Dislocation in Total Hip Arthroplasty

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SpR Trauma and Orthopaedics

- 1-2% primary THR
- Up to 26% in revision THR

Increased Incidence

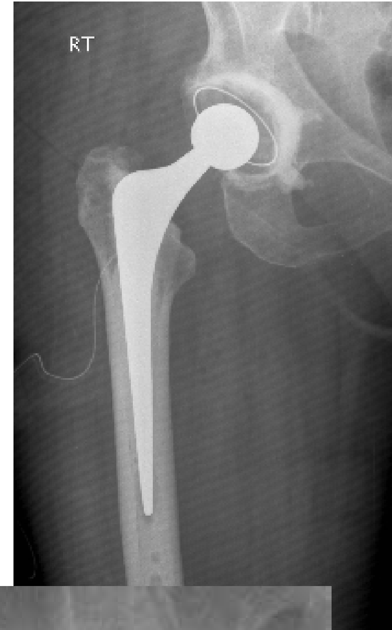
- History of previous hip surgery or revision hip replacement
- Less experienced surgeon
- poor technique
- Pre-existing neurological disease

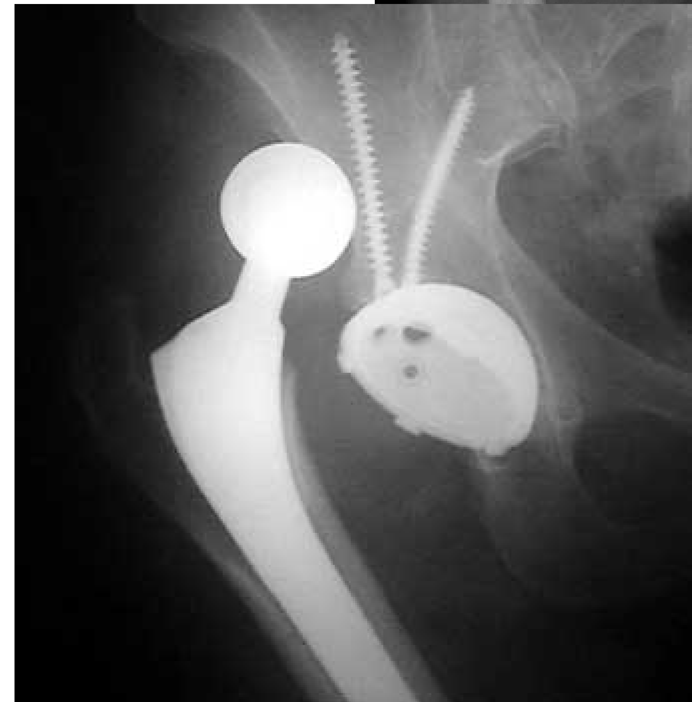
Aetiology

- Often complex and multifactorial

4 main factors in hip stability

- Component design
- Component alignment
- Soft tissue tensioning
- Soft tissue function

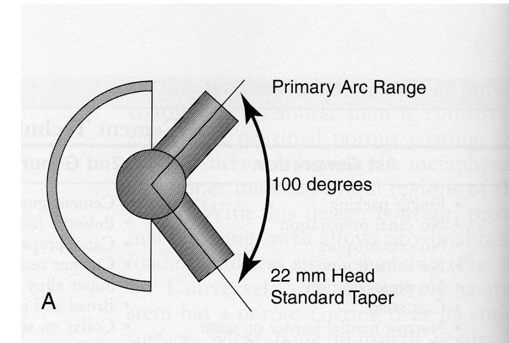


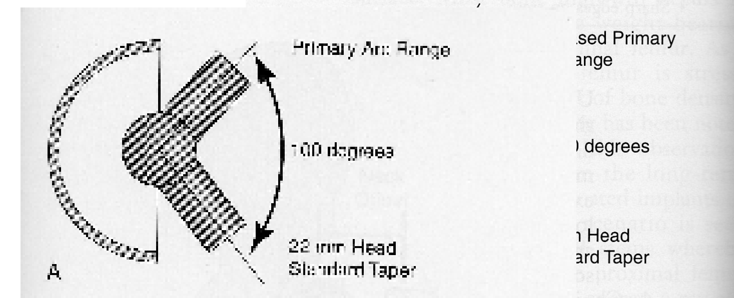


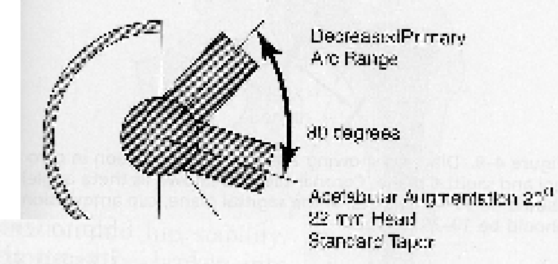
- The native femoral head is much larger
- Primary arc range – ROM of ball cup articulation
- Femoral head diameter to neck diameter ratio – major determinant of primary arc
- Excursion distance – the distance a head must travel in order to dislocate
- Primary impingement – head levering – head excursion - dislocation

