FEEDBACK FOLLOWING PRELIMINARY SEARCH

QUERY REF: Ortho-001
Received: 30.04.2013
Feedback to CSG: 31.05.2013 (due), 28.05.2013 (sent)

SEARCH METHODOLOGY

The content of this feedback report refers only to the most relevant material located under each of the evidence headings and is drawn predominantly from author abstracts or research recommendations within guidelines. The question is posed in the context of surgical and non-surgical interventions for children presenting with slipped capital (upper) femoral epiphysis (SCFE/SUFE). Further details of all the studies included in this report are shown in the appendix, sorted by report section and author name.

Criteria used (PICO):

Who? (population)
Children presenting with slipped capital (upper) femoral epiphysis

What? (intervention/exposure/measure)
Surgical and non-surgical interventions

Comparison
Surgical and non-surgical interventions

What is measured? What are the outcomes?
Pain, function, radiological outcomes, avascular necrosis

Location and setting
Hospital treatment; Worldwide

Exclusion Criteria
Non-English language articles; Letters; Comments; Editorials.

Databases Searched
DUETS; CINAHL; Cochrane Library; EMBASE; MEDLINE; ISRCTN Register; UK Clinical Research Network Study Portfolio; NIH records on ClinicalTrials.gov; Nederlands Trial Register; German Clinical Trials Register; Australian New Zealand Clinical Trials Registry; University Hospital Medical Information Network, Japan; Japan Medical Association Center for Clinical
Trials Register; Japan Pharmaceutical Information Center Clinical Trials Register (JAPIC); World Health Organization (WHO): International Clinical Trials Registry.

Types of Study
Intervention studies

Keywords searched
Search protocols were designed around the following terms: slipped capital femoral epiphysis (e.g. see Appendix 1 for MEDLINE protocol)

Date limits
None

Summary of available evidence

<table>
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<tr>
<th>EVIDENCE TYPE</th>
<th>INCLUDED IN FEEDBACK</th>
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<tbody>
<tr>
<td>A Evidence Summaries</td>
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<tr>
<td>B Systematic Reviews &amp; Meta-analyses</td>
<td>6</td>
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<tr>
<td>C Clinical Trial Registries (Current and Closed)</td>
<td>2</td>
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<tr>
<td>D Primary Research</td>
<td>9 prospective or cross-sectional (380 retrospective studies and/or small case series)</td>
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<tr>
<td>E Overviews and expert opinions</td>
<td>n/a</td>
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<td>F Intellectual Property Office</td>
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RESULTS

A: Good Quality Evidence Summaries (including guidelines)
No evidence summaries or guidelines specifically focused on the treatment of children with slipped upper femoral epiphysis were identified.

B: Systematic Reviews and Meta-analyses
See Appendix 2, Section B for details of systematic reviews and meta-analyses included in this section.

Six articles were identified: two meta-analyses; two systematic reviews; one economic and decision analysis; and one Cochrane review protocol.
Meta-analysis
- Management of unstable SUFE (Lowndes et al., 2009). Identified five pertinent studies all retrospective. Meta-analyses were all non-significant; however, the authors suggest that with SUFE reduction care be taken due to the possibility of increased risk of avascular necrosis and that unstable SUFEs are probably best managed within 24 hours of symptom onset. The urgent need for multi-centred RCTs was highlighted.
- Post-operative complications for SUFE and associated risk factors (Tosounidis et al., 2010). They found that there was a significantly greater risk of avascular necrosis with unstable compared to stable SUFE irrespective of surgical interventional. Furthermore, little clinical evidence regarding chondrolysis and reoperation in the context of physis stability was identified.

Systematic Review
- Best available evidence for treatment options for SCFE (Loder and Dietz, 2012). This concludes the best treatment for stable SCFE is in situ single screw fixation and for unstable SCFE urgent gentle reduction, decompression and internal fixation.
- Elective removal of orthopaedic implants in children (Raney et al., 2008). The authors conclude there is currently no evidence to support or refute the routine practice of implant removal. In the case of SUFE noted complication rate was 34% compared to 10% overall.

