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## Indication for Tenotomy in Club feet patients treated by Ponseti Method.

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### ABSTRACT

Tendo achillis tenotomy is proven method in management of clubfoot using ponseti method but what are the indication of performing tenotomy and whether it is needed in all patients is the aim of this study. 91 patients with 105 clubfeet were assessed at presentation based on pirani score and Ponseti method and prospective study was done and Tenotomy was performed in 89 of the 105 clubfeet (84.76 %). Indication for tenotomy was when seventy degrees of abduction and dorsiflexion was less than 15 degrees and we noted these cases atypical club feet (100% of atypical clubfeet) and 202 clubfeet which were having high pirani score at presentation (98.01% of cases with a Pirani score  $\geq 5$ ). Hind foot contracture also correlated with increased need for tenotomy (76.14% clubfeet with hind foot score  $> 2$ ). Clubfoot treated with Ponseti technique by serial casting is proven method and percutaneous tenotomy is integral step but Tenotomy is not indicated when 75 degrees of abduction and 15 degree of dorsiflexion were achieved but the foot with hind foot score more than 2 at presentation along with the atypical clubfoot and with pirani score more than 5 can predict the need for tenotomy.

**Keywords:** clubfoot, Ponseti, Tendo Achilles, tenotomy, dorsiflexion.

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## INTRODUCTION

Congenital Talipes Equino Varus (CTEV) is a common congenital anomaly with an incidence of one to three per 1000 live birth and manipulation and casting were mentioned by Kite<sup>1</sup>, Ponseti and Smoley<sup>2</sup> but Ponseti corrected the Kite's mistake in following ways First, the use of the calcaneocuboid joint as the fulcrum which blocks the abduction of the calcaneus and thereby prevents eversion of the calcaneus. Second, pronation of the forefoot to correct the cavus actually worsens the cavus but In Ponseti's technique, the first two casts are applied with the forefoot supinated so as to bring it into alignment with the hindfoot whereas the third cast is applied with the forefoot abducted and simultaneous counter pressure over the head of the talus and In the fourth cast, the forefoot is further abducted. Before the sixth cast, the degree of dorsiflexion is assessed, and if dorsiflexion is not possible beyond neutral and foot abduction is 70 degrees then a percutaneous Achilles tenotomy is required<sup>3</sup> and final cast with foot in 70 degrees of abduction and overcorrected dorsiflexion is applied for three weeks then following the removal of the last cast, foot is placed in a foot abduction brace, which is used for 23 h a day in the initial 3 months and then subsequently for night time for 3 years<sup>4</sup>. According to Ponseti, an Achilles tenotomy is required in 70% of the cases<sup>5</sup>.

The purpose of this study was to study the indication of tenotomy in the Ponseti method of correction in all cases of clubfoot based on the severity of the deformities. We used Pirani score<sup>6</sup> for assessment of the deformities of the clubfoot.

## MATERIALS AND METHODS

91 patients presented to Thanjavur medical college and hospital during January 2018 to January 2020 with a total of 133 clubfeet were studied. All the feet were initially assessed and Pirani score was recorded and treated with serial casting according to Ponseti technique at weekly intervals. Scoring was done at each subsequent visit, before application of the cast and in follow up period also.

The Pirani system registers the deformity of six different components of the clubfoot (three midfoot components and the three hind foot components) and the scale is from 0 to 6 points, with 6 representing the most severe deformity.

Ponseti method of correction was followed in all cases<sup>7,8</sup>, Feet were gently manipulated before cast application and then placed in toe-to-groin plaster casts with the knee flexed 90°. The first cast was applied with the forefoot in increased supination and the first ray elevated to correct the cavus deformity. Subsequent casts were then applied while gently abducting the forefoot, navicular, and cuboid around the talus, allowing correction of the adductus as well as the heel varus. Casts were applied at weekly intervals until the adductus and heel varus were corrected. The final cast was applied with the foot with minimum 15° of dorsiflexion. And foot in 75 degree of abduction. A percutaneous Achilles tenotomy was performed if the foot could not be dorsiflexed to 15° but 70 degree of abduction was achieved before application of the final cast.

Figure 1-2 15 degree of dorsiflexion was achieved so tenotomy not performed for all these babies.

