Increased Retention and Stability of Maxillary Dentures

BENEFITS AND DESCRIPTION OF THE MODALITY USED IN THE TEACHING CASE

Intramucosal inserts increase the retention and stability of maxillary dentures[1] (Fig. 20-1). Retention is a measure of a denture’s resistance to dislodgment, its ability to maintain a suctionlike seal. Stability is a measure of a denture’s resistance to movement when its seal is maintained. Much as skin can move across a knuckle, a seated retained denture can show movement in function if some areas of gingiva move freely over bone. Lack of retention is a serious problem for the denture wearer. One’s ability to laugh and talk with confidence and to chew without being self-conscious is compromised. These constraints can cause a personality to change, as the wearer fears detection of the denture during normal activities, resulting in less laughter, less talk, and in general less interaction with others. Lack of stability can also compromise confidence, chewing efficiency, and the ability of the wearer to act naturally.

Figure 20-1

Maxillary denture with intramucosal inserts

Intramucosal inserts are mushroom-shaped titanium devices affixed to the tissue surface of a maxillary partial or total removable denture. They plug into prepared receptor sites in attached gingiva at the crest and palatal incline, materially increasing the denture’s retention and stability[2] (Fig. 20-2).
Retention is enhanced by engaging tissue in two ways. First, each individual intramucosal insert engages tissue that grows into the undercut area between its **head** and **base**. This tissue, following receptor site preparation, initially heals by epithelialization, followed by **keratinization** (Fig. 20-3). Second, the two rows of inserts—typically four on the ridge crest from the cuspid extending posteriorly and three on the lingual incline—are each oriented perpendicular to the tissue into which they seat. As a result, the long axes of the inserts in the two rows are at an angle to each other, and therefore a large amount of tissue is engaged between the rows (Fig. 20-4).

**Figure 20-3** Histology (A) and view of keratinized tissue lining gingival receptor site (B).
Stability is achieved because each insert is seated into attached gingiva. Areas of mobile tissue under the denture base are avoided when selecting receptor site locations for intramucosal inserts, so the denture becomes essentially immobile.[9] Receptor sites in attached gingiva can be compressed but cannot be moved across bone to cause instability. The entire denture is secured in position in attached gingiva.

Intramucosal inserts are not effective for treatment to stabilize mandibular dentures. This is because the tissues covering the mandibular ridge are too thin to seat inserts properly, the labial and buccal inclines of the ridge are generally at an angle too acute to the ridge crest to allow for seating, and the tongue has a dislodging effect. Thus, intramucosal inserts are contraindicated in the mandible, although research has been conducted and continues to evolve to overcome this limitation. For example, the concept of intramucosal/intraosseal inserts has been explored to make this treatment effective in the mandible (Figs. 20-5 and 20-6).
**Prosthodontic Simplicity**

The practitioner starts with a well-fitted maxillary partial or total removable denture, adjusted for sore spots and occlusion. Affixing the inserts to the denture, preparing the gingival receptor sites, and inserting the denture is performed in one visit, followed by routine follow-up and adjustment. The armamentarium is simple. This procedure can be effectively performed in every dental office as a part of the general practice of routine prosthodontics.

**Technique-Permissive Receptor Site Preparation**

In a mainstream total denture case lacking sufficient retention and/or stability, such as that shown in the teaching case in this chapter, 14 gingival receptor sites for standard intramucosal inserts are prepared in 5 to 10 minutes. A latch-type No. 3 round bur and a standard tissue receptor site bur are all that are needed. A few drops of local anesthetic containing vasoconstrictor are deposited at each planned gingival receptor site to minimize bleeding and discomfort.

**Proven Long-Term Success/Survival Rates**

It is very rare for an intramucosal insert case to fail or exhibit complications. When a complication does occur, it is almost always localized at a single gingival receptor site. In such cases, the insert is simply removed from the surface of the denture. The insert denture continues to provide increased retention and stability even in the absence of an individual insert. In some cases, the retention and stability is so great that the patient finds it difficult to remove the denture. No case of
Also of interest is the fact that insert dentures rarely require relines over time, although the reasons for this are not known. It is postulated that the added stability retards bone resorption under the denture. This is an important benefit of the use of intramucosal inserts.

**Unique Benefits**

Intramucosal inserts offer patients a cost-effective service that rapidly and predictably yields new confidence and joy in the use of their dentures.

Experience has shown that the vast majority of patients who have few complaints about their complete maxillary dentures but who agree to treatment with intramucosal inserts are pleased at the unexpected degree of increased stability and functional improvement. In view of this, and also because insert dentures tend not to require relining, the use of intramucosal inserts could be an option offered to all maxillary denture patients, and perhaps in time may become a conventional procedure in maxillary complete or partial removable denture treatment.