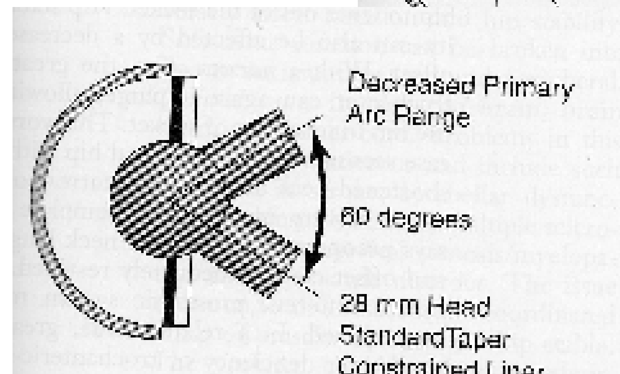
Primary arc

- Increased with increased head to neck ratio
- Decreased with neck collars
- Decreased with augmented acetabular liners
- Decreased with constrained liners



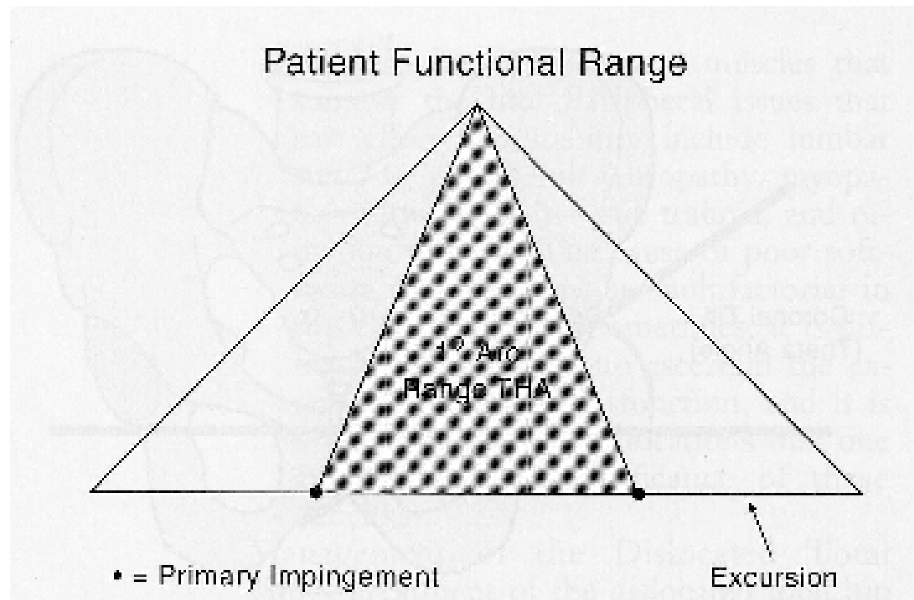


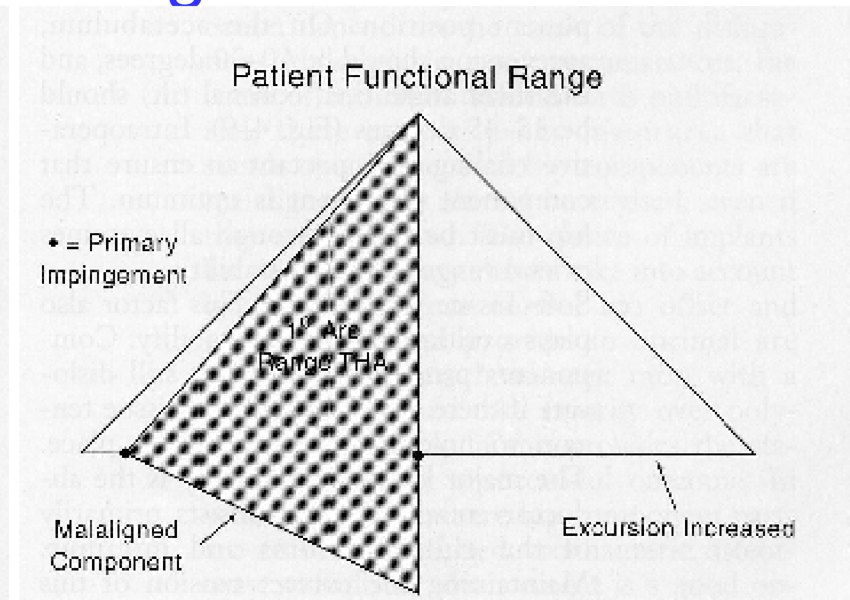


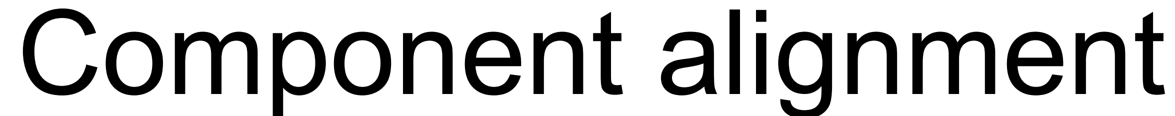


Component alignment

Prosthetic primary arc in the middle of patients functional range







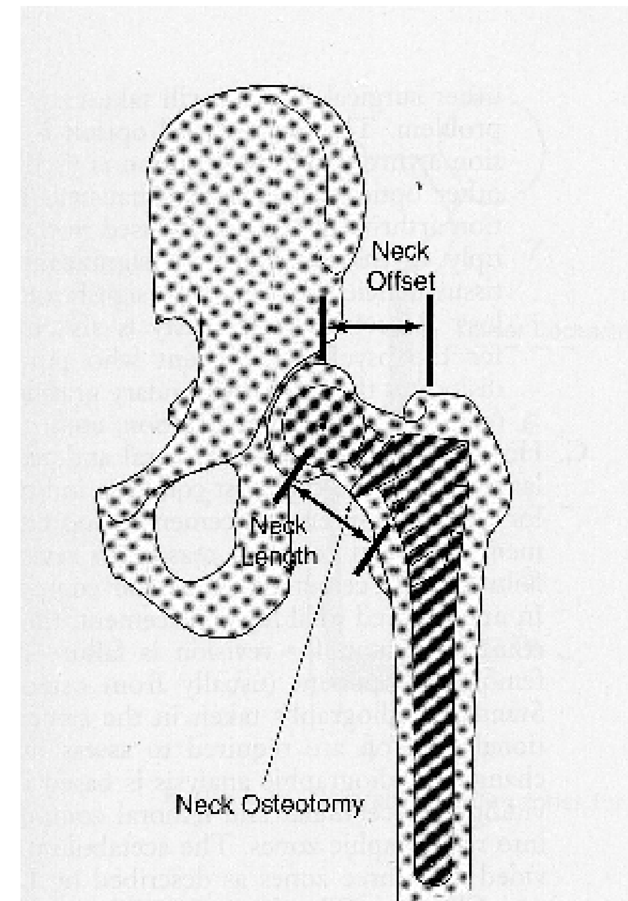
- D’Lima et al. JBJS Am 2000 - Acetabular abduction angle b/w 45-55 degrees permitted better overall ROM and stability when combined with appropriate acetabular and femoral anteversion

- Barrack RL. JAAOS 2003 – optimal cup position 45-55 degrees abduction, combined anteversion angle 10-20 degrees

Safe Acetabular orientation with anteversion 15-30 degrees, coronal inclination (abduction angle) 35-45 degrees

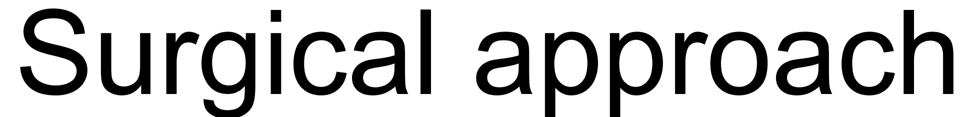
Soft tissue tensioning

- Abductor muscle function
- Gluteus medius and minimus
- Pre-op templating essential
- Restoring appropriate neck length and offset
- restoring mechanics gives stability via appropriate abductor tension



Insufficient or weak abductor muscles increases dislocation risk

- Synchronised neurologic firing from brain via PNS controls abductor complex. Any disruption in system can affect stability.
- Central (brain, brain stem, spinal cord: stroke, parkinsonism, cerebellar dysfunction MS, dementia, cervical stenosis, myelopathy, psych disorder all can cause paralysis or spasticity)
- Peripheral (lumbar stenosis, peripheral neuropathy, myopathy, soft tissue trauma, radiation fibrosis)
- Trochanteric avulsion/non-union
- Woo and Morrey. JBJS 1982 A dislocation rate of 17.6% in those with a displaced trochanteric non-union as opposed to 2.8% when the trochanter healed by osseous or fibrous union without displacement



Posterior +/- soft tissue repair/ direct lateral/ anterolateral?

