



## Medial Arch Restoration after Kidner's Procedure with Rerouting of Tibialis Posterior Tendon for Symptomatic Accessory Navicular Presenting with Flexible Flat Feet

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### Abstract

**Aim:** Accessory Navicular is the most important and largest supernumerary bone in the foot. Accessory Navicular have been reported to occur in 0.1% (1 in 1000) with a prevalence 10% to 12%. This entity is usually asymptomatic but when symptomatic its mainly manifest as medial pain in the midfoot, lowering of the arch of the foot, and valgus deformity of the hindfoot. When symptomatic the patients are initially treated conservatively with analgesics and casting. In case of failure of conservative treatment, the patient is treated surgically with Kidner procedure.

**Methodology:** This prospective case series study was carried out at Rehman Medical and Surgical Center Daggar Buner from June 2019 to June 2022. A total of 20 patients with either age or gender were included in the study. Patients with symptomatic accessory navicular presenting with flat feet were subjected to Kidners procedure. All the patients underwent standing lateral radiograph of the foot pre and postoperatively at 6 weeks follow up on which measurement recorded for Calcaneal Pitch Angle and Mearys Angle. Data was recorded and analyzed with SPSS version 20.

**Results:** The preoperative Mearys angle was having a mean of  $15.80 \pm 2.7$  which improved postoperatively at 6 weeks to  $5.85 \pm 2.35$  with a P value of 0.002. The Calcaneal pitch angle preoperatively had a mean of  $7.70 \pm 2.51$  showing a significant improvement postoperatively at 6 weeks to a mean of  $14.00 \pm 2.90$  with a P value of 0.000 leading to restoration of medial arch.

**Conclusion:** Kidners procedure is an effective mean of treatment for patients with symptomatic accessory Navicular presenting with flexible feet.

**Objective:** This study aimed to evaluate medial arch restoration after Kidners procedure in patients with symptomatic Accessory Navicular presenting with flexible flat feet.

**Keywords:** Accessory Navicular; Flatfoot; Medial arch; Posterior tibial tendon; Kidner

### Introduction

Accessory Navicular is the most important and largest supernumerary bone in the foot [1] characterized by an additional ossification versus a bony prominence off the Navicular. The prevalence of accessory Navicular in children is estimated at 10% to 12%. The development of symptoms secondary to the presence of an accessory Navicular have been reported to occur in 0.1% (1 in 1000) of adult patients [1,2]. There is a higher incidence in women and the finding might be bilateral in 50% to 90%. This entity is usually asymptomatic, although populations with medial foot pain have a higher prevalence [3]. The symptomatic AN causes pain in the medial portion of the bone, a decreased range of motion and discomfort with shoe wearing [2,4-6]. Flatfoot with accessory Navicular bone is a common type of flatfoot deformity. When flatfeet with accessory Navicular bone are symptomatic, they mainly manifest as medial pain in the midfoot, lowering of the arch of the foot, and valgus deformity of the hindfoot [2], which causes instability of the subtalar joint, and may cause excessive tension of the posterior tibial tendon leading to flat feet's [1,7-9].

When symptomatic the patients are initially treated conservatively with analgesics and casting [6]. In case of failure of conservative treatment, the patient is treated surgically with Kidner procedure.

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Which involves excision of accessory Navicular and rerouting of tibialis posterior resulting in correction of foot deformity and subsidence of symptoms [1,6,10].

The present study was done to evaluate the value-of Kidner operation, in relieving pain and improving the mechanics of the foot in patients having symptomatic accessory Navicular.

## Methodology

This prospective case series study was carried out at Rehman Medical and Surgical center Daggar Buner from June 2019 to June 2022. A total of 20 patients with either age or gender were included in the study. Written informed consent was taken from all patients that their data will be shared for research purpose.

All patients with symptomatic accessory Navicular were enrolled in the study. In all patient's diagnosis was made by medial bony prominence at the Navicular site, with tenderness at the attachment of tibialis posterior having flat feet. After above clinical findings all patients were subjected to standing AP and LAT radiographs. X-rays were examined for accessory Navicular, talus 1<sup>st</sup> Metatarsal angle (Mearys angle) and calcaneal pitch angle. Those having coexisting foot deformity were excluded from the study.

Mearys angle has normal value of 0 and the convex downward angle showing flat feet deformity was considered significant.

All patients were given explanation regarding the nature of the disease and plan of treatment. The patients underwent kinder procedure which involves excision of the accessory Navicular with rerouting of tibialis posterior tendon followed by 3 weeks postoperative cast.

At 6 weeks follow up standing lateral radiographs were examined for Mearys and Calcaneal pitch angle.

All the data age, gender, Mearys angle and Calcaneal pitch angle were recorded on patient's case sheath and analyzed with SPSS version 20.

