Original article:

A Prospective Study on Fractured Tarsal Navicular Bone in a Tertiary Care Teaching Hospital

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Abstract

Introduction: Tarsal bone injuries are most often incurred during motor vehicle collisions and other high-energy trauma. Although uncommon, they are being seen with increasing frequency. The navicular is the most frequently injured tarsal bone. In the acute setting, avulsion, tuberosity and body fractures and comminuted fracture-dislocations can occur. It is important for orthopaedic surgeons to consider this injury when patients present with vague symptoms in the midfoot as complications such as arthritis and osteonecrosis can occur.

Material & Methods: Sixty cases each of which fractured cases in age group 21- >40 were include in this study. Study was carried out in the Departments of Orthopaedics, Bhaskar Medical College and General Hospital, Yenka Pally Village, R.R Distt., Andhra Pradesh. The duration of this study was 2 years.

Results: In the present study, 60 cases were included each of which belong to fractured categories. Among the 60 patients 73.4% were males and 26.7% were females. From the 60 cases 53.4% were 21-30 age group followed by 33.4% belong to 31-40 age group and 13.4% from the >40 age group .In our study, 60% cases affected by right side followed by 30% left and 10% bilateral. The mechanism of injuries mostly (66.6%) rode side accidently followed by sports activity (23.4%) and excessive work (10%).

Conclusions: Navicular injuries are mostly seen in sportspersons. Management of the navicular fracture by conservatively or surgically, depend on the fracture. Early diagnosis and proper treatment in crucial as delay in management is associated with complications.

Keywords: Navicular Injuries, RTA, Un-Displaced, Fracture.

INTRODUCTION

Tarsal bone injuries are most often incurred during motor vehicle collisions and other high-energy trauma**.** Although uncommon, they are being seen with increasing frequency. This trend is attributed to enhancements in automobile safety that have improved the protection of the abdomen, head, and neck but have left the feet unprotected in the pedal box area. Despite the adverse impact of foot injuries on overall outcome and long-term function in patients with polytrauma, the diagnosis sometimes is not made or is made on a delayed basis as treating physicians focus on more obvious or life-threatening injuries.[1-5] The navicular is the most frequently injured tarsal bone.[3] In the acute setting, avulsion, tuberosity and body fractures, and comminuted fracture-dislocations can occur. Stress fractures of the navicular represent more chronic,

low-energy injuries. They often present with an insidious onset of midfoot pain after an increase in the duration or intensity of exercise or other activity. It is important for orthopaedic surgeons to consider this injury when patients present with vague symptoms in the midfoot as complications such as arthritis and osteonecrosis can occur.[6]

MATERIALS & METHODS

Study Population: Sixty cases each of which fractured cases in age group 21- >40 were include in this study.

Study Area: Study was carried out in the Departments of Orthopaedics Bhaskar Medical College, Yenka Pally Village, R.R Distt., Andhra Pradesh, India.

Study Duration: The duration of this study was 2 years.

Sampling Technique & Data Collection: The detailed history was noted from the inpatient files of the admitted patients. Particularly the history of involvement in athletic sports and twisting injuries was searched for Symptoms like pain in the midfoot increasing with push-off and inability to bear any weight was looked into. A detailed clinical examination was noted from the hospital record. Presence of substantial swelling of the dorsal and medial aspects of the midfoot and presence of any open wound and whether navicular tenderness was present at the time of presentation was noted. Imaging reports like X-Ray foot antero-posterior and lateral view and 3D CT (if done) was reviewed with the help of a senior radiologist. The fractures were classified into type- 1 (body injury which was characterized by a transverse fracture line in the coronal plane), type-2 fracture by a primary fracture line extending dorsal-lateral to plantar-medial, with the major fragment and forefoot displaced medially) and type-3 injury (comminuted fracture).

Inclusion Criteria

1. All the patients above 18 years of age and diagnosed to be having navicular fracture on the basis of imaging.
2. Patient whose follow up record of 2 years could be reviewed.
3. In cases of patients who didn't come for follow up for 2 years but they could be contacted and their outcome could be reliably found out.

