

# The Role of Cosmetic Dentistry in Plastic Surgery

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## ABSTRACT

This article addresses the need for and the benefits of intraoral rejuvenation in conjunction with plastic surgical procedures. By highlighting a myriad of procedures available to the dental professional, the author demonstrates what techniques are presently available and the concomitant benefits to the patient and the reconstructive surgeon. It is important for the plastic surgeon to examine both the teeth and occlusion when evaluating a patient for perioral rejuvenation. The loss of vertical dimension is examined as well as the corrective procedures that can be employed to reestablish what time has diminished. Contouring of the lips and underlying support of the perioral area are discussed in relation to both fixed and removable prosthodontics. It is the intent of the author to demonstrate the rationale for prosthodontic stabilization through the use of endosseous implants. In effect, the author explores the concept of an "intraoral facelift" to be used prior to or in conjunction with traditional plastic surgical procedures.

**KEYWORDS:** Occlusal vertical dimension, endosseous implants, intraoral facelift

## VERTICAL DIMENSION

The loss of verticality in the lower one-third of the face is arguably one of the most difficult dimensions to overcome when considering the rejuvenation of the older patient. This is especially true when a patient has lost vertical dimension of the face through the loss of posterior teeth. Diminished vertical dimension makes the chin appear more prominent, distorting the natural contour of the face. The natural contours of the philtrum are often altered and the nasolabial fold is deepened and exaggerated. Perioral wrinkling and exaggerated creases may be observed when the patient has been wearing full dentures for an extended period of time. Proper facial contour can be accomplished by increasing the thickness of the labial flange (denture base) of the maxillary and/or mandibular prosthesis. The lip contour, aesthetic form, and phonetic function are ultimately controlled by the anteroposterior positioning of the premaxillary teeth.

The patient's current dentures can provide useful information that can be applied to the fabrication of a

new prosthesis. This is especially significant when attempting to restore lost vertical height of the face. Achieving the proper vertical dimension usually entails an increase in the vertical size of the denture base, which may lead to increased mobility, resulting in amplified patient awareness and potential discomfort. Oftentimes patients will try to overcome this denture instability by pursing their lips or engaging the buccinator muscle to help retain the unstable dental prosthesis. Denture adhesives may give the patient additional retention and stability; however, these over-the-counter remedies fall far short from their ballyhooed claims.

## POSTERIOR BITE COLLAPSE

Posterior bite collapse is another dental condition that can severely affect the verticality of our patients. Posterior bite collapse may be defined as the loss of posterior teeth with the concomitant flaring or rotation of the pa-

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**Figure 1** Protrusion of the maxillary lip can be observed as a result of posterior bite collapse.

tient's maxillary anterior teeth. Many patients present with angular cheilitis or severe chapping or cracking at the labial commissures due to the resulting distortion of the lower one-third of the face. This along with the protrusion of the maxillary lip may be observed as a result of the underlying maxillary anterior teeth splaying out due to the lack of posterior teeth needed to support the vertical height of the face (Fig. 1).

If left unchecked, some patients begin to complain that their nose and chin come too "close together." This is especially true for patients wearing complete dentures because the underlying bone that supports the prosthesis is not properly stimulated and tends to atrophy. Bone loss is exacerbated in postmenopausal patients, patients with osteoporosis, or patients with other systemic diseases. This loss of bone can be traced back to Wolff's law, where every change in the form and function of a bone, or in its function alone, is followed by certain definitive changes in its internal architecture and secondary alterations in its external conformation.<sup>1</sup> When pressure is applied to the underlying tissues resorptive patterns can readily be observed. The bone resorption pattern of



