metatarsal fractures, avulsion fractures, stress fractures, jones' fractures

INTRODUCTION

Fractures of the base of the fifth metatarsal are common foot injuries. They fall into two categories: fractures of the tuberosity and fractures distally at the diaphyseal-metaphyseal junction^[2, 5-7, 9, 13, 14, 22]. Fractures at the diaphyseal-metaphyseal junction were first described by Jones in 1902 after he himself sustained the injury, hence the eponym Jones' fracture^[8]. It is important that Jones' fractures are recognized as inherently different in their anatomical site and prognosis to the more benign tuberosity fractures to allow their appropriate management. This is important since some papers in literature have failed to differentiate between these two fractures^[1].

Fractures of the tuberosity heal well irrespective of the treatment instituted^[3, 18]. Jones' fractures however have a high incidence of delayed union and nonunion^[3, 4, 18, 10, 23]. Jones' fractures could be either acute fractures or stress fractures^[2, 5-7, 9, 13, 14, 22]. There is a correlation between the radiological appearance of the fracture at presentation and the clinical course, with stress

fractures taking longer to heal than acute fractures^[19-21]. It has previously been reported that stress fractures occur at an anatomic site more distal to that of acute fractures and result in disruption of the vascular supply which enters the bone at the metaphyseal-diaphyseal region^[4, 14, 16, 17]. This has been implicated as a reason for delayed union in these stress fractures^[14, 17].

We conducted a retrospective study of 322 patients with fractures of the base of fifth metatarsal. In this study we determined the prevalence of each type of fracture, tuberosity fracture and Jones' fracture and their prognoses. We also further studied the Jones' fractures to determine if stress fractures occur at anatomical sites more distal to those of acute fractures and whether this has any relationship with fracture union and time to union. This is one of the largest reported series of such fractures.

MATERIALS AND METHODS

We performed a retrospective review of 322 closed fractures of the base of the fifth metatarsal that presented

Fig. 1: Radiograph of a proximal fifth metatarsal tuberosity fracture

Fig. 2: Radiograph of a proximal fifth metatarsal Jones' fracture

to our hospital from 2001 to 2005. Of these 288 were tuberosity fractures (Fig. 1) and 34 were Jones' fractures (Fig. 2). The average age of the patients was 33 for tuberosity fractures and 28 for Jones' fractures.

Demographic details of patients, mechanism of injury, type of fracture, time to union and, for Jones' fractures, the presence of historic and radiological features of stress related fractures were recorded using the case notes and radiographs. Stress fractures were identified using

radiological criteria^[5-7, 9, 13]. Union of the fracture was defined as no movement or pain at the fracture site on clinical examination and radiological evidence of callus formation in two orthogonal radiographs. The distance of the fracture site from the proximal tip of the metatarsal was also measured and recorded for Jones' fractures.

All avulsion fractures were managed symptomatically and non-operatively. This included full-, partial- and non-weight bearing. The patients were followed up in the outpatients' clinic for a mean period of 2 months (range 0.5-5 months).

The management of Jones' fractures varied depending on the surgeon whose care the patients were under. This included full-, partial- and non-weight bearing. The patients were followed up in the outpatients' clinic for a mean period of 16 months (range, 2-24 months).

RESULTS

All avulsion fractures healed well in a mean follow-up period of 2 months following symptomatic management and none required surgical intervention. Jones' fractures however took longer to heal and only 14 out of 34 fractures healed using non-operative means in a mean follow-up period of 16 months. Four fractures required medullary curettage and bone grafting. Ten fractures had asymptomatic non-union and 6 were still under review.

Statistical analyses were performed on Jones' fractures to determine if stress fractures occur at anatomically distinct locations to acute fractures and to determine if there is any relation between fracture healing and distance of the fracture from the tuberosity. The clinical and radiological picture was consistent with a stress fracture in 20 out of 34 Jones' fractures. The mean distance from the proximal tip of the metatarsal to the fracture site for acute fractures was 22mm (n = 14) and for stress fractures it was 23mm (n = 20) (Independent two sample t test, $p > 0.05$). There was also no statistically significant correlation between distance from the proximal tip of the fifth metatarsal to the fracture site and union (Mann Whitney U test, $p > 0.05$) or time to union (chi-squared two sample test, $p > 0.05$).

DISCUSSION

Fractures of the base of the fifth metatarsal are common injuries of the foot and it is important that a distinction is made between Jones' fractures and the more benign tuberosity fractures. Tuberosity fractures, provided they are not significantly displaced, are managed symptomatically. Most heal or are asymptomatic by 3 weeks and radiological union is obvious by 8 weeks

[4, 12]. Our experience confirms these findings and we advocate the symptomatic management of these injuries.

Jones' fractures are difficult fractures to manage and can be acute fractures or stress fractures^[2, 5-7, 9, 13, 14, 22]. A review of Jones' original case examples shows that some radiographs have stress-related features with widening and diffuse margins of the fracture line and intramedullary sclerosis^[8]. Prevailing guidelines for the management of these fractures are ambiguous. The treatment of choice for acute Jones' fractures is immobilization of the limb in a below-knee non-weight bearing plaster for 6 to 8 weeks. Jones' fractures with stress-related features take longer to heal and may benefit from early surgery^[11, 15].

There was no statistically significant difference in the distances of acute and stress fractures from the proximal tip of the fifth metatarsal in our study. This suggests that the fractures do not occur at anatomically distinct locations.

CONCLUSION

In an attempt to further evaluate any possible implications of blood supply to healing on these fractures we performed statistical analysis on our data. Our statistical analysis showed no correlation between distance of the fracture from the proximal tip and time to union.

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