

Aberrant Tendo-Achilles Tendon in Club Foot: A case report

by J. Terrence Jose Jerome, MBBS, DNB (Ortho), MNAMS (Ortho)¹ ✉, Mathew Varghese, M.S. (Ortho)² ✉, Balu Sankaran, FRCS, FAMS³ ✉, Rajendra Kumar Gupta⁴, Simon Thomas, MBBS, DNB (Ortho), MNAMS (Ortho)⁵, Amit Mittal⁶

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This case report discusses the presentation and treatment of a baby boy with club foot deformity. He was initially treated by Ponseti's method of weekly plaster of paris casting. The club foot did not reduce after 6 weeks of serial casting. The boy then underwent percutaneous Achilles tendon lengthening and placed in a Steinbek Splint. After 12 weeks, the equinus persisted and we decided to perform an open Achilles lengthening. An aberrant tendo-achilles tendon was discovered during open tenotomy and this was released. Once the aberrant tendon was released, the club foot reduced and at 9 months, the baby could walk with good heel strike and the foot was supple with no residual deformity.

Key words: Aberrant tendo-Achilles tendon, club foot, talipes equinus, Ponseti's casting method

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Congenital club foot is a complex deformity that is difficult to correct. It has a tendency to recur until the age of six or seven years. While there may be a so-called recurrence in an adolescent, this is usually associated with incomplete initial correction rather than being secondary to growth alone. We present a case report of a 15 day-old boy with aberrant tendo-Achilles tendon of the right side which caused an incomplete correction of club foot.

Address correspondence to: Dr. J. Terrence Jose Jerome, MBBS.,DNB (Ortho), MNAMS (Ortho)
Registrar in Orthopedics, Dept. of Orthopedics
St. Stephens Hospital, Tiz Hazari, Delhi 54, India

¹Registrar in Orthopedics, Department of Orthopedics, St. Stephens Hospital, Tiz Hazari, Delhi, India.

²Head Professor, Department of Orthopedics, St. Stephens Hospital, Tiz Hazari, Delhi, India.

³Professor Emeritus, Orthopedics, St. Stephens Hospital, Tiz Hazari, Delhi, India. E-mail: pasle@bol.net.in

⁴Consultant in Orthopedics, Department of Orthopedics, St. Stephens Hospital, Tiz Hazari, Delhi, India. Phone: 991-23966021-27.

⁵⁻⁶ Registrar in Orthopedics, Department of Orthopedics, St. Stephens Hospital, Tiz Hazari, Delhi, India. Phone: 991-23966021-27.

Case Report

A 15 day- old baby was referred by a pediatrician for the management of right clubfoot. The baby was a full-term, normal delivery in a governmental hospital. On examination the baby was found to have a 3-dimensional deformity (CAVE) with four components in the right foot (Figs. 1)

- **C**-Cavus-increased longitudinal arch of foot.
- **A**-Adduction-tarsal bones are directed towards the median plane
- **V**-Varus-inversion and adduction of calcaneum
- **E**-Equinus-increased plantar flexion of foot



Figures 1 A 15 day- old baby presents with right club foot deformity. The deformity is 3-dimensional with 4 components including cavus, forefoot adduction, heel varus and equinus (CAVE).

The spine and pelvis were clinically normal. The baby was treated by Ponseti's method of weekly POP (plaster of paris) cast. Simultaneous correction of the three components of deformity (Cavus, Forefoot, Adduction and heel varus) was achieved in 6 weeks. (Fig. 2)

The baby had persistent equinus (Fig. 3A) after 6 weeks of serial POP casting. The foot could be abducted and externally rotated to 60 degrees.



Figure 2 The baby is treated with serial casting by Ponseti's method of weekly plaster of paris cast.

A percutaneous tenotomy of the tendo-Achilles was done under local anesthesia. Postoperatively, toe to groin cast with knee in 90 degrees of flexion to maintain the corrected position and to allow tendon healing was applied for 3 weeks. Then the foot was maintained in 60-70 degrees of abduction, external rotation and 15-20 degrees of dorsiflexion by Steinbek Splint (open toe high top straight shoes attached to bar of length equal to shoulder width). This splint is usually worn 23 hours/day for the first 3 months and 14-16 hours/day up to 3-4 years of age.

