Dr. Ignacio Ponseti has treated clubfoot using a manipulative, casting, and minimal surgical method since 1950. Once reduced and corrected, a foot abduction orthosis (FAO) is fitted to continue to hold the foot in a corrected position from infancy until four years of age. This method has recently been popularized in the orthopedic community due to the positive outcomes published by Ponseti, as early as his initial paper in 1963 (1). The purpose of this presentation is to describe the role of the Orthotist in the treatment. An overview of the Ponseti Treatment Method for idiopathic and complex clubfoot will be discussed and then visualized through the use of models and videos. The orthotic regimen will be discussed and problem solving will include descriptions of the most common difficulties encountered. Upon completion, Orthotists will have the opportunity to manipulate clubfoot models and practice setting up and adjusting FAOs.

Talipes equinovarus, or clubfoot, is a combination of forefoot adduction, supination and adduction of the foot, varus at the heel, and equinus at the ankle (Fig. 1). Idiopathic clubfoot develops during the second trimester of pregnancy and is detectable in sonograms. It usually occurs in otherwise healthy fetuses. Annually over 100,000 babies are born with idiopathic clubfoot worldwide (2). It is estimated that in the U.S. it occurs in 0.6-1.0 per 1000 live births (3). Half of the cases tend to be bilaterally afflicted and boys are twice as likely as girls to have clubfoot (4).

Treatment of idiopathic clubfoot should begin soon after birth. The Ponseti Treatment Method consists of gentle manipulations of the clubfoot followed by the application of a long-leg plaster cast changed every four to five days. The clubfoot is manipulated to simultaneously correct the cavus and hindfoot varus. The forefoot is supinated and the first metatarsal dorsiflexed to correct the cavus, while the forefoot, in supination, is abducted with counter pressure against the head of the talus. Thus, correcting the foot adduction and heel varus. Finally, dorsiflexion of the fully abducted foot corrects the equinus. At each visit the clubfoot is maximally corrected without hurting the baby and a cast applied with the knee flexed at 90°. The clubfoot usually corrects after the application of five to six casts (Fig. 2). A percutaneous tenotomy of the Achilles tendon is necessary in 80% of the cases and is performed before the last cast is applied. The final cast is molded with the foot in 60-70° of abduction and 20° of dorsiflexion, and worn for 2.5 to three weeks if a tenotomy was performed. After the removal of the final cast, a FAO is worn to prevent relapses. The FAO should be worn for 23 hours per day for the first three months and then at nap and nighttime only until three to four years of age. If the technique and use of FAO are done correctly, a relapse only occurs in 5% of the cases, and most relapses are correctable if caught early enough.
Complex clubfoot is an idiopathic clubfoot with tighter posterior ankle ligaments and gastrocsoleus muscle, causing a deep crease above the heel. The deep plantar muscles are thick and shortened, causing a deep crease across the sole of the foot. The adduction of the foot is corrected with the first two casts. The severe equinus and cavus persist, causing the foot to be in a straight line with the leg. The cast then slips off of the foot, increasing the equinus, which causes sloughing of the skin and swelling of the lower extremity. If the doctor is not aware of the fact that he is dealing with a complex clubfoot, he will fail to correct the equinus and cavus by further abducting the foot, resulting in a severe abduction of the forefoot. These children’s feet often slip out of the shoes of the FAO and may have blisters on their heels from use of the orthosis. However, with a modified Ponseti Treatment Method, the cavus and equinus can be corrected simultaneously by dorsiflexing the foot with thumbs of both of the physician’s hands pushing under the metatarsals and ring fingers over the calcaneal tuberosity to bring the calcaneus downwards. The foot can be successfully treated with the modified Ponseti Treatment Method (6). The physician should only abduct the forefoot to a neutral position and apply long leg plaster serial casts with the knee in 120° of flexion. A percutaneous tenotomy may be performed as previously described, usually after the second or third cast. With this technique the foot is correctable and surgery should be avoided at all costs.