**Anatomy and Nomenclature of the Intramucosal Insert**

Each solid insert has a mushroom-shaped head, with a marking teat at its apex. The head has sloping sides to permit ease of denture insertion by atraumatically stretching the healed gingival receptor site, which is undercut to promote retention. Under the center of the head, a neck extends down to the base of the insert. The length of the neck controls the depth of insertion of the head into gingival tissue. Under the center of the head, a neck extends down to the base of the insert. The length of the neck controls the depth of insertion of the head into gingival tissue. The base promotes firm attachment of the insert when it is affixed into its prepared acrylic receptor site within the tissue surface of the denture. The base has two flanges of different diameters. Each insert is supplied with a protective disposable nylon collar that precludes the insert cementing medium, usually self-curing acrylic, from expressing into the undercut area under the head when the insert is affixed to the tissue surface of the denture.

![Figure 20-7](image-url)
**Figure 20-7** Anatomy of intramucosal insert

**Figure 20-8** Positioning of disposable nylon protective collar.

**DIAGNOSIS, TREATMENT PLAN, AND END RESULTS**

*Case as Presented*

Patient's Story.
The patient’s chief complaint is dissatisfaction with his or her ability to function with a maxillary denture. The current denture may not be the patient’s first. It moves or unseats during eating, and is sometimes unstable when the patient laughs or talks. The patient may be irritable or depressed, and is exasperated with the situation.

Clinical Appearance.

Clinically, one observes a well-made denture, often one fabricated in the practitioner’s own office. The fit and flange extensions are fine. The denture is relieved to clear the frena. There is a proper post-dam area. No sore spots are observed. The occlusion is correct. The denture is flattering esthetically.

Although a few areas of gingival tissue that are less than firm may be present, by and large an adequate amount of attached gingiva exists along the ridge crests and their lingual inclines, especially from the cuspid areas distally. The saliva is normal, sometimes serous, and rarely ropy or mucinous.

In many cases, the anatomy of the ridges is adequate to support a complete denture with ease. In others, the anatomy is less adequate, and is probably the primary cause of the problem. In some cases, the musculature is overdeveloped, possibly aggravated by a habit that together with the musculature tends to unseat the denture. Sometimes the patient subconsciously cannot accept the concept of wearing a complete denture, and may have complaints about problems that other patients would barely notice or not consider particularly bothersome. Gagging may be a problem.

Radiographic Interpretation.

The pretreatment radiography can reveal a range of presentations, all of which can be approached with mainstream intramucosal insert treatment. One may observe ample available bone, or almost none. Careful inspection of the radiographs reveals a rather thick, dense layer of soft tissue over the bone. It is into this tissue that each insert will be seated within its gingival receptor site.

Rejected Alternative Treatment Plans

The patient has been offered all implant dentistry options. Appropriate endosteal and/or subperiosteal implant options were described in detail. One or several considerations led to the rejection of treatment using an abutment-providing implant modality. Treatment would take too much time, or the patient prefers to undergo a less invasive procedure, or there was previous treatment with one of the abutment-providing implant modalities that either served the patient well for a number of years, or never solved the patient’s problem. Perhaps health considerations contraindicate the use of abutment-providing implants at this time, or the age of the patient is too advanced, or the patient has financial constraints. Fabrication of another denture is also ruled out as a final solution to the patient’s problems. In mainstream cases such as the teaching case, the existing denture tends to be in fine condition. If not, a new denture is fabricated and adjusted before intramucosal insert treatment.

Accepted Treatment Plan—Single-Visit Case Sequencing

The case is diagnosed for treatment using intramucosal inserts to improve retention and stability of the existing maxillary denture. This procedure requires one treatment visit that can usually be performed in approximately 1 hour of scheduled time.
**Completed Case**

Having the goal firmly in mind during treatment is important. The end result is presented here to help the reader understand how each step of treatment contributes to the final objective, and to convey the satisfaction and benefits of treatment both for the patient and practitioner.

**Patient’s Story.**

The treatment goal has been achieved. The denture shows a substantial increase in retention and stability. The patient can now eat, laugh, talk, and socially interact with greater confidence and pleasure. Fine home care is easy to maintain.

**Clinical Appearance.**

The denture is esthetic and functional. After healing, gingival receptor sites are lined with keratinized tissue.

**PLANNING AND PROCEDURES BEFORE INSERT DENTURE INSERTION**

The steps that are performed before the intramucosal insert treatment visit are shown in Box 20-1.

**Box 20-1**

<table>
<thead>
<tr>
<th>PREOPERATIVE PROCEDURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabricate edentulous model of maxilla</td>
</tr>
<tr>
<td>Mark ideal insert locations on model</td>
</tr>
<tr>
<td>Prescribe prophylactic medication, if necessary</td>
</tr>
</tbody>
</table>

**Fabricate an Edentulous Study Model of the Maxilla**

When the maxillary denture to be used is ready, either via fabrication of a new denture or relining and adjustment of an existing denture if required, an edentulous study model of the maxilla is fabricated. This model is used to record the condition of the overlying tissues as observed during clinical examination, and for planning of gingival receptor site locations.

