Case Report
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Closed dislocation of Navicular Bone without Fracture - a Case Report

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Abstract

Closed dislocation of navicular without fracture is a very rare injury and very few cases have been reported till now. It has been claimed that navicular dislocation without fracture is an anatomical impossibility.

We are reporting a case of this uncommon dislocation with associated fracture shaft of tibia with fracture anterior lip of calcaneum. The patient was treated with open reduction and K wire fixation for navicular dislocation and interlocking nail for tibial fracture.

At six month of follow up the tibial shaft fracture had united and patient was able to walk without support with slight pain on the dorsal aspect of foot. Movements at ankle joint were comparable to the other side.

To our knowledge no such case of closed isolated navicular dislocation and associated tibial shaft fracture has been reported in the literature.

Key words : Trauma, Navicular, Foot.

Introduction

Closed dislocation of navicular bone without fracture in foot is a very rare injury and very few cases have been reported in the literature [1]. Isolated dislocation of navicular without fracture was reported by Iaralov-Iarialints va in 1955 [2], Dixon in 1979 [3], Pathria in 1988 [4] and Freund KG in 1989 [5]. The navicular is bound firmly by supporting bones, strong dorsal and plantar ligaments and has a recessed position. Navicular fractures are much more common then dislocation and it has been claimed that navicular dislocation without fracture is an anatomical impossibility. Dhillon et al [1] reported 6 cases of navicular dislocation in which one case had excellent result and two cases developed avascular necrosis. Wilson has stated that even fractures of the tarsal navicular are rare and represented only 0.26 % of all injuries [6]. Most common mechanism is said to be an abduction/pronation injury causing a mid tarsal dislocation which on spontaneous reduction may dislocate the navicular medially.

Here we are reporting a case of closed navicular bone dislocation without fracture with associated lower one third tibial fractures with fracture of anterior calcaneum. To our knowledge no such case has been previously reported in the literature.

Case Report

A 22 year male was seen at emergency department at our hospital after an injury to his right leg and foot due to road traffic accident. Patient was unable to bear weight followed by severe pain and swelling in the leg and foot. On examination there was severe swelling, tenderness and deformity localised to the dorsomedial aspect of the foot and lower one third of the leg. There was no neurovascular deficit. Radiological investigation showed dislocation of navicular bone without fracture with associated fracture shaft of middle third tibia with fracture anterior lip of calcaneum (Figs 1 and 2).

A 2 stage surgery was planned, an emergency surgery to reduce tarsal navicular to prevent impending skin

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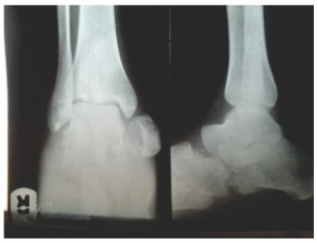

Figure 1: Xray(rt) foot AP and lateral view showing isolated dislocation of navicular bone

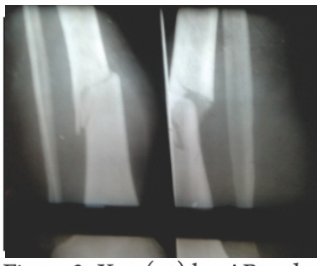

Figure 2: Xray(rt) leg AP and lateral view showing isolated fracture shaft of tibia middle third

Figure 3: X ray showing reduced navicular (open reduction and internal fixation by k wire)

Figure 4: Post op x ray after tibial interlock

Figure 5: Follow up x ray after one month

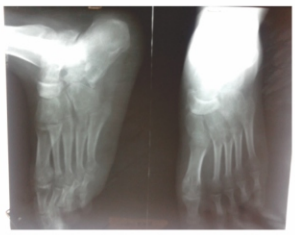

Figure 6: Follow up x ray after three and half month

Figure 7: At three and half month follow up foot in full planter flexion

Figure 8: Follow up x ray after four and half month

pressure necrosis from dislocated bone in foot and a later surgery for tibial shaft fracure. Closed reduction of navicular was attempted but it failed and it was decided to perform an open reduction and internal fixation for the same. The operation was performed under spinal anaesthesia with a tourniquet. A curvilinear incision on dorsomedial aspect of foot was used for approach. After skin incision soft tissue dissection was done to expose the dislocated bone preserving its soft tissue and muscle attachment. Navicular bone was found dislocated medially without fracture. The empty space between talus and cuneiform was cleared off all soft tissues and debris. Lateral and plantar stress was applied to the forefoot to open up the gap and reduction of the navicular was done. After reduction position was checked with the help of image intensifier which was found to be acceptable and stable. 3 K wires were used to fix the reduced navicular and to prevent any further chances of subluxation or dislocation. K wires were passed from cuneiform through navicular to talus and calcaneum (Fig.3). After wound closure a padded above-knee slab was applied in neutral position. Postoperative x ray show satisfactory reduction and fixation. After 12 days stitches were removed and CRIF by tibial interlock done and above knee slab applied for immobilisation (Fig.4). Patient was discharged and regularly followed up at monthly interval with instruction of non weight bearing (Figs 5, 6 and 7).

