

## A Practical Approach to Presurgical Orthodontic Preparation

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Over the past decade, new rigid-fixation techniques have improved the skeletal stability of most surgical cases, at least in the months immediately following surgery, compared to traditional wire fixation.<sup>1-4</sup> Rigid fixation not only allows orthodontic treatment to be started within a few weeks after surgery, but also reduces the need for ideal orthodontic preparation of perfectly level arches and ideal interdigitation.

While there will always be surgical-orthodontic patients in whom the arches can be easily leveled and aligned (Fig. 1A, 1B, 1C, and 1D), there are many exceptions. With rigid fixation, it appears that if anteroposterior and rotational incisor corrections are made and there is good arch coordination from canine to canine, then leveling and torquing do not have to be completed before surgery. It may even be acceptable to have contact between only the incisors and molars—in other words, a temporary lateral open bite—immediately after the surgical correction (Figs. 2A, 2B, 2C, and 2D, and Figs. 3A, 3B, 3C, and 3D).

Rather than trying to close the open bite as quickly as possible, the orthodontist can take advantage of it. Final space closure, arch leveling, molar torquing, transverse coordination, and root uprighing can all be achieved more efficiently without the presurgical interferences.

The presurgical orthodontic goal can then be reduced to simply preparing the teeth to facilitate the surgical jaw movements. Most patients can be ready for surgery in 12 to 14 months, even after bicuspid extractions. This leaves ample time after surgery to achieve a well-detailed occlusion, with ideal cuspid and incisal guidance, before the patient or parents become annoyed over the length of treatment.

### **Active Archwires at the Time of Surgery**

In the past, when post-surgical splints were commonly used, passive archwires were left in place for several weeks before surgery.<sup>5,6</sup> With rigid fixation, however, it is often advantageous to have active archwires in place at the time of surgery. As soon as the jaws are moved and the occlusion is unlocked, the three-dimensional tooth movements dictated by the appliances can be expressed. This is especially true now that there are fewer segmental maxillary surgeries performed in the transverse dimension, due to the possibility of surgically assisted rapid maxillary expansion.<sup>7-11</sup>

When active archwires are present, the presurgical working casts should be made within a few days prior to the surgery. If this cannot be done, the wires should probably be made passive to ensure that further tooth movement will not affect the fit of the surgical bite wafer and the execution of the planned jaw movements.

### **Indications and Contraindications**

In Class II deep-bite cases, it is already common practice to leave final leveling until after surgery, so that post-surgical extrusion of the buccal teeth can enhance the surgical increase in lower face height.<sup>6</sup> With the availability of rigid fixation, however, this approach also applies to Class II and Class III malocclusions and asymmetries in patients with average or short faces.

In patients with long faces and anterior open bites, on the other hand, most tooth movement should be carried out before surgery, since arch leveling and posterior torquing will have extrusive effects. The lack of vertical muscular anchorage in such cases makes arch coordination and preparation easy to achieve<sup>12-14</sup> (Figs. 4A, 4B, 4C, 4D, 4E, and 4F). After surgery, the orthodontist merely has to avoid any muscular or skeletal relapse by rebuilding minor dentoalveolar compensations. It may be necessary to align the anterior and posterior segments at different levels to account for the differences in occlusal plane heights that are common in open-bite patients.<sup>5</sup> This will not only improve the esthetic results, but will limit extrusive presurgical incisor movements, which are liable to relapse after active treatment.

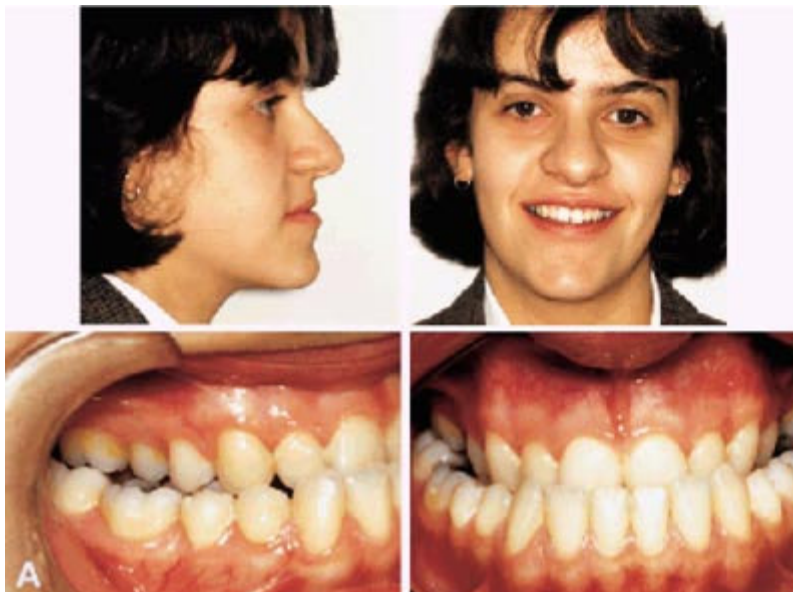
### A Team Approach

The method outlined above will require even closer collaboration with the surgeon in planning treatment. The surgeon will not necessarily be placing the teeth in positions of maximum intercuspation according to hand-held casts. Indeed, if this were done without bilateral Class I relationships, the orthodontist would have difficulty achieving an ideal buccal interdigitation, because a new locked-in occlusion would have been substituted for the presurgical one. *It is the surgical unlocking of the arches that alters the environment so the teeth can be placed in final, well-detailed positions.*

Presurgical orthodontic objectives still need to be set. In general, these should include anteroposterior incisor positioning, arch coordination from canine to canine, management of transverse discrepancies, and any required vertical steps in the maxillary arch. After surgery, the orthodontist will then be able to take full advantage of the unlocked occlusion to complete detailing in all dimensions within a reasonable treatment time.

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### FIGURES



**Fig. 1A** 22-year-old female with Class III malocclusion before treatment.



**Fig. 1B** Presurgical occlusion after 11 months of orthodontic treatment.



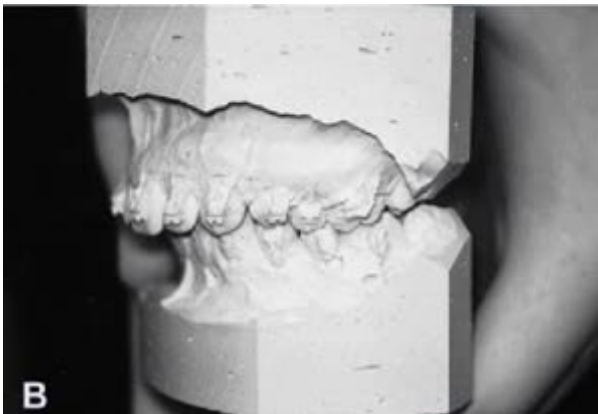
**Fig. 1C** Cast simulation of maxillary advancement and mandibular setback.



**Fig. 1D** Patient after surgery and seven months of additional orthodontic treatment.



**Fig. 2A** 31-year-old male with Class II, division 2 malocclusion before treatment.



**Fig. 2B** Presurgical occlusion after 13 months of orthodontic treatment.



**Fig. 2C** Cast simulation of mandibular advancement.



**Fig. 2D** Patient after surgery and nine months of additional orthodontic treatment.



**Fig. 3A** 27-year-old female with Class III malocclusion before treatment.



**Fig. 3B** Presurgical occlusion after 14 months of orthodontic treatment.



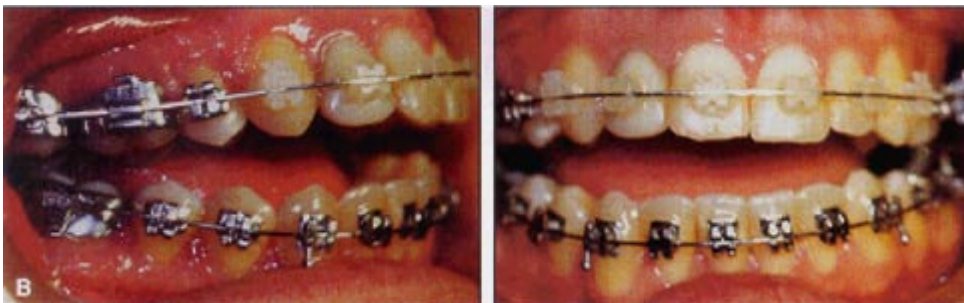
**Fig. 3C** Cast simulation of maxillary advancement and mandibular setback.



**Fig. 3D** Patient after surgery and eight months of additional orthodontic treatment.



**Fig. 4A** 32-year-old female with open bite before treatment.



**Fig. 4B** Presurgical occlusion after nine months of orthodontic treatment.



**Fig. 4C** Cast simulation of maxillary impaction.



**Fig. 4D** Actual occlusion after surgery.



**Fig. 4E** After nine months of additional orthodontic treatment.





**Fig. 4F** Three years after debonding.

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