

USING SOUND DENTAL PRINCIPLES TO SALVAGE THE COMPROMISED IMPLANT CASE

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When implant-supported prostheses fail, the initial focus is on eliminating the source of the failure and salvaging the prosthesis. What often remains are implants with compromised osseous support and unfavorable bone-to-implant ratio and an inadequate peri-implant seal with concomitant chronic peri-implantitis. In an attempt to salvage failing implants, grafting techniques with autogenous and synthetic bone, with and without guided tissue regeneration membranes, are frequently used. To date, these techniques have had mixed results with no reported long-term success rates.

Case History

A healthy 65-year-old woman presented with a failing maxillary implant-supported overdenture and two failing lower implant-supported bridges replacing the four anterior incisors. Both were placed 5 years previously. She had a full complement of remaining mandibular teeth to the second molar bilaterally and a moderately sized maxillary tori. This case demonstrates several problems that created the implant failure that could have been remedied during initial treatment planning. Seven osseous implants were placed within an atrophied anterior maxilla with a knife-edge ridge, pronounced anterior ridge projection, and lack of attached buccal tissue with low muscle attachments (Fig. 1). The lower implants also lacked an adequate peri-implant seal because of atrophy of the alveolus and a high mentalis attachment. These implants were without attached tissue, which further compounded the problem. The diagnostic panoramic radiographs also demonstrated an unfavorable implant-to-bone ratio of the maxillary implants, creating nonphysiologic stress at the implant-bone inter-

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Figure 1. Severe implant-bone discrepancy on the upper, and the lost peri-implant seal on the lower implant supported bridge.

Figure 3. Pre-op implants with the primary spark erosion bar which contributed to the failing case by transferring excessive lateral forces.

Figure 5. Initial cut on the implant body using a carbide bur and copious irrigation.

Figure 6. Preparation of the implant body with a diamond bur and copious irrigation to provide a finish line for the custom ERA abutments.

Figure 7. ERA custom paralleled abutments bonded to place. Occlusal view.

Figure 8. Denture with male ERA picked up in the denture with acrylic.



Figure 1.

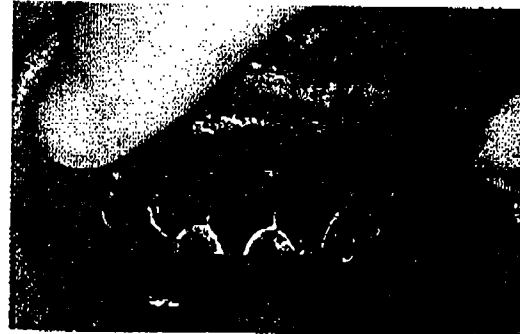


Figure 3.



Figure 5 and 6.



Figure 7.

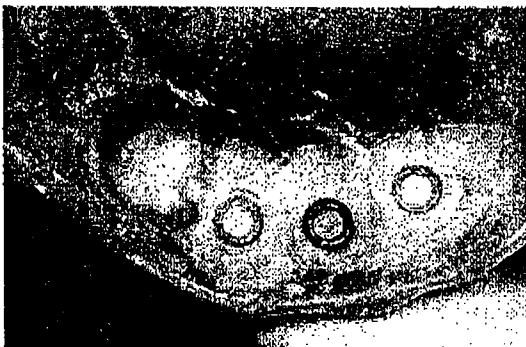


Figure 8.