**Mark the Ideal Locations of the Gingival Receptor Sites on the Model**

The ideal locations of the gingival receptor sites are marked on the edentulous study model (Fig. 20-9) based on a thorough clinical examination of the overlying mucosa. First, record any areas of flabby and/or unattached gingiva that may exist in areas targeted to receive intramucosal insert gingival receptor sites on the study model.

**Figure 20-9**
In the teaching case, 14 standard intramucosal inserts are used. Four insert locations are marked on the crest of the ridge on each side of the study model, starting at the cuspid area and progressing distally at regular intervals to the height of the tuberosity. Next, three receptor site locations are marked on the lingual incline of each ridge. Each lingual incline receptor site is located between two crestal inserts, forming equilateral triangles. Inserts are not placed along the posterior border of the denture, nor are they usually placed on the ridge crest or lingual incline anterior to the cuspids. Along the posterior border, the tissue is too vascular and tender—not as keratinized—and anteriorly the crest is often too flabby and the lingual incline too steep.

During the initial examination, the areas of flabby or unattached gingiva are marked on the study model, as shown in Fig. 20-9. The presence of such areas is uncommon, but when encountered, they are important to record. Inserts should not be placed in flabby or unattached gingiva. Therefore, insert dentures are occasionally fabricated with 11 to 13 inserts, rather than the conventional 14, if an area targeted for insertion exhibits flabby tissue.

Mainstream cases do not present with inflamed, sore gingiva. If a patient presents with such a condition, the conventional soft-tissue treatment favored in one’s office is performed. When such treatment is complete, resulting in healthy gingival tissues, the intramucosal insert protocol is initiated.

**Prescribe Preoperative Prophylactic Medication, If Necessary**

Prophylactic antibiotic medication is only recommended if, in consideration of the patient’s general health and history, the practitioner deems it advisable. For most patients, preoperative antibiotic coverage is not necessary. Patients who take prophylactic aspirin daily are advised to discontinue doing so for at least 3 weeks preoperatively, to allow for normal clotting at the insertion visit.

Postoperative edema is usually not observed, and therefore does not require special consideration preoperatively. If it does occur, it is almost always minor, and not visible. The denture, which is seated firmly over the newly created gingival receptor sites, acts as a stent to minimize swelling by compressing the tissues. The soft palate and uvula may experience slight
edema, which will bother the patient during swallowing for a few days. Inform the patient of this likelihood. No medication is required to counteract this edema, which recedes naturally within a few days postoperatively.

**INSERT DENTURE INSERTION VISIT**

The steps that are performed during the one-visit intramucosal insert denture insertion procedure are shown in **Box 20-2**.

**Box 20-2**

<table>
<thead>
<tr>
<th>ONE-VISIT INTRAMUCOSAL INSERT TREATMENT PROTOCOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirm use of prophylactic antibiotic, if prescribed</td>
</tr>
<tr>
<td>Mark each acrylic receptor site location on tissue surface of denture</td>
</tr>
<tr>
<td>Prepare acrylic receptor sites in tissue surface of denture</td>
</tr>
<tr>
<td>Affix intramucosal inserts to denture, trim, and polish</td>
</tr>
<tr>
<td>Mark locations of planned gingival receptor sites on maxillary mucosa</td>
</tr>
<tr>
<td>Administer local anesthetic</td>
</tr>
<tr>
<td>Prepare gingival receptor sites</td>
</tr>
<tr>
<td>Test seat denture with inserts</td>
</tr>
<tr>
<td>Adjust for accuracy of seating of inserts within gingival receptor sites</td>
</tr>
<tr>
<td>Perform final seating of insert denture</td>
</tr>
<tr>
<td>Check occlusion, initial retention, and initial stability</td>
</tr>
<tr>
<td>Prescribe postoperative medication</td>
</tr>
<tr>
<td>Provide home care instruction</td>
</tr>
</tbody>
</table>

**Confirm That Preoperative Medication Has Been Taken**

Preoperative medication is generally not required in mainstream cases. If prophylactic antibiotic was prescribed but not taken, it is usually not necessary to postpone the case. The practitioner should have antibiotics on hand for preoperative administration in such cases. If a patient on an aspirin regimen has not discontinued its use, insertion may nonetheless be performed, with delayed clotting expected.

**Instrumentation Setup— The Armamentarium**

The inserts and their protective collars are not part of the tray setup. They are placed on a separate laboratory tray, together with a No. 3 straight handpiece round bur, a straight handpiece acrylic receptor site bur, an acrylic receptor site testing instrument, a tube of cyanoacrylate cement, a dappen dish with pink quick-cure polymer, another dappen dish with quick-cure monomer, a straight brush, a soft Robinson bristle brush, a straight handpiece acrylic trim bur, a needle holder, college pliers, a few gauze squares, and alcohol. This tray setup is used in the laboratory to attach the inserts to the denture.

The sterile tray setup for clinical use consists of a mirror, an explorer, a low-speed contra angle, a No. 3 latch-type round bur, a tissue receptor site bur, local anesthetic containing 1:100,000 vasoconstrictor, povidone-iodine (Betadine), an indelible tissue marker, a tissue receptor site
testing instrument, and gauze squares. The specialized standard insert (Fig. 20-10) and large insert (Fig. 20-11) bur sets are illustrated.

