Common Pediatric Orthopedic Problems
Anne K. Dzus May 13, 2016

- **Objectives:**
  - Identify and manage common pediatric orthopedic problems
  - Determine which of these require referral

- **Introduction:**
  - Normal variations in children can be due to:
    - 1] hypermobility of joints (ligamentous laxity):
      - flexible flat feet
      - knock knees
    - 2] torsional deformities (rotational):
      - external femoral torsion, i.e., outtoeing
      - internal femoral torsion, i.e. intoeing
      - internal tibial torsion, i.e., intoeing
      - physiologic bowlegs (external rotation of hips plus internal tibial torsion and varus of tibia)
    - 3] intrauterine positioning:
      - maintained by sitting or sleeping positions
    - 4] combination of the above

It is important to understand that the natural history is usually benign and treatment consists of only observation for most children with torsional problems. There is a small possibility that the deformity will persist and parents should be warned of this, but the ineffectiveness of non-surgical management makes observation the choice of management for most children.

**History:**

- prenatal history; birth history; developmental milestones; age of onset; rate of progression; previous treatment; family history; associated pain or disability; altered function
Physical Exam:
- examination of "opportunity" in paediatric population
- complete, to rule out other things such as CP or congenital dislocation of the hip (DDH)
- gait; foot progression angle
- examine the foot, the tibia and hip rotation individually to determine rotational profile
- wide normal range in children
- may have two or more rotational or torsional deformities:
- may compensate each other or be additive

ETIOLOGY
- genetic
- intrauterine position
- favorite positions: sitting/sleeping
- iatrogenic: splints/surgery
- compensating mechanisms or neurological abnormalities (i.e., polio, cerebral palsy, meningomyelocele)

INTOEING
Causes:
- searching great toe
- metatarsus adductus (varus)
- internal tibial torsion
- medial femoral torsion (femoral anteversion)
- combination of above

Searching Great Toe:
- common
- abductor hallucis overactivity
- very rarely requires surgical lengthening
- usually resolves spontaneously
**Metatarsus Adductus (Varus)**

- usually presents from birth to one year of age
- intrauterine positioning
- convex lateral border of foot
- associated with DDH; important to examine hips
- flexible:  - common
- most (90%) resolve spontaneously
- stiff:  - fixed
- often have deep medial skin crease
- manipulations: avoid pushing heel into valgus, i.e., laterally
- splints or "special shoes" may be used
- casting if severe
- rarely surgery in older child
- rarely causes problems in shoe fitting

**Internal Tibial Torsion**

- most common cause of in-toeing
- often seen during second year when child starts to walk (8 to 10 months until 3 years)
- wide range of normal at this age
- medially directed "twist" in tibia
- **cause:**
  - intrauterine positioning
  - sitting and sleeping positions may slow spontaneous resolution
  - may be asymmetric; left side often worse
  - usually (90%) resolves spontaneously
  - often in-toeing worse if tired or if heavy boots or shoes on
  - parents concerned that "toddler" "trips on own feet"
    - **treatment:** controversial
  - often "treating parents"
  - shoe wedges and manipulations ineffective
    - night splinting:
    - prevents sleeping on legs and feet
    - unproven value
    - operative
    - seldom appropriate
Medial Femoral Torsion (Femoral Anteversion)
- medially directed "twist" in femur
- commonly seen during early childhood after age 3
- reaches its peak in severity between 4 and 6 years
- some true correction until age 7 or 8; after this voluntary effort by adolescent to walk straight may compensate for intoeing with external tibial torsion in some children
- **clinically:**
  - more common in girls
  - W" sitter
  - excessive internal (medial) rotation and limited external (lateral) rotation of hips
  - intoes when walking with patella medially rotated ("kissing patella")
  - runs awkwardly ("egg-beater")
  - often familial
- in most (>95%) cases, resolves spontaneously
- avoid "W" sitting, as "W" sitting may decrease natural tendency toward improvement
- if asymmetric hip rotation, x-ray pelvis to rule out hip disease
- not a precursor of degenerative arthritis of hip
- non-operative management ineffective
- surgery (femoral rotational osteotomy) associated with a significant complication rate and rarely indicated
- indications: cosmetic; rarely functional

**OUT-TOEING**

External (Lateral) Rotation Contracture of Hips
- normal
- due to intrauterine positioning; diapers
- prewalking and early infancy
- spontaneous resolution usually by 18 to 24 months
- external rotation of hips close to 90° with minimal internal rotation

Calcaneovalgus Foot
- common post-natally
- positional
- treatment: stretching
External Femoral Torsion
- laterally directed "twist" in femur
- uncommon

External Tibial Torsion
- older children
- may have increased femoral anteversion
- may be secondary to Denis Browne splint (used in past for intoeing)

ANGULAR DEFORMITIES: BOWLEGS AND KNOCK-KNEES

INTRODUCTION
- small number (5-15%) will have pathologic malalignment that may require treatment
- important to differentiate between physiologic angular deformities and pathological conditions

DEFINITIONS
- genu varum = bowlegs ("varus my knees")
- genu valgum = knock-knees

NATURAL HISTORY
- newborns to age 1 year: bowlegs (varus) ≥15°
- age 18 months: angle gradually corrects to neutral and legs appear straight
- age 2 and 3 years: increase valgus angulation to about 12° giving knock-knees
- gradual correction of valgus to that of adults (8° females; 7° males)
**DIAGNOSIS**

- history; family history; normal growth; special diets or nutritional problems; onset; injury or illness; general health
- asymmetry or rapid progression could suggest a pathologic condition
- physical exam; is the deformity worse when standing?
- x-ray only if pathologic form suspected, i.e.: (1) positive family history, (2) asymmetry, (3) other musculoskeletal abnormality, (4) inconsistent with normal bowleg/knock-knee sequence, (5) stature below 5th percentile, (6) severe deformity

**PHYSIOLOGICAL BOWLEGS**

- 1] lateral bowing confined to tibia
  - occurs during first year and nearly always resolves
- 2] combination of external rotation of hips and internal tibial torsion and varus of tibia
  - late infancy (second year of life)
  - bilateral
  - no lateral thrust of knee when walking
  - resolution occurs spontaneously in most children
  - bracing doesn't affect natural history
  - should be resolving by around age 2 years

**PATHOLOGIC BOWLEGS**

- rare
- trauma
- tumor: often unilateral
- infection
- rare hereditary conditions:
  - metaphyseal dysplasia; osteogenesis imperfecta
- metabolic:
  - rickets; renal disease
  - hypophosphatasia
- -Blount's disease
**PHYSIOLOGIC KNOCK- KNEES**

- most pronounced between ages 3 and 4 years and in obese children
- usually more extreme in girls
- accentuated by ligamentous laxity
- no treatment other than observation in children less than 7 years unless excessive
- most resolve; if persists: operative correction with guided growth before puberty

**PATHOLOGIC KNOCK- KNEES**

- renal osteodystrophy
- rickets
- tumors
- infections
- trauma
  - growth plate injury
  - proximal tibial (metaphyseal) fracture
- hereditary conditions, i.e., metaphyseal dysplasia
- paralytic conditions
- chronic juvenile arthritis