



TRIPLE COMBINATION PROCEDURE TO CORRECT CLUBFOOT RELAPSES IN WALKING AGE

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ABSTRACT **BACKGROUND:** Clubfoot is a common congenital anomaly of lower limb. It is easily treated with Ponseti regime, which requires serial casting to gradually correct the cavovarus deformity followed by a tenotomy. This is followed by splinting using foot abduction orthosis. Cavus is the primary problem since it combines forefoot adduction and hindfoot varus. The same principle applies in relapses also. Our combination procedure targeted this deformity to give a good long lasting correction.

MATERIALS AND METHODS: 18 children with a relapsed clubfoot were evaluated. We had access to all records since birth. We assessed their Pirani scores at the time of primary treatment and clinical records of subsequent follow ups. We also evaluated the outcome of our combination procedure, by assessing various objective parameters. We followed up these children for a mean of 4.3 years.

RESULTS: 16 out of 18 patients had some residual cavus after the initial treatment. After treatment of relapses with our combination procedure, all of them had satisfactory results.

CONCLUSIONS: Persistent cavus after the initial clubfoot casting is an important reason for early relapse. Our combination procedure gave satisfactory results at a long term followup.

KEYWORDS :

INTRODUCTION

Ponseti method of casting, is the most popular and effective method of treating this disorder¹. This method is also advocated for use in relapses or fresh cases in walking age children. Ponseti regimen requires a significant duration of splinting with foot abduction orthosis². Ensuring compliance to this splint in a grown up child is difficult. As such rate of relapses is high when this method is used for children in walking age group.

Ponseti method of casting requires correction of cavus first, followed by abduction of forefoot². There is also an emphasis laid on preventing a "rockerbottom foot"³, which is flatfoot induced by attempted dorsiflexion without a tenotomy. However classical teaching doesn't lay enough emphasis on complete correction of cavus. Also, many ponseti practitioners lay an emphasis on abducting foot to demonstrate a suitable correction of foot by the 2nd or 3rd plaster. This leads to an undercorrection of cavus but a good abduction. Once the tenotomy is done, correcting this cavus becomes very difficult. Additionally a persistent cavus makes it difficult for the child to retain the FAO⁴. This leads to an early relapse.

When a child learns to walk with a cavus deformity, the first metatarsal is planterflexed⁵. Thus to accommodate the foot on the floor, foot needs to supinate when in weightbearing position. And this induces a hindfoot varus. Overtime, as the child continues to walk like this, the Tibialis anterior tendon, becomes short and further induces supination, thereby adding to this deformity.

In our study, we attempted to study two effects... One, by reviewing the records of children with relapsed clubfoot we attempted to designate undercorrection of cavus as the cause of relapse. Secondly, in treating these relapsed children, we attempted to correct cavus to give a corrected foot which doesn't re relapse on long term follow up.

MATERIALS AND METHODS

18 children participated in our study. All of these children had been treated for clubfoot and were treated with Ponseti method at birth. We noted the progression of pirani score in the records. Records of subsequent followup were assessed for compliance to FAO and assessing the severity of cavus. Once the decision to operate the relapses was made, their foot was examined and certain individual parameters were noted.

We recorded intoeing in midswing phase using slow motion gait analysis⁶. We used a static podograph to document the foot shape⁷. We assessed the Meary's angle in standing foot xray, lateral view⁸. We assessed the strength of dorsiflexion with manual muscle testing. Each of these parameters were assessed before the surgery and after the surgery, during the followups.

Our triple intervention was same in all cases. We corrected three main components... 1st metatarsal planterflexion, hindfoot equino varus and

dynamic foot supination. Correction of the first two components add up to correct the cavus of foot. The tibialis anterior is transferred to lateral cuneiform to enable it to dorsiflex the foot without supination. 1st Ray planterflexion was corrected by doing a percutaneous planter fascia release first. If there was persistent mild cavus... we added 1st MT base closing wedge osteotomy. The aim was to get mearys angle to less than 15 degrees. Hindfoot equino varus was corrected by doing a Tendo achilles lengthening, releasing sheaths of tib post, FDL FHL and peronei. We also did a posterior ankle capsulotomy, medial subtalar capsulotomy and calcaneo fibular ligament release. Lastly a complete Tibialis anterior transfer to lateral cuneiform was done in standard fashion.