**Figure 20-10** Standard insert armamentarium

**Figure 20-11** Large insert armamentarium

**Mark Each Acrylic Receptor Site Location on Tissue Surface of Denture**

The receptor site locations are carefully marked on the edentulous maxillary study model, as shown in Fig. 20-9. In the office laboratory area, using the study model as a guide, mark the corresponding receptor site location directly on the tissue surface of the denture with an indelible pencil (Fig. 20-12). Check for accuracy. At the center of each planned acrylic receptor site, drill a score mark into the acrylic using a No. 3 round straight handpiece bur.
This score mark records each acrylic receptor site location and acts to stabilize the acrylic receptor site drill when it is used. In preparing the final score marks, check again that all receptor sites, if connected by lines, would form equilateral triangles. This ensures ideal spacing when tissue conditions permit, as they almost always do in mainstream cases.

**Prepare Acrylic Receptor Sites**

Place the acrylic receptor site bur into the score mark closest to the cuspid on the ridge crest. Hold the long axis of the bur perpendicular to the tissue surface (Fig. 20-13).
Figure 20-13 Acrylic receptor site bur held perpendicular to tissue surface of denture

The center point of the cutting edge of the bur nests within the score mark to stabilize the bur during cutting.

At a moderate speed, with gentle downward pressure, prepare the acrylic receptor site. Stop and cleanse as required during the procedure.

Watch the safety stop of the bur. This large, smooth area controls the depth of the acrylic receptor site to coordinate it with the depth of the insert base. When this bur is properly used, it is not possible to make the acrylic receptor site too deep. Stop drilling when the safety stop contacts the tissue surface of the denture.

Moving distally, complete the three remaining crestal acrylic receptor sites. Prepare the four crestal acrylic receptor sites on the opposite side according to the same procedure.

Always keep the long axis of the acrylic receptor site bur perpendicular to the tissue surface. This ensures that the four crestal inserts will be parallel.

Now prepare the three lingual incline receptor sites on each side. Start anteriorly, holding the long axis of the acrylic receptor site bur perpendicular to the tissue surface on the incline. Complete the preparation of all of the lingual acrylic receptor sites according to the procedure described for the crestal sites (Fig. 20-14).
Test each acrylic receptor site for completion using the acrylic receptor site testing instrument. Place it into each site. Its tip is the same shape and size of an insert base. This allows visualization of how each insert base will seat into its acrylic receptor site.

Confirm that the base of each insert will seat properly, and that the upper flange of the base will be flush with the denture tissue surface. If not, deepen the receptor site.

**Affix the Intramucosal Inserts to the Denture**

Place the nylon protective collars onto the inserts. With college pliers, seat each insert into position on the ridge crest of one side of the denture. Tease them parallel to one another. Remove the most anterior insert, and apply a drop of cyanoacrylate cement into its receptor site to hold the insert steady during the final affixation process. Reseat the insert with its protective collar. Repeat this procedure for each subsequent insert, proceeding distally. Wait until the cement hardens (Fig. 20-15).

Tease the inserts parallel to one another as each is seated with initial retention cement. This step prevents an insert from being affixed at a less-than-ideal angle.
Dip a straight sable brush into the self-cure monomer, and then into some polymer to pick up a small mix on the tip. Apply the mix at one area around the base of the insert, and let it harden (Fig. 20-16). After hardening, apply self-cure acrylic around the entire base of each insert.

**Figure 20-16** Initial phase of cementation with self-cure acrylic.

Note that the upper flange of the base has a smaller diameter than the lower flange. The acrylic flows into the space between the upper flange and the denture to seal the insert into position. The protective collar prevents acrylic from getting into the area of the neck of the insert, where it would be very difficult to remove. Apply the sealing acrylic carefully, to minimize excess.

Repeat this insert cementing procedure for the four crestal inserts on the opposite side, and then for the three lingual incline inserts on each side. The denture may be placed into hot water to hasten the hardening of the pink self-cure fastening acrylic.

After the acrylic hardens, grasp and lock onto the upper 2 mm of the nylon protective collar over an insert using a needle holder. Rapidly pull the collar away from the insert in the direction of its long axis to remove the nylon protective collar without disturbing the insert. Remove each of the remaining protective collars in the same way.

One can now understand the value of the protective collars. Hardened excess acrylic is clearly visible around the base, but no acrylic is present around the neck or on the underside of the mushroom head.

Trim excess acrylic with the acrylic trim bur. Pass the trim bur over the head of each insert at low speed without water coolant. Hold its long axis parallel to the long axis of the insert, and press toward the base until the cutting edge of the bur cleans the top flange of the base (Fig. 20-17). Repeat this process for each insert, brush away debris, and inspect for any areas of excess acrylic that cannot be removed using the acrylic trim bur.