At two month follow up, K wire was removed and partial weight bearing was allowed. At four and a half month of follow up patient was able to walk without support with slight pain on and off on dorsal aspect of the foot. At ankle joint range of motion was comparable to the other side (Fig 8, 9).

Discussion

For the navicular to be dislocated in isolation there must be signifcant disruption of medial and lateral colums of the foot. Because of support from the surrounding bones and envelope of strong ligaments around it, navicular dislocation especially closed and isolated is very rare.

Berman in 1924 reported a case of dislocation of the navicular bone inferomedially in a 17 year old male child due to animal hoof injury which was treated by closed manipulation.and plaster cast application [7]. In 1979

Dixon reported a case in which he had to perform an open reduction and plaster cast application for a 52 year old male patient [3]. Pathria et al [4] tried close reduction of navicular in 27 year male but failed and subsequently an open reduction and k wire fixation was done. Freund also reported a similar case in a 43 year old male due to road traffic accident and treated him by closed reduction and kirschner wire fixation [5].

Dhillon and Nagi [1] studied six patients between 1990 and 1997 in whom the navicular had dislocated from talonavicular as well as naviculocuneiform joints without fracture of the body. All the cases were treated by open reduction and k wire fixation. Out of these one patient died, one was lost to follow up and only one patient gave excellent results, Out of the remaining three patients, one had post operative pain due to residual navicular subluxation and two had other complications like avascular necrosis and stiff foot.

Many of the cases had associated lateral column injuries and it should always be evaluated for instability and fixed if required. The mechanism of these injuries is still not very clear but an abduction/pronation injury causing a midtarsal dislocation, and a spontaneous reduction causing a medial dislocation of the navicular is said to be the most common [1].

Rao et al [8] reported a case of isolated open dislocation of navicular in 85 yrs F treated by open reduction and arthrodesis of the naviculocuneiform and calcaneocuboid joints. Pt was asymptomatic and had nearly normal foot function at 2 yrs of follow up.

In our case there was closed dislocation of navicular without fracture of the body with associated fracture of anterior lip of calcaneum and mid shaft tibial fracture. Such an injury complex has not been reported earlier and it was very difficult to ascertain the injury mechanism. The navicular was reduced and fixed with K wires. In our follow up of six months patient had mild residual pain on dorsum of foot but there were no signs of avascular necrosis on radiographs.

Most commonly used classification for fracture of tarsal navicular include four types, fracture of tuberosity, fracture of dorsal lip, fracture of body, and stress fracture. Eichenholtz and Levine [9] reviewed the relevant literature and reported avulsion fractures of medial tuberosity and dorsal cortex most frequent and fractures of the body unusual.

Sangeorzan et al [10] classified body fractures on basis of the direction of fracture line, pattern of disruption of surrounding joints and direction of displacement of foot. In type -1 injury fracture line is in the coronal plane and there is no angulation of the fore part of foot, In type- 2 fracture primary fracture line is dorsal-lateral to planter-medial,and the major fragment and fore part of foot displaed medially, In type -3 injury there is comminuted fracture in sagittal plane of the body of tarsal navicular and the fore part of foot is lateraly displaced.

Anatomical reduction using closed or open methods is universally recommended for displaced navicular fractures. When the patient is seen early, close reduction with fixation for six to eight weeks is recommended by Wilson [6]. If this cannot be achieved or there is considerable damage to the articular surfaces fusion of navicular cuneiform joint [9] and talonavicular joint or both of these has been proposed [11]. Other procedure recommended is triple arthrodesis combined with navicular-cuneiform fusion or partial or complete excision of navicular with or without bone graft replacement. Result of triple arthrodesis plus arthrodesis of the cuneonavicular joints are superior to the result obtained after fusion of only the involved joints [12].

Summary

In our case we did open reduction and internal fixation by k wire and found satisfactory reduction. Very few cases have been reported till now. Prognosis for these injuries of the navicular body is often poor. To our knowledge no such cases has been reported in the literature having dislocation of navicular without fracture of body with associated fracture shaft of tibia .At six months of follow up there is only slight pain on walking is present. Long term follow up is required to look for late complication like avascular necrosis, traumatic arthritis which have been reported in the earlier cases. Because of the rarity of the cases no fixed protocol for treatment of dislocation of the navicular has been recomended and larger studies are required for the same.

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