TREATMENT OPTIONS FOR JAW GROWTH VARIATIONS

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ABSTRACT: Several treatment options besides jaw surgeries for jaw growth variations; that is, for skeletal jaw deformities, are discussed. Editorial opinions are expressed.

KEY WORDS: prognathism; overgrowth; retrusion; dental compensations; hypertrophy; Delaire headgear; distraction osteogenesis; temporary anchorage devices (TAD); orthodontic positioners; myofunctional appliances.

The surgical correction of skeletal jaw variations has a long history of success. Orthognathic (ortho = straight, gnathic = jaws) surgery is often the ideal treatment option for skeletal jaw dysplasias. The variety of facial osteotomies that require orthognathic surgery, and the surgical techniques involved, are discussed on this website in a separate document under the heading Clinical Applications – Facial Osteotomies.

Not all patients with skeletal jaw problems accept the recommendation for orthognathic surgery. In such instances, dental clinicians are faced with either declining to provide optional treatments, or may do so with the understanding that less-than-an-ideal result may follow. For some patients with only partially expressed jaw growth variations, treatment options other than surgery are available and often appropriate.

Some selected treatment options will be discussed and evaluated here. The basic discrepancies of jaw overgrowth and jaw growth deficiencies will be discussed, along with some selected treatment alternatives to orthognathic surgery.

PROBLEMS OF OVERGROWTH OF A JAW: It is well known among orthodontists that where there is a growth process involving overgrowth of a jaw, the general rule is that you should allow growth to proceed and then treat the situation after growth has ceased. The reason for this is that you cannot effectively stop growth or otherwise modify it to the extent that you can overpower growth. Mother Nature is smarter than any of us in dentistry.

What can be done, however, is some orthodontic “remodeling” of some of the parts which are expressing overgrowth. An example is a Class III growing mandible. Functional appliances, such as the Frankel or Bionator, can influence the shape of the growing mandible by remodeling, which may give the appearance of manipulating growth, while instead, long-term studies show that this is only temporary. Over time, the overgrowth pattern returns. Hence, the orthodontic caveat is that it is best to let a mandible grow to its full extent and then treat it either by a combination of jaw surgery and orthodontics, or orthodontics alone which may amount to camouflaging the problem.
What happens dentally in the example of overgrowth of the mandible is that in an attempt for the body to try to maintain dental contacts, the lower incisors tip lingually and the upper incisors tip labially (facially) in an attempt to maintain a contact relationship of upper and lower anterior teeth as lower jaw growth continues. If the treatment decision is to try to correct the problem with orthodontics alone, Class III elastics would be used along with orthodontic fixed appliances to maintain the lingual tipping and maxillary flaring of incisors. If, however, the treatment decision is made to combine orthodontic treatment with jaw surgery to set back the mandible, the orthodontic set-up maneuvers prior to surgery would involve moving the lower incisors forward and the upper incisors back so that they are aligned over the arch they are attached to. The orthodontic process of “decompensating the dentition” simply means that the teeth are being aligned in an ideal position to each arch. In doing so, you may wonder whether the orthodontist knows what he is doing since the malocclusion becomes even more evident – until surgery is done and the teeth then fit perfectly.

From the discussion above, it should be obvious that where there is a skeletal malocclusion such as overgrowth of the mandible, surgery is ideal whereas a nonsurgery orthodontic approach is termed a “practical” or “compromised” plan. As mentioned, such plans are selected by patients who do not agree to have surgery. In such instances, the opportunities for relapse are greater, and the opportunities for the tongue to develop into a myofunctional problem are heightened. This is why it is important for orofacial myologists to find out as much as possible about the orthodontic treatment plan and to be informed as to whether there is a skeletal malocclusion problem that will be treated with surgery, or not.

Other skeletal malocclusions that may or may not be treated with a combination of orthodontics and surgery include vertical maxillary excess (overgrowth downward of the upper jaw), where a patient shows too much gums; mandibular retrusion (a small mandible); maxillary retrusion (a small maxilla); or an excessively large maxilla (maxillary hypertrophy). In each of these situations, a treatment decision needs to be made as to whether to combine orthodontics with surgery (the ideal plan), or whether to perform a “practical” or “compromised” orthodontic treatment to achieve an improvement but not an ideal result. **Of special interest to orofacial myologists:** those patients who opt for a “compromised” treatment plan (whose skeletal jaw discrepancies are ideally suited to orthognathic surgery) more often have an accompanying orofacial myofunctional disorder (OMD). In addition, skeletal malocclusions often include OMDs that may or may not spontaneously resolve and disappear following surgery. In both treatment situations, orofacial myologists should be thoroughly informed by the dentists involved of the details of the presenting problem and the treatment decisions and factors of concern. The details involved are important for the orofacial myologist to know.
It was stated above that for problems of growth excess, the orthodontic caveat to let growth progress – that you cannot effectively stop growth with chin caps, headgear, or removable appliances. In fairness, it should be noted that many Japanese orthodontists and some other orthodontic providers believe in chin caps as being effective. Most USA orthodontists dispute this view.