Twelve weeks later, the parents were complaining that their baby touches the floor only with tip of the right toe. On examination, the heel cord was found tight. (Fig. 3B) Equinus was found to be persistent. We decided to do an open tendo-Achilles lengthening. Intra-operatively, we found an aberrant tendo-Achilles tendon (Fig. 4) attaching just posterior to the tendo-Achilles tendon and the calcaneal tuberosity. This was released from the calcaneum and the foot could be dorsiflexed to 20 degrees on the operating table. The baby was given an above- knee POP cast for 3 weeks and followed with Steinbek Splint in 70 degrees of abduction, external rotation on affected side and 45 degrees on normal side with 15 degrees of dorsiflexion.



Figures 3A and 3B The boy presents with persistent equines following 6 weeks of serial casting. (3A) After 12 weeks, the heel cord was still found to be tight and open Achilles tendon lengthening was planned. (3B)

At 9 months, the baby could walk with a good heel strike and the foot was supple with no residual deformity. (Fig. 5) At 18 months follow up the baby was found to have a pain-free, plantigrade foot, with good mobility. (Fig. 6) The parents were advised to continuously use the brace for the baby, 14 to 16 hours a day until 3 to 4 years of age.



Figure 4 An aberrant tendo-Achilles tendon was discovered during open tenotomy. The aberrant tendon was located just posterior to the Achilles tendon and calcaneal tuberosity.

Discussion

Club foot deformity has four components^{3-5,6,14,15}: equinus, varus, adductus, and cavus. The goal of treatment is to reduce or eliminate these four deformities so that the patient has a functional, pain-free, plantigrade foot, with good mobility and without calluses, and does not need to wear modified shoes. The most severe deformities in a club foot occur in the hind part of the foot. The talus and calcaneus are generally deformed and in severe equinus, the calcaneus is in varus angulation and medially rotated, and the navicular is severely displaced medially.^{2,11,12,17,18,20,21} These components of the deformity are inextricably inter-related. The ligaments of the posterior aspect of the ankle and of the medial and plantar aspects of the foot are shortened and thickened. The muscles and tendons of the gastrocnemius tibialis posterior, and toe flexors are shortened.^{4,14,15,20}



Figure 5 At 9 months, the boy could walk with good heel strike and the foot was supple with no deformity.

Most orthopedists have agreed that the initial treatment of a club foot should be non-operative.^{4,5,8,11,12,14,15} The preferred method is manipulation and application of a plaster cast at weekly intervals. Less favored methods of initial treatment are use of a Denis Browne splint, stretching and adhesive strapping, and physiotherapy. Manipulation and serial application of casts, supported by limited operative intervention, yielded satisfactory functional results in 89 percent of the feet.^{8,14,15} However, at other institutions, manipulative treatment has resulted in increased cavus deformity, rocker-bottom deformity, a longitudinal breach, flattening of the proximal surface of the talus, lateral rotation of the ankle, and increased stiffness of the ligaments and joints.^{1,2,3,4} To avoid these distressing outcomes, early and even primary operative treatment of club foot is practiced in some centers^{5,7,9,10,12,15,19,23}, often with equally disturbing failures and complications, such as wound infection, necrosis of the skin, severe scarring, stiff joints, overcorrection and under correction, dislocation of the navicular, flattening and beaking of the talar head, talar necrosis, and weakness of the plantar flexors of the ankle with major disturbances of gait.



Figure 6 At 18 months follow-up, the baby was found to have a pain-free, plantigrade foot, with good mobility.

The reported results of operations in newborns have been either short term and not encouraging. Early operative treatment often results in reduced motion of the ankle and foot, whereas manipulation and the application of plaster casts with proper technique lead to greater mobility and less disability.^{7,9,10,13,15}

Most orthopedists have agreed that an operation^{3,4,5,11,12,15,21} should be considered only after manipulation and serial application of casts have failed to obtain correction in a specified period of time, preferably not more than three months. The poor results of manipulative treatment of most club feet in many clinics suggest that the attempts at correction have been inadequate or that the technique has been faulty.^{8,14,15} Books and papers on pediatric orthopedics have devoted scant space to manipulative technique in the treatment of this deformity, and often the descriptions have been incorrect. The correction of the cavus component of the deformity is usually not addressed.^{14,15} The equinus is corrected by dorsiflexion of the foot with the heel in valgus after the adduction of the foot and the varus deformity of the heel has been corrected. The correction entails stretching of the tight posterior capsules and ligaments of the ankle and subtalar joints and the tendo-Achilles.^{4,5,8,12,14,15}

Two or three plaster casts that carefully mold the heel, applied after manipulation, are usually needed to correct the equinus deformity. Care should be taken not to cause a rocker-bottom deformity, which can occur when dorsiflexion of the foot is attempted with pressure under the metatarsals rather than under the mid-part of the foot, particularly when the varus deformity of the heel has not been corrected.^{1,8}

