

Controversies in Orthognathic Surgery



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KEYWORDS

- Orthognathic surgery • Sequence • Condylar positioning • Virtual planning • Open bites
- Segmental osteotomies • Splint less surgery • Pre/bend plates

KEY POINTS

- Orthognathic surgery remains a mainstay of treatment in the correction of dentofacial deformities.
- Research and technology continue to drive the evolution of current surgical practice.
- The implementation of virtual planning and intraoperative navigation are increasingly becoming mainstay in the day-to-day management of this patient population.
- Clinical studies and patient research must continue in the context of temporomandibular disorders, to establish a standard of care in addition to research-based, directed management.
- With new evidence-based medical practices, the oral and maxillofacial surgeon must increasingly abandon unsubstantiated dogma and antiquated paradigms to deliver long-term, predictable results.

INTRODUCTION

Controversy has accompanied orthognathic surgery since its adaptation for the correction of dentofacial deformities in the 1950s. With the development of less invasive and less morbid osteotomy designs, questions regarding overall osteotomy stability have abounded. Along the lines of stability, the transition from prolonged intermaxillary fixation and wire osteosynthesis to rigid internal fixation has spurred questions regarding the most effective fixation technique, and challenged previously accepted hierarchies of stability, for example: Are bicortical screws superior to lateral border plates for the fixation of the mandibular sagittal osteotomies? How many screws or plates should be used to optimize outcome and stability, while minimizing patient cost and overall health care burden? Is there an ideal technique for seating the condyle in its most anatomic and functionally stable position?

What is the correct sequence to operate bimaxillary cases? These questions represent only the surface of a sea of debate and discussion, as measures have been taken to optimize patient outcome, minimize patient morbidity, and maximize operating room productivity.

Some of these historic questions have been answered; some remain topics of frequent discussion. In addition to osteotomy design and fixation techniques, technology is leading to new paradigms in planning and execution of corrective jaw surgery. Specifically, the application of 3-dimensional imaging technology and virtual surgical planning (VSP) is revolutionizing the way that orthognathic surgery is carried out. With this technology, however, new questions have arisen, which are specific to computer-based surgical planning and technique. Newer paradigms have shifted emphasis away from osteotomy design, and focused on the possibility of negating the

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need for positioning splints, ushering in an era where prebent, patient-specific plates may be the new norm. Questions that have prevailed as technique has evolved include the following:

1. What is the proper sequence to operate a bimaxillary case?
2. Are segmental osteotomies safe, stable, or necessary, and if so, what are the indications and limitations?
3. Is there an ideal fixation technique and configuration in orthognathic surgery?
4. Is there an ideal technique for seating the mandibular condyle that will optimize jaw function and minimize the risk for early or delayed relapse?
5. What is the best way to close an anterior open bite (AOB)? Is counterclockwise rotation of the mandible in apertognathia stable?

As technology has evolved, and accelerated treatment paradigms have proven stable, new questions have presented, including:

1. How does VSP compare with more “conventional” hinge-articulator based planning?
2. What is the predictability of splintless surgery, using prebent, custom designed plates?
3. Is there an indication for a “surgery first” model, and if so, is it as predictable as the more conventional model of decompensation, surgery, and dental finishing model?
4. What is the etiology of mandibular condylar resorption as it relates to orthognathic surgery, and are there measures that can be taken to prevent or treat it?

With these considerations in mind, the authors’ aim is to provide a concise review of “classical” and current controversies that have prevailed in orthognathic surgery, and to address these questions, where possible, with the most recent evidence-based treatment paradigms.

SEQUENCING: WHICH JAW SHOULD GO FIRST?

The question of sequencing in the context of bimaxillary surgery has prevailed since the introduction of rigid internal fixation. In the years preceding rigid internal fixation, where wire osteosynthesis was mainstream, rigid stability of the mandible, if done first, was not feasible. In this context, maxillary surgery was completed and stabilized, followed by the mandibular osteotomies. The mandible was then wired to the maxilla in the final occlusion, with a subsequent period of maxillomandibular fixation (MMF).^{1,2}

With the introduction of rigid internal fixation, however, the option of completing the mandibular osteotomies first, rigidly fixating the mandibular segments, and finishing with repositioning of the osteotomized maxilla into final position is now possible. Buckley and colleagues³ were among the first to describe the sequencing of this technique, which has since been optimized in the execution of bimaxillary surgery. Numerous publications have addressed indications and advantages of one technique versus the other; however, no consensus has been reached, in terms of whether one method provides superior results to the other.^{1,2,4,5}

Circumstances where mandible-first surgery can be beneficial include bimaxillary surgery cases where a multipiece maxillary osteotomy is indicated to optimize the maxillary occlusal plane and normalize transverse occlusal relations. By performing the mandibular osteotomies first, followed by rigid mandibular fixation, the segmented maxilla can be wired into a single final splint, then to the stably fixated mandible, negating the need for the “splint within a splint” paradigm, which is required when the maxilla is completed first. In this instance, only the vertical repositioning of the maxillomandibular complex remains to be measured intraoperatively (Fig. 1).

In addition to segmental maxillary osteotomies, cases in which the clinical situation calls for large maxillomandibular advancements (obstructive sleep apnea) or significant counterclockwise rotations of the skeletofacial complex are typically easier to carry out when the mandibular osteotomies are completed first. The advantage in these situations is splint stability. When the mandible is



Fig. 1. In the multipiece maxilla during double jaw surgery, performing the mandible first significantly simplifies model surgery because the segmented maxilla can be wired into a single final splint, then to the stably fixated mandible, negating the need for the “splint within a splint” paradigm.

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