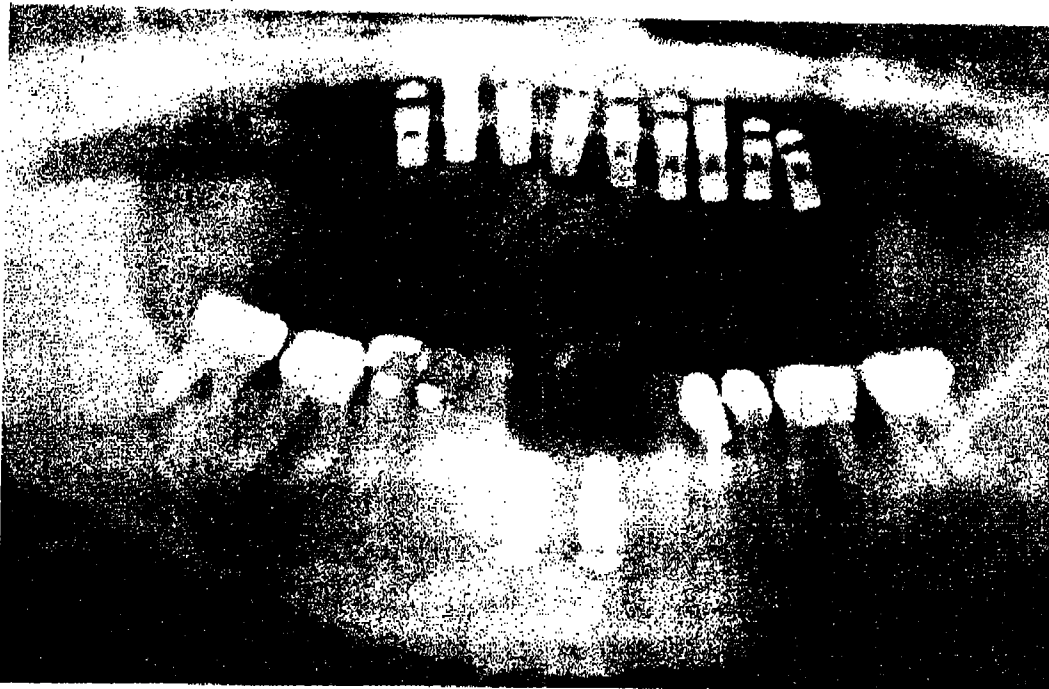


Figure 2. Severe bone loss around the upper implants.

face during loading that could not be directed along the long axis of the implant body (Fig. 2). The upper implants were connected with a spark-erosion primary bar that supported a secondary bar that contained the denture (Fig. 3). The maxillary implants had 6 to 8 mm of exposed implant body superior to the hyperplastic gingival crest (see Fig. 1). The patient related that almost immediately after the implants were uncovered, bone loss occurred, even before the denture being placed. Oral examination also revealed periodontal problems in the lower posterior areas. The patient had a significant palatal tori, which prevented palatal coverage and the added stability it would have provided. The patient was also diagnosed with nocturnal bruxing.

TREATMENT PLAN

Treatment plan options were formulated after interviewing the patient. Her wish was to save as many of her implants as possible. She was aware that a conventional denture would not be acceptable because of her severely atrophied maxillary ridge, and she did not wish to undergo additional surgery in preparation for new implant placement. Therefore, the treatment plan was devised to eliminate as many factors as possible that contributed to the failing prosthesis. Consultation between the restorative dentist, periodontist, and oral surgeon concerning the amount and type of bone present, lack of attached tissue, muscle attachment at the bone-implant interface, and unfavorable implant-to-bone ratio and angulation resulted in a number of surgical and restorative options. The goal was to retain as many implants as possible to support a maxillary overdenture and produce an environment for implant health and maintenance.

The mobile implants were extracted and the sockets curetted via a crestal incision. A suprapariosteal dissection was performed of the anterior maxilla,

and the loose buccal alveolar soft tissue and muscle attachments were reflected superiorly in preparation for keratinized tissue grafting. Keratinized tissue was harvested from a split-thickness dissection of the hyperplastic palatal tissue adjacent to and palatal to the failing implants. This served a dual purpose of decreasing the pocket depth of the remaining implants and harvesting sufficient keratinized tissue for grafting, approximately 6×20 mm. The concomitant removal of the palatal tori was not impaired by this combined procedure and also allowed autogenous bone for grafting of the remaining implants.

A supraperiosteal dissection was also performed buccal to the anterior mandibular implants. The dissection was carried inferiorly over the mandibular symphysis to reposition the mentalis muscle inferiorly. A keratinized graft, previously harvested from the anterior maxilla, was then positioned and secured with isobutyl cyanoacrylate. The patient was prescribed clindamycin (Cleocin) 150 mg four times per day for 5 days, chlorhexidine rinses twice daily, and fentanyl (Duragesic patch) for analgesia.

A healing prosthesis was placed to act as a stent for the midpalatal surgery and keratinized grafts on the anterior premaxilla as well as creating more support for the remaining implants (Fig. 4). After the initial healing period, approximately 6 weeks, the implant bodies were reduced approximately 6 mm using a carbide bur with copious irrigation (Fig. 5). A diamond bur was used to prepare a finish line for the custom ERA copings (Fig. 6), which were paralleled and provided retention for the new denture. The ERA attachments were bonded directly to the reduced implant body using Meta-Bond (Parkell Bio-materials Division, Farmingdale, NY) (Fig. 7). The male ERA attachments were picked in the new overdenture using acrylic, and the occlusion was finalized (Fig. 8).

DISCUSSION

Most, if not all, probable implant-prosthetic failures can be detected and addressed during patient selection and the treatment planning stage. Inadequate osseous support or lack of attached keratinized tissue no longer limits the predictability or longevity of the restored implant fixture. Full-thickness and split-thickness and dermal grafts, membrane therapy with and without synthetic or autogenous bone grafts, veneer grafts using osteosynthesis (grafting with compression screws), and distraction osteogenesis are all adjuncts that must be considered when osseous implants are to be used. An osseous implant can be only as healthy as the tissue and bone in which it is surgically placed to integrate. Therefore, before placement of any dental implant, a thorough knowledge of the tissue and osseous physiology and anatomy is imperative. If inadequate bone is present at the implant site, osseous augmentation and adequate healing are necessary and must be integrated into the overall treatment plan. Depending on the type of grafting technique used, osseous healing into mature implant-supporting bone may take from 3 months (with veneer grafting, using osteosynthesis or distraction osteogenesis techniques) to 6 months (with membrane therapy and synthetic graft materials).

