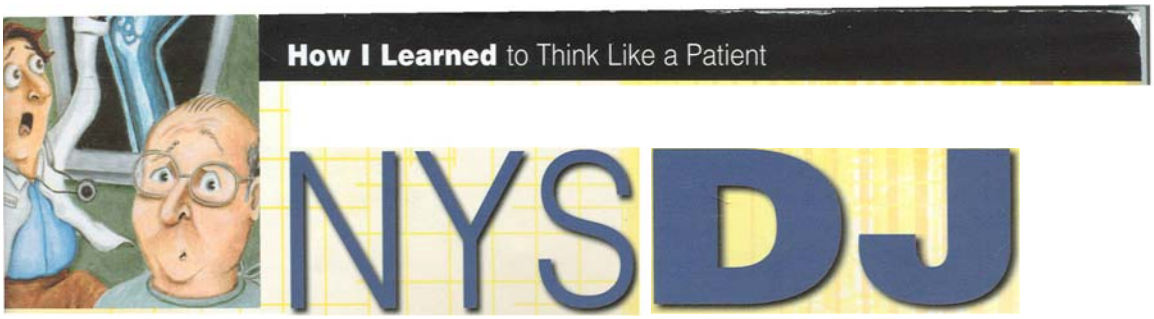

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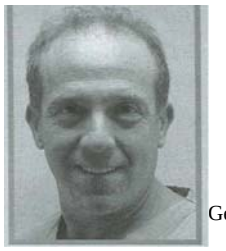
Jeffrey M. Rabinowitz, D.M.D., is a graduate of the University of Pennsylvania School of Dental Medicine. He completed his general practice residency at Mount Sinai Medical Center and his implantology training at New York University College of Dentistry. He is partner with Dr. Gerald Herman at Park 56 Dental Group in New York City.


Jeffrey M. Rabinowitz, D.M.D

Gerald L. Herman, D.M.D., is a graduate of the University of Pennsylvania School of Dental Medicine. He received his postgraduate education and certificate in the specialty of prosthodontics from New York University College of Dentistry. He is partner with Dr. Jeffrey Rabinowitz at Park 56 Dental Group in New York City.


Gerald L. Herman, D.M.D

An Implant-Supported Rehabilitation Case

Using Innovative Provisional Restoration Design and Conversion as Diagnostic and Treatment Modalities

Gerald L. Herman, D.M.D.; Jeffrey M. Rabinowitz, D.M.D.

Abstract

This article reviews and details a maxillary anterior implant-supported rehabilitation case that required an interdisciplinary approach. An innovative technique is presented, in which a transitional acrylic and wrought wire removable partial denture was converted at chairside to a provisional fixed bridge on the day of Stage II implant surgery. This technique underscores and illustrates the importance of diagnosis, planning, and sequential, coordinated treatment in dental rehabilitation.

THE LOSS OF TEETH in the "esthetic zone" of the mouth as the result of periodontal disease and the concomitant loss of surrounding hard and soft tissues creates a unique challenge for the surgeon and restorative dentist. This challenge is underscored when the teeth adjacent to the newly created edentulous area are unrestored and structurally sound, thus dictating judicious treatment planning and decision making, especially with regard to the preparation of these teeth as fixed bridge abutments.

Contemporary dentistry's favorable success rate with dental implants, combined with current innovative surgical ridge maintenance and augmentation techniques, have created a paradigm shift in the treatment planning of these cases. Restorative dentists no longer have to routinely consider preparing healthy teeth as fixed bridge abutments; nor do they have to rely upon "Maryland" type resin-bonded bridgework or removable bridgework to restore these edentulous areas.

This paper will review the restoration of an edentulous and atrophic region in the anterior maxilla (Figure 1) and demonstrate an interesting conversion of a transitional removable partial denture to an implant-supported provisional fixed bridge.