A simple subcutaneous tenotomy of the tendo-Achilles, performed with the patient under local anesthesia, facilitates correction of the equines.^{8,14,15} This tenotomy is done in about 70 percent of patients, when 15 degrees of dorsiflexion has not been obtained with the use of the casts. Dorsiflexion of the ankle to more than 10 to 15 degrees is rarely possible because of the talar and calcaneal malformations and tight ligaments. A posterior capsulotomy of the ankle and subtalar joint is rarely done, because the few additional degrees of correction that are obtained may be completely lost later due to retraction of the scar tissue.^{4,5,13,14,15}

Regardless of treatment, a club-foot deformity tends to relapse until the child is about seven years old.^{3,4,5,8,12,14,15}

To prevent relapse, some orthopedists hold the foot in maximum correction with a series of plaster casts or with splints. Denis Browne splints and high-top shoes with well-molded heels that hold the feet in lateral rotation are the most effective means for maintenance of the correction. The splints are worn full time for two to three months and thereafter at night for two to four years. The splint should maintain the foot in 60 to 70 degrees of external rotation, to prevent recurrence of varus deformity of the heel, adduction of the foot, and in-toeing.^{8,14,15} With careful supervision and with cooperative and responsible parents who follow instructions faithfully; relapse can be prevented in about 50 percent of patients. In the other 50 percent, a relapse will occur between the ages of ten months and seven years (average age, two and one-half years). A relapse is detected when slight equinus and varus deformity of the heel is observed, usually without increased cavus and adduction deformity of the fore foot.^{16,18,22,23}

The original correction may be recovered in four to eight weeks with manipulations followed by application of a toe-to-groin plaster cast, with the foot held in marked lateral rotation, every ten to fourteen days. This treatment is often followed by lengthening of the tendo-Achilles, if the tendon prevents dorsiflexion of the ankle to at least 15 degrees, and by use of the Denis Browne splint at night.^{3,4,5,8,12,14,15} A large proportion of club feet that are treated with this procedure found the correction of the equinus, varus deformity of the heel, was obtained with manipulation and application of casts. If this can be maintained, the anteroposterior talocalcaneal angle will become normal. Cavus component of the club-foot deformity rarely recurs.^{8,14,15} When this deformity is resistant to manipulation, it should be treated with plantar fasciotomy and recession of the extensor hallucis longus tendon to the neck of the first metatarsal. The adductus component of the club-foot deformity does not recur in patients who have received good treatment and follow-up care. When proper treatment with manipulation and casting has been started shortly after birth, operative release of the tarsal joints is seldom needed.¹⁹

An early operation (not later than the second month of life) is indicated only in the small percentage of patients who have short, rigid feet, with very severe equino varus deformity, that do not respond to proper manipulations. Many orthopedists also favor release of the tarsal joints in less rigid feet when manipulations have failed to completely correct the displacement of the navicular and the talocalcaneal alignment to a normal talocalcaneal index. Extensive posteromedial release, with or without internal fixation of the tarsal bones, is the preferred procedure, but there has been much disagreement about the timing of the operation. Recently, more radical^{19,22,23} techniques have been tried in younger patients. The objective of all of these operations is release of the tight capsules and ligaments of the ankle and tarsal joints, and lengthening of the shortened tendons of the foot to facilitate placement of the tarsal bones in normal alignment.

The baby in this case report had a persistent equinus deformity even after percutaneous tenotomy. Intra-operatively an aberrant tendo-Achilles was noted and was released from its calcaneal attachment. This could be the reason for the resistant equinus deformity. The literature rarely describes the aberrant tendo-Achilles tendon and the management.

Conclusion

The initial treatment of club foot should be non-operative. Corrective manipulation and serial application of casts, followed by calcaneal tenotomy and release of an aberrant tendo-Achilles tendon if found, should be successful in at least 85 percent of patients who are initially treated a few days after birth. High index of suspicion for an aberrant tendon should be there, if there is a resistant equinus deformity alone, especially after manipulation, POP cast correction and percutaneous tendo-Achilles tenotomy.

The orthopedist and podiatrist must have a thorough understanding of the deformity and be highly skilled with regard to manipulation and the application of plaster casts. Most relapses can be treated successfully with additional manipulations and applications of casts for four to eight weeks. Operative correction of a club foot is indicated when the deformity has not been treated successfully with proper manipulation and serial application of casts, supported by limited operative intervention. Most of these resistant club feet can be corrected with the use of an extensive posteromedial release and release of aberrant tendo-Achilles tendon with satisfactory functional results.

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