

Immediate Mini Implant Placement Following Extractions



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INTRODUCTION

Small-diameter implants (SDIs) have become an efficient tool for denture and removable partial denture stabilization, as well as some specific fixed restorative situations. One downside of SDI utilization has been the prolonged healing time necessary prior to SDI placement following tooth extraction. The following article details a method for immediate SDI placement in the interproximal bone following the extraction of mandibular anterior teeth.

BACKGROUND

A patient with an otherwise unremarkable medical history presented to the author's office in poor oral health, with extensive decay and partial edentulism throughout the upper and lower arches. The time and cost of the restorative process were a concern for this patient. The author presented 3 treatment options involving a variety of endodontic, restorative, implant, and/or prosthetic protocols. Given the opportunity to choose, the patient selected an option that called for extraction of her remaining teeth, a removable maxillary denture, and an SDI-supported removable mandibular denture. An increasingly common tool in clinical practice, SDIs offer a lower-cost, simpler alternative compared to standard-width implants.¹

One downside of SDI utilization has been the prolonged healing time necessary prior to SDI placement following tooth extraction.

The literature supports these aforementioned uses in clinical practice. In their review of 41 studies, Sohrabi et al² concluded that SDIs have success rates similar to their traditional-width counterparts and can serve as a viable option to retain fixed prosthetics or mandibular overdentures in certain patient populations. A biometric analysis by Bulard and Vance³ of 1,029 SDIs up to 8 years *in vivo* demonstrated their effectiveness in long-term prosthetic stabilization, and a study by Shatkin et al⁴ noted a 94.2% overall success rate of SDIs used in support of prosthetics, with improved placement techniques affecting outcome.

CASE REPORT

Diagnosis and Treatment Planning

A 38-year-old female in otherwise good health presented with partial edentulism and severe decay of most of her remaining teeth (Figures 1a to 2b). After a full clinical and radiographic examination, the author developed 3 potential treatment options to discuss with the patient at the consultation appointment. They

were as follows: (1) full-mouth reconstruction with selective tooth extraction, endodontic therapy, root form implants, periodontal surgery, full crowns, and porcelain veneers; (2) full-mouth extraction with fixed maxillary and mandibular restorations (All-on-Four);¹⁻⁵ and (3) removable denture stabilization with root form or SDIs.

The patient chose a treatment plan that included full-mouth extraction with removable dentures and SDI stabilization of the mandibular denture. A maxillary immediate denture would be placed at the time of tooth extraction. SDIs would be immediately placed in the interproximal bone of the mandibular anterior region at the time of tooth extraction. The mandibular extraction sites would be bone grafted and covered with a resorbable membrane. A mandibular denture would be constructed 3 months post-extraction.

Clinical Protocol

Impressions of the maxillary and mandibular arches, along with a face-bow record, were taken at the examination appointment for pre-extraction fabrication of a maxillary removable denture.

At the first treatment appointment, the patient was sedated, and her remaining maxillary and mandibular teeth were extracted. Care was taken to remove the teeth vertically, preserving the buccal bony plates. The maxillary teeth were extracted first so that the immediate maxillary denture could be fitted to the occlusion of the mandibular teeth, preserving both general preoperative occlusal planes and vertical dimension (Figures 3 and 4). The maxillary immediate denture was relined with soft liner (3M ESPE). Fixodent powder (Procter & Gamble) would be used to further secure the maxillary immediate denture during the 3-month healing phase.

Following extraction of the mandibular teeth, an incision was made and reflected to expose the wedge-shaped interproximal bone. The bone was then recontoured using



Figures 1a to 2b. The patient presented with severe decay, worn restorations, and partial edentulism.

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a sterile, coarse, football-shaped diamond bur (No. 5379 023 [Brasseler USA]) to create flat platforms for SDI placement (Figure 5). Only minor bone recontouring was necessary. Note that it is important to insert the SDIs into a flat surface, and recontouring the interproximal bone to create these platforms maximizes long-term stability and periodontal health. Small-diameter implants require 10.0 mm of vertical bone height, but can be placed in bone widths as narrow as 3.0 to 4.0 mm facial-lingually, with approximately 1.0 mm of bone surrounding the implant.¹

Four 1.8 x 13 mm SDIs (MDI Mini Dental Implants [3M ESPE]) were placed in the flat platforms created in the interproximal bone. The cortical plate was first pierced with a pilot drill, then the implants were screwed through the cortical plate and into the trabecular bone with a finger driver, followed by a winged wrench (the ratchet wrench may also be used if the patient cannot open the mouth sufficiently to allow enough vertical space for the winged wrench) (Figures 6 to 9). The extraction sockets were grafted with sterile xenograft bone (Bio-Oss 1.0 to 2.0 mm cancellous granules [Geistlich Biomaterials]) and covered with a resorbable membrane (BioCollect [IMTEC, a 3M Company]) (Figures 10 and 11).

