Ponseti Treatment Method for Idiopathic Clubfoot

Continuing Education Module

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Today’s Plan

- Pathogenesis and diagnosis
- History of method
- Manipulation technique

- Orthotic treatment
- Parental instructions
- Treatment of Complex Clubfoot
- Review
Case Study
Pathogenesis and Diagnosis
Talipes Equinovarus

- Combination of deformities:
  - Foot adduction and supination
  - Cavus foot
  - Equinus

Photo From Netter FH
Development of Idiopathic Clubfoot (ICF) Deformity

- Develops during 14-18th week of pregnancy
- Detectable in sonograms
- Syndromic anomaly
- Most occur in otherwise healthy fetuses

Photo From Ponseti IV
ICF Incidence

- Occurs in 0.6-1.0 per 1000 live births
- 60% are bilaterally afflicted
- Boys twice as likely as girls
History of Method
Ponseti History

- Came to UIHC in 1941
- Published technique since 1963
- Non-operative technique practiced in 27 countries
- Parents and the internet spread the word
Manipulation Technique
The Ponseti Method of treating the congenital clubfoot deformity follows the normal kinematics of the subtalar and midtarsal joints.
Cavus Correction

- **Correct:**
  - Abduct forefoot in supination (E)

- **Common Error:**
  - Pronation increases the cavus (F)

Photo From Ponseti IV
Varus & Medial Deviation Correction

- **Correct:**
  - Abduct foot in supination while applying counter pressure against the head of the talus

- **Common Error:**
  - Kite’s Error
  - Abducting the forefoot while applying counter pressure at calcaneal-cuboid joint
Dorsiflexion of Foot

- Dorsiflex the fully abducted foot
Model Manipulation
Timing of Treatment

- Start a few days after birth
- Can correct up to 28 months old
- Premature babies
  - Wait 1 mo or until feet fit smallest shoes avail.
Serial Casting

- Apply to the manipulated foot
- Change every 5 days
- 3-8 applications

First Cast  ~~~~~~~~~~~~~~~~~~~~~~~~~~ Last Cast
Review Cast

- Use long leg cast to decrease slip and leg rotation.
- Foot remains in slight supination while abducted.
- Abduct 70° for complete correction and to prevent relapse.
- Maintain a good arch and prominent heel.
- Plantar flexion is corrected LAST.
Percutaneous Tenotomy

- Performed in 80% of patients
- Site: 7-10mm above to calcaneus
- Done under local anesthesia in the minor procedures room
- Last cast
  - Wear for 3 weeks
  - Abduction = 70°, Dorsiflexion = 20°
Case Study
Longest Follow-up
Recurrences

- Commonly observe:
  - Decreased dorsiflexion
  - Metatarsus adductus
  - Heel varus

- Occurs up to 3-4 y.o.

- Adult foot by age 6, so corrections permanent
Treating an Early Recurrence

- Child < 1 y.o.
- Cause:
  - Non-compliance with orthosis
  - Foot coming out of shoe
  - Equinus was not corrected
- Treatment:
  - Repeat manipulations and casts every 1-2 wks.
  - Tenotomy if dorsiflexion < 10°
  - Set FAO at 70-80° abduction and 10° dorsiflexion
  - Can be corrected up to 2 ½ - 3 y.o.
Treating a Late Recurrence

- Child is 2 ½ - 5 y.o.
- Cause:
  - Dynamic deformity
  - Observe that foot supinates and is in equinus when patient walks
- Treatment:
  - Repeat manipulations and casts
  - 5% of cases require transfer of anterior tibial tendon to dorsum of foot (3rd cuneiform)
Orthotic Treatment
Foot Abduction Orthosis (FAO)

- Used to prevent relapses

Traditional FAO

Ponseti FAO
Relapse Rates with Use of FAO

- 90% if FAO is not used
- 60% if FAO is discarded when child begins to walk
- 5% if use FAO until 3-4 y.o.
Radical Reduction in Surgical Rates

- Morcuende et al.
  - 99% had initially successful treatment
  - 10% relapsed
    - 88% of these were due to non-compliance with brace
    - 5% required surgery

