Slipped Capital Femoral Epiphysis
Current Concepts in Treatment
Eduardo Novais, MD
Assistant Professor of Orthopedic Surgery

Severity

Mild < 30°
Moderate 30° – 60°
Severe > 60°

Stability – Loder Criteria

Stable
Unstable

Osteonecrosis 5-50%

SCFE and FAI

Stable SCFE

SCFE FAI Cartilage damage OA

Rah 1999 Richold 1999 Wienssas 2012
Ganz 2002 Leung 2000 Sink 2010
Ganz 2003
Articular cartilage Damage

Mild

In situ pinning + open anterior osteoplasty

13 yo male IRF: -30°

2 year postoperative

-10° IRF

15° IRF
Radiographic correction was achieved more reliably in the modified Dunn group than the in situ pinning group.

**Heyman and Herndon scores**

- **good or excellent**
  - $p = 0.0343$, OR $= 5.86$, 95% CI $= 1.13$ to $40.43$
### Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>In-situ pinning N = 15</th>
<th>Modified Dunn N = 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteonecrosis</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Slip progression</td>
<td>1 (7%)</td>
<td>---</td>
</tr>
<tr>
<td>Pin impingement</td>
<td>2 (13%)</td>
<td>---</td>
</tr>
<tr>
<td>Implant failure</td>
<td>---</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Intra-articular pin</td>
<td>---</td>
<td>1 (7%)</td>
</tr>
</tbody>
</table>

$p = 0.6588$ (OR: 1.6; 95% CI, 0.2–15)

### Unplanned reoperations

Patients in the in-situ pinning group were more likely to require a secondary procedure ($p = 0.0230$; OR, 8.4; 95% CI, 1.32–90.37)

### Moderate and Severe

11 yo female – Severe Stable SCFE

2 years postoperative
Moderate and Severe

- Moderate
- Severe
- PH
- Closed
- Osteotomy

14 yo female - FAI 2 y after severe SCFE

SHD flexion valgus rotation ITO – 2 y

Unstable SCFE

12 year old male

Closed reduction
In situ Pinning

Unstable SCFE

Lateral Position

Deep exposure

Trochanteric Osteotomy

Modified Dunn is Superior to In-Situ Pinning for Anatomic Restoration and Clinical Outcome with Similar Osteonecrosis Rate in Unstable SCFE

Eduardo N. Novais, MD; Lauryn Kestel, BS; Claire Palmer, MS; Joao Caetano Abdo, MD; Travis Heare, MD; Ernest Sink, MD
### Group characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>In situ pinning (n=18)</th>
<th>Modified Dunn (n=27)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, No. (%)</td>
<td></td>
<td></td>
<td>0.67</td>
</tr>
<tr>
<td>Female</td>
<td>10 (56%)</td>
<td>12 (44%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8 (44%)</td>
<td>15 (56%)</td>
<td></td>
</tr>
<tr>
<td>Age, mean (range)</td>
<td>12.7 (9.3,16.4)</td>
<td>12.6 (7.6,17.7)</td>
<td>0.923</td>
</tr>
<tr>
<td>BMI, mean (range)</td>
<td>24.6 (17.3,31.1)</td>
<td>26.5 (16.3,38.5)</td>
<td>0.223</td>
</tr>
<tr>
<td>Fahey Classification [10]</td>
<td></td>
<td></td>
<td>0.358</td>
</tr>
<tr>
<td>Acute on Chronic</td>
<td>12 (67%)</td>
<td>13 (48%)</td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td>6 (33%)</td>
<td>14 (52%)</td>
<td></td>
</tr>
<tr>
<td>Time from trauma to surgery</td>
<td></td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>&gt;24 hours</td>
<td>6 (33%)</td>
<td>17 (63%)</td>
<td></td>
</tr>
<tr>
<td>&lt;24 hours</td>
<td>12 (67%)</td>
<td>10 (37%)</td>
<td></td>
</tr>
<tr>
<td>Preoperative Southwick angle</td>
<td>64.5 (51.2, 81.3)</td>
<td>66.9 (56.6, 79)</td>
<td>0.808</td>
</tr>
<tr>
<td>Follow-up, mean years (range)</td>
<td>5.8 (1.15.9)</td>
<td>2.4 (1.7,9.6)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

 Restoration of proximal femoral head and neck anatomy was superior in the modified Dunn group compared to the in-situ pinning group.

### Radiographs

![Radiographs graph](image)

### Heyman and Herndon scores

- **Modified Dunn**: 28% (good or excellent, p = 0.016)
- **In-situ Pinning**: 67%

### Unplanned Procedures (p=0.894)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>In situ pinning (N=18)</th>
<th>Modified Dunn (N=27)</th>
</tr>
</thead>
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<tr>
<td><strong>Single procedure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removal of implant penetrating the joint</td>
<td>1 (5.5%)</td>
<td>SHD with bone graft to the femoral head</td>
</tr>
<tr>
<td>SHD with ORIF of femoral head non-union</td>
<td>1 (5.5%)</td>
<td>Revision of implant penetrating the joint</td>
</tr>
<tr>
<td>SHD with osteochondroplasty</td>
<td>1 (5.5%)</td>
<td>THA</td>
</tr>
<tr>
<td><strong>Multiple procedures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revision of implant penetrating the joint</td>
<td>1 (5.5%)</td>
<td>Revision of implant penetrating the joint</td>
</tr>
<tr>
<td>THA followed by revision THA</td>
<td></td>
<td>Revisions of implant penetrating the joint</td>
</tr>
<tr>
<td>SHD osteoplasty after osteonecrosis</td>
<td>1 (5.5%)</td>
<td>THA</td>
</tr>
<tr>
<td>Revision of implant penetrating the joint</td>
<td>1 (5.5%)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Unplanned Procedures</strong></td>
<td>33%</td>
<td>26%</td>
</tr>
</tbody>
</table>

### Heyman and Herndon scores

- **Modified Dunn**: 28%
- **In-situ Pinning**: 67%

### Unplanned Procedures

- **In situ pinning (N=18)**: 33%
- **Modified Dunn (N=27)**: 26%

- **Single procedure**
  - Removal of implant penetrating the joint: 1 (5.5%)
  - SHD with bone graft to the femoral head: 1 (3.7%)
  - SHD with ORIF of femoral head non-union: 1 (5.5%)
  - Revision of implant penetrating the joint: 1 (3.7%)
  - SHD with osteochondroplasty: 1 (5.5%)
  - THA: 1 (3.7%)

- **Multiple procedures**
  - Revision of implant penetrating the joint: 1 (5.5%)
  - THA followed by revision THA: 2 (7.4%)
  - SHD osteoplasty after osteonecrosis: 2 (7.4%)
  - Revisions of implant penetrating the joint: 2 (7.4%)

### Heyman and Herndon scores

- **Modified Dunn**: 28%
- **In-situ Pinning**: 67%

- **12 yo female – Acute unstable SCFE**
Thank you

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