



## The Ponseti Method of Clubfoot care:

### A vision for the developing world

Prepared by:

Dr. J. Norgrove Penny, MD, FRCS(C)

**The Problem:** The neglected clubfoot deformity worldwide. 135,000 newborns annually with the clubfoot deformity, 80% in the developing world, most with little or no access to orthopaedic care

**The Solution:** Implementation of an inexpensive, effective, low technology system of treatment (The Ponseti Method) on a country-wide basis

**The Field Trial:** The Uganda Clubfoot Project

**The Vision:** Introduction of the Ponseti method into every country in the developing world as part of their national preventative/public health strategy

#### The Problem of the Neglected Clubfoot:

Any orthopaedic surgeon volunteer to the developing world cannot but be struck by the large numbers of cases of neglected clubfoot deformity presenting to outreach clinics. Why so many cases? Is the incidence greater, or is it the prevalence? The worldwide incidence is thought to be approximately 1 in 1000 live births per year, occurring in both girls and boys. In some populations the studied incidence is higher (Malawi: 1 in 500 births) More likely, we are seeing a prevalence effect. Uganda & Malawi, typical of most sub-saharan African countries, have among the highest birth rates in the World with together an estimated 1.5 million births a year. Therefore, 1500 to 3000 of these infants will have clubfeet. Because of poverty and inadequate resources, few cases are treated and so the cumulative numbers of clubfoot disabled children grows.

Regardless, the clubfoot deformity is the most common congenital cause of locomotor disability in the developing world, yet is eminently treatable.

The management of clubfoot has traditionally been a trial of manipulation & casting by the method of Kite, or modifications, with surgical release for resistant cases. Typically, only 5-10% of clubfeet respond satisfactorily to Kite's method, with the remainder coming to surgery, if sufficient surgical resources are available. In poorer countries, the majority of infants born with clubfeet receive no attention and remain neglected. Moreover, for those who are identified and receive some medical attention, surgical resources are unattainable. For example, in Uganda in 2002, there were less than 12 orthopaedic surgeons for a population approaching 25 million people, and most of their efforts were directed towards coping with large numbers of trauma cases.

With the limited number of surgeons and hospital resources in developing countries, the majority of clubfeet in developing countries have remained inadequately treated or neglected.

Neglected clubfeet can have a dramatic effect on quality of life, particularly in developing countries where effective treatment is seldom available and rehabilitation for people with disabilities is limited. Physical impairment results in decreased ambulation and the inability to perform basic tasks such as obtaining food and water. Disability leads to dependency in activities of daily living with significant economic impact on both the family and the village. Furthermore, the visible physical and functional differences in individuals with clubfoot are associated with considerable social stigma. Children with locomotor disability are less likely to be able to access education. Girl children are vulnerable to social, physical and sexual abuse, and are even less likely to achieve education than boys with the disability.



As a non-invasive technique for the management of congenital clubfoot, the Ponseti method has been proven in the developed world to be a superior method of correcting clubfoot deformity and avoids major surgical intervention. With this method, a long term study by Cooper and Dietz reported 78% good & excellent results at a minimum follow-up of 25 years.



The Uganda Clubfoot Project – implementing the Ponseti Method on a country-wide scale.

For six years, between 1996 and 2002, I lived and worked in Uganda, helping establish a children's orthopaedic surgery and rehabilitation program for the rural communities which was called the "Children's Orthopaedic Rehabilitation Project (CORP)". One quarter of all surgical cases were focused on the neglected clubfoot deformity, and this effort was not making a significant impact on the prevalence. In 1998 I began a collaboration with Dr. Shafique Pirani, a fellow Canadian paediatric orthopaedic surgeon with an interest in clubfeet. We realised that a strategic public health type of approach was needed to encourage early awareness and treatment by conservative methods. In 1999, we established a Rotary funded, Ponseti treatment program for clubfoot in collaboration with the Disability Section of the Ministry of Health, the Dept of Orthopaedics at Makerere University, & CORP. This was called "The Uganda Clubfoot Project" (UCP). After an initial 2 year field trial which showed remarkable success, an early intervention and Ponseti method program was incorporated into the official primary health policy of the Ministry of Health in Uganda, the first such national policy that we are aware of.

#### The hallmarks of the program constituted:

- A national strategic plan incorporating all levels of health care in the country, from rural dispensaries, through regional clinics and hospitals, through to the national tertiary referral orthopaedic center.
- Endorsement by, and collaboration with, the Ministry of Health's Disability Desk and Curative Services Department ensured that the program potentially impacted the entire population.