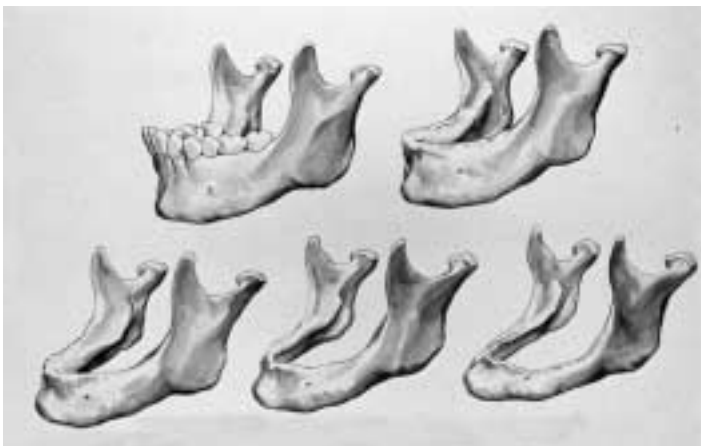
**Figure 3** Cad-Cam model of an edentulous maxilla displaying classic resorption patterns.

the mandible follows a forward, downward, and outward progression, whereas the maxillary bone resorbs backward, upward, and inward (Figs. 2, 3).

Over the last 25 years, there has been a significant drop in the usage of porcelain teeth for denture construction. The vast majority of dentures are made entirely of plastic, including acrylic teeth. The wearing of the acrylic teeth over time can cause significant loss of vertical occlusal dimension if the dentures are not refurbished or remade. Contrary to popular belief, this is very unlikely to occur in the natural dentition. In the natural dentition the wearing down of the teeth does not always lead to a loss of vertical dimension due to the ongoing eruption process. The entire dental alveolar process moves vertically in its entirety: this is how nature accommodates wearing of the teeth.

**DENTAL IMPLANTS**

A dental implant may be described as an artificial root or tooth anchor. Oftentimes with ill-fitting dentures the patient is forced to purse his or her own lips to help secure the underlying prosthesis. This muscular tension



**Figure 2** Resorption patterns of the mandible.

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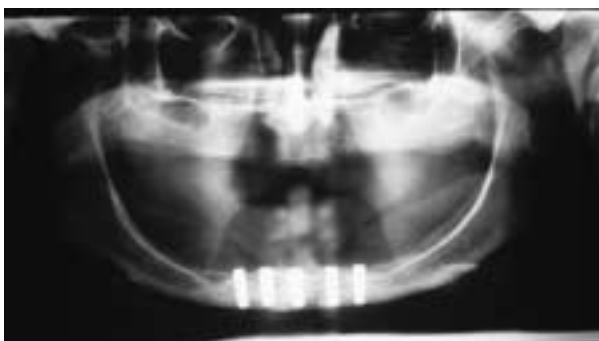


**Figure 4** Standard endosseous root form implant.

applied to the prosthesis can result in a notable distortion of the perioral tissues. Fine lines around the mouth develop and the lips appear thin. By securing the prosthetics with dental implants (Fig. 4) the patient is no longer forced to accommodate the denture by applying muscular tension periorally.

The following prosthodontic devices are secured in place by endosseous root form dental implants. In the first example the patient is wearing a *fixed hybrid* prosthetic device. The fixed hybrid prosthesis derives its name from a combination of the following: a denture fused to an underlying alloy substructure that is bolted or "fixed" into place. The patient is unable to remove this prosthesis without the assistance of a dental professional. The prosthesis is secured by five endosseous implants located anterior to the mental foramina and may be seen in the panoramic radiograph (Fig. 5). The screw access holes are eventually covered with the appropriate colored acrylic after the prosthesis is screwed into place (Fig. 6).

The second example of an implant-supported prosthodontic device is a removable mandibular implant-supported overdenture. The overdenture is worn 24 hours a day, 365 days per year, but is removed by the patient



**Figure 5** Panoramic radiograph displaying five endosseous implants.



**Figure 6** Five screw access holes are eventually sealed with acrylic.

for ease of cleaning. Note the "trailer hitch balls" on the metal bar that engage the "o-rings" on the tissue side of the prosthesis (Figs. 7, 8).

