

Orthodontic Preparation for Orthognathic Surgery



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KEYWORDS

• Orthodontics • Orthognathic surgery • Treatment planning

KEY POINTS

- Orthodontic preparation is critical to the success of orthognathic surgery. Recognition and correction of existing dental compensations allows full correction of skeletal discrepancies.
- Presurgical orthodontic goals are important to define at the start of treatment and may not always include complete arch leveling or space closure, or ideal interdigitation.
- Orthodontic preparation dictates the skeletal movements that are possible at the time of surgery.
- Different malocclusion types have characteristic dental compensations that can be identified and described.
- Proper planning, monitoring, and communication between surgeon and orthodontist are critical to avoid potential pitfalls in the orthodontic preparation.

INTRODUCTION

Proper orthodontic preparation is critical to the outcome of orthognathic surgical treatment (**Box 1, Table 1**). All orthodontic tooth movement should be planned before treatment, even if some movements are completed after the surgery. The ultimate goal is to create a situation in which the teeth are in proper position relative to their underlying skeletal bases.¹ This goal creates a presurgical dental discrepancy that is at least as great as the skeletal discrepancy so that the occlusion acts as a guide for the surgeon to produce the optimal position of the skeletal parts during surgery. Because normal physiologic processes tend to compensate for the skeletal problem, significant tooth movement is generally needed to create the most esthetic and balanced outcome for the patient. Patients undergoing orthognathic treatment with orthodontic preparation should be well informed about the orthodontic procedures and what to expect from treatment and retention.²

PRESURGICAL GOALS

There is no universal agreement among orthodontists and surgeons about the goals of orthodontic treatment before surgery. Some teams prefer nearly ideal interdigitation of presurgical plaster models before proceeding, whereas others are content to do the detailed finishing after surgery. In general, the guiding principle is that the teeth need to be moved sufficiently to allow the maxilla and mandible to be put in the desired position.³ If this general principle is used as a guide, it is possible to define certain parameters of presurgical goals.

Decompensation of Dentition

Natural physiologic adaptation, or previous orthodontic treatment, often places teeth in a position that reduces the dental discrepancy compared with the skeletal difference. This adaptation, or compensation, needs to be removed before surgery. An example is the need to upright the lower

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Box 1**General concepts of orthodontic preparation for orthognathic surgery***Three Concepts and a Corollary*

1. Whenever possible, treatment should be planned so that the orthodontic and surgical relapse tendencies are in opposite directions.
2. Incisors should be positioned relative to their respective skeletal bases rather than external references.
3. Tooth movement is usually in the exact opposite direction for surgical versus non-surgical treatment.

Corollary: starting treatment without deciding whether to treat with or without surgery is generally a bad idea.

incisors in a class II patient in whom the incisors were initially proclined to minimize the overjet.

Alignment of Arches

Gross crowding, spaces, or rotations are corrected.

Coordinate Arches

If the maxilla and mandible are to be treated as single pieces, the shape and dimensions are made compatible so that they will occlude reasonably following surgery. If one or both jaws are to be treated segmentally, the individual segments should be arranged so that the arches will be compatible following the planned surgical movement of the segments.

The general principle is that the teeth must not interfere with the planned skeletal movement, and they must be within reasonable distance for postsurgical orthodontic finishing. This principle means that not all orthodontic movement must be complete before surgery. For this reason it is also important to consider what the presurgical goals may not be.

Table 1

Goals of presurgical orthodontics (see text for complete description)

Should Include	May Not Include
Decompensation of dentition	Full closure of all spaces
Alignment of arches	Perfect occlusion of surgical models
Coordination of arches	Leveling of arches

Full Closure of All Spaces

Some spacing may be desirable at the time of surgery to allow extra overjet to ensure canine seating (eg, distal to upper lateral incisors) or to allow room for postsurgical leveling without forward movement of the lower incisors. A small degree of spacing also creates flexibility during postsurgical finishing to create optimal occlusal relationships if the surgical outcome deviates from the plan.

Perfect Occlusion of Surgical Models

Ideal occlusion may be the desired end result, but spending a great deal of time to achieve this perfection before surgery and then again after surgery may increase treatment time. It has been reported that the orthodontic preparation for surgery averages 17 months.⁴ In addition, some tooth movements can be accomplished most efficiently after surgery. For example, proclining lower incisors to decompensate a class III malocclusion can be faster and easier following surgery when soft tissue pressures are working with the desired tooth movement rather than against it.⁵

Leveling of Arches

The decision whether to level the lower arch before or after surgery should be based on planning for the desired vertical change. Presurgical leveling allows mandibular advancement with minimal clockwise rotation of the mandibular, which helps promote horizontal movement and chin prominence. However, maintaining the curve of Spee requires the creation of a tripod occlusion on the incisors and molars at the time of surgery, which increases the vertical dimension and increases clockwise rotation. In some cases, this postsurgical leveling produces more desirable vertical changes and minimizes chin prominence, and trying to produce a perfect occlusion at the time of surgery prevents the optimal outcome. It is important to understand that the decision to level or not to level the lower arch before surgery has an important impact on the final chin position and lower face height (see **Figs. 2** and **7**).⁶

THREE CONCEPTS AND A COROLLARY FOR ORTHODONTIC PREPARATION

Whenever Possible, Treatment Should Be Planned so that the Orthodontic and Surgical Relapse Tendencies Are in Opposite Directions

The idea is to be well informed regarding possible posttreatment changes that will affect the stability of the final correction. When possible, it makes sense to plan orthodontic movements in a direction that causes any orthodontic change to be in

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