Varus and Valgus Knees in Children
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**Varus:** the leg is tilted toward the midline of the body

**Valgus:** the leg is bending away from the body midline

Deformities of knees and legs in young children are most common deformities of the lower limbs. Although most of them are physiological and spontaneously correct with growth, yet they are most obvious and cause a distorted perception from the parents. Therefore good discussion, adequate explanation, and a lot of assurances from the health care providers are warranted.

*How some parents appear to view their children*
(Mercer Rang, MD)

"He has a twist in his legs"
(Mercer Rang, MD)
This presentation will cover:
- Recognition and management of physiological varus and valgus knee deformities
- Present the data which will help health care provider to discuss and assure the family of spontaneous correction
- Recognition of pathological conditions of varus and valgus and how to differentiate them from physiological deformity

Physiologic Genu Varum

**BOWLEGGS**

- Physiological genu varum is an extremely common condition in children younger than 2 years
- The apex of the bow is at the knee. The proximal tibia and distal femur are both involved with a tibio-femoral angle of approximately 10 degrees

- This is differentiated from infantile tibia vara (Blount’s Disease) where the apex of the angulation is at the proximal tibia
- Growth plates on X-rays are normal (they are abnormal and deformed in infantile tibia vara–Blount’s disease)

**Physical Exam:** symmetric bowing, smooth curve from hip to ankle, the bending is centered at the knee, Often accompanied by internal tibial torsion, which may accentuate the bowing appearance

Measure distance between knees with ankles touching for future reference

**Natural History:** Spontaneous resolution of the varus to neutral tibio-femoral alignment by 24 months of age and to the adult mild valgus alignment after 3 years of age is well documented.

Use this curve to explain the natural history to the family and assure them of the spontaneous correction

**X-ray:** is not often necessary; should be AP of lower extremities from hip to ankle with knees pointing forward, it may show a delayed ossification of distal femur, proximal tibia medial physis but normal growth plate,
The metaphyseal-diaphyseal angle is normally below 11 degrees (It is higher and increasing in Blount’s disease)

**Differential Diagnosis:** Blount’s disease, Rickets (vit D deficiency), skeletal dysplasias

**Treatment:** assurance, observation

**Tibia Vara**

- Tibia vara is defined as growth retardation at the medial aspect of the proximal tibial epiphysis and physis and usually results in progressive or at least persistent bowleg.
- Two forms: infantile (younger than 3y at the onset) and adolescent (10y or older)
- The two forms have distinctively different radiographic characteristics and treatment results, with infantile tibia vara being more common

**Infantile Tibia Vara (Blount’s Disease)**

**Physical exam:**

- Deformity concentrated at proximal tibia (in contrast to Physiologic Genu Varum which is concentrated at the knee)
- May be asymmetrical
- More common in the obese and in African-Americans
- Lateral thrust of the knee on walking due to varus instability

**X-ray:** Standing AP of lower extremities from hip to ankle (knees forward): it will show proximal tibial angulation, physisal and epiphyseal distortion and a wedge-shaped epiphysis with a “beak” at the medial metaphysis. Apparent lateral subluxation of the proximal end of the tibia is often present.
Metaphyseal-diaphyseal angle >11 degrees and increasing on follow up x-rays

Stages of Blount’s disease and the expected outcome (Langenskiöld)

<table>
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<tr>
<th>Stage</th>
<th>Duration</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>2-3 years</td>
<td>Complete restoration common</td>
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<tr>
<td>II</td>
<td></td>
<td>Restoration possible</td>
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<tr>
<td>III</td>
<td></td>
<td>10-13 years</td>
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<td>V</td>
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Treatment:
- Brace in young (younger than 3 or 4 years and with early stages)

- Osteotomy and realignment in older and stage III, IV

- Lateral epiphysiodesis in adolescent

Adolescent Tibia vara (adolescent Blount’s Disease)
- Less common

- Obese patient

- Correction with osteotomy
growth arrest if there is a residual growth remaining

**Genu Valgum (Knock-Knees)**

- most common is physiological
- Normal developmental stage, age 3-5 years (see Salenius curve)

![Salenius & Vanka, 1975](chart.png)
- **Physical Exam:** measure inter-malleolar distance with knees touching

**X-ray:** Standing AP of lower extremities from hip to ankle: normal growth plate

**Natural History:** Resolution after age 6

**Differential Diagnosis:** metabolic diseases (Renal Rickets), bone dysplasias,

**Treatment:** If persistent and severe, surgical (osteotomy vs. partial epiphysiodesis). There is no non-operative treatment
Supplemental Reading


