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TRIPLE PERCUTANEOUS NEEDLE RELEASE TECHNIQUE FOR THE MANAGEMENT OF RELAPSED CLUBFOOT

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ABSTRACT **Background:** The clubfoot has a stubborn tendency to relapse, regardless of the mode of treatment. We describe a triple release technique by percutaneous needle Tenotomy in the management of late relapsed clubfoot. Objective: To evaluate the triple percutaneous needle release technique for the management of relapsed clubfoot. **Methods:** 20 feet in 15 patients with relapsed clubfoot was treated with triple percutaneous needle release technique and evaluated by pre- and post-operative Pirani score. **Results:** On follow-up of 3 weeks, we had excellent results in 5 feet (25%), good results in 12 feet (60%) and fair results in 3 feet (15%). **Conclusions:** Triple percutaneous needle release technique for the correction of relapsed clubfoot is simple and easy to learn with good to excellent outcome.

KEYWORDS : : relapse, percutaneous, clubfoot, needle

Introduction

The clubfoot has a stubborn tendency to relapse, regardless of the mode of treatment. In the present scenario, Ponseti1 technique of serial cast bracing is the most effective2 and prevalent mode of management. Although it corrects the deformity, it does not remove the cause of clubfoot.

With growth, the tendency for relapse lessens considerably: 91% of relapses occur before 5 years of age. Relapse after age of 7 is rarely seen, which may be an indicator of underlying neuromuscular disorder. Not all components of the clubfoot tend to relapse to the same degree. The most common relapses occur in the hindfoot, first in the equinus, and then in the heel varus. Relapse of the cavus deformity is rare and usually mild, whereas forefoot correction is permanent without metatarsus adductus.

Most relapses develop gradually and follow a characteristic sequence. Early relapse presents as a loss of dorsiflexion. Later, heel varus and adductus develops. Rarely, a significant cavus appears. Detection of early relapse is important, as it is easier to correct than late relapse.

Although, relapse can be treated at an early stage, again by Ponseti technique, but in our setup, parents do not report patients in early relapse phase. In our Indian Scenario, late relapses are very common, almost always due to failure or incorrect brace wear. Due to ignorance, illiteracy or lack of proper counselling, the braces or splints are prematurely discarded at the families' own initiatives, thinking that the correction was stable. Patients usually presents to us with relapse of equinus, hindfoot varus, slight cavus and metatarsus adductus deformity.

We describe a triple release technique by percutaneous needle in the management of late relapsed clubfoot. In our technique, we used percutaneous release for three structures i.e. tendoachilles (for correction of equinus and hindfoot varus), planter fascia (for correction of cavus) and flexor hallucis longus (for correction of adductus). Tendons appear to heal clinically and functionally within 3 weeks and correction of all the deformities is achieved.

Materials and Methods

A total of 20 feet in 15 patients were treated with triple percutaneous release technique. A short history with clinical examination of spine and foot was done. There were 9 boys and 6 girls with bilateral relapse in 5 patients, 3 boys and 2 girls. All these feet had relapsed clubfoot with either moderate or severe type of deformity as assessed by Pirani scoring system3 (fig-1). A foot with a Pirani score as modified by Flynn et al,4 less than 2.5 and which got corrected with Ponseti weekly casting was considered as mild. A foot was considered to be having moderate deformity when the foot had a Pirani score between 2.5 and 5. These feet did not get corrected fully with weekly Ponseti's casting or recurred in a few weeks time due to poor parent compliance, ignorance, illiteracy, or low socioeconomic status5. A foot was said to be having severe deformity if the Pirani score was more than 5. Moderate and severe clubfoot can be treated with this technique at the time of presentation. If clubfoot is severe convert it into moderate type by serial casting then do the percutaneous triple release.

Procedure: The surgery was done under short General Anaesthesia with patient in supine position. A thigh tourniquet was used. Knee was kept extended and foot in dorsiflexion as much as possible so that the ligament become taut. With the help of an appropriate size (16 or 18 Gauze) sterile needle, directly reach up to the planter fascia origin and release it for the correction of cavus, as in Steindler technique6 (fig-2). The beveled tip of the needle was used as a blade, for sectioning through lateralization and elevation movements of the cutting end. Next, percutaneous tendoachillles released by multiple partial three level tenotomies was done with the foot in complete dorsiflexion, and then foot was dorsiflexed to correct equinus (fig-3). For being sure that our needle is placed on the tendoachilles only, after inserting the needle on to the tendon, we perform dorsiflexion and planterflexion of the ankle joint and look for the movement of the needle. We describe this movement as the “dancing sign”, and it confirms the placement of our needle on to the tendoachilles. After that great toe was assessed in full dorsiflexion of foot and if it was found to be tight, then percutaneous release of the flexor hallucis longus was done at the midpoint of proximal crease of great toe at metatarso-phalangeal joint, described by Mittal et al7 (Fig. 4). Correction was assessed on the table with regard to cavus and equinus (Fig. 5). Deformity always needs to be corrected in a sequence, first planter fascia then tendoachilles and then finally FHL. Correction was maintained by applying above knee CTEV cast from toe to groin for 3 weeks in over corrected position. After 3 weeks cast was removed and CTEV splint applied. The parents were counseled about the importance of bracing in the prevention of relapse.

