

The Ponseti Method of Clubfoot Management

The second in a series of three articles by Janet McGroggan, joint winner of the Cosyfeet Podiatry Award 2009

Abstract

In article one I discussed Dr Ponseti, who dedicated his life's work to developing a technique for treating talipes which aimed to produce a flexible, functioning, pain free foot. He researched previous techniques, dissected stillborn foetus' affected by talipes and embraced the tri-planar nature of the deformation. The method he devised has been tested and documented and is now the standard treatment offered in the UK, with surgical treatment of the deformity a last resort.

On the 10th day of the 10th month 2010, when every young couple with an interest in numerology was getting married, I attended a workshop in Manchester's Chancellors Hotel and Conference Centre to learn the basics of the Ponseti method. In a room of 50 I was the only podiatrist. The following day I returned to master the advanced aspects of the method, and in a room of around 80 I was once more the only podiatrist. This raises a lot of questions that I will go into in article 3. In this article I will take you through my experience of the Ponseti methodology.

Day one began with Gavin DeKiewiet¹ recapping on the subtalar joint and how it works. His talk emphasised the interaction between the ankle mortise and the subtalar joint. This was a nice revision of the triplanar motion available at these joints and how this is involved in the talipes deformity.

A bone model workshop followed in which we got to work with skeletal models mimicking a foot affected by talipes (see picture 1). The faculty group moved around, working with us to show how the talus can be held and the first ray elevated as in the first stage of correction. Ms Naomi Davis² who is a consultant orthopaedic surgeon in Manchester's Children's Hospital and the Ponseti organisation's ambassador in the UK, then began a talk describing the manipulation involved in the Ponseti method.

There are four stages to the treatment (see box 1) and each of these stages requires the same attention to detail as the others. The procedure must be adhered to in order to be as successful as possible.

In the first stage, manipulation, the treatment uses the mnemonic CAVE and corrects the deformity in the order of Cavus, Adductus, Varus and Equinus. The first three components are corrected simultaneously. All gripping techniques must be very soft using the pad of the digits. The manipulator can spend from 10 seconds to a minute gently manipulating the foot prior to casting but must be able to read the foot and never force it further than it is happy to go at each stage. There is no specific set number of manipulations which must be carried out as each foot is treated individually.

In order to correct the cavus, the manipulator must find the exact location of the talar head. This is laterally displaced and will be about 1cm anterior to the lateral malleolus. This is

due to the medial displacement of the navicular, which will almost contact the medial malleolus.

Whilst correcting the left foot, place the right thumb on the talar head and reaching round the back of the ankle, place the right index and middle fingers on the medial malleolus, taking great care not to touch the rear foot as this will obstruct the calcaneus, which will abduct automatically with the forefoot. Now place the index and middle fingers of the left hand below and medial to the first ray and elevate the first ray to bring the forefoot in planar alignment to the rearfoot.

Correcting the cavus allows the forefoot to be abducted and as this happens the rearfoot will move into valgus. This can be felt as the navicular begins to move in front of the talar head, and as the calcaneus moves laterally underneath the talar head. When the anterior process of the calcaneus is palpable, abducting out from under the talus, adequate abduction has been reached. This is about 60° to the frontal plane of the tibia.

Prior to adequate abduction being reached the foot is never dorsiflexed. When it is reached, this is the time to assess how much dorsiflexion is present and consider if a tenotomy is required.

It takes an average of six manipulations and casting before a tenotomy is considered. The casting process requires an experienced practitioner who can work in close proximity to the manipulator.

Denise Watson³ then began to detail the casting technique (see box 2) which begins once the manipulator is happy with the position of the foot and changes their grip to a one handed grip, thumb on the top of the metatarsal heads and index finger below, without altering the attained foot position.

The manipulator's free hand flexes the knee to 90°. Now a thin layer of padding is applied from toes to groin. This is to allow moulding of the plaster while protecting the limb. The manipulator's fingers stay inside the padding until the casting practitioner is clear of the foot, then they quickly move their fingers to rest in the same position but on top of the padding, without the foot changing position.

The plaster bandage is then applied three times around the foot (whilst the manipulator once again waits to place their hands on top of the plaster layer) then tightly round the ankle and snugly around the leg. This layer of plaster ends below the knee and the manipulator uses their free hand to mould an arc over the calcaneus in order to maintain its position in the cast. Then using the two handed grip they gently mould over the talar head and mould a slight medial arch shape.

Once the below knee cast is dry the casting practitioner begins to cast above the knee, while the manipulator continues to flex the knee. The knee area of the cast is strengthened either by applying a short length of plaster over the leg proximally to distally or layering medially to laterally twice before continuing around the leg. The cast is brought right up to

the groin area to maintain the knee in flexion and prevent slippage of the cast. In larger babies a small length of stockinet is used to provide comfort in the groin area.

Once dry, the cast is trimmed dorsally to expose the full length of all the toes, providing a plantar toe plate to extend the toes and an opportunity for parent and practitioner to assess for cast slippage. This can occur for a variety of reasons including poor casting technique or a difficult limb shape. If the parent or practitioner can see less than five toes in the cast then the cast has slipped. When this happens it is essential to have the cast removed as quickly as possible to prevent sores or further deformity. If the child is unable to be seen in clinic immediately then the parents must soak and remove the cast. This is one reason why plaster of paris is used rather than fibreglass.

Incorporated into this presentation was a Skype feed into another room in the conference centre, where Naomi Davis demonstrated applying plaster to a baby brought in by its parents.

After this talk and a cup of coffee we were separated into rooms with experienced practitioners, who demonstrated the casting technique on prosthetic talipes limbs (see picture 2) and then let us practice as both manipulator and casting practitioner. I found the manipulation more straightforward than I expected, but maintaining the correction as the caster applied padding and then plaster was another matter entirely, and this leg didn't even have a kicking, crying baby attached to it!!