Exclusion Criteria

1. Patients less than 18 years of age.
2. Patients who were lost to follow up in less than 2 years after discharge from hospital.
3. Patients whose 2 years follow up record was not present, and they could not be contacted to know outcome.

Data Analysis: Data were analyzed by using Microsoft excel

RESULTS

In the present study, 60 cases were included each of which belong to fractured categories. Among the 60 patients 73.4% were males and 26.7% were females. From the 60 cases 53.4% were 21-30 age group followed by 33.4% belong to 31-40 age group and 13.4% from the >40 age group .In our study, 60% cases affected by right side followed by 30% left and 10% bilateral. The mechanism of injuries mostly (66.6%) rode side accidently followed by sports activity (23.4%) and excessive work (10%).In the 60 cases, 40% un-displaced fracture followed by displaced(20%), small avulsion(20%), Comminuted fracture(10%), Bilateral stress fracture(10%). Un-Displaced and Small avulsion types of fracture treated by the weight-bearing short leg cast, displaced and comminuted fracture manage by Open reduction and internal fixation and bilateral stress fracture treated with the non-weight- bearing in a short leg cast.

Table 1: Gender wise distribution

Gender	No. of patients	Percentage
Male	44	73.4%
Female	16	26.7%
Total	60	100%

Table 2: Age wise distribution

Age	No. of patients	Percentage
21-30	32	53.4%
31-40	20	33.4%
>40	8	13.4%
Total	60	100%

P value = 0.91,* Not significant

Table 3: Side affected in cases

Side	Number of patients	Percentage
Right	36	60%
Left	18	30%
Bilateral	6	10%
Total	60	100%

Table 4: Mechanism of the injury in affected sides

Mechanism of injury	Number of patients	Percentage
RTA	40	66.6%
Due to sports activity	14	23.4%
Due to labor work	6	10%
Total	60	100%

Table 5: Fracture distribution according to types

Fracture type	Number of patients	Percentage
Un-Displaced	24	40%
Displaced	12	20%
Small avulsion	12	20%
Comminuted fracture	6	10%
Bilateral stress fracture	6	10%
Total	60	100%

Table 6: Management of fracture

Fracture type	Management type
Un-Displaced	weight-bearing short legcast
Displaced	Open reduction and internal fixation
Small avulsion	weight-bearing short leg cast
Comminuted fracture	Open reduction and internal fixation
Bilateral stress fracture	Non-weight- bearing in a short leg cast

DISCUSSION

As This navicular fractures study of 60 cases in the department of orthopedics Bhaskar Medical College, Yenka Pally Village, R.R Distt., Andhra Pradesh. Among the 60 patients 73.4% were males and 26.7% were females. From the 60 cases 53.4% were 21-30 age group followed by 33.4% belong to 31-40 age group and 13.4% from the >40 age group. This study had similarity with the anther studies conducted by Coulibaly MO et al and Maquirriain J et al[7] Most of the studies have found mass of mans but few studies reported majority of the females which were not similar to our study.[8]

Navicular fractures were found in adults male who were active . This types of findings reported were in accordance with other study who have reported cases of navicular fractures in young

athletes youngest being a girl of 13-year-old girl.[9] Authors suggested, that the tarsal navicular stress fractures should be considered in any patient presenting with vague, ill-defined foot especially if the patient is a young athlete. Similar findings were reported by Bennell KL et al.[10] In the present study, mechanism of injuries mostly (66.6%) rode side accidently followed by sports activity (23.4%) and excessive work (10%).This study to similar to another study in which found that non-specific symptomatology and paucity of physical signs the average delay in the diagnosis is approximately 7 months or even more.[11,12] In our study from the 60 cases, 40% un-displaced fracture followed by displaced(20%), small avulsion(20%), Comminuted fracture(10%), Bilateral stress fracture(10%). Un-Displaced and Small avulsion types of fracture treated by the weight-bearing short leg cast, displaced and comminuted fracture manage by Open reduction and internal fixation and bilateral stress fracture treated with the non-weight- bearing in a short leg cast. Rosenbaum AJ et al in their review of navicular bone fractures found that almost 50% of the fractures affecting navicular bone are avulsion fractures. Other authors reported that , treatment has excellent results in cases of avulsion injuries and non-displaced body fractures. For other fractures like displaced and comminuted fractures. Common complications in the patients with navicular fractures are reported to this study the males were predominantly affected be pain, stiffness, post-traumatic arthritis, avascular necrosis, nonunion, and hindfoot deformity.[13]

