Crowe Classification of Hip Dysplasia

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Hip Dysplasia

- Congenital or acquired deformation or misalignment of the hip joint
- Developmental dysplasia of the hip
- Spectrum from acetabular dysplasia to a dislocated hip with secondary high-riding acetabulum
Hip Dysplasia

- Both structural and mechanical properties of the dysplastic hip lead to early OA
Acetabulum

- Shallow and hypoplastic with deficient bone antero-laterally
- Often oval shaped with relatively narrow AP diameter
- Increased anteversion
- Lateralized centre of rotation
- High riding hips; the true acetabulum may be thin and soft
Femoral Head

- Hypoplastic femur with a straight, narrow canal and loss of metaphyseal flare
- Narrower M/L than A/P
- Increased proximal femoral anteversion
- Shortened, valgus neck
- Posteriorly displaced greater trochanter
- Femoral head may be small and aspherical or coxa magna
Soft Tissues

- Thickened capsule
- Contracted muscles - iliopsoas, rectus, adductors and hamstrings
- Shortened sciatic nerve
- Horizontal abductors
Crowe Classification

- John F Crowe, 1979
- Classification system based on the extent of proximal migration of the femoral head
- Graded I-IV
- Difference between tear drop and head-neck junction in relation to femoral head
- Extremely low rate of inter- and intra-observer variability

Inter- and intra-observer variability of the Crowe and Hartofilakidis classification systems for congenital hip disease in adults.
Yiannakopoulos CK, Chougle A, Eskelinen A, Hodgkinson JP, Hartofilakidis G.

Total hip replacement in congenital dislocation and dysplasia of the hip.
Crowe JF, Mani VJ, Ranawat CS.
Grade I  <50%
Grade II 50-75%
Grade III 75-100%
Grade IV >100%
Grade?
Radiographic measurement of dysplasia

- Lateral-centre edge angle (of Wiberg)
- Acetabular angle (of Sharp)
- Tonnis Angle

- Does not quantify the degree of subluxation/dislocation
- Does not directly correlate with timing of onset of OA
Lateral-centre edge angle (of Wiberg)

- Measures femoral head laterazation on an AP view of pelvis
- Angle formed by the intersection of a vertical line through the center of the femoral head and a line extending through the center of the femoral head to the lateral sourcil
- Normal: 25 - 45 degrees; <20 is diagnostic of DDH
Acetabular angle (of Sharp)

- Measures acetabular inclination or opening
- Angle formed between a horizontal line and a line from the teardrop to lateral sourcil
- Normal: 33 - 38 degrees
Tonnis Angle

- Measures angle of the weight-bearing surface or sourcil
- Angle formed between a horizontal line and a line extending from the medial to lateral edges of the sourcil
- Normal: ~ 10 degrees
Operative significance

• Higher failure rate of THR
  – 78% survival at 20 years for type IV

• Ensure cup is sited at true acetabulum
  – 83% loosening cf. 42% loosening for type III

• Higher the Crowe rating the higher the complications