**Figure 20-17** Proper positioning of acrylic trim bur over insert.
Proper positioning of acrylic trim bur over insert

The acrylic trim bur is designed to pass over the head of the insert with adequate clearance to prevent binding. Its cutting edge is shaped to permit visibility at the point of trimming, to facilitate accuracy. The removal of excess acrylic is limited by contact between the trim bur's cutting edge and the metal rim forming the top flange of the insert.

With a No. 3 round straight handpiece bur, carefully trim away any excess acrylic that remains after use of the acrylic trim bur.

Move this bur rapidly to leave a smooth, semi-polished area of trimmed acrylic.

Cleanse the Denture

Using a soft Robinson bristle brush at low speed, polish all the acrylic between and around the inserts (Fig. 20-18), and reinspect to be sure no excess or debris remains. Scrub the denture, wash, and dry (Fig. 20-19). Before placing the denture on the chairside tray setup, wipe it liberally with gauze squares soaked in alcohol, and rinse.
The laboratory portion of the procedure is now complete.

**Preoperative Tissue Preparation**

Apply povidone-iodine to the entire maxillary edentulous area and surrounding tissues.

**Mark the Receptor Site Locations on the Maxillary Tissue**

When marking the receptor site locations on the maxillary tissue, start with the four crestal inserts on the right side. Using a gauze square, dry the right ridge crest. Insert the denture and apply direct pressure to dimple the gingiva with the inserts, or mark each insert on and around its marking teat using an indelible blue marking pencil (Fig. 20-20).
Teats marked with indelible pencil

Drying the gingiva facilitates the transfer of the marking medium onto the planned gingival receptor sites.

Seat the denture carefully, and have the patient bite down firmly in centric occlusion for about 30 seconds to transfer the insert location markings to the gingiva.

This step may be uncomfortable for the patient.

Local Anesthetic, Promotion of Comfort, and Control of Bleeding

Remove the denture carefully. Marks that correspond to the positions of the inserts on the denture are visible on the right ridge crest (Fig. 20-21), equally spaced between the cuspid area and the height of the tuberosity. Deposit a few drops of anesthetic containing 1:100,000 vasoconstrictor directly in the center of each mark (Fig. 20-22).
Figure 20-22 Local anesthetic administered at center of each planned receptor site

The anesthetic is used to control discomfort and bleeding during receptor site preparation.

Mark Each Tissue Receptor Site

Using a No. 3 round latch-type bur in a low-speed contra angle, penetrate the tissue at the exact center of each mark, the same point at which the anesthetic syringe needle penetrated the tissue (Fig. 20-23). Wipe away the marking medium.

Figure 20-23 Gingiva penetrated with No. 3 round bur to mark receptor site locations

The penetration acts as a clear, nonremovable landmark to locate each planned gingival receptor site. Repeat these steps for left ridge crest inserts, followed by the right and left lingual incline areas. With all of the intramucosal insert locations marked and anesthetized, the gingival receptor sites can be prepared. A few additional drops of anesthetic may now be administered at each site. The patient should feel little or no discomfort as this anesthetic is administered.
**Prepare the Intramucosal Insert Tissue Receptor Sites**

The latch-type tissue receptor site bur is placed in a low-speed contra angle. Coolant is not used.

The design of the tissue receptor site bur is unique. It is smaller in diameter than the mushroom head of each insert (Fig. 20-24). This provides a degree of frictional fit on the day the denture is seated, although healing has not yet begun. The bur cuts the tissue receptor site deeper than the distance from the insert base to the apex of the insert head. This additional space, which initially fills with a blood clot, helps to preclude pain while the patient clenches in centric occlusion as hard and as long as possible for a few days postoperatively. This clenching compresses tissue. The bur is provided with a safety stop to prevent overdrilling of gingival receptor site depth (Fig. 20-25).

Hold the long axis of the bur perpendicular to the tissue surface, centered on the penetration mark, and prepare the tissue receptor site until the safety stop contacts the gingiva (Fig. 20-26). Use firm pressure at a low speed without coolant. Test each receptor site with the insert head testing instrument, and redrill if required.

![Figure 20-24](image-url)  
**Figure 20-24** Receptor site bur *(shadowed)* is narrower and deeper than insert

![Figure 20-25](image-url)
This procedure is performed for every tissue receptor site, area by area. Bleeding is usually minimal. If bleeding persists at any gingival receptor site, a few more drops of anesthetic with vasoconstrictor and direct pressure with a damp gauze square quickly controls it.

**Seat the Insert Denture**

Cleanse the tissues. Seat the denture by hand, moving it superiority and into position. It is important to ensure that the seating is firm. Once seated, have the patient close firmly into centric
occlusion for 5 minutes. Visually inspect to be sure that the occlusion is in fact in centric (Fig. 20-27). If not, position the denture properly, and have the patient close firmly again.

![Figure 20-27 Seated insert denture in proper occlusion](image)

**Figure 20-27** Seated insert denture in proper occlusion

The firm upward seating squeezes the inserts into the narrower gingival receptor sites.