Both prosthetic devices allow for the retention of the lower teeth in a more harmonic state. The patient is freed from the chore of retaining the prosthesis with the intraoral musculature or denture adhesives; hence, a more relaxed musculature leads directly to a more natural cosmetic result. The following two case studies demonstrate the perioral collapse associated with the loss of the natural dentition and subsequent reconstruction through implant prosthodontia (Figs. 9–12). The dental practitioner is able to restore a more attractive appearance to the lower one-third of the face with full upper and lower prosthetics secured by dental implants. It is more difficult to restore patients to the proper vertical and horizontal dimensions without dental implants because many patients struggle to accommodate the extra size and bulk associated with new denture construction. Implants allow the dental practitioner to plump up the lips and lengthen the face in a predictable fashion, achieving an "internal facelift."



**Figure 7** Implant bar is retained by four screws secured to the top of the implants.



**Figure 8** Tissue side of prosthesis snaps onto the trailer-hitch balls of the bar.

**RESTORING BOTH JAWS SIMULTANEOUSLY**

If one were to ask the general public about denture discomfort, most full denture patients would indicate that their maxillary prosthesis was adequate and the full lower denture was the main source of their complaints. The soft and hard tissue configurations of the palatal vault allow for a well-constructed maxillary prosthesis to be retained by negative pressure. On the other hand, a full mandibular prosthesis often lacks retentive stability and tends to fishtail, spin, or slip when patients attempt to masticate their food. This lack of stability often results in “denture sore spots” and can be a cause of significant an-



**Figure 10** A more pleasing contour is achieved through the use of implants.



**Figure 9** Note the dished-out appearance prior to implants.



**Figure 11** Patient without prosthesis.



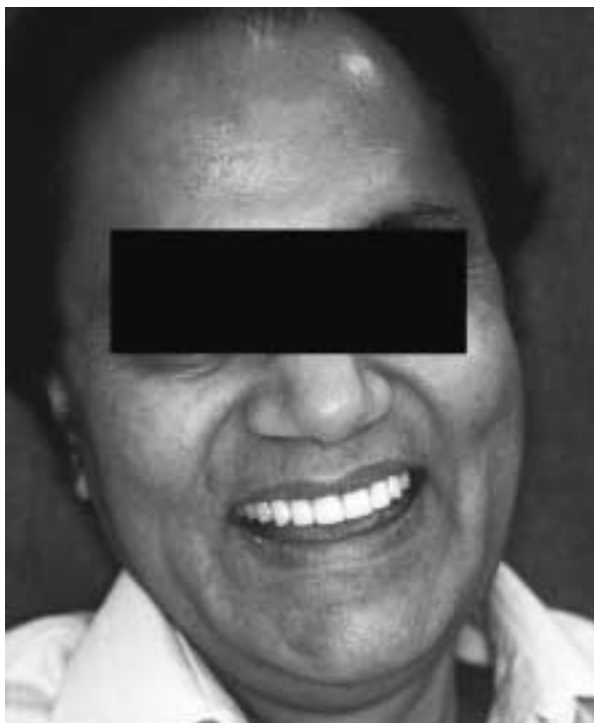
**Figure 12** Patient with implant-supported overdentures.

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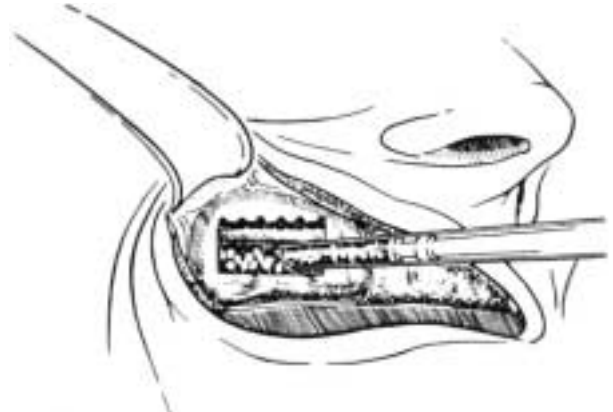


**Figure 13** Patient has 11 endosseous implants (6 in the maxilla and in the mandible) securing both upper and lower over-dentures.

guish as time marches on. Additionally, when a patient shies away from certain food due to the loss of masticatory function, his or her systemic well-being can also be compromised. It has been found that restoring the lower jaw with implants allows most patients to manage a large percentage of all foodstuffs and very nice cosmetic results can be consistently achieved. Complications on the maxillary arch arise when patients present with a flat or shallow palate. The brachycephalic patient suffers the most from maxillary denture discomfort due to a lack of suction and the resultant instability that arises. Figures 13 and 14 demonstrate both the upper and lower jaws



**Figure 14** Completed case.

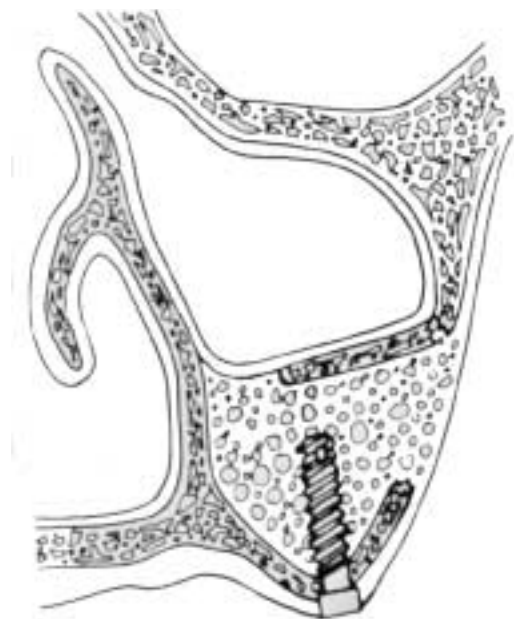


**Figure 15** The lateral wall of the maxillary sinus is reflected and "bone substrate" is delivered to the periantral area.

outfitted with implant-retained dentures that are fastened to palladium-alloyed bars.

**SINUS ELEVATION AND BONE-GRAFTING PROCEDURES**

Pneumatization of the maxillary sinuses can be expected after a patient has lost posterior teeth. The resulting bone mass, many times, is inadequate to receive endosseous implants. For the dental surgeon to place an endosseous implant in the posterior maxilla, a sinus augmentation procedure may first be required to establish an adequate amount of bone. There are several ways in which this can be achieved. Smiler described a very popular method in the late 1980s, and it is still in vogue today and a work-



**Figure 16** Grafting material may be seen below the schneiderian membrane and encapsulating the dental implant.

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**Figure 17** Tissue side of the device.



**Figure 18** The obturator ("plumper") is retained by undercuts associated with the hybrid prosthesis.



**Figure 19** Patient's chin appears too prominent for her liking.

horse in my practice.<sup>2</sup> The dental surgeon prepares the site by first reflecting the maxillary mucosa and underlying bone. The surgeon then identifies the sinus membrane and begins to gently tease it away from the bone, creating an implant receptor site both lateral and inferior to the original space occupied by the sinus cavity. The resultant periantral space is augmented with either autogenous or artificial bone substitutes. It is beyond the scope of this article to significantly expand on this important technique, but the schematics (Figs. 15, 16) will help to demonstrate this modality.

**OBTURATORS**

An obturating device can be fabricated to "plump" out the lower lip for a more pleasing appearance. Although plumpers can be used in a variety of situations, many patients object to the cumbersome nature of the prosthesis, but when used judiciously these devices can overcome many obstacles. In Figures 17 to 20 the patient is wearing a hybrid prosthesis in conjunction with a lower plumper to help fill out a soft tissue deficit readily apparent in her profile.

**THE PATIENT'S TEETH**

When replacing a patient's dentition, the dental practitioner has the ability to choose a tooth of pleasing proportions and shade. The anterior six teeth are the most



**Figure 20** "Softening" of the patient's chin is achieved by the obturating device.

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**Figure 21** Patient's preoperative panoramic radiograph.

important teeth that need to be considered for cosmetics; however, one must take into account the patient's smile line and the number of teeth observed when the patient smiles broadly. The smile line can be defined as the inferior border of the maxillary teeth that parallels the curvature of the lower lip.<sup>3</sup> A large smile that displays the entire outline of the maxillary anterior teeth and teeth posterior to at least the first molar is considered the most attractive and youthful. A smile in an older individual usually displays more of the mandibular incisors and less of the maxillary anterior teeth due to decreased muscle tone. This is correlated with a less youthful appearance. The horizontal width of the teeth most often needs to be approximately 3 to 4 mm greater than the greatest width of the malar processes. Of course, this is a general rule of thumb, but it is often overlooked when trying to reestablish the harmony of the lower one-third of the face. The shapes of teeth are generally divided into three forms: square, tapering, and ovoid. Williams suggested that there is a correlation between the shape of the upper central incisor and the shape of the face when inverted.<sup>4</sup> It is considered pleasing to the eye when the maxillary central incisors follow the form of the person's face when upturned.

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**Figure 22** Postoperative panoramic radiograph shown with six endosseous implants and a sinus augmentation.



**Figure 23** Finished prosthesis as seen from an occlusal view.

### CROWN AND BRIDGE

The mouth can be restored to function and beauty with "fixed" or permanently cemented crowns and bridges. A crown is a cemented extracoronal restoration that covers, or veneers, the outer surface of the clinical crown.<sup>5</sup> It should reproduce the morphology and the contours of the coronal portions of a tooth while replicating its function. It should also protect the remaining tooth structure from further damage. The crowns can be cemented to prepared natural teeth or to implants. The following example (Figs. 21–26) examines the use of sophisticated crown and bridge techniques coupled with a maxillary sinus augmentation with endosseous dental implants anchoring the prosthesis. A facelift was performed *after* the lower one-third of the face was corrected by traditional prosthodontics.

### LAMINATE VENEERS

Porcelain laminate veneers may be used in place of full-coverage crowns when the underlying occlusal relations permit. One may think of a porcelain laminate veneer as analogous to an artificial fingernail. Laminate veneer and artificial fingernails are both bonded onto a prepared sur-



**Figure 24** Frontal view of the finished prosthesis.

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Figure 25 Before.



Figure 26 After.

face. The bond strength of the porcelain veneer to enamel is both very strong and very dependable. The veneer itself is somewhat fragile, but after it is cemented to the underlying enamel the restoration exhibits high shear and tensile strength. Properly luted and finished laminate veneers cannot be "popped" off the underlying tooth structure but actually have to be ground off using rotary instrumentation until the original tooth surface is discovered. Porcelain veneers can therefore be used to change both the shape and length of any given tooth. Another significant advancement in the use of porcelain veneers is that the color of the veneers can be matched to the adjacent teeth. They can be stained or characterized externally as well as internally to achieve maximum aesthetic benefits. Additionally, laminate veneering is significantly less invasive when compared with conventional crowns, thus, their widespread use and acceptance. Figures 27 and 28 illustrate an example of porcelain laminate veneers covering the eight anterior maxillary teeth. If adequate enamel is not present, or the patient has excessively fluoridated teeth, then traditional crown and bridge methods should be considered.<sup>6</sup>

**CONCLUSION**

The author has demonstrated several modalities available to the dental professional that can potentially benefit the plastic surgeon in the treatment of patients. The use of endosseous implants has been discussed to help stabilize the compromised dental patient. All treating



Figure 27 Teeth are stained and shape is less than ideal for the patient's face.



Figure 28 Laminate veneers allow for a more pleasing and sophisticated appearance.

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physicians should recognize the clinical signs of the loss of occlusal vertical dimension. A more youthful appearance can be achieved by well-thought-out treatment planning and incorporating these intraoral procedures. It is the opinion of the author that restoring the lower one-third of the face must be accomplished by prosthodontic techniques before or in conjunction with definitive plastic surgical procedures.

#### ACKNOWLEDGMENT

Dr. Gittleman is a prosthodontic specialist residing in Houston, Texas. He holds 13 U.S. patents in dental medicine, and his practice is limited to oral and facial prosthodontics.

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AQ2: Au: Ref 2: Need journal article title and page number