With a bit of practice I managed to change from a one handed grip to a two handed grip and back again, even managing an effective moulding technique around the key areas. As casting practitioner I found getting the right tension on the padding and plaster difficult, and as the plaster we were using was fast drying there was no time for hanging around. After a few tries it all made sense as I rolled the plaster round the tiny limb, ensuring that it still looked like a leg afterwards. Exposing the toes in full with a neat arc was tricky, but the plaster knives we used rather than scissors were very user friendly.

Following this workshop, Chris Peach⁴ from Royal Manchester's Children's Hospital gave a talk on Pirani scoring which is an assessment tool used in clinic to grade the foot prior to and during treatment (See picture 3). It uses six measurements (see box 3) and scores each element as 0 – normal, 0.5 – mildly abnormal or 1 – severely abnormal.

The use of Pirani scoring is controversial as it bears little relevance to the functioning foot but it is a good clinical tool as it is reliable, valid and responsive to change. Clinicians can use the system to measure the degree of deformity of each element, to assess if the deformity is correcting as expected or if there is a problem, and to assist in deciding if and when a tenotomy is required.

Peach cited Dyer and Davis⁵ who researched the ability of Pirani scoring as a tool for predicting the number of casts needed for correction. They found that a score of four or more required at least four casts and a score of four or less required three or fewer casts. Referring to the rear foot scoring alone they reported that a score of 2.5 or three has a 72% chance of requiring a tenotomy, although this does not mean that a lower score rules out the chance of a tenotomy.

After a very nice lunch, Guy Atherton⁶ from Bristol Royal Hospital for Children presented on the tenotomy. A tenotomy, which is necessary in 80% of cases, is carried out when the lateral head of the talus is reduced. Previously the procedure was carried out under general anaesthetic. As surgeons became more confident in carrying out the procedure they felt that a general anaesthetic was not necessary and began to use local anaesthetic as was recommended by Dr Ponseti. This not only avoided putting a baby under general anaesthetic, but lowered the time and cost of the procedure and allowed it to be carried out in clinic as a day procedure, relaxing parents and baby.

So confident is Atherton that he has begun carrying out the procedure with no anaesthetic, as he claims that the needle is as sore as the knife, and palpating the tendo achilles becomes more difficult after anaesthetic is introduced. The tenotomy is a single cut of the tendo achilles. The blade enters vertically, quite high up the ankle as the calcaneus is not usually in the heel pad yet. The blade, either a beaver blade or any surgical blade, is turned horizontally and cuts through the tendon medial to laterally. The wound needs no stitches and the foot is dorsiflexed to between 10° and 20°, abducted to its full potential (60° - 80°) and cast. This cast remains on for up to three weeks as the wound heals and the tendo achilles regrows. The general rule seems to be, if you are even thinking a tenotomy may be required then do one.

Stuart Evans⁷ from Chelsea and Westminster Hospital then presented a talk on the boots and bar bracing stage of the treatment regime. This stage of the treatment requires the perseverance of the parents to ensure success as Evans reported a 95% recurrence rate of the deformity with noncompliance to bracing within the first year. This is reduced to 70% - 80% in the second year, 30% - 40% in the third year and 10% - 15% in the fourth year.

The child must wear the braces for 23 hours a day for three months, then at nap and night time for four years. In order to assist in compliance, the braces must be properly fitted i.e. the bar must be shoulder width and enough dorsiflexion must have been achieved to allow the heel to drop down in the shoe. (This can be seen through holes in the shoe.) If the shoe is too loose there will be friction and the skin will blister. Cotton socks must be worn under the shoes to prevent excessive sweating and sticking.

The Mitchell brace (See picture 4) provides a soft moulded inner shoe with soft leather straps placed in strategic arrangement to provide adequate support. Other braces are also available, including the Denis-Browne splint, used in developing countries, as it can be made from available materials and manufactured easily. Abduction can be set at 60° - 80° in the talipes foot and if the condition is unilateral 30° - 40° in the unaffected foot.

We then had a chance to examine some Mitchell braces. The shoes come off the bar and are strapped snugly over the foot, then clipped onto the bar, which has been set at the correct level of abduction. Stuart told us about a gel insert he sometimes uses over the dorsum of the foot if there is some friction, but said that fresh cotton socks will suffice usually.

The day concluded with talks on treating recurrences, common problems and clinical structures. These and the talks from day two will be discussed alongside the podiatrist's role in my third article.

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Four Stages of the Ponseti Method of treating talipes

Manipulation – Cavus, Adduction, Varus, Equinus

Serial Casting – Padding, BK cast and molding, AK cast

Tenotomy – Cast stays on for up to three weeks

Braces – 23hrs a day for 3mths then night & nap until 4yrs

Box 1. The four stages of the Ponseti Method

Denise Watson's features of effective plaster

Features of a bad cast- Insufficient moulding, stockinet, knee not flexed enough, too loose, not high enough on thigh, toes not visible

Features of a good cast- Snug, well moulded/sculpted, not too much padding around foot and ankle, toes clearly visible with good foot plate, high on thigh, still on at next appointment.

Box 2. Features of an effective plaster

Rearfoot measurements: Rearfoot Varus

Dorsiflexion

Empty Heel

Midfoot measurements: Curved Lateral Border

Box 3. The elements measured in Pirani scoring

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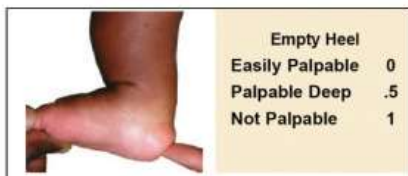
LHT



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