Figure 1



Figure 2- relapse case



**Surgical technique**

Tenotomy was done in the operation theater under local anesthesia on opd basis. Limb was prepared and draped and an assistant was holding the leg and with foot in a position of maximal dorsiflexion. Using a 15 size blade, a percutaneous tenotomy was performed by surgeon about 1cm above its insertion and allowing at least 15° of dorsiflexion. A sterile gauze pad was then placed over the incision, and the final cast was applied with the foot in overcorrected dorsiflexion and with 70 degrees of abduction.for three weeks after then baby kept in Steenbeek foot abduction brace (figure 3).



**Figure 3**

**RESULTS**

A total of 91 cases with 105 clubfeet were studied. Of these 64 were male babies and 27 were female. . In 2007, Haft, Walker and Crawford also reported that 65% of their patients were male<sup>12</sup> our study showed about 70.32% .77 were unilateral and 14 were bilateral. Age at which treatment was begun ranged from the 2nd day of birth to 24 months. The 81 babies (74.86%) presented before 1 month of age, whereas the remaining babies presented between 1months to 24 months.

**Table 1: Profile of study population.**

Variable	Number	Frequency
Gender Male	64	70.32%
Female	27	29.67%
Age 2days to 30 days	81	89.01%
1 to 2 months	4	4.39 %
2 to 12 months	5	5.49 %
12 to 24 months	1	1.01%
Family history Positive	3	6.75%
Family history Negative	88	69%
Idiopathic club foot	81	89.01%
Atypical clubfoot	5	5.49%
Resistant clubfoot	1	1.01%
Recurrent clubfoot	4	4.39%

At initial presentation, 78 of the 105 clubfeet had a score of ≥5.0 (table 2). Tenotomy was performed in 89 of the 105 clubfeet (84.76%).Among the 78 clubfeet with an initial Pirani score of 5 or more, 77 required tenotomy , while 5 of the 16 clubfeet not required tenotomy and had a score between 3 and 4.5 whereas Clubfeet with a score below 2.5 at presentation not required tenotomy were in 11 of the 19 feet [Table 1].

In the Pirani scoring system, the relation between hindfoot score and the need for tenotomy was separately correlated. Among the 11 clubfeet with a hindfoot score of 1.5 or less (table3) tenotomy was not needed

**Table 2: Requirement of tenotomy based on Pirani score at initial evaluation**

Pirani score	No tenotomy (%)	Require tenotomy (%)
0-2.5	11(10.47%)	8(7.6%)
3-4.5	5(4.7%)	11(10.4%)
5-6	1(0.9%)	77(73.33%)

**Table: 3**

Hind foot score	No of club feet	Need for tenotomy%
0 -1.5	11 (10.47%)	no
2 -3	94(89.52%)	yes

**Table 4**

Type of clubfoot	No of patients	Need for tenotomy
Idiopathic clubfoot	81	68(83.95%)
Atypical clubfoot	5	5(100%)
Resistant clubfoot	1	1(100%)
Recurrent clubfoot	4	4(100%)

At the end of casting correction achieved was similar in both requiring and not requiring tenotomy. Pirani scoring done following removal of the last cast showed a score between 0 and 0.5, with a median score of 0.5 in atypical cases.

### DISCUSSION

The Ponseti technique for the treatment of idiopathic clubfoot has been proven<sup>9</sup> and tendon achilis tenotomy is an integral part of Ponseti’s technique for the treatment of clubfeet. The indication for tenotomy has been clearly described and is reported to be necessary in approximately 70–80% of patients<sup>7,10,11</sup>.

In this study, tenotomy was done in 84.76 %of cases and remaining number of cases it was not needed and We found that a significant percentage of cases 77 (73.33%) with pirani score scored 5.0 or more had increased need for tenotomy than those with lesser scores less than 5 and the hindfoot scoring component, showed greater correlation with the need for tenotomy, in which the clubfeet with a score of 2–3 required tenotomy in a significantly greater percentage 94(89.52%) because of the equinus component being included in the hindfoot score and in all atypical ,recurrent,and resistant club feet cases underwent tenotomy (table 4)

In this study, we found that Indication of Tenotomy in club feet patients treated by Ponseti Method is not must in all cases. Parents can be reassured that the need for tenotomy does not mean a worse outcome at the end of casting.

### CONCLUSION

We conclude that clubfoot treated with Ponseti technique by serial casting and indication of Tenotomy if 75 degrees of abduction and 15 degree of dorsiflexion were not achieved. Severity of the deformity at presentation, especially the hindfoot contracture and atypical clubfoot with older age of presentation ie more than two months of age, can predict the need for tenotomy.

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