CASE REPORT

Snowboard, wakeboard, dashboard? Isolated fracture of the lateral process of the talus in a high-speed road traffic accident

Evangeline Shimei Ng,¹ Barry James O'Neill,¹ Laurence Patrick Cunningham,² John Francis Quinlan¹

¹Department of Trauma and Orthopaedics, The Adelaide and Meath Hospital Incorporating the National Childrens Hospital, Dublin, Ireland

²Department of Orthopaedics, The Adelaide and Meath Hospital Incorporating the National Childrens Hospital, Dublin, Ireland

Correspondence to

Barry James O'Neill,
barryoneill1922@gmail.com

SUMMARY

We present a 23-year-old man who sustained an isolated fracture of the lateral process of the talus (LPT) in a head-on vehicle collision at a combined speed of 200 km/h. The driver of the other vehicle sustained fatal injuries at the scene. The LPT was openly reduced and fixed with successful outcome at 3 months. This case is unusual in the method of injury, in particular in relation to the isolated relatively minor injury sustained.

BACKGROUND

Fracture of the lateral process of the talus (LPT) is the second most common fracture of the talar body, with an incidence of 24%.¹ It is an uncommon injury, accounting for less than 0.86% of all ankle injuries in the general population.² It has been shown to be much more prevalent in snowboarders, accounting for 2.3% of all injuries, 15% of ankle injuries and 34% of ankle fractures sustained during snowboarding.³ For this reason, fracture of the LPT has been termed a 'snowboarder's fracture'. Other documented modes of injury include wakeboarding,⁴ motocross⁵ and kayaking.⁶ We present a case of fracture of the LPT sustained in a high-speed road traffic accident (RTA). This mode of injury is unusual as it was not sports related, and because it was an isolated injury in a high-speed RTA in which the occupant of the other vehicle sustained fatal injuries at the scene.

CASE PRESENTATION

A 23-year-old man was involved in a head-on collision with another vehicle at a combined speed estimated at 200 km/h (kph). The incident occurred just after midnight. The occupant of the other involved vehicle sustained fatal injuries at the scene of the collision. The 23-year-old man was taken to Accident & Emergency (A&E) by ambulance and was assessed by the A&E team in accordance with Advanced Trauma Life Support protocols. After primary and secondary survey and radiological investigation, he was found to have sustained an isolated fracture of the lateral process of his right talus (figure 1). He was admitted under the care of the Orthopaedic Trauma team and was scheduled for open reduction and internal fixation (ORIF) of his fracture.

TREATMENT

Under general anaesthetic and with a thigh tourniquet inflated to 350 mm Hg for haemorrhage control, the lateral aspect of the talus was approached through a curved lateral incision as described by von Knoch *et al.*⁷ The capsule of the subtalar joint was found to be ruptured, and the fracture fragment was identified. After washout of the joint with 0.9% sodium chloride solution, the fracture was reduced and provisionally fixed with Kirschner wires. Definitive fixation was achieved with 2 AO/ASIF 3.3 mm partially threaded cancellous screws with washers, passed through the fracture fragment perpendicular to the fracture line, into the body of the talus. An image intensifier (II) lateral image of the fixation can be seen in figure 2. The wound was closed with vicryl sutures and nylon sutures to skin.

The patient's ankle was immobilised in a below knee cast for 2 weeks, and the patient was mobilised strictly non-weight-bearing on crutches.

OUTCOME AND FOLLOW-UP

The wound was reviewed in the outpatient department (OPD) at 2 weeks, and sutures were removed. A second below knee cast was applied in OPD, and the patient continued non-weight-bearing on crutches for further 4 weeks. A check X-ray performed 6 weeks post ORIF was satisfactory, and the patient's cast removed. He was given a walking boot and advised to weight-bear as tolerated in the boot for further 3 weeks. After 9 weeks all immobilisation/support was removed and he was referred to physiotherapy for range of motion exercises and gait re-education. His final review occurred 3 months post ORIF when he was mobilising full weight-bearing, reported no discomfort in his ankle, had regained a normal gait pattern and had returned to full employment. A mortise and lateral radiograph of the ankle taken at 3 months post ORIF can be seen in figure 3.

