

Effectiveness of surgically treated symptomatic planovalgus by the calcaneo stop procedure according to radiological, functional and gait parameters

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Introduction

- Flat foot is plantar medial rotation of the talus, decrease in the medial arch height, and abduction of the forefoot [Arangio et al., 1999].
- Most prevalent condition seen in pediatric orthopedic clinics [Staheli 1987; El et al., 2006], with an incidence of about 5% in children .[Feciot 1972; Nelson et al., 2004].
- Divided into flexible and rigid categories.
- Flexible Characterized by symptomatic or asymptomatic [Harris et al., 2004].

Symptoms of flexible flat feet

- **Pain along the medial side of the foot, sinus tarsi, leg, and**

MANAGEMENT

**. Activity
modifications ,
Orthoses and**

- **Arthroreisis is the limitation of subtalar joint pronation through insertion of an implant or a material into the sinus tarsi [Smith & Millar, 1983; Forg et al., 2001; Maxwell et al., 1999],**
- **The presence of screw achieves correction by stimulating the proprioceptive foot receptors allowing normal subtalar joint motion [Roth et al., 2007] but blocking excessive movement.**
- **Pavone et al., 2013 reported good results on clinical evaluation, podoscopic examination, and radiologic assessment in 242 patients**

Aim of the study

The objective of this work is to report the Long term results of this procedure and evaluate the effectiveness of this technique on limb kinematic changes and other clinical and radiological parameters.

Methodology

- **The institute
ethical
committee**

INCLUSION CRITERIA

**Failure of conservative
treatment and
development of painful and
fatiguing flatfeet**

CASES

- **A total of 53 children with pathologic flatfeet (89 feet) were identified during the study period (Jan 2012- Dec 2019)**
- **19 children were excluded -lack of adequate records**
- **16 children were excluded - joint hyperlaxity, dystrophy, or post-traumatic, neurogenic, or neuromuscular disorders.**
- **Parents of 3 children opted against**

Outcome Measures

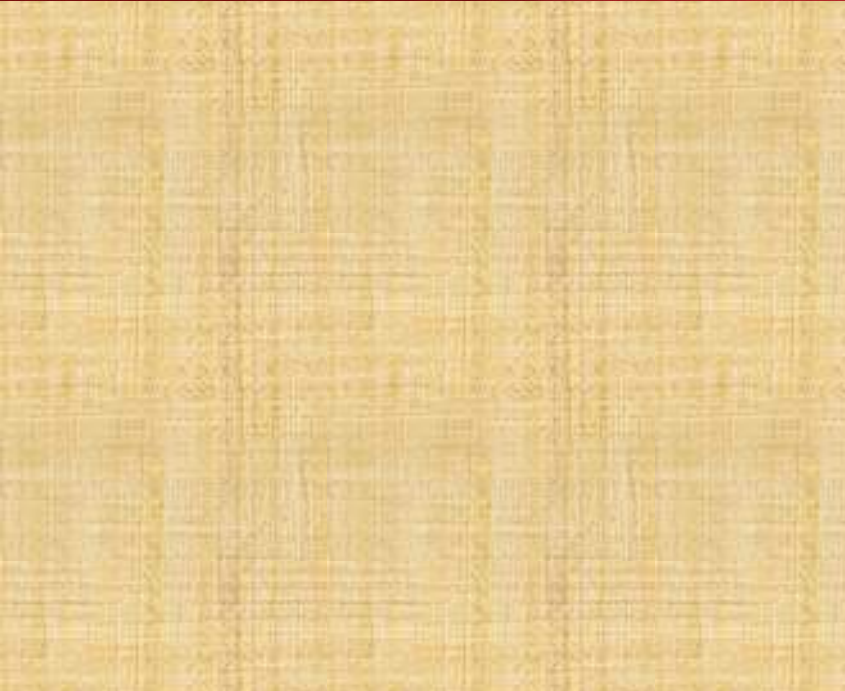
- **Ankle [Konor et al., 2012] and sub talar [Menadue et al., 2006] range of motion by a standard goniometer.**
- **Radiographic indices-**
 - **Talo-Metatarsal Angle [Banks & Downey, 2001]**
 - **Talo-Calcaneal Angle (Costa Bartani Angle and Kite Angle) [[Yates, 2009]**
 - **Talar Inclination [Yates, 2009]**