PROBLEMS OF GROWTH DEFICIENCY: Problems of deficient growth are yet another matter. Where a maxilla or mandible lags in growth in the horizontal dimension, early treatment may be indicated. With retrusive, small maxillae, whether the result of a repaired cleft palate or simple hypoplastic growth, early intervention is often successful, such as with a reverse (also called a Delaire) headgear. Such headgear uses the forehead and chin as anchors for a facemask that has hooks attached to the vertical bar extending from forehead to chin. Elastics running from the bar to molar or canine tubes attached to orthodontic bands or brackets provide a means of advancing the maxillary dental arch, and often, the maxilla itself. Such orthopedic therapy is effective between ages 6 and 10 years, but is not likely after age 10. Although reverse headgear is worn for as many hours as possible on a daily basis, most orthodontists do not insist that a child wear one of these contraptions to school, as the teasing would be relentless.

Also, early surgery to advance a maxilla or mandible can be done where the jaw deficiency is severe. Since the maxilla is essentially adult size by age 8, early maxillary surgical advancement can be accurately predicted and achieved, while mandibular growth is another matter since growth of the mandible normally continues through the teen years and in some cases, into the twenties.

DISTRACTION OSTEOGENESIS: The advent of distraction osteogenesis surgery has changed the playing field dramatically. “Scoring” (partially cutting) a bone and then placing pins (screws) in the bone – connected one with the other by an expansion bar mechanism, permits the surgeon and orthodontist to expand/elongate bones, or to even retract/shorten facial bones, as needed. As the bone expands or is retracted, the bony parts slide along and remodel. Distraction osteogenesis (separating a bone without fully cutting through it) often can be done with the distraction framework placed entirely in the vestibule of the mouth, but in many cases, the screws extend through the soft tissues and muscles and are on the outside of the cheeks.

TADS: The advent of miniscrews, or TADS (temporary anchorage devices) placed in the maxilla above the teeth roots, or in the palate, or the mandible below the teeth roots, provide skeletal anchorage that allows for more effective movement of dental arches and their segments than is possible with headgear.

ORTHODONTIC POSITIONERS: One more part of orthodontic history was the use of positioners in the retention phase of orthodontics. A positioner is a moldable soft
removable appliance that has been made/molded over teeth on a plaster model onto which teeth been reset to an ideal position. Following orthodontics, a positioner is designed to provide some small changes in tooth/teeth position that will achieve the most ideal result.

Many orthodontists used positioners as the final procedure to perfectly align the teeth; however, the appliance covers teeth from both dental arches and makes it difficult to breathe normally with the positioner in place. Even cutting breathing holes in the positioner at the incisors does not help much for many patients. As a result, “compliance” (consistent dedication to the wear schedule) has been a problem. Most patients greatly resist wearing a positioner. As a result, most orthodontists have discontinued using positioners as a final finishing procedure, relying instead on orthodontic positioning or a single-arch labial-lingual retainer with teeth reset to an ideal position.

**FUNCTIONAL APPLIANCES:** The term *functional appliance* is derived from incorporating oral muscular and soft tissue forces into the design of removable appliances. The purpose is to affect the position and growth of the jaws, and hence, to influence the position of teeth in children with developing skeletal malocclusions. The Bionator and Frankel functional appliances, or functional growth regulators, were mentioned above. These and other removable appliances are often used in growing children to attempt to simultaneously modify or otherwise influence jaw growth, dental eruption and dental alignment. Beyond age 10-12 years, the value of removable appliances is questionable.

Functional appliances are envisioned as orthopedic regulators of jaw growth. Rather than influencing dental positioning with direct attachments onto teeth, functional appliances utilize the forces of the buccal vestibule, cheeks, tongue and lips to accomplish changes in the position of jaws and teeth. The appliances are designed to modify the resting position of the jaws, including the freeway space and anteroposterior position of the mandible, for hours per day, as a way of facilitating jaw growth changes.

While the results of the use of functional appliances remain controversial, there are many documented patient successes in normalizing jaw and dental positions, so the appliances remain useful to some orthodontists. Nonetheless, there are unresolved questions about the long-term effects of functional appliances.