DISCUSSION

We present a case of LPT fracture sustained in an RTA. This was an isolated injury sustained in a head-on collision at an estimated combined speed of 200 kph in which the occupant of the other vehicle sustained fatal injuries. Fracture of the LPT is not commonly reported after high-speed RTAs. This mechanism more commonly results in traumatic brain injury, internal injuries and long bone

To cite: Ng ES, O'Neill BJ, Cunningham LP, *et al.* *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-200357

Figure 1 Mortise and lateral radiographs of ankle at presentation showing fracture of the lateral process of the talus.

fractures of the upper and lower limbs.⁸ Fractures of the ankle occur in 3.1% of non-fatal RTAs⁸ and fractures of the LPT account for 0.86% of all ankle fractures.² From these data, we can extrapolate that fractures of the LPT occur in less than 0.03% of non-fatal RTAs, making this an extremely uncommon injury pattern. That this was an isolated injury sustained in an accident where the occupant of the second vehicle sustained fatal injuries at the scene makes the case all the more remarkable.

The correlation between vehicle speed and injury severity in RTAs is well documented.^{8–11} Accidents occurring between mid-night and early morning in 100 kph speed zones have been shown to have a higher risk of death.¹⁰ Increasing traffic speed by 1 kph can lead to a 3% increase in injury crashes and a 4–5% increase in fatal crashes.¹¹ At an estimated combined speed of 200 kph, the fatal injuries sustained by the occupant of

Figure 2 Intraoperative screening radiograph.

Figure 3 Check mortise and lateral radiographs 3 months post open reduction and internal fixation.

the second vehicle are much more typical than the isolated LPT fracture reported in this case.

Previous reports regarding this injury have mostly described sports-related trauma.^{3–6} Snowboarding is the sport most closely associated with this fracture, but a wakeboarding injury has also been reported.^{3–4} Both of these sports involve binding of the feet to a rigid board, and this position may be implicated in the mechanism of injury.⁴ Some authors suggest that the mechanism involves forced dorsiflexion of the ankle with inversion and axial loading.^{1–12–13} A cadaveric study by Boon *et al*¹⁴ reproduced LPT fractures with a combination of inversion, dorsiflexion and axial loading forces. Funk *et al*¹⁵ also performed a cadaveric study and found that LPT fracture could be reproduced with a combination of dorsiflexion, axial impaction and forceful eversion. It is evident from these studies that dorsiflexion and axial loading are consistent features of LPT fracture, but the rotational element of the injury has yet to be fully elucidated.^{1–7–12–16} We hypothesise that the LPT fracture described was sustained as a result of a forced dorsiflexion and axial load incurred while attempting to apply the foot-brake of the vehicle at the time of the collision.

Our review of the literature identified a case report of bilateral LPT fractures sustained during motocross.⁵ These injuries were sustained when the rider landed his motorcycle on a ramp with both feet planted on the foot-pegs. This mechanism is again consistent with an axial load through a fixed dorsiflexed ankle. The patient had pain in the lateral aspect of the ankles with associated swelling. Both injuries were initially missed on plain radiographs, but were identified on further review because of a high index of suspicion based on the mechanism of injury and clinical findings. Another case report describes unilateral LPT fracture sustained while kayaking.⁶ The patient plunged 12 feet over a waterfall and the nose of the kayak struck a rock. Her foot was planted dorsiflexed on the foot-peg of the kayak at impact, resulting in further forced dorsiflexion and axial loading. Clinical examination of the ankle was non-specific, but the injury was identified on radiological examination.

