Skeletal stability and complications of bilateral sagittal split osteotomies and mandibular distraction osteogenesis: an evidence-based review

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CRD summary
The review found that bilateral sagittal split osteotomy (BSSO) and mandibular distraction osteotomy (MDO) had similar relapse rates within 6mm to 10mm of mandibular advancement. MDO appears to be associated with fewer major complications than BSSO. In view of major methodological problems in the review and a lack of good-quality evidence, the authors' conclusions do not appear reliable.

Authors' objectives
To compare skeletal stability and complication rates associated with bilateral sagittal split osteotomy (BSSO) and mandibular distraction osteogenesis (MDO) for treating mandibular hypoplasia.

Searching
MEDLINE was searched from 1957 to December 2007. Search terms were reported. Reference lists of retrieved articles were checked. The search was restricted to studies in English.

Study selection
Randomised controlled trials (RCTs) and prospective or retrospective case series (of at least five cases) of BSSO or MDO for patients with mandibular hypoplasia requiring lengthening were eligible for inclusion. Studies were required to report stability (skeletal relapse among patients requiring advancement of 6mm to 10mm) or complications (alveolar nerve disturbance, temporomandibular joint dysfunction, temporomandibular joint condylar changes or miscellaneous complications). Detailed definitions of outcome variables were specified in the review. Studies were required to utilise semi-rigid fixation and involve no additional maxillary surgery. Studies of obstructive sleep apnoea or craniofacial syndrome or not meeting predetermined quality criteria were excluded.

In studies of stability, most participants (94%) were in the BSSO group, in which most participants (61%) were female and the mean age was 25 years (range 16 to 35). In the MDO group the gender ratio was fairly balanced and the mean age was 14 years (range 11 to 15). Fixation methods varied across studies. Duration of follow-up for stability outcomes was six to 12 months.

Two reviewers independently selected studies for inclusion. Disagreements were resolved by consensus.

Assessment of study quality
Standards were required to be adequate for the following aspects of study validity: design and conduct (description of randomisation and use of intention to treat analysis for RCTs and sample size of at least five for case series), outcomes assessment, follow-up and reporting of surgical protocol. Detailed criteria for meeting these standards were specified in the review; studies that did not meet all standards were excluded.

Two reviewers independently assessed study validity. Disagreements were resolved by consensus.

Data extraction
Studies were grouped by outcome. For skeletal relapse, data were extracted on the mean change for each eligible patient, grouped by percentage change (0-10%, 11-20%, 21-30%, 31-40%). Event rates were extracted for complications.

The authors did not state how many reviewers performed the data extraction.
Methods of synthesis
It appeared that data were combined by adding up the numbers of events and participants from all studies to calculate pooled event rates for each outcome. Numbers needed to harm were calculated, with 95% confidence intervals (CIs).

Results of the review
Twenty-three studies were included in the review, all case series of either BSSO or MDO. Stability was reported by four prospective and six retrospective studies (n=235). Complications were reported by seven prospective and nine retrospective studies (n=more than 1,100).

Stability: For postoperative months six to 12, mean skeletal relapse was 15% in the BSSO group (nine studies, n=222) and 17.1% in the MDO group (one study, n=13).

Complications: Persistent alveolar nerve disturbance occurred in 27% of participants after BSSO (four studies, n=1,109) and 2.9% of participants after MDO (one study, n=70). The number needed to harm for BSSO compared with MDO for this outcome was 4 (95% CI 3 to 5). Condylar remodelling occurred in 12% and condylar resorption in 2.9% of the BSSO group (three studies, n=425); condylar remodelling occurred in 12% and condylar resorption in 1.4% of the MDO group (one study, n=70). The number needed to harm for BSSO compared with MDO for condylar remodelling was 21 (95% CI 12 to 88). No data were available on temporomandibular joint dysfunction in the MDO group.

Miscellaneous complications were also reported in the review.

Authors’ conclusions
Bilateral sagittal split osteotomy (BSSO) and mandibular distraction osteogenesis (MDO) had similar relapse rates within 6mm to 10mm of mandibular advancement. MDO appeared to be associated with fewer major complications than BSSO.

CRD commentary
The objectives and inclusion criteria of the review were clear. Only one database was searched, no specific attempts were made to retrieve unpublished studies and the search was restricted by language, so some studies may have been missed. Publication bias was not formally assessed. Steps were take to minimise the risk of reviewer bias and error by having more than one reviewer select studies and assess study validity; it was unclear whether these methods were applied to data extraction. It was unclear whether the studies were methodologically and clinically sufficiently similar to pool. The methods used to pool data were not statistically robust, since they did not allow for differences in sample size or event rates between the studies. Comparisons between BSSO and MDO were unreliable because there were no studies that directly compared the two interventions. Few details were provided about participant characteristics, but the BSSO and MDO populations differed markedly in age and may also have differed in other ways, which would create bias. No controlled data were available. Sample numbers for MDO were very small. In view of major methodological problems in the review and a lack of good-quality evidence, the authors’ conclusions do not appear reliable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that RCTs were needed to compare BSSO and MDO and identify risk factors for relapse. Their effects on temporomandibular joint dysfunction should also be compared. The authors also recommended long-term studies to assess whether modulation of the distraction rate and rhythm and use of Class II elastics reduced the risk of condylar resorption in MDO patients.

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