ASSESSMENT OF OUT COME

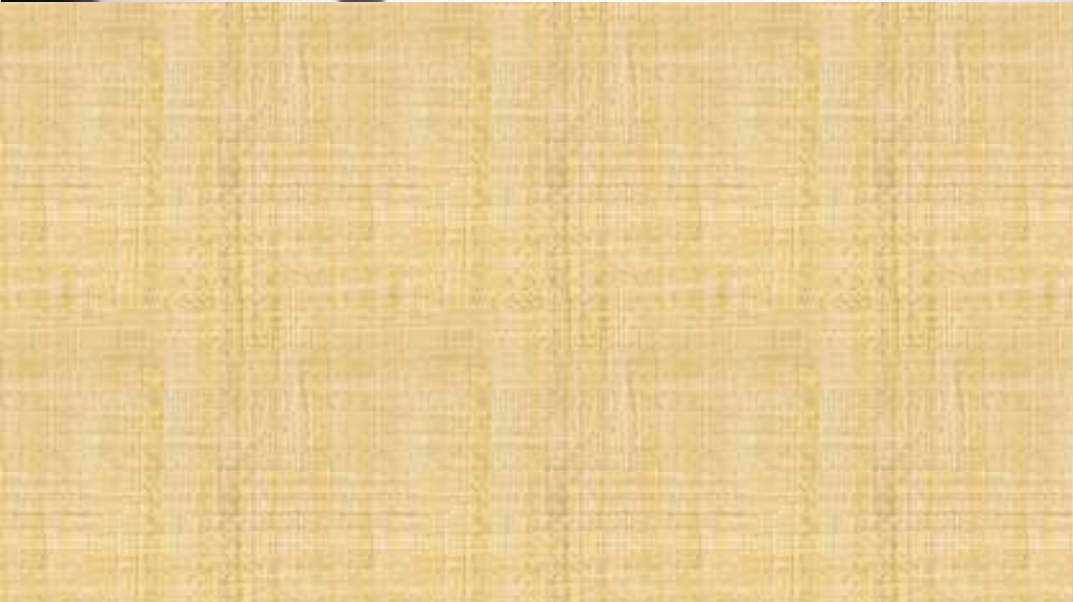
- **Outcome measures were assessed by an independent investigator pre-operatively and followed up at a mean of 2 years and 6 months .**
- **A paired Student t test was used to compare the clinical, radiographic and gait variables. The differences were considered statistically significant at the 0.1% level ($p < .0001$).**

