

Surgical Outcomes of Kinder's Procedure in Symptomatic Accessory Navicular Bone Pain- A Case Series and Literature Review

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Abstract:

Accessory Navicular bone is a normal variant in 12% of population. Majority of patients are asymptomatic. Symptomatic patients respond to conservative treatment well. But a little group of patients needed surgical correction. The main purpose of this study is to determine the Efficacy of Kinder's Procedure. Twelve patients were taken up for the surgery who were followed up for a period of 6 months is discussed in this case series. Patients who undergo Kinder's Procedure for Symptomatic Accessory Navicular bone had good results and improved in American Orthopaedic Foot and Ankle Score. It is a reliable procedure which can be safely done in those selective subjects.

Keywords: Accessory Navicular, Flat foot, Kinder's Procedure, AOFAS score.

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Introduction

Accessory Navicular is a normal variant seen in up to 12 % of population. Majority of Patient are asymptomatic. Most commonly symptomatic in females.

Navicular Bone has a single centre of ossification. Ossifies at age 3 in girls and 5 in boys and fuses at 13 years of age. An accessory navicular is a normal

variant form which the Tuberosity of the navicular develops from a secondary ossification centre that fails to unite during childhood. The accessory navicular does not begin to ossify prior to age 8.

Tibialis Posterior inserts onto the tuberosity (medial) of the navicular bone. Innervated by tibial nerve.

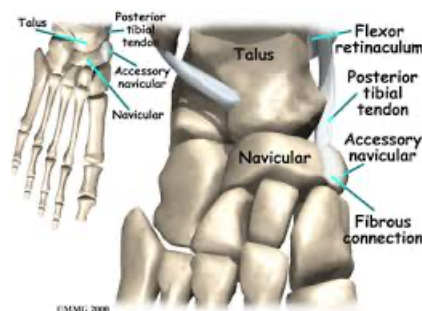


Figure 1:

Classification [4]

Radiologic Classification

Type 1: Sesamoid Bone in the substance of the Tibialis Posterior Insertion.

Type 2: Separated Accessory Bone attached to native navicular via synchondrosis.

Type 3: Complete bony enlargement.

Clinical Presentation – Majority of the patients are asymptomatic as it occurs as a normal variant.



Figure 2:

Pain develops as the alignment becomes abnormal. Medial Arch pain is the most common presentation often worse with overuse. It's due to repeated Micro fracture at the synchondrosis or from the inflammation of the Posterior tibialis tendon insertion. Patients may have a visible swelling in the medial and dorsal aspect of foot.

Medial foot tenderness (firm and tender at the medial and plantar aspect of the navicular bone)

The investigations should include Radiographs AP, Lateral and External Oblique views. It is best seen in external oblique views. The findings include enlargement or accessory bone.

MRI is only needed to rule out other pathologies which cause pain in that region. Blood panel to rule of arthralgia should be included if any Metabolic cause of foot pain is suspected.

Treatment

Non operatively managed with Activity Restriction, Shoe Modification and Non- Narcotic analgesics. It is the first line of treatment. The use of arch supports or pads over the bony prominence may be helpful. A UCBL orthosis may invert the heel during walking and decrease symptoms. Orthotics must offload pressure from the accessory Navicular, or they will exacerbate symptoms.

Most children and adolescents who have a symptomatic accessory tarsal navicular bone

become asymptomatic when they reach skeletal maturity.

When the pain is refractory to activity modification and shoe modification, a short period of Cast immobilization is done.

Operative Management included excision of Accessory Navicular Bone and reattachment of Tibialis Posterior to Native Navicular Bone (Kidner's Procedure)

Material and Methods

This case series consists of 13 cases who had symptomatic Accessory Navicular bone who presented to Cosmopolitan Hospital, Trivandrum OPD.

First patient is a 27 year old dancer who had medial side foot pain since her adolescence. Her pain was so severe and intermittent that she discontinued dancing because of the nature of the recurring foot pain. We evaluated clinically and radiologically with Xray, MRI Scan to rule out other causes of Chronic Foot pain. She was found to have symptomatic Type 2 accessory navicular bone. She was analysed with AOFAS (AMERICAN ORTHOPEDIC FOOT AND ANKLE SCORE) and her score was 48. She had moderate disability as per scoring. The second patient is a 22 year old student, who had medial sided foot pain since 6 months. He had mild to moderate pain on walking, climbing stairs and on jumping. His pain was intermittent. He had severe pain on walking with

toes. Navicular tenderness was present. There was no reduction in Medial arch of the foot. He has been evaluated with X-Ray- which revealed Type 1 Accessory Navicular Bone. AOFAS assessment has been done and it was found to be 58. The third patient is a 23 year old Male who is an IT professional and who does sports recreationally. He

had moderate to severe pain over the medial aspect of foot. He discontinued his sporting activities for a couple of years because of the symptoms. Clinically and Radiological evaluation showed Type 2 Accessory Navicular bone which is symptomatic. His AOFAS score was 64.

