

4th Manchester International Clubfoot Conference

11th 13th November 2007

Highlights from the presentations

These are not comprehensive accounts of the presentations, but rather a highlighted tour to give a flavour of the event with special emphasis on information for parents and the public.

Patho-Anatomy of clubfoot, Ernesto Ippoliti, Rome



Dr Ippolito gave a detailed presentation of the anatomy of the clubfoot from foetal development to the growing child. He described the relationship between the capsules and ligaments thickening and shortening resulting in the pulling of muscles and tendons. The posterior medical capsule (the back part of the foot and heel) is the most affected but all of these affect the shape size and relationship of the tarsal bone. What is most interesting is that leg muscle atrophy is present at

the end of the fourth month of intrauterine life. This needs more research.

Kinematics of the Sub-Talar Joint, Marc Sinclair, Dubai

This presentation explored the biomechanics and the relationship of the joint surfaces in normal foot movement and specifically within the range of the Ponseti technique manipulations. Points of interest for parents are that by elevation the first ray(toe) in the first Ponseti manipulation, you make the appearance of the foot look worse, but in fact by doing this you are bringing the forefoot into alignment with the hindfoot! The extreme adducted position of 70° when the affected foot is put into the boots & bar is in fact at the normal end of the range of motion for an infant foot.

The Ponseti Technique, Fred Dietz, Iowa

Dr Dietz gave a detailed description of the Ponseti Technique through manipulation, casting, tenotomy if required, and application of the boots & bars. Points for parents are:

- The last cast should look extreme

- The boots & bar are essential, there is a 90% chance of recurrence if they are not worn and only a 5% chance of recurrence if they are used religiously.
- Younger feet are more likely to have a recurrence than older feet.
- Tip for removing plasters. Wrap then in damp towelet or muslin and cover with cling film a few hours before the clinic visits. They are then damp enough to remove easily in the clinic.

Using the Pirani Scoring System, Shafique Pirani, New Westminster, Canada



This is a well known and simple scoring system which is used all over the world. Various elements of the foot deformity are scored and the scores are added up to indicate the level of deformity. A high score of 6 is an uncorrected foot and a score of 1 is a normal foot. It is a valid and reliable method and can also be used after correction to show recurrence.

Tenotomy - options and evidence, Hari Prem, Birmingham

The healing pattern of 21 Achilles tendons in 16 children (age 3-32 months) undergoing Ponseti tenotomy was assessed. Ultrasound scans were performed before and immediately after tenotomy and at approximately 3, 6 and 12 weeks post-tenotomy. Three phases of healing were identified. At 3 weeks when cast immobilisation is discontinued, the tendon was in mid-phase of healing. At 12 weeks there was evidence of continuation of tendon fibres. The incomplete healing at the time of cast removal may allow further stretching of the tendon using boots and bar.

The best option is to have one tenotomy as this reduced the risk of adhesions forming. Also the healing takes longer in the older child.

Strategies for the boots and Bar, Nigel Kiely and Andy Bing, Oswestry.

Adherence to the boots and bar regimes is the key to long term success. It's really important to educate parents about this part of the treatment and it should be

started at the pre-natal counselling.

Boots and bar compliance is poor if there is under-correction because of problems with rubbing, blisters etc. the best thing to do is to put the baby back into plaster. Sometimes use of the Mitchell boot and bar might work if there is only a small amount of under correction.

In Oswestry there is emphasis on the good fit of the boot and they have a stock supply of sizes in clinic to ensure a good fit. Parents are given a lot of advice on fitting the boot and they are invited to attend clinic one week after the boots have been fitted for a check-up and to discuss any issues.

The width of the bar is important for fit and comfort and on the affected foot would aim for 60° to 70° external rotation.

A lot of support is given to the families including support for applying for Disability Living Allowance.

What to do if it doesn't go to plan. Naomi Davis, Manchester

Again there was a strong emphasis on the importance of using the boots and bar (B&Bs)

religiously. The probability of a recurrence if the boots and bar are not used is:

- 95% in the first year
- 70/80% in the second year
- 30/40% in the third year
- 10/15% in the 4th year
- 5% until around 10 years

Problems with the B&Bs in the under two's require the foot to be checked for full correction, if full correction isn't there it's back into plaster and then the B&Bs. If there are still ongoing problems you need to think that there could be other conditions underlying the clubfoot. The likely suspects are cerebral palsy and other neuromuscular conditions, arthrogyriposis and other syndromes.