- A Community and public awareness program using posters
- Sensitization of maternity units and traditional birth attendants and establishment of referral pathways for casting
- Training of trainers in the Ponseti method in the main referral center
- Training of orthopaedic officers in every administrative district (53) in the Ponseti method
- Training of medical officers (primary care physicians) in tenotomy technique
- Development and distribution of a locally made inexpensive abduction-foot-orthoses

Rural health care workers, including midwives and traditional birth attendants, coming into regular contact with mothers and infants were sensitized as to how to diagnose a clubfoot and refer infants with this deformity to local orthopedic officers, who in turn were trained to treat these patients by the method of Ponseti. A key to the program were orthopaedic officers, paramedical personnel assigned to all district and regional hospitals, who perform a valuable role in basic fracture care in countries where physicians are in short supply. Over 4 years in Uganda, more than 100 orthopaedic officers and physiotherapists were trained, blanketing the country with skilled personnel.

Taking a cue from effective workshop training programs such as the AO course and ATLS course, a didactic training syllabus and manual was developed. This allowed standardization of training. Training sessions typically involved one full day of classroom work utilizing the manual and the Ponseti teaching models, and a half day live casting clinic during which each trainee put on at least 2 casts. Typically 6-10 students were trained in each session. The clubfoot clinic at the national teaching hospital, Mulago Hospital, was a major resource since up to 40 babies with clubfoot deformity were treated weekly, providing a large and concentrated experience. A considerable portion of the curriculum focused on the Pirani-Columbian foot scoring method since it was felt that standardization was crucial, and the timing of tenotomy could be accurately predicted.

An appropriate technology Foot Abduction Brace (FAB) was necessary to complete the Ponseti program since the lowa experience suggests that the risk of recurrence of deformity is 90% if the brace is not used, compared to 10% with proper brace use. The brace used in North America is too costly (\$US 200) to be used extensively in developing countries. A brace was developed in Uganda (SFAB: the Steenbeek Foot Abduction Brace-\$US 12) made from locally available materials and technology, and distributed "off the shelf" to working locations. A manufacturing template was developed such that any basic workshop, or an artisan anywhere with basic materials, could produce an effective orthoses.

Local anaesthetic tenotomy procedure was taught to general medical officers (physicians) and implemented by them once the orthopaedic officer felt the foot was ready on the basis of the Pirani-Columbian foot score.



#### Pilot Study of the Ponseti Method in Uganda

From Nov 1999 – Oct 2002, a pilot study was performed primarily at the Mulago Hospital Clubfoot Clinic by the Dept of Orthopaedics

& CORP, looking specifically at the rate of correction of deformity.

- 236 clubfeet in 155 consecutive patients aged 9 months or less at start of treatment were treated by 8 trained orthopaedic officers.
- 118 infants with 182 clubfeet completed corrective phase of treatment.
- 176/182 clubfeet (96.7%) corrected with the Ponseti Method.
- 6/182 clubfeet did not correct & were referred for surgery.
- 37 infants (23.4%) with 54 clubfeet (22.9%) did not complete the corrective phase of treatment.

The results were presented at the 2003 POSNA meeting in Florida.

The pilot data suggested that the rate of correction of deformity in the hands of orthopaedic officers was over 90% in those infants who completed manipulation, casting and tenotomy. This rate far exceeds the rate of success of previous treatment by the method of Kite in these institutions, giving children a better functioning foot while reducing pressure on the hospital surgical resources.

#### The Uganda Sustainable Clubfoot Project 2004-2010

Despite the physical and social benefits of the early intervention program, the pilot study showed that almost 25% of children did not complete the initial course of treatment. As a consequence the Uganda Sustainable Clubfoot Project (USCP) was conceived by Dr. Shafique Pirani and is currently underway. This Government of Canada funded project over 6 years examines the social, cultural and logistical factors associated with non-compliance in an effort to understand factors common to underdeveloped societies and it is hoped that workable solutions can be tested. The USCP is a collaboration between the Departments of Orthopaedic Surgery at the University of British Columbia in Canada, and Makerere University in Uganda and incorporates experts not just in orthopaedic care, but in public health, epidemiology, medical education and administration. Uganda, therefore, has become the center of field trials in early clubfoot care on a national level and we look to use the information gained to assist other developing nations.

#### Other Africa Initiatives

As the Uganda Clubfoot Project gained international attention as a pioneer national effort to combat neglected clubfoot deformity, other African countries became involved. A pilot project was undertaken in Malawi in 2000 at the national referral hospital in Blantyre. After one year of experience using the technique, surgical referral rates dropped by almost 90%. In 2002 a national training scheme, similar to Uganda's, was introduced.

