

Original Research Article

Management of complete dislocation of tarsal scaphoid without fracture

M. A. Q. Ansari^{1*}, Shivanand Mayi², Sachin A. Shah³

¹Associate Professor, ²Assistant Professor, ³Professor and Head, Department of Orthopaedics, KBN Institute of Medical Sciences, Gulbarga, Karnataka, India

Received: 01 February 2017

Revised: 20 February 2017

Accepted: 25 February 2017

*Correspondence:

Dr. M. A. Q. Ansari,

E-mail: dransari.ortho@yahoo.co.in

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Injuries to the mid tarsal joints usually occur in the form of various combinations such as fracture, fracture subluxation, and fracture dislocation. Dislocations of navicular without fracture are rare injuries, minimal literatures exist, which describe the probable mechanism of injury and optimal treatment.

Methods: Four patients with complete dislocation of navicular without fracture presented to us following a history of trauma. The diagnosis was confirmed by radiology and further details were studied by CT scans. One injury was open and the rest were closed. One had associated fracture of talus and two had metatarsal fracture and one was purely isolated navicular dislocation without any associated injury. All were initially stabilized in a below knee plaster of paris slab and foot end elevated. All were successfully treated surgically under spinal anesthesia with open reduction and internal fixation with Kirschner wires through a dorsomedial approach. Postoperative immobilization was continued for twelve weeks then gradual mobilization begun followed by physiotherapy.

Results: All patients had good clinical results with two patients resuming their work within twelve weeks and the one with open wound took twenty weeks for resuming his original work. One with associated talar fracture later had to undergo subtalar arthrodesis for pain in the foot while weight bearing after one year of surgery for navicular dislocation.

Conclusions: Open reduction and internal fixation with Kirschner wire is an effective way of managing patients with complete dislocation of tarsal navicular for early resuming of the functions and return to work.

Keywords: Mid tarsal injuries, Navicular dislocation, Talo-navicular arthrodesis

INTRODUCTION

Tarsal navicular is strategically located in the uppermost portion of the medial longitudinal arch of the foot, hence plays a major role in weight bearing during ambulation. It acts as the keystone for vertical stress on the arch. Multiple deforming forces act on the navicular during various sporting and dancing activities or in high energy injuries resulting in varied degrees of fracture, subluxation or dislocation involving tarsus and metatarsus. Pure navicular dislocation is a very rare injury with only few cases reported.¹⁻⁶ Because of this rarity, its mechanism of injury is poorly understood and its optimum treatment plan could not be worked out.

Most of the cases are associated with other injuries either bony or ligamentous.⁷ Few are treated with closed reduction while other with open reduction and Kirschner wire fixation.

METHODS

This is a prospective clinical study of four rare patients who presented to us in KBN teaching and general hospital during the period from April 2013 to September 2016, with diagnosis of complete dislocation of navicular bone without fracture. All had history of significant trauma. Patients presented with pain and swelling in the foot. Clinical examination revealed swelling over the dor-

somedial aspect of the foot as given in Figure 1 and that the swelling was bony. Movements of the foot were restricted because of severe pain. Weight bearing was not possible in all the patients. One patient had history of diabetes and was on anti-diabetic therapy with insulin and oral hypoglycemics for more than ten years.



Figure 1: Clinical appearance of injury.

Inclusion criteria were all patients who were diagnosed as complete dislocation of tarsal navicular after the radiological examination. Pathological fractures, partial dislocation of navicular and fracture-dislocation of navicular were not included in the study.

Investigation

The radiographs showed complete dislocation of navicular without fracture. Figure 2 shows lateral radiograph with gap between the talus and the medial cuneiform. The navicular lays superomedial to the head of the talus. Figure 3 is the CT scan of the foot which showed that there was no fracture of navicular or other tarsal bones and confirmed the diagnosis.



Figure 2: Preoperative X-ray showing displaced navicular.



Figure 3: Preoperative CT scan showing dislocated navicular.



Figure 4: Peroperative displaced navicular.



Figure 5: Postoperative X-ray showing navicular in place with K-wires.

Management

The joint was approached through a dorsomedial approach to find that the navicular was displaced completely and was not fractured as seen in Figure 4. It was denuded of its articular cartilage and was reduced in its anatomical position, fixed in place with two Kirschner wires. Wound was closed in layers after hemostasis, and ankle immobilized in below knee posterior slab.

Follow up

Postoperative radiographs as in Figure 5 shows well reduced navicular held in position with two Kirschner wires. Sutures were removed at two weeks and immobilization of ankle and foot was continued for three months and gradual weight bearing was then started along with physiotherapy. Patients were evaluated based on presence or absence of mid foot pain, range of motion at ankle and weight bearing capacity.