In all of the cases described, the injury is sustained when a fixed dorsiflexed ankle is subjected to further forced dorsiflexion and axial loading. The literature remains equivocal as to the relevance and nature of any rotational force at the time of impact. The case that we describe is extremely unusual in the fact that this was an isolated injury sustained in a high-speed

RTA in which the occupant of the other vehicle sustained fatal injuries at the scene. The energy involved in this RTA is markedly greater than in previously described injury patterns, and would be expected to result in other significant axial and appendicular injuries. The radiographs in figure 1 show a very obvious LPT fracture making the diagnosis relatively easy, but other reports in the literature suggest these radiographic findings can be very subtle. We would suggest that all patients who have lateral ankle pain following a forced dorsiflexion and axial load injury should be treated with a high index of suspicion for LPT fracture.

Learning points

- ▶ Fracture of the lateral process of the talus (LPT) is an uncommon injury.
- ▶ The injury is sustained when a fixed dorsiflexed ankle is subjected to further forced dorsiflexion and axial loading.
- ▶ The injury is commonly termed a 'snowboarder's fracture', but can be sustained in any injury with the above mechanism of injury.
- ▶ Radiographic findings can be very subtle.
- ▶ All patients who have lateral ankle pain following a forced dorsiflexion and axial load injury should be treated with a high index of suspicion for LPT fracture.

Contributors ESN and BJO co-authored the case report. LPC proof read and edited the case report, checked and validated the references, and provided the radiology for the images. JFQ is the consultant responsible for the overall care of the

patient. JFQ edited the case report and provided technical data with regard to the operative procedure.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Hawkins LG. Fracture of the lateral process of the talus. *J Bone Joint Surg Am* 1965;47:1170–5.
- 2 Mukherjee SK, Pringle RM, Baxter AD. Fracture of the lateral process of the talus: a report of thirteen cases. *J Bone Joint Surg Br* 1974;56:263–73.
- 3 Kirkpatrick DP, Hunter RF, Janes PC, *et al.* The snowboarder's foot and ankle. *Am J Sports Med* 1998;26:271–7.
- 4 Mussmann SE, Poirier JN. Snowboarder's fracture caused by a wakeboarding injury: a case report. *J Chiropr Med* 2010;9:174–8.
- 5 Barnett TM, Teasdall RD. Bilateral lateral process fracture of the talus in a motocross rider. *Foot Ankle Int* 2008;29:245–7.
- 6 Yan AY, Mesfin A, Schon LC. Lateral process talus fracture in a kayaking injury. *Orthopedics* 2011;34:296–9.
- 7 von Knoch F, Reckord U, von Knoch M, *et al.* Fracture of the lateral process of the talus in snowboarders. *J Bone Joint Surg Br* 2007;89:772–7.
- 8 Peden M, Scurfield R, Sleet D, *et al.* *World report on road traffic injury prevention*. WHO. 2004.
- 9 Pei X, Wong SC, Sze NN. The roles of exposure and speed in road safety analysis. *Accid Anal Prev* 2012;48:464–71.
- 10 Chen H, Cao L, Logan DB. Analysis of risk factors affecting the severity of intersection crashes by logistic regression. *Traffic Inj Prev* 2012;13:300–7.
- 11 May M, Tranter P, Warn J. Towards a holistic framework for road safety in Australia. *J Transp Geogr* 2008;16:395–405.
- 12 Nicholas R, Hadley J, Paul C, *et al.* Snowboarder's fracture: fracture of the lateral process of the talus. *J Am Board Fam Pract* 1994;7:130–3.
- 13 Bladin C, McCrory P. Snowboarding injuries. *Sports Med* 1995;19:358–64.
- 14 Boon A, Smith J, Zobitz M, *et al.* Snowboarder's talus fracture. *Am J Sports Med* 2001;29:333–8.
- 15 Funk J, Srinivasan S, Crandall J. Snowboarder's talus fractures experimentally produced by eversion and dorsiflexion. *Am J Sports Med* 2003;31:921–8.
- 16 Langer P, DiGiovanni C. Incidence and pattern types of fractures of the lateral process of the talus. *Am J Orthop* 2008;37:257–8.

Copyright 2013 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow