



Criteria for Orthognathic Surgery

Preface

The following statements are intended to summarize the indications for orthognathic surgery. These criteria are based on a thorough review of the available literature and the expert opinions of clinicians with considerable experience in this discipline. The statements express the consensus opinion of the American Association of Oral and Maxillofacial Surgeons and were developed in light of the federal government's definition of medical necessity as stated in Medicare/Medicaid guidelines.

The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon response to the circumstances presented by each patient. The definitive guide to the management of patients with facial skeletal deformities can be found in *Parameters of Care: AAOMS Clinical Practice Guidelines for Oral and Maxillofacial Surgery (AAOMS ParCare) Sixth Edition 2017*.

Definition

Orthognathic surgery is the surgical correction of abnormalities of the mandible, maxilla or both. The underlying abnormality may be present at birth or may become evident as the patient grows and develops or may be the result of traumatic injuries. The severity of these deformities precludes adequate treatment through dental treatment alone.

Primary Goal of Treatment

The primary goal of treatment is to improve function through correction of the underlying skeletal deformity.

Consequential Outcomes of Treatment

As a direct effect of the resultant skeletal movements, changes in the soft-tissue drape overlying the facial skeleton may be realized. The soft-tissue changes are inherent to the procedure and must be considered in the surgical work-up. They should not be considered the primary goal of surgery.

Background

There is a direct relationship between facial skeletal abnormalities and malocclusions, specifically Class II, Class III, asymmetry and open bite deformities. A strong correlation has been demonstrated between the state of a patient's occlusion and his or her chewing efficiency.

Scientific studies have shown that many patients with skeletal malocclusions suffer from a variety of functional impairments, including diminished bite forces, restricted mandibular excursions and abnormal chewing patterns, and temporomandibular disorders. While the etiology of facial skeletal deficiencies is not fully understood, it is known that patients with these deformities have pathologic alteration in their muscle fibers when compared to those with normal facial skeletons. Electromyography further demonstrates significant differences between these two groups of patients. Clinical experience and the literature have demonstrated that, when indicated, orthognathic surgery leads to improvement in a variety of functional parameters. The medical appropriateness of these procedures is further supported by the fact that the military healthcare system recognizes the need for and benefits of orthognathic surgery.

Classification

The classification and analysis of dentofacial skeletal deformities is complex and involves discrepancies in all planes of space. However, they can generally be classified as follows:

Congenital anomalies

1. Cleft lip and palate
2. Congenital dentofacial skeletal deformities

Acquired anomalies

1. Traumatic facial skeletal injuries
2. Cysts and tumors of the jaws
3. Obstructive sleep apnea



4. Temporomandibular joint disorders resulting in skeletal malocclusion
 - a. Rheumatoid arthritis
 - b. Degenerative arthritis
 - c. Condylar atrophy
5. Growth disturbances
 - a. Condylar hyperplasia

Indications

Given the relationship between facial skeletal deformities and masticatory dysfunction as well as the limitations of non-surgical therapies to correct these discrepancies. The measurement of these discrepancies must consider dental compensations relating to the malocclusion and the underlying skeletal deformity. Orthognathic surgery should be considered medically appropriate in the following circumstances:

- A. Anteroposterior discrepancies: established norm=2mm
 1. Maxillary/mandibular incisor relationship
 - a. Horizontal overjet of +5mm or more
 - b. Horizontal overjet of zero to a negative value
 2. Maxillary/mandibular anteroposterior molar relationship discrepancy of 4mm or more (norm 0 to 1mm)
 3. These values represent two or more standard deviation from published norms
- B. Vertical discrepancies
 1. Presence of a vertical facial skeletal deformity, which is two or more standard deviations from published norms for accepted skeletal landmarks
 2. Open bite
 - a. No vertical overlap of anterior teeth
 - b. Unilateral or bilateral posterior open bite greater than 2mm
 3. Deep overbite with impingement or irritation of buccal or lingual soft tissues of the opposing arch
 4. Supraeruption of a dentoalveolar segment due to lack of occlusion
- C. Transverse discrepancies
 1. Presence of a transverse skeletal discrepancy, which is two or more standard deviations from published norms

2. Total bilateral maxillary palatal cusp to mandibular fossa discrepancy of 4mm or greater, or a unilateral discrepancy of 3mm or greater, given normal axial inclination of the posterior teeth

D. Asymmetries

1. Anteroposterior, transverse or lateral asymmetries greater than 3mm with concomitant occlusal asymmetry

These indications relate verifiable clinical measurements to significant facial skeletal deformities, maxillary and/or mandibular facial skeletal deformities associated with masticatory malocclusion. In addition to the above conditions, orthognathic surgery may be indicated in cases where there are specific documented signs of dysfunction. These may include conditions involving airway dysfunction, such as sleep apnea, temporomandibular joint disorders, psychosocial disorders and speech impairments. The following is a brief review of some of these conditions.

Refer to the attachments at the end of this document:

1. Form titled “Criteria for Orthognathic Surgery” created for use to summarize the data on a single form. Consider submitting the completed to payers for orthognathic surgery prior authorization.
2. Form titled “Orthognathic Surgery Clinical Evaluation” created to help gather the information to document the orthognathic criteria.
3. Form titled: “Orthognathic Surgical Planning” created to quantify movement in preparation for orthognathic surgery.

Facial Skeletal Discrepancies Associated with Documented Sleep Apnea, Airway Defects and Soft-Tissue Discrepancies

Breathing patterns, craniofacial growth and skeletal alteration are known to be closely related. Intervention with orthopedic and/or surgical means on selected patients has been shown to decrease airway resistance and improve breathing. For example, studies demonstrate that patients with vertical hyperplasia of the maxilla have an associated

increase in nasal resistance, as do patients with maxillary hypoplasia with or without clefts. Following orthognathic surgery, such patients routinely demonstrate decreases in nasal airway resistance and improved respiration.

Obstructive sleep apnea (OSA) is a specific type of respiratory dysfunction. Defined as periodic cessation of breathing during sleep, patients with OSA may have such associated findings as hypertension and cardiac arrhythmias. While this condition is multifactorial, a significant number of patients with obstructive sleep apnea have underlying facial skeletal deformities and benefit from orthognathic surgery.

Prior to surgical treatment, such patients should be properly evaluated to determine the cause and site of their disorder with appropriate non-surgical treatment attempted when indicated.

Facial Skeletal Discrepancies Associated with Documented Temporomandibular Joint Pathology

It is generally accepted that temporomandibular joint (TMJ) dysfunction may have a variety of causes. In some patients, skeletal malocclusion and TMJ dysfunction may be correlated. While some types of malocclusion have been more commonly implicated, a variety of deformities have been reported to be associated with TMJ symptoms. The rationale for proceeding with surgery to correct skeletal-dental deformities is based on common reports of significant improvement in joint and muscle symptoms after a variety of orthognathic procedures. The literature reports that approximately 80 percent of patients show improvement of preoperative symptoms after orthognathic surgery. Prior to performing an orthognathic procedure on such patients, non-surgical therapies should be attempted, including those procedures and treatments that mimic the effects of occlusal alteration.

Facial Skeletal Discrepancies Associated with Documented Psychological Disorders

Physical characteristics are likely the single-most important variables that determine self-esteem, behavior patterns and successful personal interactions. In addition to measurable improvements in masticatory function, studies demonstrate the beneficial effects on patients' self-image after surgical correction of facial skeletal deformities, with concomitant improvement in their psychosocial condition and, by extension, work force



productivity. Prior to surgical treatment designed primarily to improve psychological conditions, appropriate consultation should be obtained and non-surgical therapy attempted when reasonable.

Facial Skeletal Discrepancies Associated with Documented Speech Impairments

Abnormal jaw relationships affect many of the structures involved in the production of speech, including the position of the lips, tongue and soft palate. Studies demonstrate that altered speech production may be associated with facial skeletal deformities, the most common impairment of which is a distortion within the sibilant sound class. Such studies also demonstrate the beneficial effects of orthognathic surgery on speech production, documenting improvement in a high percentage of patients after the correction of abnormal jaw relationships. In the age of information, the ability to accurately communicate with an articulate speech pattern is of great importance.

