Normal lower limb variants in children

Liz Clayton
Specialist Physiotherapist
Paediatric Rheumatology

April 2020
Learning objectives

• Identify common normal lower limb variants seen in children
• Decide when treatment is required
• Consider appropriate referral pathway

Practical tips rather than evidence
• Flat feet
• Intoeing / out toeing
• Valgus / varus knees
• Tiptoe walking
• Curly toes
Flat Feet

• May cause children to complain of ‘tired’ feet
• Children ask to be carried
• Excessive wear on sole of shoes
• Very concerning to parents!

• Normal up to age 5 years
• May be present in older non-weightbearing children
## Assessment

### Establish if structural or flexible

- tip toe standing

- dorsiflexion of great toe

Palpate to identify pain, ↓joint range of movement, muscle tightness

Observe gait

Screen for other biomechanical problems or pathologies
## Management

<table>
<thead>
<tr>
<th>Flexible</th>
<th>Structural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reassure +++</td>
<td>Orthopaedic opinion</td>
</tr>
<tr>
<td>Consider orthotic provision if painful or in association with other biomechanical problems</td>
<td></td>
</tr>
<tr>
<td>Strengthen arches in older children who have insoles</td>
<td></td>
</tr>
</tbody>
</table>
Many children have postural flat feet. This means that your feet look flat when you are standing on the floor, but an arch appears when you stand on tiptoe. In most cases this is just a slight variation of the normal foot position, but occasionally it can lead to pain in the foot, or sometimes in the knee or hip.

You may benefit from having insoles fitted to wear inside your shoes. These will support the foot in the correct position when you are standing or walking. However many children can strengthen the muscles under the arch of the foot by carrying out exercises at least twice every day.

**How to carry out the exercise** (see illustration)

- Stand with feet slightly apart and with toes pointing a little outwards
- Lift the arch of the foot slightly, by transferring the weight slightly onto the outside part of the foot
- Make sure you keep the joint at the base of the big toe on the floor, and the toes relaxed
- Hold this position for 5 seconds, then relax
- Repeat for 6 seconds and relax
- Then repeat for 7 secs, 8 secs, 9 secs, and 10 secs, relaxing between each one.
In toeing / Out toeing

- Usually symmetrical and painfree
- Normal up to age 10
- Usually few functional problems
- Well child
What is causing the problem?

- Hip – femoral anteversion
- Knee – tibial torsion
- Foot – metatarsus adductus
Assessment

- Stance position and gait*
- Range of movement (ROM)*
- Thigh foot angle*
- Preferred sitting position

<table>
<thead>
<tr>
<th>Hip</th>
<th>Knee</th>
<th>Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Craig’s test</td>
<td>Thigh foot angle</td>
<td>Vertical heel – toe</td>
</tr>
</tbody>
</table>

| Improves spontaneously up to age 10 | Improves spontaneously up to age 6 | Normal foot has straight lateral border |

http://www.pmmonline.org/doctor/approach-to-clinical-assessment/examination
check out pREMS for details of the assessment
Management

Reassure +++ and avoid ‘W’ sitting*

Refer if child ‘clumsy’ – Community paeds physio, OT or paediatrician

Refer to orthopaedics if painful or asymmetrical

*W sitting - Drawing from Ms Barbara Salas, medical student, Newcastle University, used with permission.
Knock knees / bow legs

- Abnormal angular alignment
- Usually symmetrical and pain free
- No impact on function or mobility

Genu varum
Genu valgus

Drawing from PMM
Used with permission
## Assessment

<table>
<thead>
<tr>
<th>Genu Varum (bow legs)</th>
<th>Genu Valgus (knock knees)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Image of Genu Varum" /></td>
<td><img src="image" alt="Image of Genu Valgus" /></td>
</tr>
<tr>
<td>Child aged 10 – 24 months</td>
<td>Child aged 3 – 4 years</td>
</tr>
<tr>
<td>Occurs alongside development of weight bearing</td>
<td>Accentuated by obesity, flat feet and hypermobility</td>
</tr>
<tr>
<td>Inter-condylar distance measures &gt; 6cm</td>
<td>Inter-malleolar distance &gt; 8cm</td>
</tr>
<tr>
<td>Usually resolves by age 3</td>
<td>Usually resolves by age 8</td>
</tr>
</tbody>
</table>
Management

<table>
<thead>
<tr>
<th>Reassure +++</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to orthopaedics if extreme, persistent, painful or asymmetrical</td>
</tr>
<tr>
<td>Consider inflammatory arthritis and refer appropriately</td>
</tr>
</tbody>
</table>
Tip toe walking

• Transient / intermittent tiptoe walking common in young children
• Usually symmetrical
• Well child with normal developmental milestones

• Can be an indicator of other problems, e.g., cerebral palsy, Duchenne Muscular Dystrophy, inflammatory arthritis
# Assessment

<table>
<thead>
<tr>
<th>Child aged &lt; 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Careful history taking</td>
</tr>
<tr>
<td>Palpate to identify pain, ↓joint ROM, muscle tightness</td>
</tr>
<tr>
<td>Observe gait</td>
</tr>
<tr>
<td>Observe functional movement and changes of position</td>
</tr>
<tr>
<td>Screen for other biomechanical problems or pathologies</td>
</tr>
</tbody>
</table>
Management

If no ‘red flags’ identified, reassure+++  
Discourage use of baby walkers  
Refer to paediatrician or paediatric rheumatologist as appropriate
Curly Toes

- Commonly affect 3rd 4th 5th toes
- Tend to run in families
- Rarely symptomatic, but become fixed over time
- Child may develop excessive thickening of skin, pressure from adjacent toe nails, difficulty wearing certain shoes
Assessment and Management

- Identify type of curly toes
- Observe for pressure or skin thickening
- Assess degree of deformity

<table>
<thead>
<tr>
<th>Underlapping</th>
<th>Overlapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Underlapping Image]</td>
<td>![Overlapping Image]</td>
</tr>
<tr>
<td>More likely to be problematic</td>
<td>Treatment not indicated</td>
</tr>
<tr>
<td>Occasionally require surgery</td>
<td></td>
</tr>
</tbody>
</table>
Take home messages

• Normal Variants are common in paediatric practice
• Most do not need treatment except parental reassurance and explanation
• Occasionally they will be indicators of a more significant problem that requires onward referral to a specialist
http://www.pmmonline.org/doctor/approach-to-clinical-assessment/normal-variants