Results:

In our study, there were 20 feet in 15 children (average age 28 months) having relapse of deformity, who were treated by triple percutaneous needle release technique. Deformity was assessed preoperative and 3 weeks postoperatively by Pirani's scoring system3 and was compared and analyzed. On comparing the pre and post-operative Pirani score, we observed a significant reduction in the deformity. On follow-up of 3 weeks, we had excellent results in 5 feet (25%) (post-operative Pirani score <0.5), good results in 12 feet (60%) (post-operative Pirani score <1.5), and fair results in 3 feet (15%) (post-operative Pirani score <2). None of the patients had post-operative complication and failure of treatment.

Table 1. Assessment of deformity correction by pre- and post-operative Pirani scores.

Pirani Score	Pre-operative	Post-operative
0-0.5	0	5
0.5-1.5	0	12
1.5-2	0	3
2-3.5	2	0
3.5-5	7	0
5-6	11	0
Total	20	20

Discussion

Ponseti's technique is the worldwide accepted technique for the treatment of clubfoot1, but still relapse of deformity is not uncommon, especially in the Indian scenario due to failure or incorrect brace wear. The relapse can still be treated non-operatively by Ponseti's technique in the early stage, but in late stage, even Ponseti recommends operative procedure. Although various operative techniques for relapse clubfoot have been described in the literature, the results are still dependant on the strict adherence to the bracing protocol. Ponseti has described anterior tibialis tendon transfer technique for relapse foot in children more than 30 months of age. Traditionally, the soft tissue release surgeries described, using Turco's8 and Cincinnati's9 incision have their own complications like wound dehiscence, multiple casting and infection. These postoperative wound complications are more common in India, due to its subtropical location with hot and humid climate leading to increased risk of skin and soft tissue infection resulting in recurrence of the deformity.

In the present scenario of minimally invasive techniques, correction of deformity by percutaneous tenotomy or release is the trend. Tenotomy can be done by a tenotomy blade or a sterile needle. Originally, as described by Ponseti, tenotomy is performed using a tenotomy blade, such as a #11 or #15, or any other small blade, such as an ophthalmic knife. However, complications related to the procedure, such as excessive bleeding10, formation of a pseudoaneurysm11 and neurovascular injuries12, were described. To avoid these rare but serious complications, needle tenotomy has been developed according to the requirements of the surgeons and patients.

Use of wide bore needle to perform percutaneous tenotomy of tendoachilles was first described by Minkowitz et al13 and has been reported by few other authors. Minkowitz et al published a modification for the sectioning of tendoachilles tendon, performing this procedure percutaneously with a large gauge hypodermic needle. This technique with needle may possible have advantages when compared to other tendon lengthening techniques, due to the minimally invasive approach, the simplicity and very low morbidity.
We describe this triple release technique by percutaneous needle in the management of late relapsed clubfoot, in which we performed percutaneous release of three structures i.e. tendoachilles (for correction of equinus and hindfoot varus), planter fascia (for correction of cavus) and flexor hallucis longus (for correction of adductus). On follow-up of 3 weeks post-operatively, we had excellent results in 5 feet (25%), good results in 12 feet (60%) and fair results in 3 feet (15%). None of the patients had post-operative complication and failure of treatment.

Conclusion

We suggest this triple percutaneous needle release technique, for the correction of relapsed clubfoot, which is simple and easy to learn with good to excellent outcome. Further follow-up to 2 yrs is required.

Fig-1. Pre-operative Clinical pic of Relapsed Clubfoot

Fig. 2. Planter Fascia release by Percutaneous Needle technique.

Fig-3. Tendoachilles release by Percutaneous Needle Technique

Fig-4. Flexor Hallucis Longus by Percutaneous Needle Technique

Fig-5. Full Correction achieved by Triple Percutaneous Release

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