



## PEDIATRICS MASTERCLASS Level 3



8-9 October 2018

Orthofix Education Centre, Verona, IT

### A report article

**Intended for senior pediatric orthopedic surgeons, this advanced seminar took place in Verona, Italy, on the 8th and 9th of October 2018 at the Orthofix Educational Centre. The eminent global faculty, the high quality of the scientific content and the complexity of the clinical cases presented were key to the success of this two-day master class.**

More than 30 participants from Europe (France, Germany, Italy, Poland and the United Kingdom); South America (Brazil, Chile and Colombia); and Lebanon took part in the two-day master class. The chairman was **Christopher Iobst**, director of the Center for Limb Lengthening and Reconstruction at the Nationwide Children's Hospital in Columbus, Ohio, US. The other faculty members were **Oliver Birke**, from the Sidney Children's Hospital Network at Westmead and Randwick in Sydney, Australia; **Franz Birkholtz**, an expert orthopedic surgeon from the Walk-a-Mile Centre for Advanced Orthopedics in Pretoria, South Africa; **Alexander Cherkashin**, co-director of the Center for Excellence in Limb Lengthening and Reconstruction at the Scottish Rite Hospital for Children in Dallas, Texas, US; **Pierre Journeau**, director of the Department of Chirurgie Infantile Orthopédique at the Centre Hospitalier Universitaire de Nancy, France; **Mikhail Samchukov**, director of the Center for Excellence in Limb Lengthening and Reconstruction at the Scottish Rite Hospital for Children in Dallas, Texas, US; **Ludwig Schwering**, director of the Pediatric Orthopedic Department at the Mariannen Hospital in Werl, Germany.

Particularly praised by all attendees were the quality of the seminar organization and the interactive learning method, presented on the first day by **Elisa Luciani**, Orthofix Global Medical Education Manager. That method can be summarized in a famous quote by Benjamin Franklin: *"explain it to me, show me, and involve me"*.

Objectives of the course were *"to master new techniques of treatment of pediatric complex deformities; to share challenging clinical cases and to discuss the most controversial issues, in order to reach a consensus on some evidence-based surgical outcomes based on innovative surgical options"*, E. Luciani said.

## CLUBFOOT

The first section of the seminar was focused on **Clubfoot** (Talipes equinovarus), a musculoskeletal pathology and common birth defect. At the beginning of his talk, **Prof. Journeau** showed a painting from 1642 by Jusepe de Ribera, displayed at the Louvre, entitled *"The boy with the clubfoot"*. Ancient references to this condition can be traced back to Hippocrates, 370 BCE, as **Dr. Schwering** later noted.

Etiology: Not entirely understood. It can be an inherited or an idiopathic condition, with unknown causes, sometimes associated with other congenital conditions such as arthrogyposis or skeleton abnormalities. Risk factors may include smoking during pregnancy, or too little amniotic fluid during pregnancy. Males are twice as likely as females to be born with clubfoot. Clubfoot can be mild or severe; 50% of the affected children have clubfoot in both feet.

Goal of treatment: To improve the aesthetics and the functionality of the child's foot before he or she learns to walk, in order to prevent long-term deformities and disabilities. In older children, often coming from neglected areas in the world, to restore the proper functionality and prevent arthritis, further deformities and more pain. Reaching a plantigrade, normal range of motion (ROM) and cosmetically acceptable foot without pain can be considered a fully successful treatment outcome.

## Non-surgical Management

**Prof. Journeau** and **Dr. Schwering** referred to a pain-free and conservative approach to clubfoot in small children: the **Ponseti method** (1972), which consists of gentle manipulation (ligaments, joint capsules and tendons are stretched) and casting.

Procedures: The doctor moves the baby's foot into the correct position and places it in a cast to hold it there. Once or twice a week the foot is repositioned and recasted, for 2 months in average. Towards the end of the therapy period, the doctor performs a percutaneous Achilles tenotomy to lengthen the Achilles tendon, following by physiotherapy and splinting until the walking age.

