A systematic review of the clinical and radiological outcomes of LISS plating for proximal tibial fractures

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CRD summary
This review of the Less Invasive Stabilization System (LISS) in the management of tibial plateau and proximal tibial fractures concluded that LISS was appropriate and had satisfactory clinical outcomes. There was a high incidence of postoperative complications. The conduct of this review was mostly fine, but the conclusion seemed overstated given that evidence came from lower-quality observational studies.

Authors' objectives
To determine the clinical and radiological outcomes of the Less Invasive Stabilization System (LISS) in the management of tibial plateau and proximal tibial fractures.

Searching
MEDLINE, CINAHL, EMBASE, BioMed Central, AMED and The Cochrane Library were searched from 1990 to April 2009. Search terms were reported. SIGLE, NTIS, NRR, British Library's Integrated Catalogue and the Current Controlled Trials were searched for unpublished studies. Reference lists of reviews were searched.

Study selection
Clinical trials that investigated clinical and/or radiological outcomes after LISS fixation of proximal tibial fractures (including tibial plateau fractures AO/ASIF classification AO 41 A-C and proximal AO 42 A-C) were eligible for inclusion. There were no age or gender restrictions. Isolated injuries and polytrauma cases were included. Case series smaller than five participants, studies that did not differentiate LISS results from other fixation results and studies that assessed locking plates not described as LISS were excluded.

Most of the included fractures were type AO 41 and others were AO 42, AO C1 to C3 or Schatzker V or VI. Mean time to surgery was eight days (range 3.7 to 13 days). Mean operation duration was 128.6 minutes. Sixty-seven per cent of participants were male. Mean age ranged from 39 to 62 years. Follow-up ranged from three to 48 months.

Studies were selected by two reviewers independently. Disagreements were resolved by discussion.

Assessment of study quality
The authors used the Critical Appraisal Skills Programme (CASP) appraisal tool for observational studies to assess methodological quality, presentation of results and external validity to a total possible score of 15.

Assessment was performed by two reviewers independently. Disagreements were resolved by discussion.

Data extraction
Results for knee range of motion, extension and flexion, functional outcomes (such as Lysholm score), time to full weight bearing, radiological outcomes (such as time to union) and post-operative complications were extracted by one reviewer and checked by a second. Any German papers were extracted by one reviewer only.

Methods of synthesis
Results were presented in a narrative synthesis grouped by type of outcome.

Results of the review
Fourteen studies (n=597 patients, 610 fractures) were included. All were observational studies; four were retrospective and 10 were prospective in design. Quality scores ranged from 2 to 14 out of a possible 15. Most studies reported how patients were selected for the study. All studies except one followed up more than 85% of the sample. Only three three
studies adjusted for relevant confounding factors. Only one study reported a power calculation. No studies reported confidence intervals. Descriptions of the study population were generally poor.

Clinical outcomes: Knee range of motion was assessed in nine studies. Extension ranged from 10° hyperextension to -20° and flexion ranged from 60° to 150°. Functional outcomes were assessed using a range of outcome measures in five studies. Two reported Lysholm scores: one had a mean score of 90 and the other reported good or excellent scores in 68% of patients. One study reported a mean score of 88 for lower extremity measures; another reported a mean Short Form 36 physical component score of 40 and mental component score of 51 at 12 months. Two studies reported Hospital for Special Surgery scores: one with a mean of 83.3 at two years and the other with a mean of 88 for extra-articular and 74 for intra-articular fractures. The mean Knee Society Score was 91 for extra-articular and 80 for intra-articular fractures in one study. One study reported 44 cases of excellent or good and one poor Rasmussen score. Four studies assessed time to full weight bearing and this ranged from six to 21 weeks.

Radiological outcomes: Two studies reported time to union, which ranged from six to 28 weeks. Two studies reported time to observable callus formation, which ranged from three to 10 weeks.

Postoperative complications: Postoperative loss of reduction was the most frequently reported complication. Other complications were valgus/varus deformity and inflexion and flexion/extension deformity. Cases of implant failure, proximal screw pull out, delayed union and non-union were reported. There were forty cases (7%) of superficial or deep infections. Cases of peroneal nerve injury and compartment syndrome were reported.

Authors’ conclusions
The LISS fixation method was appropriate and had satisfactory clinical outcomes. There was a high incidence of postoperative complications.

CRD commentary
This review had a clearly stated research question and appropriate study selection criteria. A number of relevant databases were searched. The authors searched for unpublished studies. Studies published in English and German were included; it was unclear whether there were any language restrictions. Although clinical trials were eligible for inclusion, only observational studies with a higher risk of bias were identified and included. Study validity was assessed using a relevant checklist for observational studies; full details were not reported for each study. Study selection, validity assessment and data extraction were performed by two authors independently or by one and checked by a second to reduce risks of error.

The conduct of this review was mostly fine, but the conclusion about clinical outcomes seemed strong given that the evidence came from lower-quality observational studies, not all of which reported clinical or functional outcomes.

Implications of the review for practice and research
Practice: The authors stated that in cases of tibial plateau fractures, additional intrafragmentary fixation and medial buttress places may be required.

Research: The authors stated that further research was needed and should present outcomes from LISS plate fixation separately for tibial plateau fractures and extra-articular proximal tibial fractures and assess whether LISS efficacy differed for functional outcomes and complication rates.

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Not reported.

Bibliographic details
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.