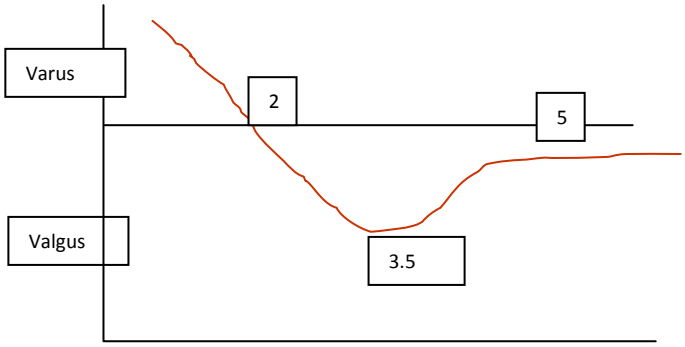
TORSIONAL AND ANGULAR DEFORMIOMITIES

ALIGNMENT PROBLEMS LOWER LIMB

Assessment is important



Developmental history

Family history

Dietary history: Vit D

Progression of deformity

Physiological changes

First 2years Genu varum
2-4 Genu Valgum

Previous treatment

Mile stones

Limitations

Clinical
Gait: any thrust on weight bearing at the knee

Look for Signs: Rickets, Dysplasia

Sitting and standing height

Intermalleolar and intercondylar distance:
In Genu varum there will be increased intercondylar distance at knee and in genu valgum there is more intermalleolar distance. More than 5 cm is significant

Any limb length discrepancy: True length; block test

Torsional assessment

Shoes: examine for any excessive wear

Joint movement: Knee and ankle movement

Genu Varum

Bilateral	**Unilateral**
Physiological	Absent of tibia
Blount's	Infection
Dysplasia	Trauma
Osteoarthritis, Rheumatoid	

Physiological varus	**Blount's disease**
Always bilateral: Symmetrical	Bilateral or Unilateral
Gentle curve	Sharp angulation
Drennen angle: < 11º	>11º
Epiphysis: normal shape	Thinned or fragmented and sloppy
Growth Plate is normal	Growth plate is narrow medially
Metaphysis is normal	Metaphysis is beaked
Lateral thrust is absent	May be present

Treatment

Physiological genu varum	None, Orthotic, rarely surgery
Pathological genu varum	Orthotic Osteotomy Epiphysiodesis

GENU VALGUM

Bilateral and unilateral causes are similar.
More common in Turner's syndrome, Downs syndrome, Morquio's disease

Assessment is similar to varus deformity. Also look for: Flat foot, Hallux Valgus, Subluxation of patellae, dysplasia and proximal femoral deficiency syndrome

Treatment

1. Physiological leave it alone
2. Metabolic: treat the cause
3. X ray after 2 years and yearly clinical and radiological assessment
   Limb length assessment
4. Orthosis: if deformity is progressive
5. Selected cases: Epiphysiodesis at 12 years
6. Role of corrective osteotomy: Distal femoral close wedge, medial osteotomy

TORSIONAL DEFORMITY

Femoral version – angle between the transcondylar axis distally and the axis if the femoral neck.

Anteversion plane of the neck anterior to the transcondylar axis
Retroversion is plane of the neck is posterior to the transcondylar axis.

Femoral

Child	Anteversion	40º
10yrs	Anteversion	24º
Adolescent	Anteversion	16 º

Tibial

1 yr	External rotation	5º
Childhood	External rotation	20-24 º

INTOEING GAIT

8 degrees of intoeing within 2 S.D of normal and should be considered normal variant

Normally with time leg rotates outwards and intoeing gets corrected. Failure of improvement should prompt investigation

Always rule out: Cerebral Palsy; Hip dysplasia

IMPORTANCE OF AGE IN INTOEING

Infancy	Metatarsus	adductus
	Metatarsus primus varus	
Toddler	Intoeing tibia	
Early childhood	Femoral	Anteversion
	Tibial torsion	