Case Report

The patient, a medically healthy 44-year-old female, presented for routine dental examination with the chief complaint, "my bridge feels loose." Her past dental history included operative dentistry, crown and bridge treatment, and a single tooth replacement via an endosseous implant-supported crown in the #19 site. Among an otherwise generally stable dental presentation was the problematic region of teeth #05 through #07, which had been restored via a porcelain-fused-to-metal fixed bridge (Figure 2) and which had a complex and interesting history.

The bridge had been placed approximately 20 years earlier to replace the maxillary right cuspid, which had originally been palatally impacted and, following a protracted and unsuccessful course of surgical and orthodontic corrective treatment, was removed. The deciduous cuspid had remained in the succedaneous cuspid site until the patient's early 20s, at which time her modeling

Figure 1. Restoration of edentulous and atrophic region in "esthetic zone" of anterior maxilla presents unique challenge to surgeon and restorative dentist.

Figure 2. Initial presentation of porcelain-fused-to-metal fixed bridge restoring teeth #05 through 07.

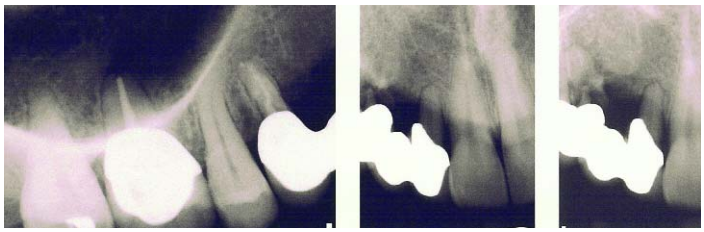


Figure 3. Radiographic imaging of area reveals advanced periodontal and carious involvement of abutment teeth.

Figure 4. Abutment teeth were extracted using atraumatic flapless technique.

Figure 5a. Immediately postoperative.

Figure 5b. One week postoperative.

and acting career aspirations prompted her to seek improvement of her appearance and her smile.

The deciduous tooth was removed at that time because of advanced root resorption and poor esthetics.

Upon initial presentation, the splint exhibited significant mobility. Radiographic examination revealed advanced loss of periodontal support associated with abutment teeth #05 and #07 and severe, non-restorable carious involvement of tooth #07 (Figure 3). The preliminary treatment plan included removal of the bridge, extraction of teeth #05 and #07, restoration of the edentulous span via a transitional partial denture, and initiation of Phase I periodontal therapy (scaling and root planing) of the remaining dentition and periodontium. The intention was to remove the hopelessly involved teeth and control the infective process prior to initiating any definitive restorative dentistry.

Choosing Implant Therapy

It was apparent that endosseous implant-based fixed prosthetic therapy, if clinically feasible, would be the most conservative, optimal means of restoring the edentulous area while avoiding preparation of multiple adjacent unrestored teeth as abutments for a fixed bridge. In the absence of implant placement and utilization, the length of the edentulous span, its position in the maxillary arch, and the patient's periodontal and occlusal status would mandate use of a majority of the remaining maxillary teeth (that is, teeth #s 02, 03, 04, 08, 09, 10, 11) as fixed bridge abutments. The patient concurred with the obvious benefits of implant therapy in this case. Additionally, she did not wish to maintain a removable prosthesis for an indefinite period of time.

Site development and alveolar ridge maintenance were indicated in this case whether the treatment plan involved implant-based or natural tooth-based fixed crown and bridge restoration of the edentulous area. As such, an important objective in extraction of the maxillary right first bicuspid and lateral incisor was maintenance of as much associated alveolar bone and soft tissue as possible.