- Reasons for low rates:
  - 70-80° of abduction achieved with casting
  - Increased compliance with FAO wear

*Pediatrics* Feb 2004; 113(2): 376-380
Wearing Schedule

- Used upon completion of serial casting and manipulations
- Full-time wear for first 3 mos
- Night / naptime until 3-4 y.o.
- Do NOT end treatment early
Setup of FAO

- Buckles of shoes always medial
- Affected side
  - 10° dorsiflexion
  - 60-70° abduction
- Unaffected side
  - 0° dorsiflexion
  - 20-30° abduction
Setup of FAO

- Width of bar equals child’s shoulder width
- Fit shoes so ½-3/4” longer than child’s foot
- Use marks on joints to re-align proper shoe abduction
Traditional FAO

- Traditionally used for most typical cases
- Same bar used with FAO throughout entire treatment
- Shoes come in multiple sizes and widths
- Inexpensive
Traditional FAO Components

- Fillauer Night Splint 9-15 #012204
- Markell Tarso Medius straight last shoes
- Plastazote pad
- Wrymark "Iowa Heel Counter #1 and #2"
Traditional FAO Improvement Needs

- Shoe with well developed heel
  - Better anatomical match
  - No need for addition of plastazote heel counter
  - Better fit for infant and atypical cases
  - Softer leather for increased comfort

- Easier orthosis to don
  - Use of buckles versus laces
  - Quick release mechanism for shoes
Ponseti FAO

- Used with complex clubfoot treatment
- Used for infants when difficult to keep foot in Traditional FAO
- Available through MD Orthopaedics
Advantages of Ponseti FAO

- Well molded heel
- Soft, conformable materials
- Foot well contained
- No blisters/sores
- Holes in heel for viewing
Ponseti FAO Improvement Needs

- Modular version
- Quick release for shoes
Why Not AFOs?

- AFOs immobilize the leg
  - Causes muscle atrophy
  - Allows continued muscle imbalance
  - Causes knee and ankle stiffness
- Want to allow mobility at ankle and knee
- Shoes and FAO used to control abduction
Parental Instructions
Donning Instructions

- Wear cotton socks
- Pull dorsal strap first
- Check that heel is down
- Tighten laces taughtly or tighten remaining straps (depends on FAO used)
Ways to Don Orthosis

- If child is docile
  - Focus on most affected foot first
  - Once affected foot is secure attend to second
- If child is strong in temperament
  - Focus on good foot first
  - Child will tend to kick poorer foot into shoe once first foot is secure
Advice for Parents

- Make it a routine
- Be sure to play with child with orthosis
  - Teach child to kick both legs simultaneously
- If redness is observed on the heel
  - Achilles tendon may be tight
- Pad the bar
Treatment of Complex Clubfoot
Complex Clubfoot

- Observe crease across sole of foot and deep crease above heel
- Posterior ligaments very tight
- Adduction is easy to correct, but cavus and equinus are difficult

Photos courtesy of Dr. Morcuende
Complex Clubfoot: Traditional Method

- Severe crease on lateral aspect of midfoot and overabduction of forefoot
- Difficult to keep in FAO
- Often have red spots or blisters on heels from using FAO

Photos courtesy of Dr. Morcuende
Complex Clubfoot: New Method

- Correct adduction and varus with foot in equinus
  - First 2-3 casts
- Correct cavus and equinus simultaneously with hindfoot in neutral position
  - Next 2-3 casts
- Tenotomy and final cast
  - 30° abduction and 10° dorsiflexion
- Use Ponseti FAO
Complex Clubfoot: New Method

Results
- No lateral midfoot crease observed
- Heel stays down better in shoe
- No red spots or blisters observed on heel

Photos courtesy of Dr. Morcuende
Review: Ponseti Method
Review: Ponseti Method

- Idiopathic clubfoot presentation
- Manipulations: supinate, abduct, dorsiflex
  - Do NOT touch calcaneus
- Usually 4-5 above knee casts, maybe tenotomy
- Corrected = $70^\circ$ abduction and $10^\circ$ dorsiflexion
- FAO worn for 23 hrs/day for 2-3 months
- Night & nap for next 3-4 years
- EDUCATE the parents!!
References


Thank-you!
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