Legg-Calves Perthes

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Disclosures
• I have no relevant financial disclosures

Outline of This Talk
• What we don’t know
• What we know
• Current treatment options
• Future directions
Shameless plug

International Perthes Study Group

• Prospective
• Retrospective

http://www.perthesdisease.org

What we don’t know

• Who
• What
• Where
• When
• Why
• How

What we know about Perthes
What we know: What it is

- Idiopathic osteochondrosis of the capital epiphysis
- For some reason the head loses its blood supply and dies
- Femoral head becomes flattened

What we know: Why it’s important

Etiology of Arthritis of the Hip

- Dysplasia 43%
- Perthes Disease 22%
- Slipped Epiphysis 11%
- Other 12%
- “Idiopathic”/“Primary” 12%

Aaronson AAOS ICL 1986

Total hip arthroplasty in young adults, with focus on Perthes’ disease and slipped capital femoral epiphysis

- Norwegian hip registry

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Correct numbers after validation (hips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary arthropathy</td>
<td>18</td>
</tr>
<tr>
<td>RA / OA</td>
<td>110</td>
</tr>
<tr>
<td>Sequence of femur neck fracture</td>
<td>31</td>
</tr>
<tr>
<td>Sequence of DDH</td>
<td>72</td>
</tr>
<tr>
<td>Sequence of Perthes’ disease</td>
<td>142</td>
</tr>
<tr>
<td>Sequence of SCFE</td>
<td>49</td>
</tr>
<tr>
<td>Ankylosing spondylitis</td>
<td>80</td>
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<tr>
<td>Acute fracture of the femur neck</td>
<td>2</td>
</tr>
<tr>
<td>Others, specified</td>
<td>162</td>
</tr>
<tr>
<td>Missing diagnosis</td>
<td>0</td>
</tr>
</tbody>
</table>

41%

What we know: Epidemiology

- Incidence: 1:1200
- Ages peak: 6-8 yrs
- Male:Female = 4:1
- Caucasian > African Am
- 10% Bilateral
  - sequential

What we know: How it presents

- Vague hip/groin/knee pain
- Limp
- Insidious onset
- Exam:
  - Decreased internal rotation
  - Decreased Abduction

What we know

- Hip ROM is important
What we know

• Early treatment is important
  – Joseph – odds ratio of maintaining sphericity 16.58 times higher if treated in early stages
  – Axer
  – Heikinnen
  – Holkka
  – Lack

What we know

• Growth helps
  – On average younger patient do better
  • 80% patients <6y.o. (Rosenfeld et al)
  • 65% < 6y.o. vs 12% > 8 y.o. (Joseph et al)

What we know

• Weightbearing may hurt

Effects of Non-Weight-Bearing on the Immature Femoral Head Following Ischemic Osteonecrosis

An Experimental Investigation in Immature Pigs

Harry K. Kim, MD, MS, FHSC, Ontitee A. Alagadjik, MD, Kittfer, and Alex Nall, MD
What we know: Degree of involvement is predictive

- Lateral pillar A - No change
- Lateral pillar B - >50% height maintained
- Lateral pillar B/C Border
- Lateral pillar C - <50% height maintained

What we know: Goal of treatment

- Maintain sphericity and congruency
  - Radiographic
  - Stulberg system

  Prevent arthritis

Treatment: 3 main concepts

- Preventive
- Remedial
- Salvage
Preventive Treatment

• Early stages of disease
• Before deformity/extrusion
• Goal = avoid deformity
• Key = ROM

Preventive Treatment

• Containment
  – Place anterior-lateral epiphysis in the acetabulum
  – Abduction splinting
  – Surgical
    • Femoral osteotomy
    • Pelvic osteotomy
Non-surgical Containment

- ROM is key
  - Maintaining abduction
- A-frame orthosis plus ROM exercises
  - Only works while in brace
  - Until lateral column reconstitutes (1-2 yrs)
- Tenotomy and abduction casting

Management of Legg-Calvé-Perthes Disease Using an A-Frame Orthosis and Hip Range of Motion: A 25-Year Experience

- Outcomes:
  - 93% of hips congruent
  - 78% of lateral pillar B and C

Surgical Containment

- Same principle
- Femoral varus osteotomy
- Pelvic osteotomy
- 8-11 year old
- Before late fragmentation
- ROM is key!!!!!!
Surgical Containment – good outcome

Surgical Containment – not so good
Surgical Containment

- Results of containment osteotomy
  - Meta analysis Saran et al – better odds of spherical head with surgery than non-op in kids >8 y.o.
  - Multicenter prospective by Herring et al
    - > 8 y.o. 73% op vs 44% nonop

- How does femoral osteotomy work?
  - Continuous containment
  - 1/3 Skip fragmentation stage

Preventive treatment in younger children

- < 8 y.o.
  - Studies suggest better natural history
  - 80% good overall
  - Only 58% lateral pillar C had good outcome
  - Require close monitoring for ROM and extrusion

Preventive treatment in older children

- >11 y.o.
  - Generally don’t do well
  - Containment less likely to be successful
  - Still looking for best options
  - Epiphyseal Drilling
  - Distraction
Late stage treatment

- Late fragmentation, extrusion
- Hinge abduction
- Goal = minimize deformity
  - Improve ROM
- Best option unclear
  - Containment
  - Distraction
  - Osteochondroplasty/head reduction
  - Valgus ITO

Residual Stage Treatment

- Salvage
- Optimize established deformities
  - FAI
  - Acetabular Dysplasia
  - Troch overgrowth
  - Cartilage lesions
- Long term outcomes unknown
- This is where it gets fun
14 y.o. Coxa Magna and Acetabular Dysplasia

2 yrs post op

17 y.o. Dysplasia + Short neck + High Trochanter
2 yrs post op

14 y.o. Coxa Magna, Acetabular Dysplasia, High Trochanter
Future Directions

• Earlier assessment of risk of collapse
  - Worse fragmentation = worse outcome
  - Treatment is best done before fragmentation
  - Which patients will fragment?

Perfusion MRI

Kim et al JBJS 2014
Future Directions

• Disease Modulation
  – Medical prevention of head collapse
  – Suppress Osteoclasts
    • Bisphosphonates
    • Osteoproegrin
  – Stimulate bone formation
    • BMP

Summary

• Perthes is hard
• Early treatment is crucial
• ROM is crucial
• A lot we still need to learn

Thank you