Recommendation: The Ponseti technique is painless, non-invasive, cost-effective and successful in almost 100% of cases of newborn congenital clubfoot; it is supported (among others) by WHO (2012), NHS (2011), AAOS (*American Academy of Orthopedic Surgeons*, 2011) and EPOS (2011). Of 193 United Nations member states, 113 have officially adopted the Ponseti Method (**Shabtai L.** et al 2014). Stiff, severe clubfoot condition and small calf sizes are more prone to relapse within two years, very rarely after four years.

## Surgical Management

Recommendation: If the clubfoot condition is severe; if the patient is older with an untreated clubfoot and does not respond to conservative approaches; or if there is a residual and/or recurrent clubfoot, a surgical correction may be needed.

**Dr. Birkholtz** presented the four-step correction of a severe clubfoot deformity using a '**Ponsi-HEX technique**' (the Ponseti principles applied with a hexapod frame):

Preoperative planning should include:

Lateral radiograph of the tibia and the foot in maximal plantar flexion;

- ATL and plantar fascia release: acute correction;
- Hinge rotation axis relative to the center of the talus;
- Joint distraction to prevent articulating surfaces from compressing the ankle.

All operations are performed at the same time, then the frame corrects gradually.

In the dry lab session all attendees were able to practice what they had just learned, performing the correction of a clubfoot deformity with the 'Ponsi-HEX technique':

*"Two rings together work like one more powerful ring"*; **Dr. Birkholtz** affirmed.

## LIMB LENGTHENING BY COMBINED USE OF CIRCULAR EXTERNAL FIXATION AND INTRAMEDULLARY NAILING

The **treatment decision** for children with length discrepancies is based not only on the extent of the disparity at the time of diagnosis, but also on predicted increases in discrepancies over time. The **goal of treatment** is to restore the deformed extremities to functional alignment. Treatment outcomes depend mainly on early recognition and correct management of the underlying disease, if any is present.

For **limb length discrepancy of about 2-5cm**, where bones are still growing, epiphysiodesis may be appropriate. This procedure slows down the growth of the contralateral limb by blocking the growth plate and allowing the affected limb to catch up. Proper timing of the treatment is fundamental for best outcome.

For **limb length discrepancy of more than 3-5cm**, limb lengthening may be the effective treatment choice.

Surgical options range from correction with internal and external fixation devices to deformity correction and lengthening. The choice of the most appropriate device depends on the complexity of the deformity (IM nails, *monolateral* or *circular frames*) and on the specifics of the patient.

## POST OPERATIVE MANAGEMENT

*"We are carpenters on living and delicate organisms, and we must respect and protect nature using the biological approach"* said **Dr. Birkholtz**.

Orthopedic surgeons must be aware of the patient's overall status. A supplement of vitamin D may be necessary.

**Dr. Cherkashin** explained the philosophy of the Texas Scottish Rite Hospital for Children (TSRH): the **young patient** (incl. family) is considered a partner in the therapeutic process from the beginning. The post-operative care goals are:

- To make sure prescription are correctly followed by patients;
- To practice physical therapy;
- To manage complications.

Pin site care - Ilizarov and TSRH protocols:

- Every day for the first three days to ensure blood removal, using a solution with 70% alcohol and dressing with chlorhexidine;
- Pin site cleaning and changes of the occlusive pressure dressing once a week;
- It is easier after a shower (starting on the seventh post-op day) using normal saline solution if no crusting or erythema;
- No swimming in the sea or lakes; only swimming in a pool is allowed.

Physical therapy - TSRH protocol on rehabilitation:

It must be started immediately after surgery, as soon and as often as possible (but twice a week is fine), as bone is lengthened by the frame adjustments, but muscles are lengthened by continuous exercises. The suggested exercises are active and passive joint extension under the supervision of a physical therapist.

Weight bearing as much as can be tolerated and as soon as possible. All faculty agree that not only the quantity of weight bearing counts, but also the quality (right functionality, proper physio-training etc.).

Pain management: if necessary, preferably with non-steroidal drugs.

Frame removal when the child can walk with full weight bearing and X-rays show bone union.

*Text: Patrizia Salvaterra*

*In collaboration with: Oliver Birke, Franz Birkholtz, Alexander Cherkashin, Christopher Iobst, Pierre Journeau, Mikhail Samchukov and Ludwig Schwering.*