Late recurrence with the over twos is nearly always a problem with B&B usage. This could be because the child is suddenly not co-operating (a normal stage in child development called the terrible twos!) or the B&Bs being taken off for over correction. Again it's back into 2-3 two weekly casts to get full

correction. Some children will need a tendon transfer and a few weeks in a cast, but after this procedure there is no need for the B&B.

The Supporting Evidence, Fred Dietz, Iowa

This presentation is available to download as a PDF. There are some pictures of minor surgery in this presentation.

This presentation aimed to answer these three questions by looking at published papers treating clubfoot.

1. 1) What treatment most effectively obtains initial correction of idiopathic clubfoot?
2. 2) What treatment most effectively maintains correction?
3. 3) What treatment gives best long term foot function?

However there are few high level of evidence studies, in spite of the relative commonness of clubfoot. There are few case series studies with follow of more than a few years and fewer yet that follow patients to maturity.

Overall the weight of the evidence supports Ponseti over Posterior Medial Release (PMR). However, the strength of this evidence is poor; there are too

few papers, with non-comparable follow-up periods and potential selection bias in many.

Genetic Update - The Hunt for the Clubfoot Gene, Simon Barker, Aberdeen

This presentation is available to download as a PDF.

The 'hunt' is powered by scientific curiosity but more crucially speaks to the unmet parental need to 'have an answer'. Answers could also promise more effective treatments or preventions.

Up to now no single candidate has emerged.

Prenatal Diagnosis of Clubfoot, Sarah Russell, Manchester

Ultrasound (US) screening of the foetus is very 'operator dependent' and also dependent on factors that influence the sensitivity of the prenatal US in the detection of any structural abnormality. Studies have found 2% anomaly prevalence at the 20 week scan with a sensitivity of 26% for an isolated condition and 66% sensitivity for complex conditions.

On average a District general Hospital would detect around 20 major prenatal abnormalities, a tertiary referral centre up to 450.

One of the issues is that isolated talipes is like the tip of the iceberg in terms of the volume of detection of complex prenatal foetal anomalies detected by US. Many of these complex conditions are not compatible with foetal viability.

Studies have shown that the ratio between unilateral talipes (one side) / bilateral (both sides) is 40:60; and isolated / complex, 50:50 with a 2% reclassification to complex, with a 4% false positive rate. Complex conditions cover chromosomal, syndromes, musculoskeletal and neurological.

Clubfoot Treatments Across the UK and the Parents' Experience, Ros Shelton, Sue Banton, steps

This presentation is available to download as a PDF.

A postal questionnaire was sent to 250 parents from the steps database, website and forum in August 2007. 106 questionnaires were returned. 7 were excluded.

The questionnaire was splint into 4 sections - General information, Diagnosis, Treatment and Support.

Of the 86 counties in the UK, questionnaires were received from 43.



The sample was taken from children born since July 2002

Preliminary analysis shows that families were overwhelmingly shocked and stressed at the diagnosis of clubfoot and many felt that they were not given enough support and information. Availability of the Ponseti method of treatment is growing with over 78% of babies having this treatment. However, only 61% of families were able to access their preferred treatment with 41% of families unable to get treatment at a local hospital.

83% of children were put into boots and bars, 66% of those parents reported that it was difficult to put the B&B on and 55% reported that their child developed sores. 33% reported that they would give their child a break from the regime or gave up.

However overwhelmingly families felt supported by their hospital with 91% giving positive feedback and 85% felt the treatment had been successful.

To sum up, the journey can be quite eventful to quote from one parent's experience: "having a surgeon talking of amputating his foot" and later, "...son is now just starting school and is not affected by his clubfoot".

3D view of clubfoot, Shafique Pirani, New Westminster, Canada

This presentation demonstrated how the bones of the foot remodel throughout the Ponseti treatment. It used MRI imaging and computer 2D modelling software and demonstrated that the Ponseti method stimulated the development of the ossific nucleus of the talus bone.

Results of Treatment, London and Manchester, Mike Karski, Manchester

This presentation looked at the data collected from centres in London and Manchester. London had 140, with 46% referred from elsewhere and a DDH rate of 2%; Manchester had 241 with 25% referred from other units and a DDH rate of 2%.

They had a combined tenotomy rate of 80%, and a combined rate of 7% needing tibial anterior tendon transfers (this will probably increase because of weighting toward younger patients in the study).