A FAO is used to prevent relapses after the removal of the last cast. There are two styles of FAO currently used: the Traditional FAO (Fig.3) and the Ponseti FAO (Fig. 4). The Traditional FAO consists of a Fillauer adjustable night splint¹, Markell straight last shoes², and “Iowa Heel Counter” (Fig. 5)³. This orthosis works well for most cases. The Ponseti FAO⁴ consists of an adjustable bar and shoes made by MD Orthopaedics. This orthosis is especially useful for newborns, complex clubfoot, or when difficulties arise with the Traditional FAO. Either FAO should be setup with 10° of dorsiflexion and 60-70° of abduction for the clubfoot or 30° of abduction for the unaffected foot (Fig.6). Although the shoes are straight last they should be attached to the night splint with the buckles on the medial aspect, so that the parents do not have to turn the child prone to tighten the straps. The width of the bar, heel center to heel center, should equal the child’s outside shoulder width. Finally, for the Traditional FAO, the Iowa Heel Counter is glued into the posterior proximal aspect of the shoe as a heel counter and to allow normal development of the calcaneus. To don the FAO, place the child’s foot firmly into the shoe while keeping the knee at 90°. Keep a thumb over the dorsum of the foot and shoe, while pulling the dorsal foot strap snug. Secure the strap with the buckle. Check that the heel is down by gently pulling up and down on the child’s calf or by watching the heel through the posterior holes in the shoe (Ponseti FAO only). If the toes move proximally while applying a gentle upward pull on the calf, the heel is not securely down in the shoe, so the strap should be tightened by one more hole. Once the foot is securely in the shoe, the laces or remaining straps may be tightened. If the child is of strong temperament, it is recommended that the FAO be donned first to the good foot because the child will likely kick his/her way into the other shoe. It

¹ Night Splint 9-15” #012204 from Fillauer, Inc., Chattanooga, TN.
² Tarso Medius straight last shoes #1644 or #2644 from M.J. Markell Shoe Co., Inc., Yonkers, NY 10701.
³ Iowa Heel Counter (1/4” plastazote), Sizes 1 or 2, from Wrymark, Inc., St. Louis, MO 63146.
⁴ Ponseti FAO, from MD Orthopaedics, Inc., Wayland, IA 52654
is the responsibility of the Orthotist to fit the orthosis, explain its use to the parents, and follow-up with the patient.

Parents find the following advice useful. The child may initially fuss after application of the FAO, but it often subsides if the parents play with the child while the FAO is worn. However, irritability is not common with the Ponseti FAO. Parents must teach the child to simultaneously kick and swing his/her legs while wearing the FAO. If redness is observed on the heel, it indicates that the child’s heel is not secure in the shoe; the child should be checked to ensure that a relapse has not occurred. If a child continually escapes from the FAO these steps should be followed until the foot remains secure within the shoe: 1. Tighten the dorsal foot strap by one more hole, 2. Tighten the laces or remaining straps, 3. Remove the shoe tongue (Traditional FAO). In order to protect the child, family, and furniture it is recommended that the FAO bar be padded. A bicycle handle bar pad or pads from a car seat strap work well for this. These tips should help parents successfully use the FAO.

The FAO is used only after full correction (60-70° abduction and 20° dorsiflexion) of the clubfoot is achieved through the Ponseti Treatment Method. It is the only device proven to reduce relapses (3, 5). It is the responsibility of the Orthotist to fit the FAO to the child, to explain its use to the parents, and follow-up with the family regularly.

This presentation would not be possible without the generosity of Dr. Ignacio Ponseti who has spent numerous hours mentoring me in clinic on this technique. Special thanks also to Donald Shurr, C.P.O., P.T. without whose encouragement I never would have pursued a career in orthotics and prosthetics or had the opportunity to work with Dr. Ponseti and the babies with clubfeet.

References:
PONSETI TREATMENT METHOD FOR IDIOPATHIC CLUBFOOT

Hall MJ

Figures:

Figure 1: Idiopathic clubfoot is a combination of forefoot adduction, supination, and equinus at the ankle.

Figure 2: Left to right illustrates the progression serial casting with the Ponseti Method of clubfoot correction.

Figure 3: The Traditional FAO is used upon completion of the serial casting to prevent relapses.

Figure 4: The Ponseti FAO is used upon completion of the serial casting to prevent relapses.

Figure 5: A plastazote heel counter is used in the shoe (Traditional FAO only).

Figure 6: This Traditional FAO is setup for a left clubfoot, as observed by the 70° of abduction on the left and 30° of abduction on the right.