CONCLUSION

Navicular injuries are mostly seen in sportspersons. Management of the navicular fracture by conservatively or surgically, depend on the fracture. Early diagnosis and proper treatment in crucial as delay in management is associated with complications.

REFERENCES

1. Richter M, Wippermann B, Krettek C, Schratt HE, Hufner T, Therman H. Fractures and fracture dislocations of the midfoot: occurrence, causes and long-term results. Foot Ankle Int. 2001 May;22(5):392-8.
2. Richter M, Thermann H, Wippermann B, Otte D, Schratt HE, Tscherne H. Foot fractures in restrained front seat car occupants: a long-term study over twenty-three years. J Orthop Trauma. 2001 May;15(4):287-93.
3. Evans J, Beingessner DM, Agel J, Benirschke SK. Minifragment plate fixation of high-energy navicular body fractures. Foot Ankle Int. 2011 May;32(5):S485-92.

4. Richter M, Thermann H, von Rheinbaben H, Schratt E, Otte D, Zwipp H, Tscherne H. [Fractures of the foot region of car drivers and passengers. Occurrence, causes and long-term results] [German]. Unfallchirurg. 1999 Jun;102 (6):429-33.
5. Eichenholtz SN, Levine DB. Fractures of the tarsal navicular bone. Clin Orthop Relat Res. 1964 May-Jun;34(34):142-57.
6. Torg JS, Pavlov H, Cooley LH, Bryant MH, Arnoczky SP, Bergfeld J, Hunter LY. Stress fractures of the tarsal navicular. A retrospective review of twenty-one cases. J Bone Joint Surg Am. 1982 Jun;64(5):700-12.
7. Maquirriain J, Ghisi JP. The incidence and distribution of stress fractures in elite tennis players. British Journal of Sports Medicine. 2006;40(5):454-459.
8. Saxena A, Fullem B, Hannaford D. Results of treatment of 22 navicular stress fractures and a new proposed radiographic classification system. J Foot Ankle Surg. 2000 Mar-Apr;39(2):96-103.
9. Ostlie DK, Simons SM. Tarsal navicular stress fracture in a young athlete: case report with clinical, radiologic, and pathophysiologic correlations. J Am Board Fam Pract. 2001 Sep-Oct;14(5):381-5.
10. Bennell KL, Malcolm SA, Thomas SA, et al. The incidence and distribution of stress fractures in competitive track and field athletes: a twelve-month prospective study.Am JSportsMed 1996;24:211–7.
11. de Clercq PF, Bevernage BD, Leemrijse T. Stress fracture of the navicular bone. Acta Orthop Belg. 2008 Dec;74(6):725- 34.
12. Torg JS, Pavlov H, Cooley LH, Bryant MH, Arnoczky SP, Bergfeld J, Hunter LY Torg JS, Pavlov H, Cooley LH, Bryant MH, Arnoczky SP, Bergfeld J, Hunter LY Stress fractures of the tarsal navicular. A retrospective review of twenty-one cases. J Bone Joint Surg Am. 1982 Jun; 64(5):700-12.
13. Mann JA, Pedowitz DI. Evaluation and treatment of navicular stress fractures, including nonunions, revision surgery, and persistent pain after treatment. Foot Ankle Clin. 2009 Jun;14(2):187-204.