**Remove the Denture and Check for Accuracy of Insert Receptor Site Placement**

The denture is now slowly and carefully removed. Rinse the denture, and wipe the tissues with damp gauze squares. Carefully inspect all the tissues around each receptor site. Examine carefully to determine if there is a deep depression in tissue near a receptor site.

If a deep depression is present, the gingival receptor site for that insert is incorrectly located. If so, follow the complete regimen to make a new gingival receptor site at the location of the observed depression. With the new receptor site completed, reseat the denture for 3 to 5 minutes again, remove, and reinspect. The misplaced gingival receptor site that was prepared initially will heal uneventfully.

**Final Seating and Radiography**

When the gingival receptor sites are confirmed to be positioned correctly to receive each insert, seat the insert denture firmly into position. The patient is instructed to stay closed firmly in centric occlusion for the next several hours, with as little movement as possible. The patient may alternate between firm and gentler pressure, and may open when necessary to relieve the muscles, but should stay closed with no movement to the extent possible.

Staying closed firmly in centric occlusion for several hours promotes blood clot formation around each insert, to initiate healing.

A radiograph is taken for the patient record.

**IMMEDIATE POSTTREATMENT HOME CARE INSTRUCTIONS**

**Trauma**
No medication for edema is required. The patient may experience some discomfort when swallowing for a few days postoperatively.

Prophylactic Medication

Antibiotic treatment may be initiated or continued, if deemed necessary by the practitioner. It is usually not required.

Comfort Medication

Prescribing medication to alleviate discomfort according to one’s customary office regimen for postextraction or endodontic treatment is usually sufficient for intramucosal insert treatment.

Cleanliness

It is advised that the patient not remove the denture for any reason for 2 weeks postoperatively. Starting 12 to 18 hours after treatment, the patient may gently rinse with a warm saltwater solution. Gentle brushing with a soft-bristled brush and toothpaste without removal of the denture is permitted.

Diet/Function

A soft diet is essential for at least 2 weeks. During healing, movement should be avoided. The less movement that occurs, the tighter the grip of the tissues around and among the inserts will be, and the greater the ultimate retention and stability.

General Considerations
Postoperative Follow-Up Visits.

The schedule and purpose of each follow-up visit are shown in Box 20-3.

Box 20-3

<table>
<thead>
<tr>
<th>FOLLOW-UP SCHEDULE AND PURPOSE OF EACH VISIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Follow-up visit 1, week 1 to 2:</strong> Check occlusion and perform prophylaxis. Check comfort of denture.</td>
</tr>
<tr>
<td><strong>Follow-up visit 2, weeks 2 to 4:</strong> Prophylaxis, denture removal and reinsertion. Increasing function instruction.</td>
</tr>
<tr>
<td><strong>Follow-up visit 3, weeks 4 to 6:</strong> Denture removal and reinsertion. Increasing function instruction.</td>
</tr>
</tbody>
</table>

The first postoperative follow-up visit is generally scheduled 7 to 14 days after seating of the insert denture. The patient should not remove the denture before the follow-up visit, movement should be limited, and diet should be restricted to soft foods. By the time of the follow-up visit, the blood clot surrounding each insert has organized. Gingival epithelial cells have migrated around the entire insert head and neck, but the tissues are still fragile. In fact, the tissues are so fragile that removal of the denture at this time can tear valuable, functional tissue. The patient is examined to ensure that centric occlusion is routinely observed on closing. General prophylaxis is
performed as required. The next recall visit is scheduled in 7 to 14 days. Home care instructions are reiterated.

At the next recall visit, 14 to 28 days after insert denture insertion, the denture is removed and cleansed. Most often the patient has performed adequate home care. Consider that most of these patients have prior experience wearing a maxillary complete denture. It is recommended that the patient remove the denture, because he or she can determine the path of least resistance and greatest comfort for removal. Removal may be uncomfortable. The tissue is not yet keratinized from long-term function. Only rarely need the practitioner remove the denture. When this is the case, the patient is usually a new denture wearer.

Place a liberal amount of topical anesthetic paste or gel on a gauze square. Immediately following removal of the denture, wipe topical anesthetic into each healing gingival receptor site. Although it is impossible to anesthetize the tissues topically to make the initial denture removal more comfortable, topical anesthetic is applied to make the reinsertion more comfortable. Before wiping the tissues clean with damp gauze squares, permit enough time to elapse to ensure that the topical anesthetic has taken effect. During this wait, the denture is thoroughly scrubbed, and topical anesthetic is placed on each insert head. This acts as a lubricant to ease the denture back into the receptor sites, which need to be stretched open to accommodate the inserts. Following cleansing of the tissues with damp gauze, wipe more topical anesthetic into each receptor site. Wait a few minutes, and then have the patient reseat the denture. Again, it is best if the patient does this. Patients can feel their way, avoid as much discomfort as possible, and sense when the denture is seating properly.

With the denture reseated, patients gain confidence that they can indeed remove and replace the denture. However, at this time, urge them not to do so. A bit more function is now permitted. Request that the denture not be removed until the next recall visit, which is scheduled in 2 weeks. Home care instructions are reiterated.