S No	Age	Duration Of Pain	Severity Of Pain	Aofas Score Preop	Aofas Post Op	Complications
1	1	1	1	1	4	1
2	3	2	2	3	4	1
3	2	2	1	3	2	2
4	1	2	2	2	4	1
5	3	1	1	1	4	1
6	1	3	3	3	1	1
7	3	3	1	2	4	1
8	2	3	1	1	1	1
9	2	2	2	3	4	1
10	2	1	2	2	4	1
11	1	3	1	2	4	1
12	3	1	2	2	1	1
13	2	3	1	3	4	1

1	Age	1	<20 Years
		2	20-30 Years
		3	>30 Years
2	Duration of pain	1	< 6 MONTHS
		2	6-12 MONTHS
		3	>12 MONTHS
3	Severity of symptoms	1	Mild (Doesn't Affect ADL)
		2	Moderate (Partly Affects ADL)
		3	Severe (Severely Affects ADL)
4	AOFAS Score Preop	1	> 75-90
		2	65-75
		3	<65 4.>90
5	AOFAS Score Postop	1	> 75-90
		2	65-75
		3	<65 4.>90
6	Complications	1	No Complications
		2	Complications Including Tp Rupture, Infection, Wound Dehiscence, Persistent Foot Pain

All the thirteen patients have been given a conservative treatment regimen for a period of 4-6 weeks. The modalities included were Rest, Footwear modification, Physiotherapy including inverter strengthening and stretching exercises and weight reduction.

All the patients were taken up for Kidnersprocedure, Medial approach to the foot. An incision is made from the distal third of talus to medial cuneiform. Identify the Posterior tibialis and then reflect the tendon (either plantar or dorsal).

The synchondrosis between the accessory navicular and native navicular can typically be identified easily.

Resect accessory navicular (a 1/4" curved osteotome may facilitate the resection) through the synchondrosis. Trim down the body of the navicular (typically with osteotomes and rongeurs) to remove any medial prominences. Resection is typically in line with medial border of the medial cuneiform.

Do not advance the Tibilais Posterior Tendon. The advancement does not enhance the result and increase the downtime and morbidity.

Flat foot deformity correction is not performed concomitantly with the procedure unless the flatfoot is the primary pathology.

The tendon is reattached with Suture achors to the base of native navicular bone. ALL INSIDE Suture

anchor was used in Case 3 alone. Post operatively, patients were put on BK Slab for a period of 4 weeks, then partial weight bearing in initiated, towel crunches and side to side – Streamboats exercises with therabands were started 4-8 weeks

the goal was to improved dorsiflexion and plantar Flexion. After that a normal gait and symmetrical ROM exercises can be obtained. At 4-6 months, return to normal sports activities are encouraged.



Figure 3: Type 3 Accessory Navicular



Figure 1: Medial Approach Forceps Showing Insertion of Tibialis Posterior



Figure 2: intra Operative Picture Showing Metal Suture Anchor with Trimmed Accessory Navicular



Figure 3: Post Operative Lateral View

Results

The mean age of the thirteen subjects were 25.

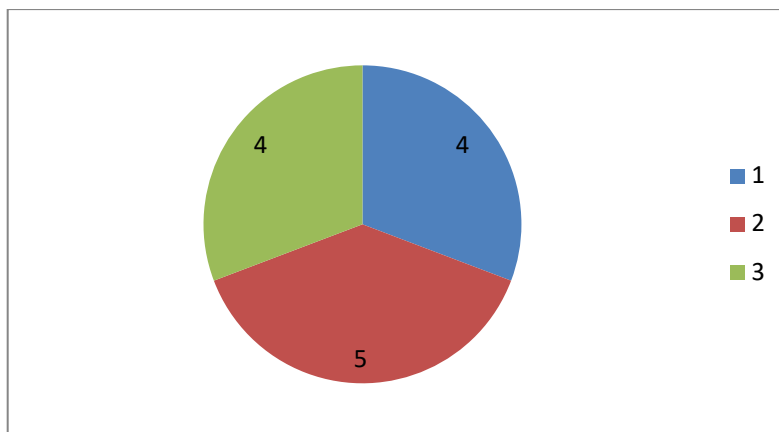


Figure 4: 1. Age Less Than 20 Years 2. 20-30 Years 3. >30 Years

Mean duration of pain was 1 year.