## Results

A total of n=20 patients were included in the study with a mean age of  $20.5 \pm 5.04$ . Out of n=20 we had n=15 (75.0%) female patients and n=5 (25.0%) male patients showing a female predominance.

The preoperative Mearys angle (convex downward) measured from standing lateral radiographs in all patients was having a mean of  $15.80 \pm 2.7$ . Postoperatively at 6 weeks on the standing lateral radiograph the Mearys angle was having a mean of  $5.85 \pm 2.35$  showing a significant improvement in flat feet deformity. The person correlation value was 0.651 which shows moderate positive correlation between preoperative and postoperative Mearys angle. The P value turned out to be 0.002 which is less than 0.005 hence significant correlations was observed.

Preoperatively and post operatively at 6 weeks the calcaneal pitch angle was calculated on the standing lateral radiograph. Preoperatively which had a mean of  $7.70 \pm 2.51$  showing a significant improvement postoperatively to a mean of  $14.00 \pm 2.90$  leading to restoration of medial arch. The person correlation value is 0.794 which shows strong positive correlation between Preoperative and Postoperative Calcaneal Pitch angle. The P value turned out to be 0.000 which is less than 0.005 hence significant correlations is observed (Figures 1a-1f and 2) (Tables 1-4).



Figure 1a-1f: Different steps of Kidner procedure.

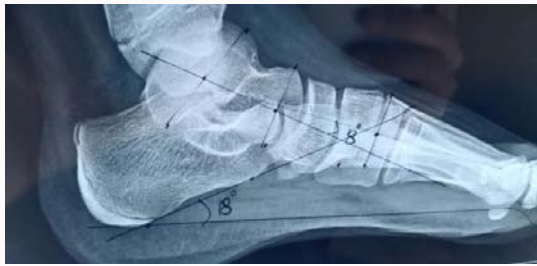


Figure 2: Postoperative different angles.

## Discussion

The navicular bone on the medial side of the foot is important for normal gait and posture. An accessory navicular is usually asymptomatic in majority of cases but trauma such as ankle eversion sprain and high-impact sports such as basketball or football can make it symptomatic with medial side pain and can be confused with a fracture [11]. This minor anomaly alters the suspensory mechanism of the medial arch of the foot, and it is often associated with pes planus [12,13].

Some authors have speculated the role of concomitant posterior tibial tendonitis, pressure inflammation over the bony prominence, ligamentous laxity, trauma to the synchondrosis and alterations in midfoot biomechanics as potential sources for pain. The above foot profile also leads to flatfoot deformity [7,12].

Kidners suggested that the abnormal insertion of the Posterior Tibial (PT) tendon on the AN disrupts the normal biomechanics of the tendon and results in a weak longitudinal arch and flatfoot [12].

The study aim was to investigate that either Kidner procedure improve foot appearance in terms of medial arch restoration or not. The literature review shows various studies showing that modified Kidner procedure with rerouting of tibialis posterior tendon improve foot appearance and American College of Foot and Ankle Score (ACFAS). In a study by Kim et al. who operated 21 patients by modified Kidner procedure showed that the foot appearance improved postoperatively by 70% for lateral talus-first MTT angle and 72% for calcaneal pitch angle. The ACFAS score appearance improved from 1.5 (± 1.0) to 4.5 [14].

Tian et al. conducted a study in which calcaneal pitch angle and Mearys angle were measured preoperatively and postoperatively. The improvement occurred from preop value of 11.78 ± 2.21 to 3.63 ± 1.73 for Mearys angle and 11.54 ± 2.73 to 20.79 ± 1.24 for calcaneal pitch angle showing a significant improvement in medial

Table 3: Pre-op Mearys angle vs. post-op Mearys angle.

		Pre-Op	Post Op
Pre-Op	Pearson Correlation	1	0.651**
	Sig. (2-tailed)		0.002
	N	20	20
Post OP	Pearson Correlation	0.651**	1
	Sig. (2-tailed)	0.002	
	N	20	20

\*\* : Correlation is significant at the 0.01 level (2-tailed)

Table 4: Pre-op calcaneal pitch angle vs. post-op calcaneal pitch angle.

		Pre-Op	Post Op
Pre-Op	Pearson Correlation	1	0.794**
	Sig. (2-tailed)		0
	N	20	20
Post Op	Pearson Correlation	0.794**	1
	Sig. (2-tailed)	0	
	N	20	20

\*\* : Correlation is significant at the 0.01 level (2-tailed)

arch [4]. The results of above study are comparable to our study. In our study preoperative Mearys angle was 15.80 ± 2.7 which improved postoperatively to a mean of 5.85 ± 2.35 showing a significant improvement in flat feet deformity. Similarly calcaneal pitch angle improved from preoperative value of 7.70 ± 2.51 to a postoperative value of 14.00 ± 2.90 leading to restoration of medial arch.