At the next follow-up visit, ask the patient to remove the denture once again. Healing is now well advanced. It may remain difficult to remove the denture. Patient confidence in denture removal and reinsertion should be high after this visit.

The patient is placed on a routine 3- to 4-month recall program, and advised to remove his or her denture for cleansing as needed. Some patients feel they must do this every day, and some cleanse their dentures weekly. Almost no untoward results occur, whatever the cleansing schedule. Insert dentures rarely require relines, long-term.

**COMPLICATING AND ATYPICAL CONDITIONS**

**Inflammation of a Gingival Receptor Site**

Although more common than other complications, inflammation of a gingival receptor site nonetheless is only rarely observed. Its prime cause is excessive lack of parallelism between the affected receptor site and the others. In such cases, with each removal and reinsertion of the denture, tissue is damaged, and chronic inflammation results. Another reason may be that the affected receptor site is in tissue that is too friable or thin. Whatever its etiology, grind off the insert until the stem is flush with the tissue surface of the denture, and polish. Do not replace the insert. The remaining inserts are sufficient to provide retention and stability of the denture.

**Lack of Attached Gingiva and/or Excessive Flabby Tissue**
Lack of attached gingiva and/or excessive flabby tissue are unusual preoperative presentations that make the intramucosal insert treatment non-mainstream. When these situations occur, the areas marked as unusable on the edentulous study model are extensive enough to limit how many inserts can be used in acceptable areas. In such cases, add additional inserts on the crest of the ridge between the cuspids, but not on the lingual incline. Such insert dentures are sometimes uncomfortable, and have a more guarded prognosis. Excessive flabby tissue can be removed, and following healing, tissue conditioning, and relining of the denture in the treated area, inserts may again be considered.

**Insufficient Retention and/or Stability Following Treatment**

In rare cases, treatment yields insufficient change to satisfy the patient. If the cause is poor healing or widened receptor sites as a result of too much movement during healing, it is best to remove all the inserts, reline and adjust the denture, and start over. Patient cooperation is a must.

If all the healing seems acceptable, and retention and/or stability still is lacking, add inserts on the ridge between the cuspids. This increases the potential for discomfort, and a more guarded prognosis is expected.

**Excessively Acute Palatal Incline From the Ridge Crest**

Use of intramucosal inserts in cases that have an excessively acute palatal incline from the ridge crest results in great difficulty in removing and reseating the denture. Often there are inflamed receptor sites. Remove the offending palatal incline inserts and, where room permits between the inserts on the posterior ridge crest, add additional inserts, or if tissue thickness permits, add large-sized inserts. Use of the large inserts is discussed under Variations and Alterations later in this chapter.

**Excessively Thin Mucosa**

When inserts are used in a maxilla that has excessively thin mucosa, the chief complaint is discomfort on pressure. The tissue receptor site bur cuts the receptor site deeper than the depth of the insert. In cases of thin tissue, when drilling the receptor site, the tissue receptor site may encounter bone before its safety stop contacts the gingival epithelium. In such cases, press firmly to drill away sufficient bone to allow for insert clearance. Epithelium will migrate to line the entire receptor site upon healing. If a receptor site was not drilled deep enough in a case with thin mucosa, leave the inserts in position in the denture, redrill the affected receptor site to its proper depth, and follow the protocol through healing again.

**Habits That Tend to Dislodge the Denture**

Mainstream intramucosal insert treatment is not indicated for patients who have habits that tend to dislodge the denture, because too much movement occurs during healing. Treatment should only be attempted in such cases after experience with several mainstream cases. Although the prognosis is more guarded, these patients need insert treatment the most, and every effort should be made to help them.

**Gagging**

Historically, gagging was the prime reason for the development of intramucosal inserts. Often the added retention and stability is so great that the entire palate can be removed from the denture. A patient who tends to gag with a seated maxillary denture must be informed that the inserts are
used to enhance retention and stabilization, and the patient should be monitored with a conventional intramucosal insert denture. Palatal material is removed only if necessary. Clinical experience has shown that gagging almost always stops when the denture is stabilized, without the need for removal of the palate.

**Esthetics That Require Removal of the Labial Denture Flange**

Some patients have a very thin upper lip, and a denture flange makes it look swollen. With the flange removed, and the anterior teeth of the denture ridge lapped in the same way that fixed bridge pontics would be, the problem can be solved if intramucosal inserts are used to compensate for lost retention and stability (Figs. 20-28 and 20-29).

**Figure 20-28** Insert denture with labial flange removed

**Figure 20-29** Intraoral views of seated insert denture with labial flange removed. Note relationship with underlying tissue

**Closure of Tissue Receptor Sites**
Patients must be told before treatment that they should wear their denture at all times. The denture may not be removed at night. If a denture is removed for as little as 4 hours, its receptor sites can close to the extent that denture reseating may be impossible (Fig. 20-30). If this occurs, the receptor sites must be redrilled, and the healing protocol followed again.