RESULTS

The demographic profile of the patients is depicted in Table 1. Mean age of the patients was 40 years. 75% of patients were male and 25% were female. The mechanism of injury was abduction-pronation in 75% of patients and the rest has direct injury.

Table 2 shows the pattern of injury, and associated injuries are presented in Figure 6. All the patients had clinically good results at follow up of twenty weeks. All the patients had mid foot pain till twelve to sixteen

weeks. The patient with open dislocation had difficulty in wound healing. One had persistent pain over midfoot but started weight bearing at eighteen weeks.

Table 1: Demographic profile of patients.

Age (years)	Male (%)	Female (%)	Total (%)
30-40	02 (50%)	00 (00%)	02 (50%)
40-50	01 (25%)	01 (25%)	02 (50%)
Total	03 (75%)	01 (25%)	04 (100%)

Table 2: Injury pattern (type of injury and side involved).

Side affected	Closed (%)	Open (%)	Total (%)
Right	02 (50%)	01 (25%)	03 (75%)
Left	01 (25%)	00 (00%)	01 (25%)
Total	03 (75%)	01 (25%)	04 (100%)

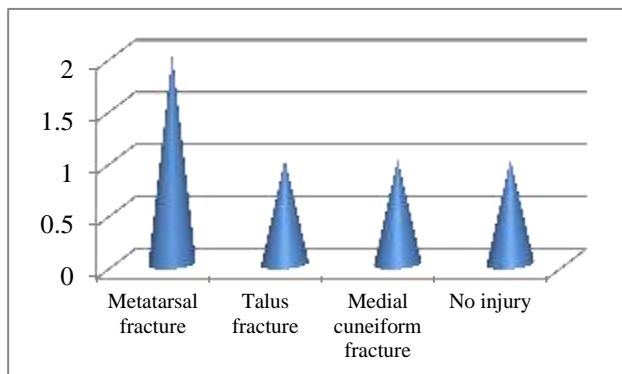


Figure 6: Associated injuries.

Complications

One patient (25%) developed subtalar arthritis with continuous pain over foot while walking and had to undergo subtalar arthrodesis after one year.

DISCUSSION

The tarsal scaphoid is a boat-shaped bone. It articulates distally with the medial, intermediate and lateral cuneiforms. Its proximal articulation with the talar head, the talonavicular joint has the greatest range of motion. The calcaneocuboid joint along with the talonavicular joint forms the transverse tarsal joint or the Chopart's joint, which allows motion of the forefoot on the hindfoot. The bones of the midfoot fit snugly to one another and are shaped to form transverse and longitudinal arches. The navicular is the keystone of the medial longitudinal arch, and is rigidly stabilized by an extensive network of dorsal and plantar ligaments.⁸ The rarity of this injury can be attributed to this rigid bony and ligamentous support surrounding the navicular, which usually undergoes fracture and dislocation rather

than pure dislocation.¹ Since the foot is composed of two longitudinal columns, the lateral and the medial, each adding to the stability of the other, there must be break in both columns for the navicular to dislocate completely without fracture.

The blood supply of the navicular comes from small branches of the posterior tibial and dorsalis pedis arteries. The proximal and distal portions of the navicular are covered by articular cartilage and the blood supply enters both medially and laterally. The central third portion is therefore relatively avascular. When devoid of surrounding soft tissues, as in case of complete dislocation, it is prone for avascular necrosis.

Mechanism of injury

Due to the complexity of the mid tarsal and tarso-metatarsal joint complex the exact mechanism of injury is often not known particularly when there are multiple deforming forces present, as in high energy injuries.^{2,9} Sports and activities that have a relatively high risk of navicular injury include those involving jumping and sprinting - basketball, soccer, football, rugby; Ballet and other dancing activities, gymnastics; biomechanical abnormality and military training.

Classification

High energy injuries are a result of motor vehicle collisions, falls from a height or a crushing injury. Low energy injuries are those due to twisting injuries in athletes. These injuries can also be classified as direct or indirect injuries. Medial TCN dislocations are often called as "acquired clubfoot" (because of their appearance) or as "basketball foot" (a term coined by Graham in 1964), since many of these injuries are often with associated sport injuries, particularly basketball. Lateral TCN dislocations are often called as "acquired flatfoot".

