Cleft maxillary distraction versus maxillary osteotomy: A systematic review

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INTRODUCTION

Maxillary hypoplasia is a common developmental problem in individuals with cleft lip and palate. It is characterized by underdevelopment of the maxilla resulting in skeletal deficiency and hypoplasia. Traditionally treatment for maxillary hypoplasia is undertaken once growth is complete by conventional orthognathic surgery. The development of maxillary distraction osteogenesis in the late 1990s has provided an alternative method of surgery. The aim of this review is to assess whether distraction osteogenesis is as effective as orthognathic surgery in achieving surgical outcomes, with a specific focus on growth and development of the maxilla and nasal complex.

AIM

To complete a systematic review of the literature comparing the effectiveness of distraction osteogenesis (DO) versus conventional orthognathic surgery (OS) for the treatment of maxillary hypoplasia in patients with cleft lip and palate.

METHOD

IDENTIFICATION OF STUDIES

Electronic database search

The search strategy used was adapted from MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), Scopus, Web of Science and Cumulative Index to Nursing and Allied Health Literature (CINAHL), and was performed in the 21st century. The active and archived registers of the Current Controlled Trials metaRegister of Controlled Trials and the International Clinical Trials Registry Platform. Search terms were used for relevant clinical trials. A search of OpenGrey, WorldCat Dissertations and Index to Theses was also undertaken to identify relevant grey literature.

Handsearching


Inclusion criteria

Participants: Individuals with maxillary hypoplasia secondary to non-syndromic cleft lip and palate and completed growth.

Intervention: Maxillary distraction osteogenesis (DO).

Comparator: Conventional orthognathic surgery (OS).

Outcomes: Evaluation of maxillary correction achieved with the two interventions, stability and relapse, speech and velopharyngeal function, psychological and emotional well-being, and adverse events.

Study design: Prospective randomised, quasi-randomised and controlled clinical trials.

DATA COLLECTION AND ANALYSIS

Selection of studies:

Titles and abstracts were independently assessed. Full copies of all potentially relevant papers which appeared to meet the inclusion criteria or those with insufficient data to allow judgement were obtained and screened by two independent reviewers and all disagreements regarding the eligibility of studies was resolved through discussion. Inter-rater agreement was assessed using the Kappa statistic.

Data extraction:

A single reviewer (SA) extracted the data from the included papers using a self-designed data collection form. These were checked for accuracy by a second reviewer (CRM).

Methodological review of the clinical trials:

One reviewer (SA) assessed the publications using the Cochrane Collaboration’s risk of bias tool, which was checked by two further reviewers (CRM and PFW). For each publication included within the review an overall assessment of risk of bias was made as follows:

High overall risk of bias: High risk of bias for one or more domains.

Unclear overall risk of bias: Unclear risk of bias for one or more domains with low risk of bias in all other domains.

Low overall risk of bias: Low risk of bias for all domains.

Data synthesis:

Meta-analysis was not precluded because the number of studies was insufficient and all the publications reported different outcome measures. Therefore narrative synthesis was undertaken to analyse the data and results.

RESULTS

The search identified 1200 references and once all duplicates were removed this left 485 references to be reviewed (Figure 1). After assessment of the titles and abstracts, 14 full text articles were reviewed for more detailed evaluation. Of these, 8 publications met all the inclusion criteria. The 5 publications included within the review report different outcome measures of a single randomised controlled clinical trial. The inter-rater agreement between the two reviewers for the selection of studies for inclusion within this review was calculated using the Kappa statistic as 0.805 (95% CI 0.744 to 0.857) and can therefore be considered to be very good.

Figure 1 - PRISMA diagram showing the selection of studies included in this review

Table 1 - Cochrane CENTRAL (RCS) search strategy

| SEARCH SCHEME | Cificador | Operators | Search Terms
|---------------|-----------|-----------|-------------|
| 1. Distraction | yes | OR | maxillary hypoplasia
| 2. Distraction | yes | OR | nasal hypoplasia
| 3. Distraction | yes | OR | orthognathic surgery
| 4. Distraction | yes | OR | maxillary osteotomy
| 5. Orthognathic | yes | OR | cleft lip
| 6. Orthognathic | yes | OR | cleft palate
| 7. Orthognathic | yes | OR | mandible
| 8. Orthognathic | yes | OR | maxilla
| 9. Orthognathic | yes | OR | hypoplasia
| 10. Orthognathic | yes | OR | skeletal
| 11. Orthognathic | yes | OR | growth
| 12. Orthognathic | yes | OR | distraction

DISCUSSION

Overall the robustness of the findings of this review are constrained by the limited data available for synthesis. In addition the quality of the data is restricted by the methodological limitations of the included publications. All the publications below included in the review have a high level of methodological rigour. The quality of the evidence for both the DO and OS groups is high. The results therefore cannot be generalised to the wider population.

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There is a need for further meaningful prospective randomised controlled trials with adequate sample sizes and reduced bias, to allow conclusive recommendations to be made. These should compare the effects of maxillary distraction osteogenesis with conventional orthognathic surgery and also compare different types of alveolar distraction such as internal, external and anterior maxillary distraction.

CONCLUSIONS

There is a lack of sufficient evidence to conclude whether distraction osteogenesis is more or less effective than conventional orthognathic surgery for the treatment of cleft related maxillary hypoplasia. The 5 publications included within this review report different outcomes measures of a single study that were at high risk of bias and no implications for practice can therefore be given.

REFERENCES