The important point with this procedure is that the fully inserted implants may not be turned with full finger pressure on the finger driver; if the finger driver can be used to completely insert the implant, the SDI likely will not osseointegrate fully and will fail. It is also important that the implants make a “ting” sound rather than a “thud” when tapped with a dental mirror handle.

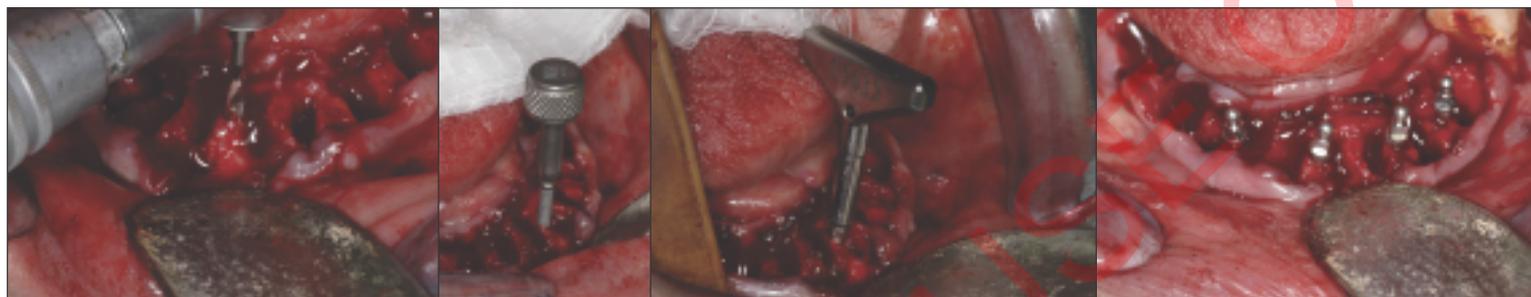
As previously mentioned, there should be at least 1.0 mm of bone on the facial and lingual aspect of the implants. If there is less than 1.0 mm bone on the facial, additional bone grafting on the facial surface should be considered. There will often not be 1.0 mm of bone on the coronal one quarter to one third of the mesial and distal aspect of the implants. The interproximal bone almost always becomes wider mesialdistally as the implant is advanced apically, so at



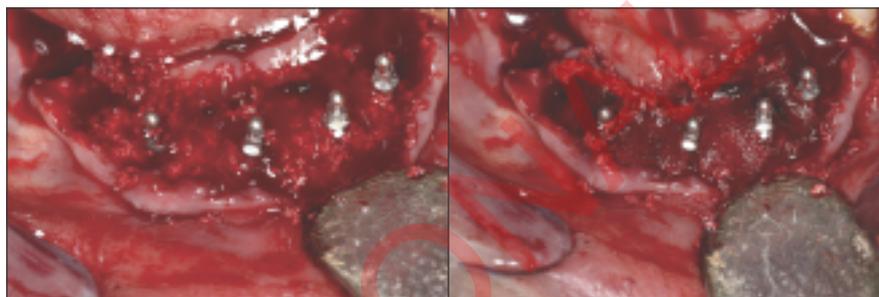
Figures 3 and 4. The maxillary teeth were extracted, and a maxillary denture was fabricated and fitted to the occlusion of the lower arch.



Figure 5. A coarse, football-shaped diamond was used to flatten the mandibular interproximal bone.