The Malawi group has subsequently published their results, reduplicating the Uganda experience that the Ponseti method can be taught and is effective in the hands of non-physician orthopaedic clinical officers. In 100 consecutive cases 98 were treated successfully and avoided open surgery.

Other more limited training projects have been undertaken in Ghana, Tanzania, Zambia, Rwanda and Congo.

Lessons learned from the Africa experience with the Ponseti method:

- The crucial importance of gaining consensus amongst all stakeholders including the Academic Departments of Orthopaedics & Public Health, Government Ministry of Health,



Community organizations and Non-Governmental Development Organizations (NGDO's).

- The importance of developing a National Program in collaboration with the Ministry of Health and existing healthcare resources.
- The importance of a public awareness campaign.
- The method can be made to be effective in the context of the impoverished developing world situation.
- The method can be taught to non-specialists or paramedical personnel.
- A standardised didactic teaching method is effective.
- Hands-on experience with the Ponseti foot models is crucial to the understanding of the technique.
- Including the Pirani-Columbian foot score brought a level of standardization and refined timing of tenotomy.
- Simple foot orthoses can be manufactured using local materials, and are effective.
- The "African clubfoot", often thought to be a more resistant clubfoot deformity, corrects in precisely the same manner and in the same time as the non-african clubfoot.
- Treatment does not have to start at birth to be effective. We routinely salvaged feet presenting for the first time up to one year of age, and occasionally in the second year.



### International initiatives

The successes of the Ponseti projects in Africa spurred the concept of a global initiative to introduce the Ponseti method into all needy developing countries.

Projects are currently developing in Brazil; several states in India; Cambodia; Nepal, and several Central American countries.

The concept of an International Clubfoot Project, patterned on the Uganda Clubfoot Project, has been endorsed by:

- The "Bone and Joint Decade"
- The Pediatric Society of North America (POSNA)
- The Canadian Orthopaedic Association (COA)

Preliminary discussions have taken place with the World Health Organization to explore their collaboration.

It is understood that every region, or country, will have specific

cultural, logistical and socio-economic factors which will require adaptation and modification of the implementation methods while, at the same time, keeping true to the fundamentals of the Ponseti method. Asian and South American countries, for example, have a large and highly skilled professional workforce with respect to Africa, with sophisticated private medical resources, yet have a large unreached and impoverished sector of their society.

### The Role of NGDO's

For an international campaign to be established, particularly within the working context of the World Health Organization, the energy, finances and personnel of NGDO's has to be harnessed. Our intent is to study similar successful WHO programs such as the Polio Plus vaccination program and Vision 2020 Prevention of Blindness Program as prototypes. In these programs, the NGDO's are the main sources of funds, expertise, and implementing personnel in developing countries. Christoffel Blindenmission / Christian Blind Mission International (CBM Int.) is one such NGDO and has offered initial support for an international campaign on clubfoot care. CBM is the largest NGDO in the world taking care of the blind in developing countries, is the primary consultant to the WHO Prevention of Blindness program, and a major partner in the Vision 2020 initiative. CBM also sponsored the children's orthopaedic projects in Uganda & Malawi from which the clubfoot projects developed. As such, CBM's experience at WHO level is greatly appreciated. CURE International, an American based NGDO involved in construction and development of children's orthopaedic and rehabilitation hospitals in several developing countries, has also offered support.

### Our Vision:

- A global initiative to eradicate the problem of the neglected clubfoot worldwide, specifically in poorer developing nations, by introducing broad-based training in the Ponseti method. This initiative would be under the umbrella of the World Health Organization and be incorporated into the preventive public health programs of all developing nations. There would be endorsement, academic and logistical support from numerous partners, including professional orthopaedic societies and the Bone & Joint Decade.
- That, by the end of the Bone and Joint Decade, every country would have developed and initiated a strategic plan to eliminate the congenital clubfoot deformity as a source of chronic disability amongst it's children.
- That skilled national professionals in each country be empowered to strategize and implement their national plan, with assistance, support and collaboration from the international partners.



*Norgrove Penny with Jo, Treated in Africa*

Project Team Members: Dr.Norgrove Penny, MD, FRCS(C)

Dr. Shafique Pirani, MD, FRCS(C)

Mr. Chris Lavy, MB.BCh., MD, FRCS

Dr. Jose Morcuende, MD

Advisory Working Group in Orthopaedic Surgery & Rehabilitation  
Christoffel Blindenmission / Christian Blind Mission (CBM) Int.