Universal Neonatal Foot Orthotics (UNFO): A Novel Method to correct forefoot adduction, Preliminary report

Avi Panski, Naum Simanovski, Vladimir Goldman, Ron Lamdan
Pediatric Orthopedics Unit, Hadassah medical center, Jerusalem
**Metatarsus Adductus (MA), what do we know?**

The most common foot deformity in newborns: 1-2/1000 births

<table>
<thead>
<tr>
<th>Severe</th>
<th>Moderate</th>
<th>Natural History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not correctable past neutral</td>
<td>Correctable to neutral</td>
<td>Most cases will resolve spontaneously</td>
</tr>
<tr>
<td>Heel bisector at 4th toe or beyond</td>
<td>Heel bisector medial to 4th toe</td>
<td>11-14% persistent and require treatment</td>
</tr>
<tr>
<td>Deep medial skin crease</td>
<td>Mild or no skin crease</td>
<td></td>
</tr>
</tbody>
</table>
Treatment of Metatarsus Adductus

• Serial casting (best results up to 8-9 month old babies) Occasionally followed by an orthosis
  • Time consuming
  • messy
  • Interferes with bathing & hygiene
  • Slippage of the cast
  • Pressure sores

• Treatment options in unresolved MA among older children
  • Ignore
    • There is no functional impairment
  • Surgery
    • Stumbling
    • Esthetics
    • Footwear
    • Social
Materials and methods

• Retrospective study of our first 15 consecutive patients treated with UNFO (June 2014 – November 2015)
• Follow up of 2 months minimum after cessation of treatment
• Treatment protocol:
What is UNFO

- Universal Foot Orthotics
  - 2 sizes
- 3 point pressure
  - Heel held firmly
  - Point of pressure against the 1\textsuperscript{st} metatarsal head
  - Strap for increasing pressure gradually over base of 5\textsuperscript{th} metatarsus
UNFO treatment protocol

• UNFO was first applied for 23 hours a day
• Weaning gradually when full correction was achieved
  • 3-4 weeks 18 hours
  • 3-4 weeks 12 hours night time
  • Stop UNFO
    • (if the parents wish, continue night time bracing as long as it fits)
• Follow-up 3 week
• Follow-up when walking
• Follow-up at the age of 1.5 and 2 years
## Patients details

<table>
<thead>
<tr>
<th></th>
<th>Pat.</th>
<th>Foot</th>
<th>age 1st visit months. weeks</th>
<th>flexibility</th>
<th>Heel bisector</th>
<th>Age UNFO application</th>
<th>Age at last F-Up months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>YM</td>
<td>R</td>
<td>2.3</td>
<td>very</td>
<td>4</td>
<td>5.1</td>
<td>1.05 y</td>
</tr>
<tr>
<td>2</td>
<td>MMS</td>
<td>R</td>
<td>6</td>
<td>very</td>
<td>4</td>
<td>6</td>
<td>1.03y</td>
</tr>
<tr>
<td>3</td>
<td>LD</td>
<td>L</td>
<td>3.2</td>
<td>neutral</td>
<td>4</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>AD</td>
<td>R+L</td>
<td>3</td>
<td>neutral</td>
<td>4-5, 4</td>
<td>3.1</td>
<td>6.2</td>
</tr>
<tr>
<td>5</td>
<td>RYF</td>
<td>L</td>
<td>4</td>
<td>very</td>
<td>3-4</td>
<td>5.3</td>
<td>10.3</td>
</tr>
<tr>
<td>6</td>
<td>GMD</td>
<td>L</td>
<td>6.3</td>
<td>neutral</td>
<td>4-5</td>
<td>7</td>
<td>1.03</td>
</tr>
<tr>
<td>7</td>
<td>RG</td>
<td>R+L</td>
<td>4</td>
<td>Neutral</td>
<td>4, 4</td>
<td>4</td>
<td>8.2</td>
</tr>
<tr>
<td>8</td>
<td>LHM</td>
<td>R</td>
<td>2.3</td>
<td>very</td>
<td>3-4</td>
<td>6.3</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>ZYH</td>
<td>R+L</td>
<td>3</td>
<td>very</td>
<td>3, 4</td>
<td>4.2</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>SY</td>
<td>R+L</td>
<td>3.5</td>
<td>very</td>
<td>3-4, 3</td>
<td>5.3</td>
<td>7.2</td>
</tr>
<tr>
<td>11</td>
<td>KF</td>
<td>R+L</td>
<td>2</td>
<td>neutral</td>
<td>4-5, 4-5</td>
<td>5.1</td>
<td>8.2</td>
</tr>
<tr>
<td>12</td>
<td>OM</td>
<td>R+L</td>
<td>6.5</td>
<td>neutral</td>
<td>4-5, 3-4</td>
<td>6.2</td>
<td>9.1</td>
</tr>
<tr>
<td>13</td>
<td>LC</td>
<td>L</td>
<td>6.2</td>
<td>VERY</td>
<td>4-5</td>
<td>7.2</td>
<td>11.2</td>
</tr>
<tr>
<td>14</td>
<td>ZT</td>
<td>R+L</td>
<td>5.2</td>
<td>very</td>
<td>4, 4-5</td>
<td>6.3</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>GL</td>
<td>L</td>
<td>3.1</td>
<td>neutral</td>
<td>4</td>
<td>6.1</td>
<td>11</td>
</tr>
</tbody>
</table>
Results

• 15 patients, 22 feet (5 Lt 3 Rt 7 bilateral) followed until end of treatment
• 7 Patients severe MA (11 feet)
• 8 Patients moderate MA (11 feet)
• Age at beginning of treatment 3.1-7.2 months (average 5 months +2 weeks)
• Time to full correction: following visit (4 days-3 weeks)
• Final outcome - resolution of MA in all cases
• Side effects – minor
  • Superficial wounds 1
  • Redness of the skin 4
  • Slippage of UNFO 2
  • Device wear 1
  • Excessive sweating 1
Discussion

• About 11-14% of MA do not resolve spontaneously
• The optimal age for treatment of MA is up to the age of 9 months
• Treatment options include serial casting or usage of adjustable orthosis
• We present our experience with treatment of MA among young babies using a new orthosis - UNFO - which fits tightly to the baby's foot and by the three-point fixation principle corrects the deformity
• The amount of pressure over the apex of the deformity is controlled by an adjustable velcro strap easy to apply and manipulate by the baby’s caregivers
• This method is better tolerated by the infant and caregivers and is less time and effort consuming than serial casting
• In comparison to the Bebax orthosis UNFO is easily applied and manipulated by one caregiver
• In comparison to the Wheaton brace the advantage of UNFO is leaving the ankle joint and leg out of the brace
• Treatment was begun as soon as the baby was diagnosed as having severe MA or only if spontaneous resolution has not occurred up to the age of 6 months
• Correction was achieved within 3 weeks with only few minor side effects
Conclusion

• Metatarsus adductus in infants should not be ignored
• Severe deformities or deformities which have not improved spontaneously up to the age of 6 months should be treated
• Treatment with UNFO is a safe and effective method to correct metatarsus adductus deformity in infants up to the age of 9 months
• There were only minor side effects as redness of the skin or superficial wounds which healed after a day or two without the orthosis

The authors declare of no conflict of interest