Decision & Economic Analysis
- Optimal management strategy for contralateral hip in SCFE (Kocher et al., 2004). The optimum decision was observation of contralateral hip after unilateral SCFE, however where the risk of contralateral slip exceeds 27% or where reliable follow-up is infeasible prophylactic in situ pinning was preferred.

In addition, there is currently a Cochrane review in progress concerning interventions for the treatment of SUFE: the protocol has been published (Alshryda et al., 2013).

C: Clinical Trial Registries
See Appendix 2, Section C for details of trials included in this section.

Two clinical trials which may be of interest were identified for this report however, neither addresses interventions for the treatment of SCFE. The first is a single group observational study using radiographic data to evaluate skeletal maturity in SCFE and to identify patients at risk of developing SCFE in the contralateral hip (C1, ages: 8-16 years). The second is a prospective case-control study to evaluate articular cartilage in all hip disease and ages including SCFE (C2).
D: Primary Research

See Appendix 2, Section D for details of studies included in this section.

No prospective controlled intervention trials were identified for this review. However, six prospective observational and three cross-sectional studies were found.

**Prospective observational studies**

Six studies were identified
- Computer navigated versus traditional fluoroscopic technique for in situ pinning in SCFE (Bono et al., 2013).
- Postoperative CT scans to determine screw placement in SCFE pinning compared with traditional radiographic views (Senth et al., 2011).
- Modified Dunn procedure with Ganz surgical dislocation for SCFE (Madan et al., 2013).
- Dynamic screw fixation in mild SCFE (Kumm et al., 2001).
- Efficacy of bone age in predicting contralateral slip in SCFE (Donamamrdi Gorva et al., 2007).

**Cross-sectional studies**

Three cross-sectional surveys were reported
- Management of acute/unstable SCFE by members of:
  - the Paediatric Orthopaedic Society for North America (Mooney et al., 2005);
  - the British Society for Children’s Orthopaedic Surgery (UK) and the Werkgroep Kinder Orthopaedie (The Netherlands) (Witbreuk, Besselaar and Eastwood, 2007).
- Current practice recommendations for treatment of SCFE by members of the European Paediatric Orthopaedic Society (Sonnega et al., 2011)

Furthermore, three hundred and eighty retrospective studies and/or small case series were identified from the literature search dating from 1950. A reference list of the 71 published over the last 5½ years (2008 onwards) is provided in Appendix 3a.
Furthermore, there were 33 articles which had no abstract and could not be accessed which were not included in this report but are listed in Appendix 3b. All were published between 1949 and 1999: none of the titles alluded to prospective (randomized) controlled trials; however it was unclear if these reported retrospective cases or were overview or expert opinion.

E: Overviews and Expert Opinions
Not relevant to this report.

F: Intellectual Property Office
Not relevant to this report.

Summary of evidence identified

Whilst the vast majority of studies identified during the evidence review process were retrospective studies and/or small case series ($n=380$), these have not been detailed in the main body of the report: they rate as low-level evidence (for interest, however, a list of those published from 2008 onwards can be found in Appendix 3a).

Six secondary research articles (2 meta-analyses, 2 systematic reviews, 1 economic & decision analysis and 1 Cochrane review protocol) and nine primary research articles (6 prospective observational; 3 cross-sectional survey) were identified for inclusion in this report. In addition two ongoing or recently completed registered trials were also found (1 cohort, 1 prospective case-control).

The systematic reviews and meta-analyses highlight the current paucity of high quality evidence regarding the treatment of paediatric SCFE/SUFE: irrespective of focus, the evidence-base identified comprised primarily of retrospective studies and/or case series. This is consistent with the findings reported in this evidence review.

Current practices in the treatment of SCFE/SUFE by orthopaedic surgeons in Europe and America is reported in 3 cross-sectional surveys (2 of which are concerned with unstable SCFE only). These suggest that evaluation of patients is relatively consistent; however, the management of patients is much more varied, particularly for unstable SCFE.