History
Prenatal risk factors: Family history

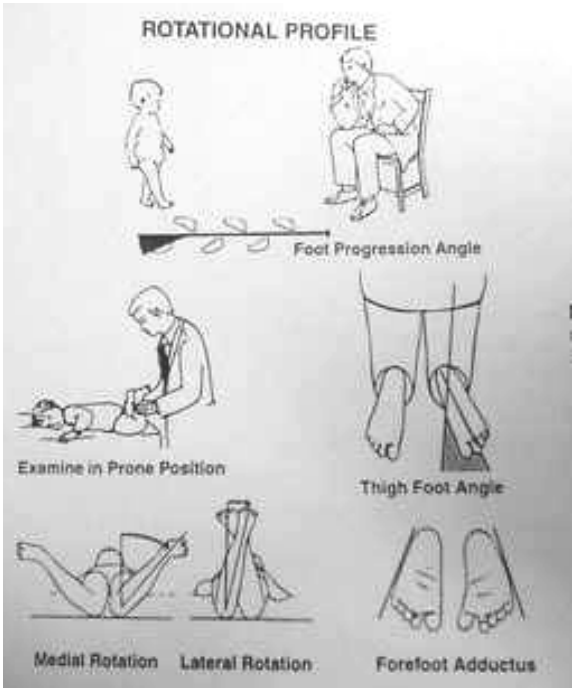
Examination sitting, standing, walking and running – tends to exaggerate deformity

Clinical signs of Femoral anteversion

Patellar squint [excessive femoral anteversion]

"w" position on sitting- hips internally rotated

Increased internal rotation in extension [prone position] and decreased external rotation



Staheli's 5 tests

.1. **Foot progression angle [FPA]**

Normal:	0-30º External Rotation
Intoeing	>10º Internal rotation

2. **Arc of Hip Rotation [Prone]**

Normal Internal rotation 50º and External is 40 º
In femoral torsion: internal rotation is 30 º more than external rotation

3. **Thigh foot angle [TFA]**

Normal 0-20 º
Pathological >30 º

4. **Shape of the foot:**

Foot: Convex lateral border
Heel bisector line normally passes through II web space

Do not forget

To check Hip abduction
Hemiplegic

Measurement of Anteversion

X ray: 90º Flexion and 10º abduction of hip; The neck shaft angle in this position gives Anteversion

CT Best way to demonstrate Anteversion

Ultrasound Not very reliable

Miserable alignment

Anteversion of femur and a compensatory External tibial rotation
Patellofemoral pain is a problem

Treatment

1. Observation and majority of femoral torsion get corrected by 10 years
   Discourage from telling child: “turn your feet out or don’t site that way

2. Asymptomatic residual: leave it alone

3. Symptomatic Torsional deformity of femur. 1% may require osteotomy
   If the internal rotation more than external rotation exceeds by 50º at 8 years

   This will prevent External tibial torsion which starts at 8 years and develops up to 14 years

4. Internal torsion of the tibia usually corrects before age seven

FOREFOOT ADDUCTUS

1:1000 births with 50% bilateral

Common, Intra-uterine Postural

All 5 metatarsal bones adducted at MTP

Midfoot and Hindfoot are normal

Sleeping position in prone may favor this deformity

Clinical

Examine the foot: see both borders of the foot

Flexible or fixed deformity

Look for hind foot deformity; any Achilles tightness

DDH association is high. Therefore, always check hip for dysplasia: abduction and Galleazzia sign

Differential diagnosis

CTEV

Skew or metatarsus varus foot

Treatment

Stretching: Resolve by 4 yrs
Serial cast
Surgery: Rare. Release of Abductor Hallucis and medial capsulotomy of naviculo-cunieform joint
[Heyman-Herndon]. There is 40% failure. Osteotomy of the base metatarsal has been suggested.

METATARSUM PRIMUS VARUS

Isolated adducted first Metatarsal bone
Lateral border of the foot is normal [cf. metatarsal adductus]

Treatment: Serial cast
Rarely basal osteotomy of the first metatarsal.

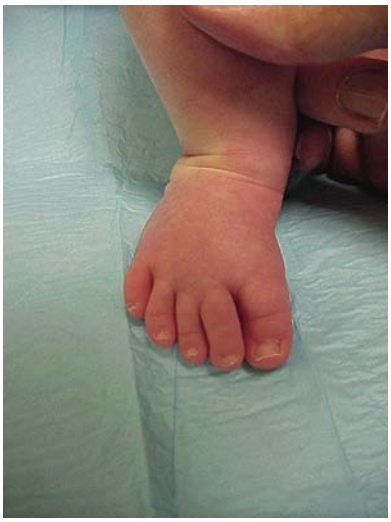
CONGENITAL METATARSUS VARUS OR SERPENTINE OR SKEWFOOT

Adductus metatarsus and valgus hindfoot

Treatment

Cast
When surgery: Open wedge of calcaneum and a Close wedge of medial cuneiform

Metatarsal Adductus



Skew foot

Metatarsal Primus Varus