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Case Report

Non-union of calcaneum – A rare complication of calcaneal fracture – A case report with brief review of literature

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ABSTRACT

Intra-articular fractures of calcaneum are known to be difficult to manage and lead to multiple complications including subtalar arthritis and malunion. However, non-union of calcaneum is rarely encountered. Only a total of six studies reporting on 12 patients could be found on reviewing the available literature (English language only). One such case of non-union of calcaneal fracture and its successful management is being reported in this case report. In addition, extremely limited literature available on calcaneal non-union is also briefly reviewed. Role of subtalar arthrodesis with internal fixation of fracture and bone grafting for successful management of this rare complication is highlighted along with the possibility of under-reporting of this relatively unknown complication.

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1. Introduction

Intra-articular fractures of calcaneum are known to be difficult to manage and lead to multiple and frequent complications including subtalar arthritis and malunion.¹ However, non-union of calcaneum is rarely encountered and most studies on management of complications of calcaneal fractures do not include non-unions.^{1,2} Only a total of six studies reporting on 12 patients could be found on reviewing the available literature (English language only).^{3–8} One such case of non-union of calcaneal fracture and its successful management is being reported in this case report. In addition, extremely limited literature available on calcaneal non-union is also briefly reviewed.

2. Case report

A 29 year old obese female sustained a closed calcaneal fracture following a fall from height. She was managed conservatively with cast immobilization for eight weeks followed by protected weight bearing for another 8 weeks at another hospital. She was referred to our hospital with persistent pain and swelling of her heel. Clinical and radiological assessment, including CT scan of the foot, revealed evidence of calcaneal non-union with subtalar arthritis (Figs. 1 and 2). She was also detected to have Diabetes mellitus during pre-operative assessment. The patient was managed by subtalar arthrodesis and open reduction internal fixation of calcaneal non-union using two 6.5 mm cancellous

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Fig. 1 – Radiograph (Lateral view of both heels) showing non-union of calcaneal fracture-right at time of presentation (6 months from injury).

Fig. 3 – Post-operative follow-up radiograph (Lateral view of right heel) at one year after surgery which is confirmatory of union of calcaneum and subtalar fusion.

screws and autogenous bone grafting. In the immediate post-operative phase, patient developed wound dehiscence with superficial surgical site infection which was managed successfully by wound dressings and antibiotics. The patient has been followed up for one year. At last follow up, the subtalar joint was completely arthrodesed and there was complete union at calcaneal non-union site (Fig. 3). She is ambulant without support and is completely pain free.

3. Discussion and review of literature

The available literature (in English language only) consists of only case reports and is summarized in Table 1.

The first reported case was published as recent as 1993 and only a total of 12 patients have been reported in six studies published till date.³⁻⁸ There is no difference in incidence between male or female gender even in the small number of

cases reported. No similarities exist between various available case reports/series. However, there is a trend towards non-union mostly after conservative treatment. Thermann et al described an unusually high incidence of 10% non-union ($n = 4/40$) in their series after conservative treatment.⁴

Smoking has been described as a probable risk factor.^{9,10} Diabetes mellitus may possibly be a risk factor in this case report. Internal fixation with bone grafting has been the mainstay of treatment combined with subtalar arthrodesis in most of the cases in all published reports, as was done in our case.

Non-union of calcaneum has been rarely described in literature. Subtalar arthrodesis with ORIF and bone grafting offers a reasonable and successful treatment in this rare complication of calcaneal fractures. Though non-union of calcaneal fractures has been rarely reported, one needs to be alert to this complication for its successful management. Also, its incidence may be underestimated because of underreporting.

Fig. 2 – CT scan (Axial section) of both heels confirmatory of right calcaneal non-union at time of presentation (6 months from injury).

Table 1 – Summary of available literature on calcaneal non-union.

Case report (As per year of publication)	Age	Gender	Initial treatment	Associated risk factors	Definitive treatment	Follow-up (Months)
Thomas & Wilson (1993) ³	36	Female	Conservative		Osteotomy, plate, bone graft	3
Thermann et al (1999) ⁴	49 (mean)	Male-2 Female-2	Conservative		Subtalar arthrodesis	62
Gehr et al (2000) ⁵	42	Male	ORIF		Osteotomy, screws, bone graft	2
Karakurt et al (2004) ⁶	61	Male	Conservative	Smoking	Bone graft	8
Zwipp & Rammelt (2006) ⁷	61, 45	Female (2 patients)	Conservative-1 Percutaneous fixation-1		Subtalar arthrodesis	-
Tim S & Peter P (2008) ⁸	47 (Mean)	Female-1 Male-2	Percutaneous fixation-1 Conservative-2		Subtalar arthrodesis	14, 3, 6
Present case	29	Female	Conservative	Diabetes mellitus	Subtalar arthrodesis, ORIF with screws, bone graft	12

Conflicts of interest

The author has none to declare.

REFERENCES

- Howard JL, Buckley R, McCormack R, et al. Complications following management of displaced intra-articular calcaneal fractures: a prospective randomized trial comparing open reduction internal fixation with nonoperative management. *J Orthop Trauma*. 2003;17:241–249.
- Lim EVA, Leung JPE. Complications of intraarticular calcaneal fractures. *Clin Orthop*. 2001;391:7–16.
- Thomas P, Wilson LF. Non-union of an os calcis fracture. *Injury*. 1993;24:630–632.
- Thermann H, Hufner T, Schratt HE, Held C, Tscherne H. Subtalar fusion after conservative or surgical treatment of calcaneus fracture. A comparison of long-term results. *Unfallchirurg*. 1999;102:13–22.
- Gehr J, Schmidt A, Friedl W. Calcaneus pseudarthrosis: a clinical rarity. *Unfallchirurg*. 2000;103:499–503.
- Karakurt L, Yilmaz E, Incesu M, Serin E. Pseudarthrosis of a calcaneus fracture; a case report. *Acta Orthop Traumatol Turc*. 2004;38:288–290.
- Zwipp H, Rammelt S. Subtalar arthrodesis with calcaneus osteotomy. *Orthopade*. 2006;35:387–404.
- Schepers m, Patka tr. Calcaneal nonunion: three cases and a review of the literature. *Arch Orthop Trauma Surg*. 2008;128:735–738.
- Assous M, Bhamra MS. Should Os calcis fractures in smokers be fixed? A review of 40 patients. *Injury*. 2001;32:631–632.
- Easley ME, Trnka HJ, Schon LC, Myerson MS. Isolated subtalar arthrodesis. *J Bone Joint Surg Am*. 2000;82:613–624.