Stability factors after double-jaw surgery in Class III malocclusion: a systematic review
Mucedero M, Coviello A, Baccetti T, Franchi L, Cozza P

CRD summary
The authors concluded that correction of skeletal Class III malocclusion by bimaxillary surgery appeared fairly stable for pre-surgical sagittal intermaxillary discrepancies under 7mm or for maxillary advancements up to 5mm (irrespective of mandibular fixation method). In view of the limited search and lack of prospective controlled studies and measures of effect size, these conclusions should be interpreted cautiously.

Authors' objectives
To evaluate the effectiveness and stability of bimaxillary surgery for skeletal Class III malocclusion in adults.

Searching
MEDLINE via PubMed and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from 1959 to October 2007. Search terms were reported. The search was restricted to studies in English. Studies published only in abstract form were excluded.

Study selection
Studies of bimaxillary surgical correction of permanent dentition in adults with skeletal Class III malocclusion were eligible for inclusion, provided lateral cephalometric X-rays were taken in a natural head position and that long-term stability was reported as an outcome. Studies were required to have at least 12 months' follow-up. Randomised and non-randomised prospective and retrospective clinical trials were eligible. It appeared that studies were required to compare two treatment strategies or to include concurrent untreated or normal controls. Case-control studies, case series, studies in mixed dentition or growing patients and studies of participants with severe temporomandibular joint disorders, genetic syndromes or other disorders (listed) were excluded.

Median age of participants in the included studies ranged from 21 to 28 years. Different combined bimaxillary procedures were compared with each other or versus mandibular surgery alone. Studies apparently included from one to four intervention arms. Details of the types of osteotomy, fixation and splinting used in individual studies were reported in the review. Orthodontic treatment continued for up to 42 months after surgery (where reported). Outcomes reported in the review were surgical effectiveness and factors that affected stability or relapse (in the view of primary study authors). Surgical effectiveness was measured by X-rays conducted up to six times during follow-up (where reported) and was reported in terms of dentoskeletal values (such as facial divergence, overjet, overbite) and/or as an overall success rate. Duration of follow up ranged from 12 to 83 months (where reported).

The authors stated neither how the papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
The following components of validity were assessed: study design, power calculation, reporting of selection, withdrawals, method of error analysis, blinding and statistical methods. Overall quality was categorised as low, medium or high. One reviewer assessed the quality of statistical methods and otherwise the assessment was conducted by two independent reviewers.

Data extraction
Detailed dentoskeletal and other descriptive data were extracted for each study group. Two reviewers independently extracted the data. Disagreements were resolved by consensus.

Methods of synthesis
Study findings were combined in a narrative synthesis, organised by outcomes and supported by a table of results.
Results of the review
Fifteen studies were included in the review (n=575): one randomised controlled trial (RCT, n=42); 11 retrospective longitudinal clinical trials with both untreated and normal controls; and three retrospective longitudinal trials without both untreated and normal controls. The RCT was medium/high quality. Overall, 12 studies were deemed medium quality and two low quality. None conducted blinded outcomes measurement.

Clinical effectiveness of bimaxillary surgery: Two retrospective clinical trials reported surgical success of over 90% and over 80%. Detailed dentoskeletal measures of clinical effectiveness were presented in the review: overall, the intervention was considered effective in correcting malocclusion.

Stability of outcomes after bimaxillary surgery (15 studies):
Factors that adversely affected horizontal stability in the maxilla were: surgical advancement of more than 6mm (one study); and use of semi-rigid fixation (one study) or resorbable plates and screws (one study) when advancement was more than 5mm. Surgery improved vertical stability of the maxilla when it was to be moved down (three studies). Mandibular relapse was associated with: pre-surgical sagittal intermaxillary discrepancies of more than 7mm (one RCT); degree of intraoperative clockwise rotation of the mandibular proximal segment (two studies); amount of mandibular setback (four studies); excessive posterior condylar displacement in the glenoid cavity (two studies); and stretching of the pterygomasseteric sling (two studies).

Authors’ conclusions
Correction of skeletal Class III malocclusion by bimaxillary surgery appeared fairly stable for pre-surgical sagittal intermaxillary discrepancies under 7mm or for maxillary advancements up to 5mm (irrespective of mandibular fixation method).

CRD commentary
The general objective of the review was clear, but outcomes of interest were not clearly defined and inclusion criteria for study design were difficult to interpret with respect to eligible comparators. Relevant sources were searched for studies, but only two databases were searched and so some studies may have been missed. Exclusion of non-English studies and abstracts meant that the review was at risk of language and publication biases. Steps were taken to minimise reviewer bias and error by having more than one reviewer independently involved in validity assessment and data extraction; it was unclear whether this also applied to study selection. Relevant criteria were used to assess study validity. The findings of the sole RCT were appropriately highlighted when interpreting the results. The review findings were reported descriptively without effect sizes, measures of statistical significance or reference to comparator interventions. Summary findings were based on the conclusions of individual primary authors. These factors made it difficult to determine the clinical significance and validity of the results. In view of the limited search and lack of prospective controlled studies or measures of effect size, the authors’ conclusions should be interpreted cautiously.

Implications of the review for practice and research
Practice: The authors stated that one of the objectives of early orthopaedic intervention in patients with class III malocclusion could be to reduce sagittal disharmony, as this might enhance stability following eventual orthognathic surgery if needed at completion of growth.

Research: The authors did not state any implications for further research.

Funding
Not stated.

Bibliographic details

PubMedID
18947284
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.