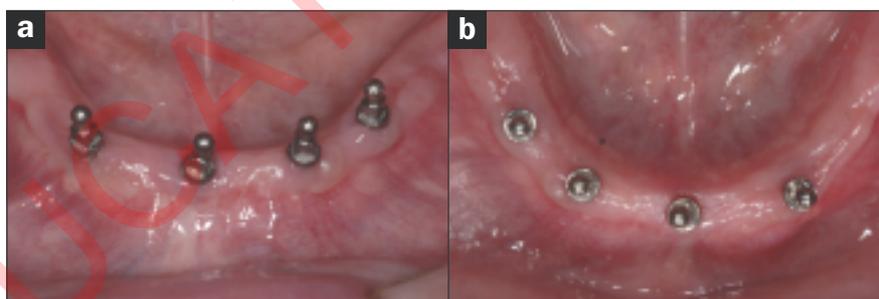
Figures 6 to 9. The cortical plate was pierced with a pilot drill (Figures 6 and 7), and the implants were screwed in with a finger driver (Figure 8), followed by a winged wrench (Figure 9).



Figures 10 and 11. Bio-Oss sterile xenograft bone granules (Geistlich Biomaterials) were used to graft the extraction sockets (Figure 10). The graft was covered with a BioCollect (IMTEC, a 3M Company) resorbable membrane (Figure 11).



Figure 12. The periodontal flap was sutured with 3-0 chromic gut.



Figures 13a and 13b. The mandibular ridge was allowed to heal for 3 months post-extraction, implant placement, and grafting.



Figure 14. The housings, o-rings, and green block-out shims were placed on the implants, then pulled into a custom tray polyether impression.

If there is less than 1.0 mm bone on the facial, additional bone grafting on the facial surface should be considered.

least the apical three quarters of the implants should be completely surrounded by at least 1.0 mm bone. The mesial and distal bone will fill in as the extraction sockets heal.

The periodontal flap was sutured passively with 3-0 chromic gut (Ethicon) (5-0 polypropylene suture [PROLENE [Ethicon 360] can also be used) (Figure 12). The author currently

prefers the chromic gut suture because it dissolves after 2 weeks in vivo. PROLENE, however, does not dissolve, and the healing tissue often grows over the suture, making it difficult to remove after one to 2 weeks of healing. If the patient has an active lower lip, a portion of these cases will require resuturing part of the flap one to 2 weeks postoperatively due to

lower lip movement. This postoperative tissue separation will not affect the outcome of the case, but the patient should be advised preoperatively of the potential necessity of this resuturing procedure.

The mandibular ridge was allowed to heal for 3 months following implant placement and bone grafting with a

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resorbable membrane (Figures 13a and 13b). Denture construction then began with a custom tray impression. The housings and o-rings, with green block-out shims, were placed on the implants and pulled in the custom tray poly-ether impression (Figure 14). The housings are used by the dental laboratory team from the beginning of denture fabrication, to ensure appropriate space in the denture for the housings. A wax rim and baseplate try-in followed (Figure 15), then the teeth-in-wax appointment and denture delivery.

The housings and o-rings may be processed in the denture by the labora-



Figure 15. A wax rim and baseplate try-in followed.

tory or pulled with a hard in-office re-line acrylic (Hard Liner SECURE Hard Pick-Up Kit No. 8720 [3M ESPE]). The author prefers to pull the housings in-office at the delivery appointment. This ensures that the denture is supported



Figure 16. The denture was placed over the housings and mandibular ridge and held in place with operator finger pressure.

vertically by the bony ridge and soft tissue, not the implants. If the denture pivots on an implant when the patient bites down, there is a high probability the denture will fracture along a line over that implant. It is not possible to confirm that all housings are ideally seated on the implants, or that the denture is fully supported vertically by the bony ridge and soft tissue, if the housings are processed by the dental laboratory team prior to denture seating. Implants are intended to support dentures and



Figure 17. Polished denture base with housings set in place.

accommodate the housings when the denture is seated firmly with operator finger pressure. The housings must not touch the denture during the pick-up process or they will distort.

3. Place adhesive in the housing holes in the denture.

4. Place Vaseline on the denture around the housing holes to prevent the pick-up material from adhering to any areas of the denture except the holes.

5. Administer flowable hard pick-up material (3M Hard Liner SECURE Hard Pick-Up Kit No. 8720) into the housing holes in the denture. It is not necessary to administer pick-up material onto the housings in the mouth.

6. Place the denture over the housings and mandibular ridge and

Once in-office procedures are complete and the patient is satisfied with the result, home care should be reviewed carefully.

removable partial dentures horizontally and to resist coronal uplifting; they are not intended to serve as vertical denture support.