Four of the six prospective observational studies included in the report address in situ pinning in SCFE: two reported on specific screw fixation techniques (dynamic and single) which are reported to have good outcomes (Aronson and Carson, 1992; Kumm et al., 2001); one on the use of computer navigation in pinning compared to traditional fluoroscopy which improved accuracy of screw placement but also increased operating time (Bono et al., 2013); and lastly a study using postoperative CT scans to assess screw placement compared with traditional radiographs showing showed that frog lateral radiographs provided more accurate estimate of screw placement than anteroposterior radiographs. Furthermore, both
radiographic views may fail to show subchondral penetration when the screw is close to the bone (Senth et al., 2011).

One prospective observational study reported the safe and reliable treatment of SCFE with surgical dislocation (Ganz) and anatomical reduction (Madan et al., 2013). Finally, bone age alone was reported to be a poor predictor of contralateral slip in SCFE (Donamamrdi Gorva et al., 2007).

In summary, this report identifies the lack of high quality clinical trial evidence as a necessary research direction in establishing the effectiveness of surgical and non-surgical interventions in the treatment of paediatric slipped capital/upper femoral epiphysis.

**Abbreviations**

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AP</td>
<td>Anteroposterior</td>
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<td>AVN</td>
<td>Avascular necrosis</td>
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<td>CCT</td>
<td>Controlled clinical trial</td>
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<tr>
<td>CI</td>
<td>Confidence interval</td>
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<td>CT</td>
<td>Computer Tomography</td>
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<td>DVT</td>
<td>Deep vein thrombosis</td>
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<td>RCT</td>
<td>Randomized controlled trial</td>
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<tr>
<td>ROM</td>
<td>Range of movement</td>
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<tr>
<td>s.d.</td>
<td>Standard deviation</td>
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<td>SCFE</td>
<td>Slipped capital femoral epiphysis</td>
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<td>SUFE</td>
<td>Slipped upper femoral epiphysis</td>
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</table>
References


APPENDIX 1: MEDLINE SEARCH PROTOCOL

1 Epiphyses, Slipped/
2 exp Femur/
3 (femur or femor*).ti,ab.
4 2 or 3
5 1 and 4
6 Slipped Capital Femoral Epiphyses/
7 (slip* adj3 ((femur or femor*) adj3 epiphys*).ti,ab.
8 SCFE.ti,ab.
9 SUFE.ti,ab.
10 or/5-9
APPENDIX 2 - FULL TEXT

SECTION B – SYSTEMATIC REVIEWS & META-ANALYSES

Square brackets around the title of an article indicate that whilst the article’s abstract is available in English, the main body of the article is NOT in English.

