Comparative systematic review of the open dislocation, mini-open, and arthroscopic surgeries for femoroacetabular impingement
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CRD summary
The review found that open dislocation, mini-open and arthroscopic methods for treating symptomatic femoral acetabular impingement were effective and safe short term; arthroscopy had lower major complications. Given potential bias in the review process, inclusion of weak study designs, limited statistical data and wide variation in the included studies, the authors' conclusions should be treated with caution.

Authors' objectives
To compare the surgical options (open dislocation surgery, arthroscopic surgery and mini-open surgery) for the treatment of femoral acetabular impingement.

Searching
PubMed, EMBASE and The Cochrane Library were searched for relevant studies published in English or German; search terms were reported. The tables of contents of a number of relevant journals published from January to December 2009 and reference lists of retrieved reviews were searched.

Study selection
Eligible studies were of adult (skeletally mature) patients who underwent chondrolabral and osteoplasty procedures for primary femoral acetabular impingement with a minimum follow-up of one year and that included hip outcome scores. Studies of secondary femoral acetabular impingement, studies of revision surgery, studies without osteoplasty, case reports and reviews were excluded.

In the included studies, the mean age of men and women ranged from 27 to 42 years and all had clinical and radiographic diagnoses of femoral acetabular impingement. Few other details were reported on the participants, but a small proportion were recreational athletes, professional hockey players, had trauma, dysplasia, slipped capital femoral epiphysis or Legg-Calve-Perthes disease. Studies were divided into subgroups according to which surgical option was undertaken: open dislocation (the traditional gold standard), mini-open surgery and arthroscopic surgery. Instruments and scales used to measure outcomes included Merle d’Aubigne, Tonnis scale, Western Ontario and McMaster Universities Osteoarthritis Index, Short Form 12 Health survey, (modified) Harris Hip score, University of Southern California activity scale, Hip Outcome score, Non-arthritic hip score and pain visual analogue scales.

Studies were undertaken in Mexico, Canada, USA, UK, Korea, Spain, Switzerland and France.

Two reviewers selected studies for the review.

Assessment of study quality
No formal method of assessing studies for quality was used. The authors commented on power calculations, loss to follow-up and study design.

Data extraction
Data were extracted on the differences between pre- and post-procedure hip outcome scores, proportion of outcomes considered good to excellent, proportion of failures, proportion of conversion to total hip arthroplasty, osteoarthritis progression and proportion of complications (according to how these were reported in the individual studies).

One reviewer extracted data from the included studies.

Methods of synthesis
The results of the studies were synthesised in narrative format and included in tables. Overall results and results in three subgroups according to type of surgery (open dislocation, mini-open procedure and arthroscopy).
Results of the review
Eighteen studies (900 participants, 947 hips) were included in the review. Six retrospective case series studies (171 participants, 184 hips) assessed the effects of the open dislocation method. Four studies (three retrospective case series and one comparative retrospective review with historical controls, 168 participants, 176 hips) assessed the effects of the mini-open procedure. Eight studies (retrospective and prospective case series and comparative retrospective reviews with historical controls, 561 participants, 587 hips) assessed the effects of an arthroscopic procedure. Mean follow-up, where reported, was 2.5 years (range 1.3 to 5.2 years). Loss to follow-up, where reported, ranged from zero to 56% and at least half of the studies had no loss to follow-up.

Overall results: Clinical success ranged from 65% to 94%. Total hip arthroplasty conversions were made in zero to 30% of studies. The major complication rate ranged from zero to 20%.

Open dislocation (six studies): Clinical success ranged from 65% to 94%. Total hip arthroplasty conversion rate was zero 30%. The major complication rate was zero to 20%.

Mini-open procedure (four studies): Clinical success was 92% in one study. Total hip arthroplasty conversion rate was zero to 11%. The major complication rate was zero to 17%.

Arthroscopy (eight studies): Clinical success ranged from 67% to 90%. Total hip arthroplasty conversion rate was zero to 9%. The major complication rate was zero to 5%.

Authors' conclusions
Open dislocation, mini-open and arthroscopic methods for treating symptomatic femoral acetabular impingement were effective in improving pain and function in short- to mid-term studies and were relatively safe procedures; arthroscopy showed comparable surgical efficacy and lower major complications.

CRD commentary
The review addressed a clear research question. Inclusion criteria appeared mostly appropriate, although study design was not specified. A range of relevant sources was used for identifying studies. The restriction to studies published in English and German meant that language and publication bias could not be excluded. Appropriate methods were used for selection of studies. Only one reviewer undertook data extraction, so reviewer error and bias could not be ruled out.

Most studies did not report confidence intervals and only one study provided power calculations and defined clinically meaningful changes in outcomes. Given that most studies were case series and no explicit methods were used to assess studies for quality, potential for bias was substantial as differences in participants, interventions and outcomes made it difficult to interpret the clinical relevance and reliability of the results. Due to this variability, the synthesis of studies in narrative format was appropriate. The three different surgical options were compared indirectly in potentially different populations, which made it difficult to interpret the findings.

Given the potential biases in the review (searching, data extraction and quality assessment), inclusion of weak study designs, limited statistical data and wide variation in the included studies, the authors' conclusions should be treated with caution.

Implications of the review for practice and research
Practice: The authors stated that the minimally invasive procedure of arthroscopy may appeal to a young athletic population with femoral acetabular impingement. Due to the feasibility of bilateral outpatient surgery, arthroscopy may be more tolerable.

Research: The authors stated that future studies should be prospective and controlled and should include validated and reliable outcome instruments for generally young, active patients and use consistent reporting.

Funding
Not stated.

Bibliographic details
Matsuda DK, Carlisle JC, Arthurs SC, Wierks CH, Philippon MJ. Comparative systematic review of the open
dislocation, mini-open, and arthroscopic surgeries for femoroacetabular impingement. Arthroscopy 2011; 27(2): 252-269

**PubMedID**
21266276

**DOI**
10.1016/j.arthro.2010.09.011

**Original Paper URL**
http://www.arthroscopyjournal.org/article/S0749-8063(10)00937-0/abstract

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Arthroscopy; Femoracetabular Impingement /surgery; Humans; Minimally Invasive Surgical Procedures; Orthopedic Procedures /methods; Treatment Outcome

**AccessionNumber**
12011001444

**Date bibliographic record published**
22/06/2011

**Date abstract record published**
26/10/2011

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.