Prior to surgery, speech evaluation should be obtained to demonstrate the nature of the problem and to determine if improvement can be expected.

References

The following references provide support for the recommendations and statements above. It should be recognized that the literature on orthognathic surgery dates back to 1849. In light of the volume of this published material, the following listing is limited to but a few representative articles. Several of these articles make extensive references to supportive material and are recommended reading.

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Clinical Paper



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PATIENT NAME: _____ DIAGNOSIS: _____ COMPLETED BY DR. _____ DATE COMPLETED: _____

A. Anteroposterior Discrepancies

1. Maxillary/mandibular incisor relationship: overjet of 5mm or more, or a 0 to a negative value (norm 2mm).
No Yes _____
2. Maxillary/mandibular anteroposterior molar relationship discrepancy of 4mm or more (norm 0 to 1mm).
No Yes _____
3. These values represent two or more standard deviation from published norms.
No Yes _____

B. Vertical Discrepancies

1. Presence of a vertical facial skeletal deformity, which is two or more standard deviations from published norms for accepted skeletal landmarks.
No Yes _____
2. Open bite
 - a. No vertical overlap of anterior teeth.
No Yes _____
 - b. Unilateral or bilateral posterior open bite greater than 2mm.
No Yes _____
3. Deep overbite with impingement or irritation of buccal or lingual soft tissues of the opposing arch.
No Yes _____
4. Supraeruption of a dentoalveolar segment due to lack of occlusion.
No Yes _____

C. Transverse Discrepancies

1. Presence of a transverse skeletal discrepancy, which is two or more standard deviations from published norms.
No Yes _____
2. Total bilateral maxillary palatal cusp to mandibular fossa discrepancy of 4mm or greater, or a unilateral discrepancy of 3mm or greater, given normal axial inclination of the posterior teeth.
No Yes _____

D. Asymmetries

1. Anteroposterior, transverse or lateral asymmetries greater than 3mm with concomitant occlusal asymmetry.
No Yes _____

E. Dysfunctions

In addition to the above conditions, orthognathic surgery may be indicated in cases where there are specific documented signs of dysfunction. These may include conditions involving:

1. Airway dysfunction such as sleep apnea, temporomandibular joint disorders, psychosocial disorders and or speech impairments.
No Yes _____