<table>
<thead>
<tr>
<th>Title</th>
<th>Sample/Aim</th>
<th>Methodology/Comments</th>
<th>Summary</th>
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<tr>
<td>Alshryda, Tsang, Al-Shryda, Blenkinsopp, Adedapo, Montgomery &amp; Mason (2013). Interventions for treating slipped upper femoral epiphysis (SUFE).</td>
<td>Systematic review of randomised controlled trials (RCTs) or controlled clinical trials (CCTs) investigating interventions <em>i.e.</em> non-operative treatments, pinning in situ and open reduction and fixation, for the treatment of SUFE.</td>
<td>Computerised search: Cochrane Bone, Joint and Muscle Trauma Review Group Specialised Register; Cochrane Central Register of Controlled Trials; MEDLINE; EMBASE; CINAHL; Science Citation Index; Current Controlled Trials; Centre Watch; TrialsCentral; UK Clinical Research Network: Portfolio Database; SUMSearch Hand-search: Journal of Bone &amp; Joint Surgery - British &amp; American Volumes; American Academy of Orthopaedic Surgeons.</td>
<td>Protocol only published to date</td>
</tr>
<tr>
<td>Kocher, Bishop, Hresko, Millis, Kim, &amp; Kasser (2004). Prophylactic pinning of the contralateral hip after unilateral slipped capital femoral epiphysis.</td>
<td>Economic and decision analysis to determine the optimal management strategy (<em>prophylactic in situ</em> vs observation) for the contralateral hip in SCFE.</td>
<td>Systematic review to determine outcome probabilities; Patient preference questionnaire – 25 adolescent males without SCFE for utility values. A decision tree was constructed and fold back analysis performed to decide optimal treatment. Sensitivity analyses were performed to determine effect of various outcome probabilities and utilities on decision-making.</td>
<td>Optimal management strategy for the contralateral hip was observation based on the outcome probabilities and utilities (expected value for observation = 9.5 vs prophylactic <em>in situ</em> pinning = 9.2). A great risk of late second slip favoured prophylactic <em>in situ</em> pinning (threshold probability 27%). Risk-taking patients with high utility for uncomplicated <em>in situ</em> pinning preferred prophylaxis (threshold utility 27%). Concludes: Decision analysis showed observation the optimal decision. However, where the probability of contralateral slip exceeds 27% or where reliable follow-up is infeasible, pinning is favoured. At an individual level, personal patient preference is important and thus, a doctor-patient shared decision-making is advocated combining outcome probabilities and personal preference to optimize the decision-making process.</td>
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<tr>
<td>Author(s)</td>
<td>Study Type/Method</td>
<td>Evidence/Findings</td>
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| Loder, Dietz (2012)                   | Systematic review of evidence for different treatments of SCFE, and based on level of evidence | determine the best evidenced treatment. Results were categorised into two groups: treatments involving surgical hip dislocation and those that did not. Best recommended treatment for:  
- Stable SCFE without surgical dislocation (mainly level IV) is *in situ* single screw fixation over multiple screw fixation, epiphysiodesis, osteotomy or spica cast.  
- Unstable SCFE without surgical dislocation (all level IV) is urgent reduction with decompression and internal fixation.  
- Both stable and unstable SCFE with surgical dislocation (all level IV) do not show advantage or improvement in outcomes compared with the above. Concludes: based on level of evidence the best treatment for stable SCFE is *in situ* single screw fixation and for unstable SCFE urgent gentle reduction, decompression and internal fixation. |
| Lowndes, Khanna, Emery, Sim, & Maffulli (2009). Management of unstable slipped upper femoral epiphysis: a meta-analysis. | Meta-analysis of studies concerned with the management of unstable SUFEs, with focus on slip reduction and timing of treatment. Only retrospective studies were identified: 4 regarding the role of slip reduction and 5 regarding the timing of treatment.  
The incidence of AVN was compared between reduced and unreduced SUFEs, and between those treated within 24 hours of symptom onset and those treated after 24 hours. Meta-analyses odds ratios: 2.20 ($p = 0.290$) for unreduced SUFEs which had a lower risk of AVN developing; and 0.5 ($p = 0.441$) in favour of SUFEs treated within 24 hours of symptom onset. Whilst clinically important, there were no significant effects. Timing of treatment was inconsistent across studies: 2 favoured treatment within and 3 after 24 hours after symptom onset. Concludes: Despite non-significant results it is suggested that when reductions of SUFEs are undertaken caution is taken as there may be an increased risk of AVN. In addition, that the ideal time for managing unstable SUFEs is probably within 24 hours of symptom onset. Finally, multicentred RCTs are urgently required. |
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<tr>
<th>Raney, Freccero, Dolan, Lighter, Fillman, &amp; Chambers (2008). Evidence-based analysis of removal of orthopaedic implants in the pediatric population.</th>
<th>Systematic review of studies regarding the elective removal of orthopaedic implants in children.</th>
<th>Systematic search of English literature.</th>
<th>Postmarket implant surveillance and basic science articles were also included in the review. A few case series studies report implant removal but lack a control group. No meta-analyses were possible, but data compilation suggested 10% complication rate for implant removal: in the case of SUFE complication rate was 34% Several small case series describe complications associated with implants retention, but provide no evidence of causation. No large studies report long-term outcomes of retained implants. Concludes: currently there is no evidence to support or refute the practice of routine implant removal in children.</th>
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<td>Nb: unable to access full article for details</td>
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<td>Tosounidis, Stengel, Kontakis, Scott, Templeton, &amp; Giannoudis (2010). Prognostic significance of stability in slipped upper femoral epiphysis: a systematic review and meta-analysis.</td>
<td>Systematic review and meta-analysis, of observational studies to explore associations between major complications post-surgery for SUFE and risk factors (condition- or treatment-related).</td>
<td>Computerised search of: MEDLINE and EMBASE. Hand search of bibliographies Studies of children and adolescents with stable or unstable SUFE and reporting at least 3 main endpoints: avascular necrosis, chondrolysis and reoperation.</td>
<td>Twenty nine studies met inclusion criteria. Avascular necrosis: Intercept-only meta-regression estimated the weighted risk for AVN as 5.3% (95% CI 3.4-7.2%). There was a 9.4-fold greater risk of AVN in patients with unstable slips. Instability was found to be an independent predictor of AVN Chondrolysis: The estimated weighted risk of chondrolysis was 0.8% (95% CI, 0.2%-1.4%) associated with unstable slips and osteotomies. Reoperation: Weighted risk of reoperation was estimated at 5.5% (95% CI, 1.7%-9.3%), with the primary reason for reoperation being loss of fixation. Concludes: the current evidence shows unstable SUFE have a significantly greater risk for AVN compared to stable SUFE irrespective of surgical intervention. Little clinical information is presently available for chondrolysis and reoperation in the context of physis stability.</td>
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### SECTION C – CLINICAL TRIALS REGISTRIES