Managing complex feet, Naomi Davis, Manchester

Sometimes called atypical feet, they usually have tightness around the inner side, back and under the foot.

Signs are:

- Swelling
- Deep transverse crease
- Hyper extended big toe
- Skin effects - tender & pink with swelling
- Tight hindfoot
- Deep lateral crease
- Pressure areas

There can be problems with cast application with the cast slipping

(4 Toe sign). The foot slips and gets stuck in a cavus and equinus position so it's important to change the cast within 24hrs. It is better to take the cast off at home than leave the foot in a bad position. If there is a lot of swelling its better to leave the foot cast free for a few days. Instruct the parents to gently massage the foot to reduce swelling and sensitivity.

Reapplication of the cast needs careful manipulation, lift all the metatarsal heads to correct the plantaris. Maybe do an early tenotomy or repeat a tenotomy.

Boots & Bar regime, can start with the Markell type, but the Mitchell boots might be easier. The heel may not come down straight away, but should improve in 2 - 6 wks. Walking will improve the foot. They will be a higher chance of recurrence, but treat early.

The Bulgarian Pull Down outside Bulgaria, Nigel Kiely, Oswestry

The "Bulgarian" technique appears to be a useful adjunct to Ponseti treatment. It enables correction of equinus in difficult cases, thereby eliminating the need for an open posterior release. The intra-operative traction on the calcaneum enables stretching of the posterior

structures with out causing a rocker bottom deformity of the foot. Once equinus is corrected, the feet can be maintained in Mitchell boots. The technique can be repeated if required.

Ilizarov meets Ponseti, Gavin De Kiewiet, Sunderland

The Ponseti technique relies on gentle stretching of the soft tissues in the foot, because breaks in the building blocks of the soft tissues (collagen) results in scarring. Studies have shown that dynamic tension - a gentle continuous stretching - helps to remodel the collagen.

This technique is used when there is a severe late recurrence, after other surgical releases, clubfoot associated with other conditions and late presentation. It can replace many of the major operations used to treat clubfoot. Can use the traditional Ilizarov style with rods or the Taylor Spatial Frame with struts.

A typical regime would be:
Casting of the forefoot, 2 - 4 wks
Apply frame, 2 - 4 wks
Modify the frame according to correction needs, 2- 4 wks
A walking shoe is provided so the child is mobile.
After the frame, physiotherapy and splints will be needed

Foot Deformities and DDH, Robin Paton, Blackburn.

This information was based on an 11 year prospective longitudinal observational study (i.e. patients enrolled at diagnosis of DDH and

	Type II	Type III	Type IV	Total number
TEV Group	15	1	0	432
CTEV Group	8	0	0	60
CTCV Group	12	0	6	93
Metatarsus adductus	0	0	1	25

then followed up) to assess the relationship between different types of foot deformity as risk factors in developmental dysplasia of the hip.

The study population was based on 41,371 infants born between 1/1/1996 and 31/12/2006. In the Blackburn district 585 foot deformities were referred as risk factors in a screening programme for DDH. All hips were ultrasonographically imaged.

The feet were classified into the following groups:

- TEV - talipes equinovarus (postural type, pointing inwards)
- CTEV- congenital talipes equinovarus

(fixed/structural type, pointing inwards/clubfoot)

- CTCV- congenital talipes valgus (pointing outwards)
- Metatarsus adductus (the front part of the foot pointing inwards)

A simple Graf classification was used to describe the hips:

- Type II - mild acetabular dysplasia (shallow socket) possibly just immaturity,
- Type III - moderate acetabular dysplasia
- Type IV - Dislocatable or dislocated hip

Results:

There is no clear evidence that postural or fixed clubfoot has a significant link with DDH requiring treatment and therefore there is not a strong indication that they should have a ultrasound unless there are other risk factors (breech or family history) other clinical signs or the condition is part of a syndrome. There is evidence that children with CTCV and metatarsus adductus have a greater risk of having DDH requiring treatment and therefore should have an ultrasound.

Tuesday 13th Nov 2007 was
Global Awareness Day -
reports of clubfoot
programmes from around
the world.

Contributors

Countries/interest

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The importance of all these
initiatives is not only that they
bring hope to children and
families who would have been
condemned to a life time of
poverty and social exclusion

because of untreated clubfoot,
but because the programmes are
developing a model of health care
solutions based on a public health
model. More detailed reports can
be found under specific country
articles.



*A child being treated by COPE in
Laos*