Post operatively we gave a below knee splint. We did dressing on 1st and 5th post op day. If the wounds were healing by 10th day the foot was casted with particular emphasis on giving a good planter mould. The casts were retained for 6 weeks, followed by AFO splinting. After the cast came off, rehabilitation consisted of active dorsiflexion planterflexion exercise and passive stretches. The AFO was worn continuously for 3 months followed by gradually weaning them off and discontinued at around 6 months postoperatively and child allowed to walk freely.

These kids were followed up for 3 months, 6 months and final follow up. In followup clinics the above mentioned parameters were measured and parents satisfaction scoring was done.

RESULTS

To fulfill our goal of identifying the reason for relapses...we reviewed medical records of children with relapses. Cavus was the first deformity to relapse, usually within 6 months in majority of these children.

12 out of 18 of our patients had attempted correction of relapses with repeat serial casting. The feet corrected but then went on to relapse once again. The mean age of presentation was -----, 10 male, 8 female children participated in our study.

Planter fasciotomy only was required in 10 patients, rest 8 patients required 1st Metatarsal Base osteotomy. Limited posteromedial release and tendon transfers were done in all children.

We followed up the children for a mean of 15 months. With maximum follow up of 2 years and minimum of 9 months. Mean of the objective measurements, recorded preoperatively and at last followup are in given table.

PARAMETER	PREOPERATIVE	POSTOPERATIVE
Intoeing	-15	-2
Podograph – Bean Ratio	.8	1.4
Dorsiflexion Stregnth	2/5	3+/5
Foot Position in Dorsiflexion	28 degree	7 degree
Tibia to calcaneum Angle	18 degree varus	0 degree
Standing Foot Lateral	28 degree	09 degree

We had some complications. Weakness of Dorsiflexion was seen in 2 children. However it was not of concern in gait analysis. Inadequate correction of intoeing was present in 3 children. Their intoeing angles were however less than 5 degrees. Persistent Heel Varus was present in 8 patients, which was again non progressive and not clinically significant. Inadequate correction of cavus, as seen on weight bearing foot lateral view x ray was seen in 9 out of 18 children. (Meary Angle 10-20 degree). Superficial Wound infection was seen in 4 children which healed in maximum of 4 weeks duration and didn't require additional surgical intervention. There were no relapses at final follow up. Wasting of calf muscles was present in all cases, which was not a clinical problem.

DISCUSSION

Clubfoot deformity in children can be treated in many ways. Ponsetti regimen, gives the best and longlasting feet. However certain feet do relapse. While the widely accepted explanation to relapse is a genetic predisposition to having a severe clubfoot, accuracy of treatment and splint compliance also play a major role. Clubfoot treatment relies on clinical examination of foot, and there is a lot of interobserver variation in this. As such defining cavus at initial casting, and then making sure it gets fully corrected before performing a tenotomy becomes very important. A tenotomy performed before adequate correction of cavus, will lead to persistence of cavus, since the tight tendoachilles provides a fulcrum in correcting foot. Persistent cavus makes it difficult to retain FAO, and goes on to relapse early. Our results of reviewing past medical records of these children show an early re-appearance of cavus on follow up. We postulate that these were severe cases and cavus not initially fully corrected.

Similarly correcting cavus is paramount to treating a relapsed foot, since cavus induces hindfoot varus, which in turn causes inversion of foot. Correcting cavus in an older child can be challenging because the tarsal bones have ossified and it may require an osteotomy. The correction of equinovarus can be done with serial casting and tenotomy, but our previous experience showed inadequate correction of equinus with just a tenotomy which tended to relapse quickly. Correction of heel varus was better with release of subtalar capsule and the results were easier to maintain with physio and splints.

Notable none of our children went into a Foot abduction Orthosis which is described as quite cumbersome by parents.

We encourage other ponseti practitioners to try our combination treatment to give a better result if the ponseti regimen is not working out for children.

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