Name: _____ Diagnosis: _____ Date: _____

| DENTAL FACIAL EVALUATION: FRONTAL VIEW | |
|---|---|
| Interlabial distance: _____ mm (lip incompetence) Lip tooth relationship: *Repose (1.5-3.5mm tooth show): _____ mm *Smile (#7-10, 8-12mm tooth show): _____ mm _____ mm gingival show Upper lip length (_22+/-2, _20+/-2mm): _____ mm Labiomental fold: Norm Deep Flat | Nasal airway: *Cottle: Right <input type="checkbox"/> + <input type="checkbox"/> - left <input type="checkbox"/> + <input type="checkbox"/> - *Septum: <input type="checkbox"/> deviated R L *Turbinates: <input type="checkbox"/> normal <input type="checkbox"/> Large Nasal ecaluation: *Tip: <input type="checkbox"/> wnl *Dorsum: <input type="checkbox"/> wnl * Nasolabial angle: _____ *Alar base (width): _____ mm <input type="checkbox"/> narrow <input type="checkbox"/> WNL <input type="checkbox"/> wide |
| <u>Midlines relative to midsagittal plane.</u> Facial midline (asymmetry): <input type="checkbox"/> wnl Nasal dorsum midline: <input type="checkbox"/> wnl Dental midline: *Upper: R _____ C _____ L _____ *Lower: R _____ C _____ L _____ Chin midline R _____ C _____ L _____ Occlusal Cant: <input type="checkbox"/> none | Midface: <input type="checkbox"/> flat <input type="checkbox"/> wnl <input type="checkbox"/> prominent * infraorbital soft tissue relative to globe: <input type="checkbox"/> posterior <input type="checkbox"/> in line <input type="checkbox"/> anterior Zygoma: <input type="checkbox"/> wnl Orbit: *Eyelids: <input type="checkbox"/> wnl *Brow: <input type="checkbox"/> wnl Facial Proportions: *Upper 1/3: *Middle 1/3: *Lower 1/3: |
| LATERAL VIEW | |
| Facial Profile: Convex Concave Flat Cervicomental angle: <input type="checkbox"/> acute (< 90 degrees) <input type="checkbox"/> obtuse (>90 degrees) Glabella Vertical: *Maxilla: <input type="checkbox"/> deficient <input type="checkbox"/> normal <input type="checkbox"/> excessive *Mandible: <input type="checkbox"/> deficient <input type="checkbox"/> normal <input type="checkbox"/> excessive | |
| ORAL EXAM | TMJ EXAM |
| Molar: I II III Canine: I II III Curve of Wilson (molar tipping): NO YES Curve of Spee: <input type="checkbox"/> flat <input type="checkbox"/> wnl <input type="checkbox"/> excessive H-Overjet: _____ mm V-Overbite: _____ mm Ant Open bite: mm post Cross Bite: NO YES Missing teeth: Third Molars: <input type="checkbox"/> missing Active Periodontal disease: NO YES Attached Gingiva: <input type="checkbox"/> wnl Pathology: <input type="checkbox"/> none Airway obstruction: NO YES Apnea: NO YES | Symptoms: NO YES: _____ _____ _____ Preauricular: NTP R _____ L _____ Muscles: NTP R _____ L _____ Click/Pop: NO YES *Open: R _____ L _____ *Close: R _____ L _____ MIO: _____ ROM: L _____ R _____ Protrusive _____ Deviation: NO YES R _____ L _____ |

Prepared by Lionel Candelaria, DDS



Planned three-dimensional surgical movements and soft-tissue modifications:

Name: _____ Diagnosis: _____ Surgery Date: _____

A) Maxilla No procedure Le Fort I osteotomy

1. Vertical impaction:
 - Posterior to correct open bite: RIGHT _____ mm LEFT _____ mm
 - Total impaction correct VME: RIGHT _____ mm LEFT _____ mm
2. Horizontal advancement (A-P): _____ mm anterior
3. Rotation for midline correction: RIGHT _____ mm LEFT _____ mm
4. Maxillary segmental surgery: NO YES: _____
 - Two piece-interdental Osteotomies between: # _____ & # _____
 - Is their adequate space between the teeth radiographically to perform the interdental osteotomies?
NO YES
 - Three piece-interdental Osteotomies between: # _____ & # _____ + # _____ & # _____
 - Is their adequate space between the teeth radiographically to perform the interdental osteotomies?
NO YES
5. Horizontal Osteotomy:
 - Conventional
 - High (for augmentation of midface deficiency)
 - Stepped with or without intermediate bone graft in the maxillary buttress.
(For advancement of the maxilla greater than 5mm and for enhanced satiability and OSAS surgery).
6. Other considerations: _____

B) Mandible No procedure BSSO IVRO Other: _____

1. Horizontal: Advancement _____ mm Setback _____ mm
2. Rotation: RIGHT _____ mm LEFT _____ mm
3. Genioplasty: NO YES: _____
 - Advancement _____ mm Setback _____ mm
 - Vertical reduction _____ mm Right Left Bilateral
 - Vertical augmentation _____ mm Right Left Bilateral
 - Rotation _____ mm Right Left
4. Other considerations _____

C) Occlusion

1. Enameloplasty: NO YES: _____
 - #
 - #
 - #
1. Extractions: NO YES: _____
 - #(s)

D) Nasal

1. Alar Cinch: NO YES: _____
2. Turbinectomy: NO YES: _____
3. Septoplasty: NO YES: _____

E) Other considerations _____