An atraumatic, flapless technique, using periotome luxation and delivery of the teeth was undertaken under local anesthesia (Figure 4). Following tooth removal, judicious probing revealed a very thin buccal plate of bone without fenestration or dehiscence. The intact mesial, distal and palatal socket walls were conservatively decorticated, and the extraction sites were grafted with mineralized cancellous bone particles *(Puros Allograft, Tutogen Medical Inc.)*. The grafts were covered with gelatin plugs *(Gelfoam, Pharmacia & Upjohn Co.)*, and the sites were sutured circumferentially with polytetrafluoroethylene sutures *(GoreTex, W. L. Gore & Associates, Inc.)* for containment and hemostasis (Figure 5). It was determined, based upon evaluation of the patient's lip line and the degree of available bone present, that there was no need for advanced vertical or horizontal ridge augmentation.

The transitional removable prosthesis, which was prepared for immediate insertion, was adjusted to minimize contact between the denture base and the grafted ridge and to assure its stability. Light centric occlusal contacts were created and excursive occlusal contacts

were eliminated. The prosthesis was further checked and adjusted for patient comfort, phonetics, function and esthetics (Figure 6).

The postoperative course was uneventful, and the site was allowed to heal for three months prior to clinical and radiographic re-evaluation. It should be noted here that despite her dismay at having to be restored with a removable prosthesis, the patient was extremely pleased with the appearance of the artificial teeth in the denture. Care was taken to reproduce or improve upon the size, shape, shade and positioning of the teeth in the fixed bridge, especially the slight rotation of tooth #07 and its overlap of the distal lobe of tooth #08.

Implant Placement

At three months postextraction and grafting, CT scan imaging, using a radiographic stent, revealed satisfactory maintenance of vertical and horizontal bone dimensions in the edentulous grafted region. The extraction sites were deemed viable recipient sites for carefully planned and placed endosseous implants. Prior to the CT scan, the tissue surface of the interim prosthesis had been channeled and obturated with gutta-percha plugs in the edentulous area. In this manner, the transitional partial denture served as a radiographic stent as well as a prosthetic planning implement and a surgical guide (Figure 7).

Stage I surgery was performed under local anesthesia using a crestal incision and two small vertical-releasing incisions. Two 10.0 mm long by 4.0 mm wide implants *(3i Osseotite, Implant Innovations, Inc.)* were surgically placed. Cover screws were installed, and primary closure was achieved using 5-0 chromic sutures. The implants were submerged, thus allowing for the continued, comfortable use of the interim removable prosthesis.

Three months later, Stage II surgery was performed using a crestal incision to ensure the maintenance of an adequate zone of keratinized tissue on the buccal aspect of the implants. Healing abutments, 3.0 mm in height *(3i, Implant Innovations, Inc.)*, were placed; and the site was allowed to heal for three weeks prior to the next phase of restorative treatment.

Following Stage II surgery, the definitive prosthetic treatment was initiated. The healing abutments were removed, and titanium stock abutments *(Gingi-Hue, 3i, Implant Innovations, Inc.)* were installed. The abutments were checked for angulation and relative parallelism and were approved for utilization in this case. Minor preparation and modifications of the abutment heads were performed to attain adequate intermaxillary clearance and proper arch form (Figure 8).

At this point, a decision was made to convert the interim partial denture into a provisional fixed bridge because of its availability and its superior esthetics. First, the entire wrought wire clasp assembly with its embedded extending wire was carefully removed from the denture. The denture was then hollowed out in the edentulous area. Care was given to maintain some acrylic mesial and distal to the prepared area, which served as a "bridge" between the denture teeth and the palatal acrylic. The prosthesis was tried in the mouth to confirm that it fit passively over the abutments and with adequate clearance (Figure 9).

Figure 6. Immediate placement of transitional removable partial denture. Note patient's low lip line.

Figure 7. Tissue surface of interim partial denture was channeled and obturated with gutta-percha, which served as radiographic CT scan markers for implant planning and placement.

Figure 8. Intraoral views of implant abutments on day of placement.

Figure 9. Interim partial denture will be converted into provisional fixed bridge.