Similarly in another study by Xu Tao et al. comparing the results of simple accessory navicular excision versus Kidners procedure for accessory navicular suggested that Kidners procedure improve the medial arch in term of foot appearance. In their study on 31 patients who underwent Kidners procedure Mearys angle improved from pre-op value of 15.50 ± 9.62 to a post-op value of 8.35 ± 6.37 having p value of 0.125. The calcaneal pitch angle pre-op 18.77 ± 3.79 and post-op 20.77 ± 4.34 having p value of 0.917 [15]. These results are similarly comparable to our study.

Zeng et al. saw a significant increase in the calcaneal pitch angle in 10 patients treated with the original Kidner procedure with a mean age 16.6 and 16.5 years [16].

## Conclusion

Kidners procedure with rerouting of tibialis posterior tendon can effectively improve pain and restore the medial arch of the foot in patients with painful accessory navicular presenting with flexible flat feet.

Table 1: (Age, pre op and post op Mearys and Calcaneal pitch angle).

		Age	Preoperative Mearys angle	Preoperative Calcaneal Pitch angle	Postoperative Mearys angle	Postoperative Calcaneal Pitch angle
N	Valid	20	20	20	20	20
Mean		20.5	15.8	7.7	5.85	14
Std. Deviation		5.04193	2.78341	2.51522	2.3681	2.90191

Table 2: Gender wise distribution.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	5	25.0	25.0	25.0
	Female	15	75.0	75.0	100.0
	Total	20	100.0	100.0	

## References

1. Mahmoud SW, El-Sheshtawy OE, Megahed AA, Lashin MF. Results of treatment of symptomatic accessory navicular bone by Kidner operation. *Tanta Med J*. 1990;18(1):23-7.
2. Knapik DM, Archibald HD, Xie KK, Liu RW. A retrospective study on factors predictive of operative intervention in symptomatic accessory navicular. *J Child Orthop*. 2019;13(1):107-13.
3. Mosel LD, Kat E, Voyvodic F. Imaging of the symptomatic type II accessory navicular bone. *Australas Radiol*. 2004;48(2):267-71.
4. Tian F, Wang J, Liu C, Li Y, Liang X, Wang X. Medial column reinforcement for the correction of flatfoot deformity with accessory navicular bone. *Am J Transl Res*. 2022;14(9):6368-74.
5. Dimmick S, Chhabra A, Grujic L, Linklater JM. Acquired flat foot deformity: postoperative imaging. *Semin musculoskelet Radiol*. 2012;16(3):217-32.
6. Prodanović N, Savić SP, Ristić B, Jovanović Z, Radivojčević U, Stepanović Ž, et al. Fe analysis of the symptomatic navicular - A case report. *Serbian J Ex Clin Res*. 2021.
7. Macnicol MF, Voutsinas S. Surgical treatment of the symptomatic accessory navicular. *J Bone Joint Surg Br*. 1984;66(2):218-26.
8. Bernaerts A, Vanhoenacker FM, Van de Perre S, De Schepper AM, Parizel PM. Accessory navicular bone: Not such a normal variant. *JBR-BTR*. 2004;87(5):250-2.
9. Kiter E, Erdag N, Karatosun V, Gunal I. Tibialis posterior tendon abnormalities in feet with accessory navicular bone and flatfoot. *Acta Orthop Scand*. 1999;70(6):618-21.
10. Kim JM, Jung SH, Park BM, Moon CS, Lee KH. Surgical treatment of symptomatic accessory navicular in adolescent. *J Korean Foot Ankle Society*. 2010;14(1):36-40.
11. Gueye A, Niane M, Kinkpé C, Diop A, Daffe M, Dia R, et al. Symptomatic accessory navicular bone: A case report. *Int J Orthop Sci*. 2019;5:806-8.
12. Rietveld AB, Diemer WM. Surgical treatment of the accessory navicular (Os Tibiale Externum) in dancers: A retrospective case series. *J Dance Med Sci*. 2016;20(3):103-8.
13. Pretell-Mazzini J, Murphy RF, Sawyer JR, Spence DD, WC JW, Beaty JH, et al. Surgical treatment of symptomatic accessory navicular in children and adolescents. *Am J Orthop*. 2014;43(3):110-3.
14. Kim JR, Park CI, Moon YJ, Wang SI, Kwon KS. Concomitant calcaneo-cuboid-cuneiform osteotomies and the modified Kidner procedure for severe flatfoot associated with symptomatic accessory navicular in children and adolescents. *J Orthop Surg Res*. 2014;9(1):1-7.
15. Tao X, dong Yang Q, Wang Z, Wang W, Tang KL. Clinical outcomes of single excision versus Kidner procedure for type II accessory navicular associated with flatfoot in adults: Does accessory navicular induce flexible flatfoot? *Research Square*; 2022.
16. Rammelt S, Sands AK. The accessory navicular and its association with flatfoot. *Fuß Sprunggelenk*. 2020;18(1):60-71.