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<th>Title</th>
<th>Sponsors and Status</th>
<th>Summary</th>
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| **C1** Evaluation of Skeletal Maturity for Slipped Capital Femoral Epiphysis  
http://ClinicalTrials.gov/show/NCT01220882 | **University of Medicine and Dentistry New Jersey**  
2008-2015  
Ongoing | Single group assignment. Diagnostic study using radiographic data to: evaluate growth problems in the hip of patients with slipped capital femoral epiphysis (SCFE) as they age; and to help determine which patients are at risk for developing SCFE in the opposite hip.   
Participants: $n = 60$; age = 8-16 years; slipped capital femoral epiphysis  
Outcomes: clinical assessment of proximal femoral physis; skeletal maturity; SCFE radiographic characteristics; limb length discrepancy on scanogram  
Assessed: baseline and 8 years |
| **C2** Evaluation of articular cartilage in hip disease using Discovery MR750 3.0T research pack 3.0 (cube T1 rho, ultra short TE etc.)  
https://upload.umin.ac.jp/cgi-open-bin/ctr/ctr.cgi?function=brows&action=brows&type=summary&recptno=R000005670&language=E | **Chiba University, Japan**  
2010-??  
Status unknown | Prospective case-control study.  
Participants: $n = 30$ (n = 10 controls); age = all; Hip disease including osteoarthritis of the hip, osteonecrosis of the femoral head, acetabular dysplasia, developmental dysplasia of the hip, Perthes disease, slipped capital femoral epiphysis, osteochondritis dissecans.  
Outcomes: Thickness, signal intensity change, localization, topographic variation of articular cartilage of the acetabulum, the femoral head, and limbus. Radial MR imaging, T2 mapping, dGEMRIC, 3D-SPGR, DWI, COSMIC, cine MRI, cube T1 rho, ultra short TE. |
## SECTION D – PRIMARY RESEARCH

Square brackets around the title of an article indicate that whilst the article’s abstract is available in English, the main body of the article is NOT in English.