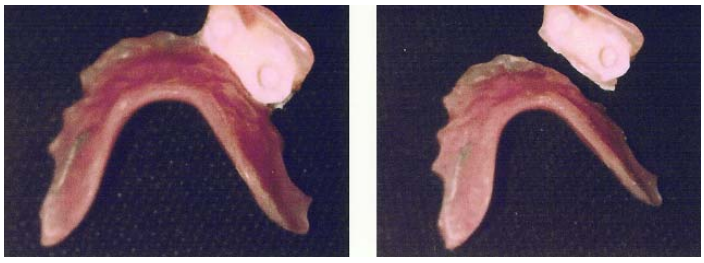


Figure 10. Palatal denture base is severed from relined portion.

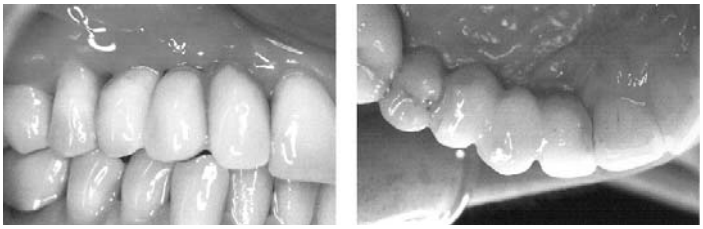


Figure 11. Conversion of removable to fixed provisional restoration is completed.

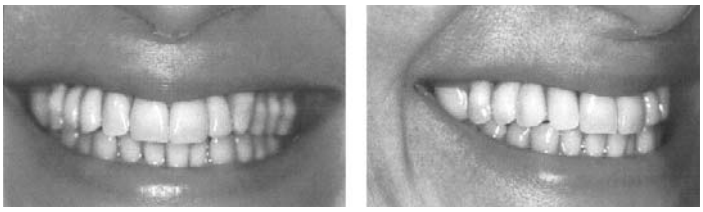


Figure 12. Prosthodontic emergence and display are enhanced by favorable lip line.

Figure 13. Definitive porcelain-fused-to-metal restoration in place.

After obturating the screw access holes in the implant abutments to avoid entrapment of material, the prepared area was relined intraorally with self-curing acrylic resin. While the acrylic was curing, the prosthesis was repeatedly removed and re-seated in the mouth to ensure and to facilitate a path of draw. When the acrylic was completely cured, the palatal denture base was severed from the relined portion (Figure 10). The relined portion was then treated as any provisional acrylic fixed bridge would be following a reline. It was adjusted, modified, trimmed, polished and seated with a temporary cement (Figures 11, 12).

The benefits of converting the interim partial denture to a provisional fixed prosthesis in this case were twofold. First, the patient was already quite satisfied with the maxillary anterior esthetics and was pleased to learn that her appearance would not undergo any alteration. Second, some pink acrylic from the partial denture remained on the provisional bridge in the gingival and gingival embrasure areas even after trimming. This was beneficial from an esthetic standpoint; and it served as a guide as to where pink porcelain might be required in the definitive fixed prosthesis.

Final impressions were taken, and a porcelain-fused-to-metal fixed bridge was fabricated. Study models and photographs of the provisionals, as well as preoperative models and photos, had been made available to the dental laboratory and ceramist to aid in re-creating the patient's original appearance (Figure 13).

Conclusion

Successful results in implant dentistry are best obtained when a coordinated and integrated team approach to the care of the patient is taken. Careful diagnostic and pre-treatment planning is essential to a positive outcome.