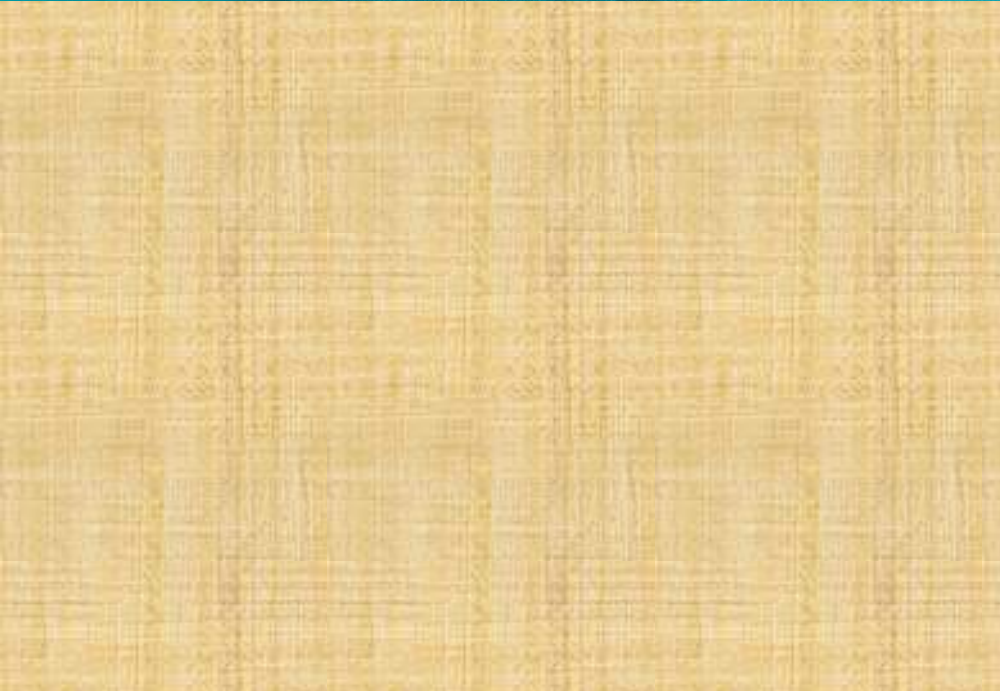
PROCEDURE

- **Supine, under epidural anesthesia with a tourniquet**
- **2 cm incision on lateral aspect on sinus tarsi taking care of sural nerve.**
- **A guide wire was inserted vertically into the calcaneus from the superior to the inferior aspect opposite to the sinus tarsi after reduction of the subtalar eversion under flurosopic control followed by drilling with a 3.2-mm over drilled.**

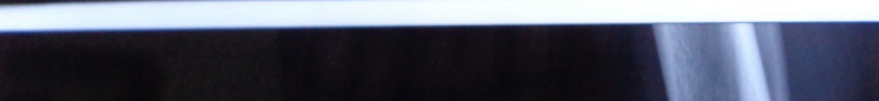












ADITYA RANJAN PATTNAIK O 14-May-15
NEW LIFE X-RAY





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PRE OPERATIVE





GAIT LAB ANALYSIS

- **Sensor placement**

1 sensor is placed over the base of sacrum, 2 sensors are placed over ASIS, mid thigh (bilateral), bilateral lateral condyles of femur, bilateral mid calf regions, bilateral lateral malleoli, bilateral calcanei and bilateral second metatarsals of feet.



- **Temporal parameters measured are**

stride time, stance time, swing times, stance phase (%), swing phase, double support phase, n velocity and cadence.



Results

Radiological Angles

Outcome measures	Pre-operative	Post-operative	P value
Costa Bartani (mean \pm S.D)	149.48 (4.56)	132.24 (5.6)	<0.05
Kite (mean \pm S.D)	30.2(1.04)	23.23 (0.92)	<0.05
Calcaneal inclination (mean \pm S.D)	14.78 (1.23)	21.38 (1.17)	<0.05
Tarso Metatarsral	32.96 (5.98)	18.45 (4.40)	<0.05
Talo Inclination	43.2 (4.46)	23.4 (4.67)	<0.05

Range of Motion

Outcome measures	Pre-operative	Post-operative	P value
Dorsi flexion	10 (4.4)	18(5.56)	<0.05
Supination	7 (1.4)	13 (2.2)	<0.05

Gait Analysis

Outcome measures	Pre-operative	Post-operative	P value
Peak dorsiflexion of the ankle during the stance phase	20 .6(6.8)	38 .4(8.4)	<0.05

Functional Scales

Outcome measures	Pre-operative	Post-operative	P value
OAFQC			
(mean \pm S.D)			
Physical	63.45 (23.78)	76.78 (23.78)	<0.05
Sports	70.06 (18.56)	79.45 (18.56)	<0.05
emotional	75.28 (17.59)	84.22 (17.59)	<0.05
VASFA	52.2(17.3)	69.63 (22.93)	<0.05
AOFAS	38 (3.62)	64 (8.20)	<0.05

Discussion

- **Calcaneus stop procedure has good outcomes on all the parameters measured except gait analysis.**
- **The procedure showed significant radiographic correction of angles and clinical improvement during follow-up.**

- **Arthroereisis procedures are designed to limit subtalar joint motion and to improve the weight bearing position of the foot by placing a motion-blocking implant into the sinus tarsi.**
- **This procedure is less invasive than the combined medial and lateral approaches described by Viladot, 1975.**
- **Our results are similar to those reported by Brancheau et al., 2012 , Jerosch et al., 2009**

Limitations

- **The choice of kinematic model might have influence measurements of ankle motion in gait analysis.**
- **There is no control group for a comparison of our outcomes .**
- **The potential biases related to measuring of the radiographic angles.**

Conclusion

The Calcaneus-stop procedure is a simple, reliable, effective and minimally invasive procedure for the treatment of pediatric flexible flatfoot except major change on gait analysis.



THANKS