- Masonis JL. CORR 2002 - Increased dislocation risk with posterior approach; increased incidence of limp with lateral approach
- Kwon MS. CORR 2006 – x8 increased RR of dislocation with posterior approach without soft tissue repair
- Hedley et al. J Arthroplasty 1990 - A very low dislocation rate with posterior approach and reattachment of the short external rotators
- Suh KT et al. CORR 2004 – dislocation rate significantly reduced with posterior approach and soft tissue reattachment
- Cochrane Review 2006 – nil significant differences found b/w posterior and lateral approach for dislocation or post-op Trendelenberg gait
- Palan J. CORR 2008 – PNRMC study – no difference in Oxford Hip Score, revision or dislocation rates at 5 years

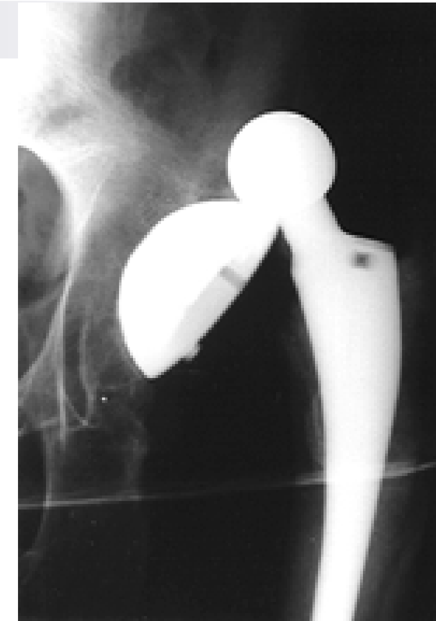
Impingement

- Impingement of femur on the pelvis or residual osteophytes
- More likely if femoral offset not restored
- Narrow offset – trochanteric impingement
- Impingement of neck of femoral component on margin of the socket
- More likely when there has been penetrative/linear wear of the socket

Early and late dislocation

- Most dislocations occur within the first 3 months
- Usually due to malpositioning before full muscular strength attained or due to technical error during surgery
- Late dislocation usually in the second decade post op can be caused by impingement, due to wear and due to increased range of movement

Management



- Analgesia
- Radiographs
- History and examination – when, where, who and with what; neurovascular status (sciatic nerve function)
- Reduction under sedation and analgesia or GA
- Longitudinal traction then abduction when femoral head at the level of the acetabulum or flexion and traction with counter traction
- Image intensifier

- Assessment of range of stability
  - note if dislocation occurring in functional range

- If satisfactory reduction, bed rest in abduction followed by an abduction orthosis for 6-12 weeks (15 degrees abduction prevention of flexion past 60 degrees)
- Allows for soft tissue healing

- 2/3 can be managed successfully with closed reduction and immobilization in brace

- Dependent on cause
- Revision surgery for recurrent dislocators
- Coventry et al. JBJS 1985 - 44% of late dislocations will require revision for recurrence
- Daly and Morrey JBJS Am 1992 - success rate of 61% in revision surgery for recurrent dislocators.
- Best results were in those with an obvious cause could be determined and remedied
- Goals to optimize head neck ratio, restore offset and neck length, optimize arc range

- Retained osteophytes and cement causing impingement should be removed
- Malpositioned implants should be revised and positioned appropriately
- Trochanteric advancement “When no component malposition is identified distal advancement of the greater trochanter has been advocated - placing abductors under tension.

The recurrent dislocators

- Revision to hemiarthroplasty (monopolar or bipolar head)
- In the presence of soft tissue deficiency or dysfunction
- Multiple previous revisions
- Large head imparts stability
- Acetabulum must not be compromised

- Constrained socket design - useful where soft tissues deficient or dysfunctional
- Acetabulum can be reconstructed

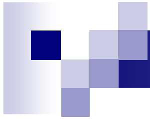
The recurrent dislocators

- Small primary arc; increased incidence of loosening through levering forces

- Removal of components (Girdlestone) – a final resort
- Non-compliant patients, psychiatric patients, elderly and debilitated, previous failed revisions

Summary

- Dislocation in primary THR incidence 1-2%, higher with revision surgery
- Often complex and multifactorial
- Component alignment and design
- Abductor muscle complex tensioning and function
- Primary arc, head neck ratio, neck length and offset
- Management – closed reduction and bracing
- Management of the recurrent dislocator dependant on ascertaining the cause



Thank you