A technique was described in this paper by which an interim removable prosthesis was converted at chairside to a provisional fixed restoration on the day of the placement of implant abutments. ■

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REFERENCES

1. Kloehn JS, Pfeifer JS. The effect of orthodontic treatment on the periodontium. Angle Orthod 1974;44(2):127-34.
2. Zachrisson BU. Cause and prevention of injuries to teeth and supporting structures during orthodontic treatment. Am J Orthod 1976;69:285-300.
3. Zachrisson S, Zachrisson BU. Gingival condition associated with orthodontic treatment. Angle Orthod 1972;30:127-136.
4. Sadosky C, BeGole EA. Long-term effects of orthodontic treatment on periodontal health. Am J Orthod 1981;80:156-172.
5. Alstad S. Zachrisson BU. Longitudinal study of the periodontal conditions associated with orthodontic treatment in adolescents. Am J Orthod 1979;76:277-286.
6. Polson AM, Subtelny JD, Meitner SW, Polson AP, Sommers EW, Iker HP, Reed BE. Long-term periodontal status after orthodontic treatment. AM J Orthod Dentofacial Orthop 1988;93:51-58.
7. Zachrisson S, Zachrisson BU. Gingival condition associated with partial orthodontic treatment. Acta Odont Scand 1972;42:26-34.
8. Sutcliffe P. A longitudinal study of gingivitis and puberty. J. Periodontal Res 1972;7:52.
9. Newman MG, Takei HH, Carranza FA. Carranza's Clinical Periodontology, 9th Ed. Philadelphia: WB Saunders; 2002:281-89.
10. Wagaiyu EG, Ashley FP. Mouthbreathing, lip seal and upper lip coverage and their relationship with gingival inflammation in 11-14-year-old school children. J Clin Periodontol 1991;18:698-702.
11. Loe H, Silness J. Periodontal disease in pregnancy. Acta Odontol Scand 1963;21:533.
12. Silness P, Loe H. Periodontal disease in pregnancy. Acta Odontol Scand 1964;22:121.
13. Seymour RA, Smith DG, Turnbull DN. The effects of phenytoin and sodium valproate on the periodontal health of adult epileptic patients. J Clin Peridontol 1985;12:413-419.
14. Goldman HM, Cohen DW. Periodontal Therapy, 6th Ed. St. Louis (MO): CV Mosby; 1980.
15. Nakagawa S, Fujii H, Machida Y, et al. A longitudinal study from prepuberty to puberty of gingivitis. Correlation between the occurrence of Prevotella intermedia and sex hormones. J. Periodontol 1994;21:658.
16. Wojcicki CJ, Harper DS, Robinson PJ. Differences in periodontal disease-associated microorganisms in prepubertal, pubertal and postpubertal children. J Periodontol 1987;58:219.
17. Mombelli A, Lang NP, Burgin WB, et al. Microbial changes associated with the development of puberty gingivitis. J Peridontal Res 1990;25:331.
18. Diamanti-Kipioti A, Gusberti F, Lang N. Clinical and microbiological effects of fixed orthodontic appliances. J Clin Periodontol 1987;14:326.
19. Alexander SA. Effects of orthodontic attachments on the gingival health of permanent second molars. Am J Orthod Dentofacial Orthop 1991;100:337-340.
20. Leggott PJ, Boyd RL, Quinn RS, Eakle WS, Chambers DW. Gingival disease patterns during fixed orthodontic therapy: Adolescents vs. adults. J Dent Res 1984;63(Spec. Issue):309(Abstr.1245).
21. Davies TM, Shaw WC, Worthington HV, Addy M, Dummer P, Kingdon A. The effect of orthodontic treatment on plaque and gingivitis. Am J Orthod Dentofacial Orthop 1991;99:155-62.
22. Boyd RL, Leggott PJ, Quinn RS, Chamber DW. Periodontal implications of orthodontic treatment in adults with reduced or normal periodontal tissues versus those of adolescents. Am J Orthod Dentofacial Orthop 1989;96:191-199.
23. Lundstrom F, Hamp SE, Nyman S. Systematic plaque control in children undergoing long-term orthodontic treatment. Eur Orthod 1980;2:27-39.
24. Boyd RL. Longitudinal evaluation of a system for self-monitoring plaque control effectiveness in orthodontic patients. J Clin Periodontol 1983;10:380-388.