

Orthognathic Surgery as a Treatment for Temporomandibular Disorders

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KEYWORDS

• Orthognathic surgery • Temporomandibular disorders • Skeletal malocclusion

KEY POINTS

- The impact of orthognathic surgery on the signs and symptoms of temporomandibular disorders (TMDs) has been unclear.
- Many studies have not evaluated single jaw surgeries; instead, TMD outcomes assessments were the result of a mixture of osteotomies combined with preorthodontic and postorthodontic therapy.
- Most clinical studies on the effects of orthognathic surgery on TMD signs and symptoms did not include a control group and, when included, most control groups were not matched on age and sex.
- The best evidence in the current literature supports the concept that orthognathic surgery does not increase the overall frequency of TMD signs and symptoms at a follow-up of 2 years or more.
- However, correction of a retrognathic mandible with a counterclockwise rotation increased masticatory muscle myalgia and, combined with a 7 mm advancement, elicited an increase in myalgia and TMJ arthralgia.

INTRODUCTION

Temporomandibular disorders (TMDs) are musculoskeletal disorders involving the temporomandibular joint (TMJ), masticatory muscles, or both. Treatments for TMDs that have moderate evidence for pain reduction efficacy include pharmacologic therapies,¹⁻³ physical medicine,⁴ behavioral therapies,^{5,6} and occlusal appliance therapies.^{7,8} These treatment approaches are considered reversible compared with irreversible treatments, which include occlusal equilibration, mandibular repositioning, orthodontics, and orthognathic surgery.⁹ In recent years, there have been reports describing early irreversible interventions such as the bilateral sagittal split osteotomy or the intraoral vertical ramus osteotomy to

address skeletal malocclusions in patients with TMDs.¹⁰ The rationale for pursuing an early surgical approach has been the clinical impression of success in reducing signs and symptoms of TMDs while correcting the skeletal malocclusion.

Clinical impressions of success are prone to different biases that can influence the perception of clinicians. For many years, these clinical impressions have driven the course of various treatments for TMDs, with the conclusion that the specified intervention was the cause for success in reducing or eliminating TMD pain and dysfunction.^{11,12} In the case of orthognathic surgery, some surgeons consider their treatment to be successful in permanently resolving both a skeletal abnormality as well as a musculoskeletal disorder, particularly one associated with pain.¹³ To address this question,

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a few publications have pursued a meta-analysis of clinical studies based on well-defined inclusion and exclusion criteria.^{14,15} However, there were few well-controlled studies available in the literature that addressed a specific skeletal malocclusion and allowed an adequate assessment of the outcome of orthognathic surgery on TMD.

The purpose of this article is to provide an update on the efficacy of orthognathic surgery as a treatment of TMD. This update was accomplished by assessing peer-reviewed, published studies of orthognathic surgery procedures that were performed in the absence and presence of TMD signs and symptoms. This topic has been a focus by a few previous investigators who provided an overview of their study design and target study populations. However, this review evaluates the methodology that was used to minimize observer bias (if any) and to provide an updated evidence-based assessment. It targets 3 types of skeletal malocclusions commonly addressed by orthognathic surgery: class II, class III, and anterior open bite. In addition, the surgical approach is considered as an independent variable when the results for each type of surgery are reported in the publication. Individual case studies (n = 5 or less) and meta-analyses were not included in the literature that was reviewed.

EXPERIMENTAL DESIGN OF CLINICAL STUDIES

Clinical studies that evaluated TMD signs and symptoms after orthognathic surgery were evaluated using the criteria listed in the headers of **Table 1**. These criteria were identified as important to document the quality of the experimental design and appropriateness of the statistical analyses used in the study. Fulfillment of these criteria generally ranked the study into an upper level and was viewed as contributory to the evidence that did or did not show efficacy of the orthognathic surgery as a treatment of TMDs.

Many of the reviewed studies were retrospective and commonly were consecutive cases seen at an educational institution. Retrospective studies, although convenient, have some advantages but also many limitations in providing an accurate assessment of treatment efficacy (**Table 2**). Assessing the unbiased, accurate pain outcome measures of TMDs in orthognathic surgery patients to determine the effect of this treatment requires special attention to the experimental design. It has been elegantly shown in 1 well-controlled clinical trial on migraine headaches that pain can be influenced by multiple factors, including patient expectation,⁴⁸ a factor that would be associated with any treatment approach.

Therefore, it is paramount to consider only the best evidence available to determine the effects, if any, that orthognathic surgery may have on different skeletal malocclusion types.

Retrospective studies using chart reviews also have been shown to be limited in the comprehensive review of TMD signs and symptoms compared with prospective studies.⁴⁹ Multiple signs and symptoms are frequently not included in chart documentation and the lack of these data may result in a low estimation of TMD prevalence. Thus, chart reviews should be considered a limited and potentially biased source of data to assess signs and symptoms of TMD in a clinical sample.

In many studies, the patient samples contained a mixture of skeletal malocclusion types and the proportion of subtypes was usually reported. However, the TMD outcomes associated with a specific malocclusion were commonly not reported. Instead, the entire surgical sample was evaluated for efficacy in reducing (or increasing) TMD signs and symptoms. In a few studies, there was a focus on a single malocclusion (class II, class III, or anterior open bite) rather than a group of malocclusion types and this allowed a better assessment of the effects of the surgery on masticatory musculoskeletal pain and dysfunction. These studies are discussed in greater detail later.

A few studies focused on the technique of mandibular stabilization after surgery and also evaluated TMD signs and symptoms.^{28,45} One well-controlled study that randomized patients into nonrigid or rigid fixation of the mandible after a bilateral sagittal split osteotomy (BSSO) found no statistically significant difference in TMD signs and symptoms after a 2-year follow-up.²⁸ This study was well designed, with randomization of a relatively homogenous sample of orthognathic patients into 2 mandibular fixation groups after the patients were screened based on specific inclusion and exclusion criteria. In addition, this study used well-defined and validated TMD assay measures and calibrated examiners. The only limitation with this study, and this was acknowledged by the investigators, was the inability to minimize bias by blinding the examiners to the type of mandibular fixation. The study had sufficient statistical power to determine differences between the two groups, and none was found, so it is doubtful that the lack of blinded examiners had an impact on the study outcome measures, particularly for TMD assessment.

Random assignment of a homogenous group of orthognathic surgery patients into an experimental and a control group is an optimal experimental design but is not feasible in a clinical study of patients who are having orthognathic surgery to correct their

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