Orthognathic surgery: The definitive answer?

By Rohan Wijey, B Oral H (Dent. Sci.), Grad. Dip. Dent. (Griffith), OM

More than any other specialty, general dentists refer their patients to specialists for orthodontic treatment. In Australia, the options given to these patients usually do not involve early intervention, tend to be symptomatic treatments in nature and can also involve orthognathic surgery as a "final resort" for severe cases.

Although it is an intuitive opinion amongst the dental profession that surgery is the final, definitive answer to a skeletal malocclusion, research has shown it to be an almost definitively unstable modality.

The first recorded orthognathic surgical procedure was performed in 1849 by dentist and surgeon Simon Hillilhen from West Virginia. His notebooks reveal he performed surgery “for making underjaws about 10 times.” As in 1849, mandibular advancement, or “making underjaws,” remains the most prevalent orthognathic procedure to this day.

Modern orthodontics has made a concerted effort to evolve into a more evidence-based science; however, some particularly large blind spots remain. One of these is shaped like orthognathic surgery.

Professor William Bell, known as the “Godfather of orthognathic surgery” and recipient of the AAOS Research Award and William J. Gies Award for major contributions to oral and maxillofacial surgery, who published 150 papers and edited two three-volume textbooks on the subject, described it as “too complicated, too invasive, too time-consuming, too expensive and too unpredictable.”

Despite this, there seems to exist an almost blithe inattention amongst the profession to the “surprisingly large” rates of instability and the “many possible complications” thereof.

Stability of orthognathic surgery

Proffit’s 2007 review incorporated more than 100 research papers and approximately 50 invited contributions and book chapters, which has yielded data on 2,254 orthognathic surgery patients. Only mandibular advancement of less than 10 mm overjet and superior repositioning of the maxilla during the first year is considered highly stable. However, after this first year, 20 percent of mandibular advancement patients experience decrease in mandibular length, while after superior repositioning of the maxilla, 33 percent of patients experience decrease in mandibular length, with up to 60 percent reporting a significant change.

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Meanwhile, widening of the maxilla results in a significant or highly significant change in 30 percent. Mobarak’s treatment of 61 consecutive mandibular advancement cases yielded a considerable relapse rate of 40 percent.

Proffit states, a “surprisingly large number of patients experience changes from one to five years post-surgery.” In terms of causes, he attributes relapse of mandibular setback surgery to the musculature returning the ramus to its original orientation. Chang et al (2006) also regarded muscular forces as the principle factor in relapse of mandibular setback. In his review of open bite treatment, Shapiro (2001) suggests the high rate of instability with or without surgery, is most likely because of “non-adaptation of the tongue.”

Graber wrote in his seminal 1963 paper on the influence of muscles on malocclusion, “whenever there is a struggle between muscle and bone, bone yields.” Patient-intuitive though it was at the time, the concept is now well accepted in the literature.

Complications from orthognathic surgery

Soussa and Turrini (2012) have amassed the most authoritative body of data in their comprehensive review, with the total study population encompassing 8,390 patients. They described orthognathic surgery as having “many possible complications,” with a staggering 25 percent of patients experiencing complications from nerve damage to blindness. Perhaps more concerning is the fact that this study did not involve complications related to surgical planning, which no doubt would inflate the figures further.

Nerve damage is the most common complication following the surgery; a study performed at the University of North Carolina reported 98 percent of patients suffered “altered sensitivity of the chin” one month post bilateral sagittal ramus osteotomy surgery, with no improvement in 81 percent six months later.

Infections after orthognathic surgeries can affect up to 10 percent of patients despite the use of prophylactic antibiotics. These infections may lead to obstruction of the airway, loss of bone or teeth, osteomyelitis, cavernous sinus thrombosis and/or meningitis.

Surgical complications can also include undue fractures, such as deviation of the nasal septum after LeFort I, perforation of the endotracheal canal causing hypoxia after maxillary segmental osteotomy and fractures of the condyle and coronoid process during bilateral sagittal ramus osteotomy.

In South Korea alone, a study found 20 reported deaths after orthognathic surgery caused by obstruction of the airway because of edema, bleeding and hypotension. Staff in a South Korean hospital were also investigated for accidental homicide, when a woman died in July 2003 after she fell into a coma during surgery. Disturbing also is the literature on patient information about the possible complications. Because it is the practitioners who propose the operations, it is a moral and legal imperative to disclose all the associated risks. One study found that 20-45 percent of patients were not properly informed about even basic considerations, such as the need for general anesthesia, postoperative diet and also, the most common complication, loss of sensibility.

Another substantial study found a similar 42 percent were not properly informed about postoperative complications, with up to 60 percent reporting numbness worse than they had anticipated.

Several studies on orthognathic surgery patients who mostly present due to dissatisfaction with facial appearance found that psychological distress symptoms are common. Pre-existing psychological conditions must be closely evaluated, especially in light of a recent attempted suicide because of “constant and serious jaw pain” after orthognathic surgery.

Toward a better answer?

The potential for relapse and complications in orthognathic surgery contrives to make it the least desirable treatment modality at our disposal. Despite this, it remains the only available treatment option and conditions reach a certain severity and patients a certain age.

If surgery is absolutely necessary, there is evidence to suggest the role of muscles in relapse is not something to be relativized. The Australian Society of Orthodontists (ASO), however, states it best: “Early treatment may prevent more serious problems from developing or make treatment at a later stage shorter and less complicated. Early treatment may also achieve results that are not possible once the face and jaws have stopped growing.”

Early orthodontic treatment has been relegated to a low priority within most orthodontic practices for allegedly being less efficient than traditional treatment methods. However, with orthognathic surgery and traditional fixed orthodontics limited by almost certain relapse, parents are forcing the agenda and generating increased momentum for early pre-orthodontic options.

Muscle-centric myofunctional pre-orthodontic treatment offers patients, who may otherwise require surgery, exceptional prospects for healthy, correct facial development and may prevent the need for more extreme treatment modalities. Furthermore, even if traditional orthodontics is unavoidable, treatment may become less complex and more stable if a myofunctional orthodontic element is incorporated.

The science is clear: the center of gravity in our clinical practice must shift toward earlier, more preventative interventions to at least attempt to avoid the prospect of surgery. It also seems as if some practitioners are holding this truth at arm’s length, because if they acknowledge it, then the legal and moral imperative for sweeping reform will be inescapable. That time is now.