To pull the housings in-office at the denture delivery appointment, the following procedure is employed:

1. Place the housings with o-rings on the implants. Place green block-out shims on the necks of the implants between the housings and the soft tissue (Figure 14).

2. Try the denture in over the housings. Be certain there is more than enough space (housing "holes") created on the tissue side of the denture to

hold in place with operator finger pressure (Figure 16). Firm pressure should be applied, similar to the pressure applied when the patient is biting. Firm patient biting pressure is the force that will fracture the denture if the denture pivots on an implant and is not supported vertically by the bony ridge and soft tissue. It is important that the operator hold the denture in place with one's fingers and thumbs as opposed to the patient biting the denture to place with the opposing teeth. If the occlusion is not ideal, the denture might torque if biting pressure is utilized to seat the denture on the housings. This torquing would cause the denture to not be seated firmly on the tissue/bony ridge throughout the arch, creating denture instability.

7. Once the hard pick-up material has set completely, remove the denture and remove the excess pick-up material with an appropriately sized acrylic bur (Brasseler USA), then polish (Figure 17). A long shank No. 8



Figure 18. Lower implant-retained denture in the mouth.

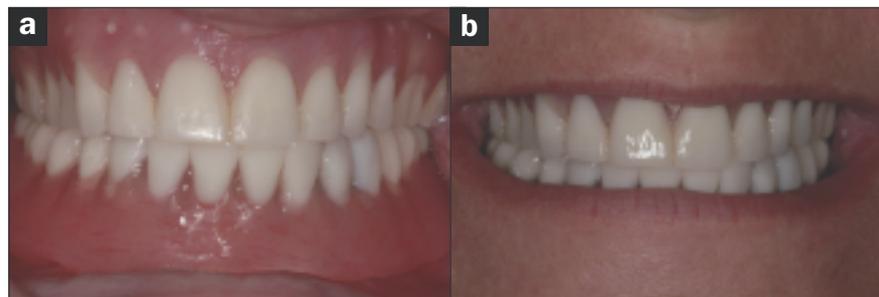
round bur is effective in removing any excess material covering the silver platforms of the housings. Also round any sharp line angles in the pick up acrylic, but be sure not to remove the hardened pick-up material interproximal to the implants. If there are any voids in the acrylic, additional hard pick-up material or gingival colored flowable composite (LuxaFlow [DMG America]) may be used to fill those areas.

8. Check the occlusion carefully with occlusal indicator paper (Bausch Arti-Check Articulating Paper). For maximum denture stability, it is important the teeth occlude simultaneously on both the right and left sides on the bicuspid, cuspids, and mesial of the first molars with the condyles in centric relation position. Check the occlusion with the patient in the “alert feeding position” (AFP), ie, sitting straight up in the operatory chair, to ensure the anterior teeth do not contact prior to the posterior teeth when the patient bites down. Light pressure should be applied to the chin with the dentist’s hand in a distal direction to check the AFP. This light pressure on the chin allows the upright patient to move the mandible forward slightly when closing, also referred to as *freedom in centric*, but prevents movement into a full protrusive position.

Final photos of the patient can be seen in Figures 18 to 19b. She was pleased with the comfort, fit, function, and appearance of her maxillary denture and implant-retained mandibular denture. She can now speak and eat with confidence, without pain, and her self-confidence has improved with her new, healthy smile.

DISCUSSION

Normally, a custom maxillary denture would be fabricated along with the mandibular, SDI-supported denture. In this case, the patient was content with the esthetics and fit of the immediate denture, so a second denture was not fabricated. Once in-office procedures are complete and the patient is satisfied with the result, home care



Figures 19a and 19b. The final dentures are pictured in occlusion and smile poses.

should be reviewed carefully. Ideally, the patient should not wear the dentures while sleeping, in order to allow the tissue to rest. The dentures may be soaked in a denture cleaner overnight and brushed with a denture brush and soap several times a week. Occasionally, a vacuum-formed nightguard needs to be fabricated to cover the implants if the patient is a bruxer.

CLOSING COMMENTS

The patient treated in the above case report presented for treatment, having endured years of dental decay, teeth pain, missing teeth, and an unattractive smile. The author offered her a number of options for treatment, keeping in mind the patient’s financial, time, and quality of life concerns. The solution she chose (a maxillary denture and SDI-retained mandibular denture) provided her with the attractive, healthy, functional, and comfortable dentition that she had always desired. ♦

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