Medical necessity of orthognathic surgery for the treatment of dentofacial deformities associated with temporomandibular disorders

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Orthognathic surgery for the treatment of dentofacial deformities associated with temporomandibular disorders.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients who had orthognathic surgery for the treatment of dentofacial deformities associated with temporomandibular disorders.

Setting
Secondary care. The economic study was conducted in a private practice of Oral and Maxillofacial Surgery, Indianapolis, Indiana, USA.

Dates to which data relate
Effectiveness and cost data were collected for patients who had undergone orthognathic surgery at the above-named practice between 1990 and 1993.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
Questionnaires were mailed to 385 patients who had had surgery at least six months previously and who had been debanded from orthodontic treatment. 150 patients (39%) responded to these questionnaires (113 females and 37 males). 59 patients were under 20 years of age, 31 patients were aged 20-30 years, 35 patients were 30-40 years of age and 25 patients were over 40 years of age. In terms of occlusal relationship, 65 patients had Class II deep bite (43%), 28 patients had Class II open bite (19%), 21 patients had Class III (14%) and 35 patients had Class III open bite (24%). Of the respondents, 54 underwent bilateral sagittal osteotomy of the mandible for advancement, 32 underwent Le Fort I maxillary osteotomy with mandibular advancement, 31 underwent Le Fort I maxillary osteotomy with mandibular...
setback, 23 underwent an isolated Le Fort 1 osteotomy, and 10 underwent a bilateral sagittal osteotomy of the mandible for setback.

**Study design**
This was a retrospective questionnaire-based study.

**Analysis of effectiveness**
The main health outcomes considered in the analysis were the improvement in myofascial and masticatory function and overall quality of life, evaluated both before and after the surgery intervention. Myofascial and masticatory functions were evaluated using a scale of 1 (mild) to 10 (most severe) for the following symptoms: jaw fatigue, clicking/popping noise, grinding teeth, limited opening (jaw locks), joint tenderness/pain, headaches, neck pain, facial muscle tenderness/pain. Quality of life was evaluated by asking patients to respond using a line scale measuring 100 mm. Patients were asked if the problem affected day-to-day living (patients responded by marking the scale line between never and always) and to estimate their quality of life due to the problem (using the same type of scale, from poor to excellent).

**Effectiveness results**
All temporomandibular symptoms were significantly reduced postoperatively, with the exception of facial pain. However, when the temporomandibular joint symptoms were examined according to the pain analog scale, all categories had a significantly reduced pain scale. All patients reported a statistically significant reduction in their day-to-day experience of the problem and, postoperatively, their quality of life also showed an improvement.

**Clinical conclusions**
All patients showed significant postoperative improvement in important parameters, substantiating the medical necessity of the surgical procedures employed to treat TMDs.

**Measure of benefits used in the economic analysis**
The authors did not provide any measure of benefit.

**Direct costs**
Patients were asked to list the following: their average monthly cost for medication to treat their orofacial symptoms, the number of doctor visits per months to evaluate or treat these symptoms and the number of days per month on which they were unable to work because of their disorder. Costs were evaluated before and after the surgery intervention. Cost dates were not specifically stated, but costs appear to have been related to the 1990-1993 period. The cost of performing orthognathic surgery for the treatment of dentofacial deformities associated with temporomandibular joint disorders was not considered in the analysis.

**Statistical analysis of costs**
Data were analysed using a t-test and also analysis of variance, Spearman conclusion, Wilcoxon and Krushal-Wallis tests. A value of p <0.05 was considered as significant.

**Indirect Costs**
Indirect costs were not considered.

**Currency**
US dollars ($).
Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
The authors did not provide any measure of benefits.

Cost results
On average, patients spent $7.08 less per month on medications postoperatively than they had spent preoperatively. The number of days of work missed per month was reduced postoperatively, but not significantly according to a t-test (but significantly according to a non-parametric statistical analysis).

Synthesis of costs and benefits
Costs and benefits were not combined.

Authors’ conclusions
Although orthognathic surgery may be of slightly greater benefit to specific groups of patients based on occlusal relationship and age, all patients in this study showed significant postoperative improvement.

CRD COMMENTARY - Selection of comparators
The non-intervention alternative can be considered as the comparator in this case. The reason for its choice is clear since non-intervention alternatives are an obvious comparator when dealing with all non-life-threatening medical conditions.

Validity of estimate of measure of benefit
The study would have benefited from the use of a proper measure of benefit (e.g. quality-adjusted life years). To assess quality of life, a line scale was used. Inter-patient variation may exist due to differences in individual baseline

Validity of estimate of costs
Direct costs relating to the surgical interventions were not considered. The direct costs for the medications which were considered were not disaggregated, whereas resource use such as visits to doctors were not valued through applying the appropriate unit costs. Also it could be quite difficult to differentiate between medications for headache and pain since analgesics are commonly used to treat both (unless specific medications such as the triptans were used). It would have been interesting to value the indirect costs (productivity losses) since different age groups are likely to have different unit costs for lost productivity days and hence lost productivity in some age groups would have greater economic impact than in others. The costs are unlikely to be generalisable to other countries or settings because of the way that the data were collected and presented.

Other issues
Retrospective research designs are prone to a number of biases, but it is appreciated that there are practical, resource and timing circumstances that can make it difficult to use designs with stronger internal (and external) validity. The questionnaire approach used in the study is particularly challenging due to problems of low response rate (as witnessed in this study - 39%) and recall bias. Medications to treat pain such as analgesics are frequently used in number, are low cost and of many different types which can make accurate recall and estimation difficult.

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