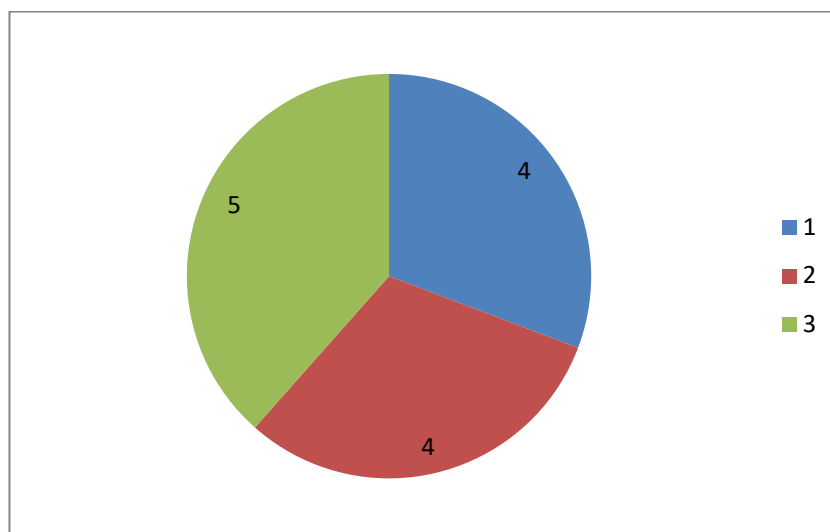


Figure 5: 1- <6 Months 2- 6-12 Months 3->12 Months

All the three patients had moderate to severe pain. Mean preoperative AOFAS score was 72.6 and Mean post Operative AOFAS score was 94.6 which is >95% improvement in the scores