Patients hospitalized for surgery should inform the hospital that they are wearing dentures with intramucosal inserts. Assure the anesthesiologist that the denture is retentive and stable enough to permit intubation. The denture should not be removed. If it is, and receptor site closure occurs, the gingival receptor site drilling process is performed again.

Should a denture crack or fracture, it should remain seated in the mouth until it can be repaired at a subsequent visit. If a new denture must be fabricated, the most successful option is to place inserts at locations that correspond as closely as possible to the existing gingival receptor sites, redrill the gingival receptor sites as required for accuracy of the axis of insertion, and follow the healing cycle protocol.

VARIATIONS AND ALTERNATIVES

Free-End Saddle Maxillary Partial Dentures

Unilateral and bilateral maxillary free-end saddle removable denture cases require carefully designed attachment mechanisms. Gravity tends to drop the distal saddles. To compensate, some practitioners tightly attach the denture to the remaining anterior teeth. This in turn severely torques the teeth, resulting in a more guarded prognosis for the clasped teeth. Treatment with intramucosal inserts is very beneficial in such cases and is considered mainstream. The inserts keep the saddles in position, greatly stabilizing them. This enables the denture attachment to the teeth to be less rigid, reducing torque and enhancing the prognosis of the teeth. This course of action is highly recommended (Fig. 20-31).
**Large Inserts**

The dimensions of the mushroom head of large inserts are 25% greater than those of standard inserts. The stem and base are of the same dimensions. Therefore, the acrylic receptor site bur and acrylic receptor site testing instrument are the same, while the sizes of the tissue receptor site bur, tissue receptor site testing instrument, and acrylic trim bur are coordinated to the insert configuration. Treatment using large inserts is considered mainstream. In general, large inserts are used on the crest of the ridge posteriorly in cases with thicker overlying tissues. Because of their added retentiveness and ability to stabilize the denture, they are usually not used on the lingual inclines. Drilling gingival receptor sites for large inserts on the lingual inclines may cause tenderness, and the patient may experience unusual difficulty in removing and reseating the denture. When used on the ridge crest only, four or five are placed on each side from the cuspid area to the height of the tuberosity. Occasionally, large inserts may be placed at the lingual incline when its angle to the ridge crest is sufficiently obtuse to allow removal and reseating of the denture with comfort (Fig. 20-32).

**Marking Intramucosal Insert Sites Before Fastening Inserts**

An interesting variation that works is the marking of gingival receptor sites intraorally, before fastening the inserts to the denture. To do this, first prepare all insert receptor sites in the denture base. Now there are two options. One is to insert the denture and send the patient home for up to a week to permit tissue to expand partway into the empty acrylic receptor sites. Clinically, one then observes slightly elevated round circles intraorally, in the exact spots where the inserts are planned. The second option is to immediately apply blue indelible marking pencil to the entire periphery of the acrylic receptor sites, section by section, and seat and reseat the denture to transfer the marking circle to the tissues. In either case, anesthetize and immediately penetrate the center of the marking with the latch-type No. 3 bur in a slow-speed contra angle. Affix the inserts to the denture, and proceed with the protocol.

**Healing Inserts**

Healing inserts have a mushroom head and neck, and instead of a base, two flat, thin extensions that lie on the tissue surface. Using these inserts changes the treatment protocol. The healing inserts are placed into the prepared tissue receptor sites, and the denture, which is not attached to them, is placed over them to keep them seated during healing. Following healing, they are removed, final inserts are placed into the receptor sites and attached to the denture in the corresponding locations, and the denture is seated. The difficulties associated with fixing the final inserts to the denture at the precisely required locations after removal of the healing inserts may outweigh the benefits. Although not contraindicated, this variation may not be practical.

**Metal Denture Bases**
Some practitioners prefer metal denture bases to acrylic. When using a denture with a metal base, the positions of planned inserts are marked on the denture master model on which the metal base wax-up will be performed. The metal base is then cast, leaving ample-sized circular holes that are filled with acrylic to accommodate the fastening of the inserts to the denture base. The protocol proceeds conventionally (Fig. 20-33).

**Inserts Placed Along the Posterior Palatal Border**

Because of its rich blood supply, the proximity of nerves, and movement along the vibrating line at the juncture of the soft and hard palate, the posterior palatal border is contraindicated for gingival receptor site preparation (Fig. 20-34).

**Figure 20-33** Intramucosal insert denture with metal base

**Figure 20-34** Excessive number of inserts and contraindicated posterior border locations
**Round or Ovoid Insert Heads**

Early insert configurations had round or ovoid heads. Although they did enhance retention and stability, the mushroom-shaped head proved to be more effective. The mushroom-shaped head is now the configuration of choice.

**Total Denture Palate Removal**

In many cases, the additional retention and stability afforded by inserts enables the removal of palatal acrylic to enhance tongue space and increase tactile and taste sensations, or to help prevent gagging (Figs. 20-35 and 20-36).

**REFERENCES**