

Grant M ¹, Molloy A ^{1,2}, Mason L ^{1,2}
¹ Aintree University Hospital, ² University of Liverpool

Introduction

Non-union following a proximal 5th metatarsal fracture can cause considerable pain with high morbidity and loss of work. Although many authors advocate early surgical management of zone 3 injuries (Jones fracture), zone 1 and 2 fractures are generally expected to heal with conservative management. Uncommonly, zone 1 and 2 fractures can develop non-unions.

Aims

The aim of this study was to evaluate the efficacy of closed screw fixation for non-unions of the 5th metatarsal base.

Methods

We performed a prospective study involving all 5th metatarsal base non-unions treated in our department over 2 years. Only minimally-displaced adult fractures were considered for this study.

The fracture pattern was categorised using the Dameron classification (figure 1). All non-unions were fixed percutaneously under radiographic guidance, without fracture site preparation. Zone 1 injuries were fixed using a 3mm headless compression screws and zone 2 and 3 with an intramedullary 4mm screw.

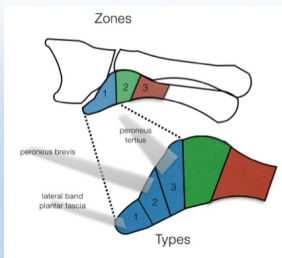


Figure 1 – Figure 1 – Schematic illustrating the Dameron classification, defined as three zones.¹ Zone 1 comprises the styloid process, zone 2 the meta-diaphyseal area and zone 3 the proximal diaphysis. Zone 1 is further divided by the Ekrol classification to types 1-3 depending on the insertion of the lateral plantar ligament, peroneus tertius and peroneus brevis.²

Results

Out of 22 patients included in this study, a minimum of 6 month clinical follow up was obtained. The average time from injury to treatment was 6.2 months (range 3-19 months). There were no smokers in this patient cohort.

There were 12 zone 1 injuries, 4 zone 2 injuries and 6 zone 3 injuries. All patients achieved union by 3 months post screw fixation, with 21 out of 22 achieving union by 6 weeks. All patients had resolution of symptoms by 12 weeks. Two patients with CRPS pre-operative, had resolution of CRPS on union. There were no complications. Patient specifics are illustrated in table 1.

No.	Age	Sex	Dameron Class	Ekrol Class	Other medical condition	Time from initial injury (months)	Time to union post surgery (weeks)
1	42	M	1	1		4	6
2	36	F	1	2		8	6
3	49	F	1	3		3	6
4	30	M	1	3	Osteoporosis	6	6
5	50	F	2		CRPS	4	6
6	56	F	1	2		3	6
7	34	M	3		Pes Cavus	11	6
8	46	F	3		CRPS, Fibromyalgia, Osteoporosis	6	12
9	48	F	3			9	6
10	32	F	1	1		3	6
11	59	F	1	2	Osteoporosis	3	6
12	21	F	1	2		3	6
13	46	F	2			4	6
14	59	F	1	2		12	6
15	29	M	1	2		3	6
16	46	M	1	2		18	6
17	43	F	2			6	6
18	26	F	1	2		3	6
19	58	F	3		Type II DM, Hypothyroid	19	6
20	38	M	3			3	6
21	46	F	2	3		3	6
22	28	F	3			3	6
Mean	41.3					6.2	6.3

Table 1 – Results including demographics. (No. – patient number, M – male, F – female, Class – classification, CRPS – complex regional pain syndrome, DM – Diabetes Mellitus)



Figure 2 – Oblique weight-bearing radiographs preoperative and at 6 weeks of zone 1 injuries (Ekrol 1,2 and 3) fixed using 3mm headless compression screws.



Figure 3 – Oblique weight-bearing radiographs preoperative and at 6 weeks of a zone 2 and zone 3 injury treatment with intramedullary 4mm cannulated screw.



Figure 4 – Clinical picture showing a healed insertion point of screw for a zone 1 injury.

Conclusion

We conclude that percutaneous fixation of 5th metatarsal base non-unions, without fracture site preparation, achieves excellent results.

We believe that the screw alters the strain of the fracture, thus promoting fibrous to osseous conversion and therefore union, even many months post injury.

References

1. Dameron Jr TB. Fractures and anatomical variations of the proximal portion of the fifth metatarsal. JBJS. 1975 Sep 1;57(6):788-92.
2. Ekrol I. Fractures of the base of the 5th metatarsal. The Foot. 2004 Jun 1;14(2):96-8.