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<th>Title</th>
<th>Sample</th>
<th>Methodology/ Comments</th>
<th>Summary</th>
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<tr>
<td>Aronson &amp; Carlson (1992). Slipped capital femoral epiphysis. A prospective study of fixation with a single screw.</td>
<td>Prospective observational study. 58 hips in 44 children (31 boys; 13 girls) with SCFE (50 chronic slips; 8 acute slips) managed with <em>in situ</em> pinning with a single cannulated screw.</td>
<td>Outcomes: clinical criteria of Heyman &amp; Herndon; radiographic parameters of Boyer <em>et al.</em> Average follow up = 3 years (range 2-6 years)</td>
<td>54 of 58 hips rated as excellent or good. AVN developed in one patient with acute SCFE. No chondrolysis occurred in any patient. Complications included: 1 patient with subtrochanteric fracture 2 patients with increase in degree of slippage of capital femoral epiphysis.</td>
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<td>Bono, Rubin, Jones, Riley, Ritzman, Schrader, Fleissner, Steiner, Morsch, &amp; Adamczyk (2013). A prospective comparison of computer-navigated and fluoroscopic-guided in situ fixation of slipped capital femoral epiphysis.</td>
<td>Prospective comparative study. 39 hip pinnings in 33 children with SCFE assigned to compare computer navigated (<em>n</em> = 22) or traditional fluoroscopic (<em>n</em> = 19) techniques for <em>in situ</em> fixation using the “approach-withdrawal” technique. Assignment was on the basis of imaging technique used by attending surgeon. Both groups were statistically similar regarding grade and acuity of slip.</td>
<td>To compare computer navigated versus tradition techniques for <em>in situ</em> fixation. Outcomes: screw penetration of joint; screw tip-to-apex distance; distance passed to centre of physis; attainment of centre-centre position; number of pin passes; intraoperative radiation exposure and operating room time. Time points: Intra- and post-operatively.</td>
<td>Computer navigation resulted in more accurate screw placement compared to fluoroscopy (with 1 case of joint penetration identified postop). Computer navigation also showed significant reduced screw tip-to-apex distance and distance to centre of physis (<em>p</em>&lt;0.05). No significant differences were detected in attainment of centre-centre position, number of pin passes or intraoperative radiation exposure. Operating room time was 19 minutes longer patients undergoing computer navigated imaging. No cases of AVN or chondrolysis in either group. Concludes: compared with tradition fluoroscopic techniques, computer navigated <em>in situ</em> fixation results in more accurate screw placement, comparable pin passes and intraoperative radiation exposure and increased operating room time. The cost-benefit ratio needs consideration at individual institution levels.</td>
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<td>Study</td>
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<td>Donamamrdi Gorva, Metcalfe, Rajan, Jones, &amp; Fernandes (2007). Contralateral slip prediction in slipped capital femoral epiphysis: is bone age the answer?</td>
<td>Prospective observational study.</td>
<td>19 Caucasian children presenting with unilateral SCFE.</td>
<td>To determine the efficacy of bone age at predicting contralateral slip in SCFE. Outcomes: bone age assessment (wrist &amp; hand radiographs). Time points: at presentation and at regular intervals post in situ fixation of affected side.</td>
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<td>Kumm, Lee, Hackenbroch, &amp; Rutt (2001). Slipped capital femoral epiphysis: a prospective study of dynamic screw fixation.</td>
<td>Prospective observational study.</td>
<td>25 consecutive children, 29 hips, with mild SCFE (&lt;30˚ slip angle) treated with dynamic screw fixation: 25 chronic, 3 acute, 1 preslip. 17 boys, mean age at surgery = 13.9 years (range 9.4 - 16.1 years); 8 girls, mean age = 11.7 years (range 11.1 - 12.9 years).</td>
<td>To assess dynamic screw fixation in mild SCFE. Mean follow up = 7 years (range 4-13 years)</td>
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<td>Madan, Cooper, Davies, &amp; Fernandes (2013). The treatment of severe slipped capital femoral epiphysis via the Ganz surgical dislocation and anatomical reduction: A prospective study.</td>
<td>Prospective observational study.</td>
<td>28 patients undergoing modified Dunn procedure alongside a Ganz surgical dislocation of the hip for SCFE.</td>
<td>To investigate the safety and reproducibility of Ganz surgical dislocation and anatomical reduction. Outcomes: degree of reduction; function; complication rate; radiological change; ROM of hip Time points: baseline, mean follow-up = 38.6 months (range 24-84 months).</td>
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<tr>
<td>Authors</td>
<td>Study Type/Details</td>
<td>Purpose</td>
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<td>Mooney, Sanders, Browne, Anderson, Jofe, Feldman, &amp; Raney (2005)</td>