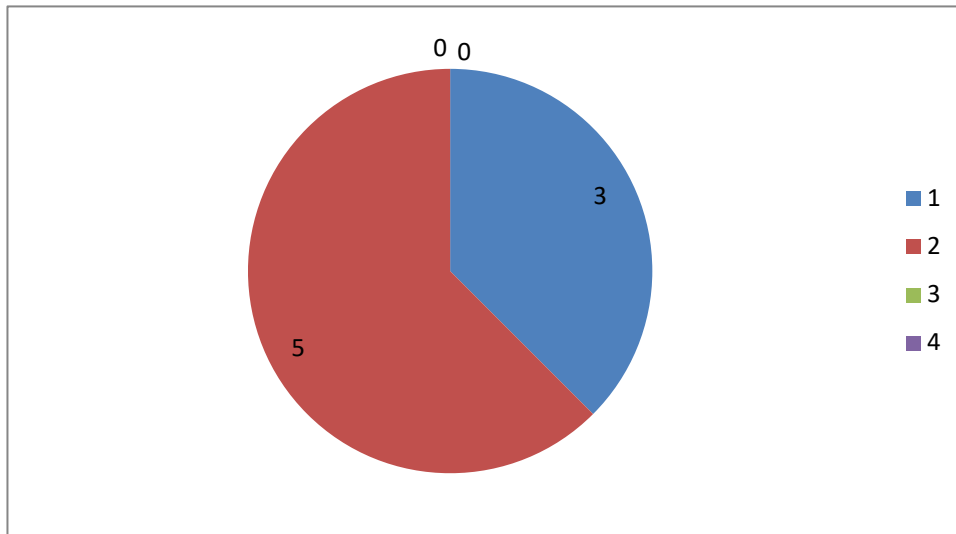


Figure 6: Pre-Op Aofas Score 1. 75-90 2.65-75 3.<65 4.>90

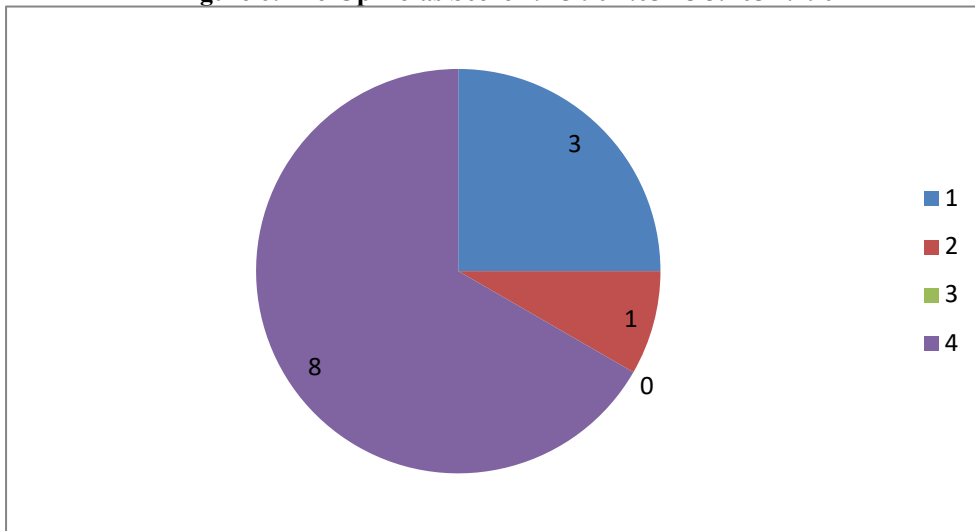


Figure 7: 6 Months Post Op 1. 75-90 2.65-75 3.<65 4.>90

Average duration of follow up was 6 months. 12 out of 13 patients returned to normal sports activities and the other patient was reluctant to do recreational dance. One patient had wound dehiscence with persisting medial arch pain and did not return to sports.

Discussion

The Accessory Navicular bone is one of the most symptomatic bones of the foot. There may be a coexistent flexible flat foot [1]. Accessory navicular is a separate ossification centre for the tuberosity of the navicular that is present approximately 5-14% of the general population [2].

Tibialis Posterior tendon has multiple insertions in the foot with the most significant on the medial

navicular bone.[3] The inheritance of accessory navicular was first reported to occur in an autosomal dominant fashion by McKusick. More recently Kiteretal described the inheritance of accessory navicular in three families to occur in an autosomal dominant pattern with incomplete penetrance. Dwight’s classification includes three categories of accessory navicular bones.

Type 1 account for 30 % of accessory navicular bones [5]. Type 2 accessory navicular is the most common at 60% of accessory navicular bones and is united to the navicular by a cartilaginous or fibro cartilaginous bridge [5]. Type 3 in 10% occurs when secondary ossification centre fuses during adolescence but leaves a very prominent medial projection [5].

A study found two adolescent dancers, one treated operatively and the other treated non operatively, it was found that non-operatively treated patient showed substantial pain relief and return to activities similar to the patient treated operatively. Recent literature has suggested that not all symptomatic accessory naviculars respond similarly to non-operative treatment. A retrospective study by Jegal et al. Found that athletes with symptomatic accessory navicular pain have symptoms that are more refractory to conservative treatment when compared to the general population.

It is well accepted in dance medicine literature that technique faults or compensations due to weakness or limited mobility increase the risk for injury. [6,7,8,9] Dancers frequently compensate for poor hip rotator strength or mobility by increasing torsion below the knee.[6,7,8,9].

It is often difficult to differentiate symptomatic accessory navicular from other aetiologies, such as tibialis posterior tendonitis. Prevalence rates of pesplanus in paediatric population ranging from 4-44%. Literature also suggests that an accessory navicular does not play a role in development of pesplanus, vice versa. In addition, the degree of pesplanus is not associated with severity of symptoms in patients with accessory naviculars[10].

The calcaneal pitch angle in patients with symptomatic accessory navicular was significantly lower than that of normal subjects. An association of pesplanus and symptomatic accessory navicular was shown.[11].

Simple excision of Accessory navicular is another proposed surgery, and when compared to Kidner's procedure, both gave satisfactory results, and both minimally restored medial longitudinal arch.[11]

The modified Kidner procedure is a recent procedure which includes subtalar arthroereisis. This procedure showed significant pain and functional improvement. The deformity correction obtained at surgery was maintained even if the arthroereisis plus was removed. The extra articular plus did not lead to subtalar arthritis [12].

Redirecting the Tibialis posterior tendon has improved the function of symptomatic flat Foot. A modification that appears to improve the final result by increasing the support and fixation of the tendon is reported in the literature [13]. Most of the patients with Accessory navicular bone are asymptomatic, but they can cause pain and functional disability in young active patients. Initial treatment should always include a non-operative regimen for prolonged periods. Patients can have exacerbations and remission of symptoms, most of the patient improves spontaneously.

Conservative therapy focuses on NSAIDs, Footwear modifications, Short Leg casting, Physiotherapy.

Operative treatment is indicated if conservative treatment fails to relieve symptoms. Operative treatment usually involves excision of Accessory Navicular bone with Reattachment of the TP tendon. Kidner suggested more plantar ward insertion of the TP tendon as abnormal insertion can cause painful Flat Foot Deformity.

Conclusion

Accessory Navicular Bone is often an Incidental finding in radiographs of Foot. Symptomatic Patients should be ruled out of other metabolic causes and other causes of Chronic Foot pain. Symptomatic Patients show better results with conservative therapy. A subset of patients who are recalcitrant to conservative therapy needs a Surgical Treatment. Kidner's Procedure provide a Safe and effective treatment for the management of this condition.

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