Clinical examination

The clinical symptoms and signs of midfoot injuries can vary and be slight especially following spontaneous reduction of dislocations preventing early diagnosis. This can often be the case in athletic injuries and in the elderly where the injury mechanism is not particularly of high energy. Swelling over dorsomedial aspect of foot, tenderness at the "N spot," defined as the proximal dorsal portion of the navicular and pain with active inversion and passive eversion of foot. Examination under anaesthesia and stressing the midfoot with an abduction and pronation stress test may reveal instability.¹⁰

Investigations

For all midfoot injuries standard AP, lateral and oblique radiographs are obtained. CT scan is useful for making and confirming the diagnosis of navicular fractures. It

helps to more precisely define the location and extent of the fracture, the amount of displacement and relative positions of other tarsal bones. Magnetic resonance imaging (MRI) remains modality of choice for diagnosing ligamentous injury and vascular insult to navicular.¹¹

Management

The main aim of treatment is early stable anatomical reduction. Anatomic reduction can be achieved via open or closed means. Preservation of the longitudinal arch is necessary for a good clinical outcome. Early reduction reduces the risk of vascular compromise. If the navicular is stable, then treatment includes a non-weight-bearing cast for 6 weeks. If the navicular is unstable, then internal fixation is required. Fixation method may vary from using a screw, plate, Kirschner wire or external fixator. The concern with the use of K wire fixation is that for the period of time fixation needs to remain in-situ they can loosen and become infected. K-wire was used in our patients but none became infected. After 6 weeks of not bearing weight on the injured foot, the patient is assessed for pain at the N spot. If the patient is free from pain, a gradual return to normal activity is begun in a stepwise fashion over next 6 weeks. In case of persistent pain at the navicular, a custom-moulded orthotic with longitudinal and transverse arch support may be prescribed to help relieve stress on the navicular.

Functional outcome regarding pain, in long term follow up appears to be better with primary arthrodesis. Primary arthrodesis reduces the need for subsequent re-operation (as in one case) when compared to those patients receiving internal fixation.

Complications

Prolonged disability due to persistent pain at navicular, stiffness of midfoot, nonunion of associated fracture, avascular necrosis of navicular, deformity of the foot, posttraumatic arthritis. Some of these complications may require a secondary surgical procedure in the form of arthrodesis or excision of the navicular.

CONCLUSION

Open reduction and internal fixation with Kirschner wire is an effective way of managing patients with this rare injury of complete dislocation of tarsal scaphoid with good clinical outcome and early restoration of the function.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Vaishya R, Patrick JH. Isolated dorsal fracture dislocation of the tarsal navicular. *Injury*. 1991;22:47-8.
2. Pathria MN, Rosenstein A, Bjorkengren AG, Gershuni D, Resnick D. Isolated dislocation of the tarsal navicular: a case report. *Foot Ankle*. 1988;9:146-9.
3. Freund KG. Isolated dislocation of the tarsal navicular. *Injury*. 1989;20:117-8.
4. Hooper G, Hughes S. Midfoot and navicular injuries. In: Helal B, Wilson D, editors. *The Foot*. Edinburgh, etc. Churchill Livingstone; 1988: 932-943.
5. Davis AT, Dann A, Kuldjanov D. Complete medial dislocation of the tarsal navicular without fracture: report of a rare injury. *J Foot Ankle Surg*. 2013;52(3):393-6.
6. Mathesul AA, Sonawane DV, Chouhan VK. Isolated tarsal navicular fracture dislocation: a case report. *Foot Ankle Spec*. 2012;5(3):185-7.
7. Dhillon MS, Nagi ON. Total dislocations of the navicular: are they ever isolated injuries? *J Bone Joint Surg Br*. 1999;81(5):881-5.
8. Early JS, Hansen ST Jr. Midfoot and navicular injuries. In: Helal B, Rowley DI, Cracchiolo A III, Myerson M, editors. *Surgery of disorders of the foot and ankle*. London: Martin Dunitz; 1996: 731-747.
9. Dixon JH. Isolated dislocation of the tarsal navicular (letter). *Injury*. 1979;10:251.
10. Myerson MS. The diagnosis and treatment of injury to the tarsometatarsal joint complex. *J Bone Jt Surg*. 1999;81:756-63.
11. Preidler KW, Peicha G, Lajtai G, Seibert FJ, Fock C, Szolar DM, et al. Conventional radiography, CT, and MR imaging in patients with hyperflexion injuries of the foot: diagnostic accuracy in the detection of bony and ligamentous changes. *Am J Roentgenol*. 1999;173:1673-7.

Cite this article as: Ansari MAQ, Mayi S, Shah SA. Management of complete dislocation of tarsal scaphoid without fracture. *Int J Res Orthop* 2017;3:371-4.