<td>Cross-sectional survey. All members of the Paediatric Orthopaedic Society for North America (POSNA).</td>
<td>To assess the management of unstable SCFE by POSNA members</td>
<td>A third of POSNA members responded. 73% of members used the stable-unstable classification; 27% acute-chronic classification. Unstable SCFE was seen as an emergency by 31% of respondent and as urgent (treatment within 8 hours) by 57%. 57% used single threaded screw and 40.3% two threaded screw fixation for unstable SCFE. Concludes: there appears to be agreement on patient evaluation methods although there are discrepancies with classification and fixation methods. The Evidence Analysis Working Group recommends the development of multicentre studies to evaluate the treatment of unstable SCFE.</td>
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<td>Senthí, S., Blyth, P., Metcalfe, R. and Stott, N.S. (2011)</td>
<td>Prospective observational study. 33 SCFEs in 24 patients.</td>
<td>To compare postoperative computerised tomography (coronal &amp; axial) and standard intraoperative or postoperative radiographs (anteroposterior and frog leg) in determining true position of screw tip following pinning of SCFE. Outcomes: distance of screw tip from subchondral bone of femoral head; number of screw threads around physis; 3D placement of screw tip in femoral head.</td>
<td>The position of 38 screws was assessed in the 33 hips. Screw position within quadrants was more superior and anterior than indicated by radiographs. Anteroposterior (AP) radiographs significantly overestimated screw tip to femoral head (mean distance = 5.5mm; coronal CT = 3.4mm, p&lt;0.0001). Bland-Altman analysis showed 95% limits of agreement between measures of -5.6 to 1.5mm indicating the screw could be 5.6mm closer to subchondral bone than estimated with AP radiographs. Frog lateral radiograph and axial CT showed closer agreement (mean distances = 4.7mm and 4.1mm respectively, p&lt;0.01). Bland-Altman analysis showed 95% limits of agreement between measures of -3.5 to 2.3mm suggesting some screws were up to 3.5mm closer to subchondral bone than estimated with radiography. Three anteriorly placed screws appeared to penetrate the subchondral bone on CT, which were not identified on standard radiographs. Concludes: Frog lateral radiographs provide more accurate estimate of screw placement than AP radiographs. Penetration of the subchondral bone may occur if screws are closer than 4mm on frog lateral, or 6mm on AP radiographs to the subchondral bone.</td>
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<td>Study</td>
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All members of the European Paediatric Orthopaedic Society (EPOS). | To establish current practice recommendations for the treatment of SCFE among the EPOS members.  
Questionnaire with 4 case vignettes: stable and unstable SCFE with mild (20 epiphysial-shaft angle) and severe (60 epiphysial-shaft angle).  
Specific questions on: role of reduction, methods of fixation, prophylactic fixation of non-affected hip, postop management; anticipated secondary surgery. | 72 of 287 members responded (25% response rate).  
Paediatric orthopaedics represented 76% total workload for participating surgeons.  
On average surgeons had 16 years experience.  
90% of surgeons do not recommend reduction of slip irrespective of severity.  
70% recommended only one screw for fixation in stable and mild unstable slips.  
For severe unstable slips, 46% recommended reduction by positioning hip on fracture table, 33% by manipulation and 11% open reduction  
Secondary osteotomy was recommended by 40% for mild and 60% for severe slips.  
32% surgeons recommended prophylactic fixation of the contralateral hip.  
Concludes: Certain aspects of SCFE management remain controversial amongst EPOS members especially those relating to unstable SCFE treatment. |                                                                                                                                                                                                     |
All members of the British Society for Children’s Orthopaedic Surgery and the Werkgroep Kinder Orthopaedie. | To assess the management of acute/unstable slip of the upper femoral epiphysis and to compare European and North America approaches.                                                                 | Response rate was 65%.  
Respondents from both countries (UK; the Netherlands) evaluated patients similarly and recognised the need for urgent management.  
60% did not reposition the slip.  
Significant differences between countries and with North America were observation regarding single screw usage, prophylactic pinning and removal of metalwork. |                                                                                                                                                                                                     |
APPENDIX 3

3a. Retrospective studies and small case-series published from 2008 onwards


Synopsis Continuing Medical Education [Sound Recording], 3(1): 22-27.


3b. Studies with no abstract and not accessible