At the initial evaluation, the location of muscle attachments and the amount and type of soft tissue also require careful evaluation. The mandibular symphysis, when atrophied, and the posterior mandible appear to be the most problematic and require critical implant placement and presurgical soft tissue grafting to lessen the muscle influences on the peri-implant tissues. The anterior maxilla can also be problematic when severe alveolar atrophy is present, as demonstrated in this case. If combined osseous and keratinized or dermal grafts are

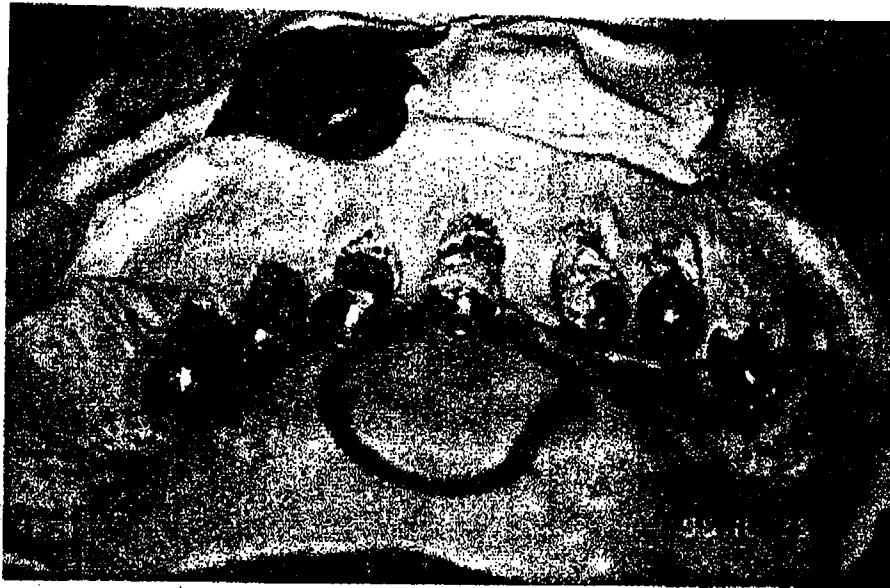


Figure 4. Tori removal on the model prior to processing the denture. The removal on the model approximates that performed on the patient during surgery.

required, the soft tissue grafts can be accomplished within 3 months of osseous grafting, if veneer osteosynthesis or distraction osteogenesis is used. Additional soft augmentation, via dermal grafts, can be accomplished 6 weeks after primary soft grafting.

Properly planned treatment in this case would have required an orthotic appliance during and after the implants were placed to relieve the stresses



Figure 9. Completed paralleled ERA abutments illustrating an improved implant-crown ratio.

created by bruxism. The palatal tori should have been removed to allow full palatal coverage during the 6-month integration period and additional palatal support should the bruxism continue. In addition, osseous veneer grafts followed 3 months later by keratinized tissue grafts would have allowed the implants to exit nonmovable, keratinized attached tissue preventing peri-implantitis with subsequent bone loss.

Although this case demonstrates a compromise (anteriorly inclined implants, significant bone loss because of chronic infection, lack of an adequate peri-implant soft tissue seal, and poor implant-to-bone ratio), the proposed treatment to salvage the remaining implants was based on sound dental and surgical principles. By placing the keratinized tissue and apically positioning the muscle attachments, the authors were able to obtain an excellent peri-implant seal. Removal of the maxillary tori allowed a well-supported prosthesis during the healing period as well as allowing the palate to be used for future support if required. Also, previously when bone loss was detected around an implant, either it was treated with antibiotics, the area was curetted, the implant body treated with citric acid or chlorhexidine, and a synthetic or autogenous bone graft placed, or the implant was removed. A viable option to the aforementioned, depending on the size and type of osseous defect present, would be to perform periodontal surgery and pocket reduction and reduce the height of the implant body. The implant body may be reduced with a carbide bur or disc with copious irrigation. The amount to be reduced is determined by the internal and external architecture of the implant (usually not a factor) and the implant height above the gingival crest. By shortening the height of the implant, one can significantly decrease the stresses and mechanical forces placed on the implant-bone interface during function and retention of the restoration or prosthesis. This case demonstrates a 40% decrease in the implant body height with subsequent placement of bonded ERA attachments (Fig. 9).

The trend in implant-supported overdentures is evolving from bar-supported prostheses to placing attachments onto individual implants. This method eliminates the need for the elusive *passive fit* required when laboratory fabricated bars are used to attach multiple implants together. The difficulty in obtaining a passive fit for bar-retained overdentures increases with the number of implants and distance between the two most distal implants (short implants usually require multiple fixtures to be placed).

The procedure discussed here was accomplished in the office using intravenous sedation augmented with local anesthetic. The total surgical time was less than 2 hours, and the results have been stable, have been free of infection, and have provided both patient and dentist satisfaction. This case could not have been performed without the combined efforts of an oral surgeon, a periodontist, and a restorative dentist with a combined understanding of the basic surgical, biologic, and biomechanical principles necessary when using dental implants, as limited by the local anatomy of the supporting bone and soft tissue.

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