Issue Date: December 2006, Posted On: 1/1/2007

Implant Treatment Planning for the Medically Compromised Patient: A Case Report of Full-Mouth Reconstruction With Dental Implants

Michael Tischler, DDS

The dental literature supports the many benefits of dental implant-supported prostheses for the fully edentulous arch.1 These benefits include increased chewing ability, bone preservation, sharpened phonetics, and an improved psychological outlook for an edentulous patient.

Treatment planning for dental implants is a multidisciplinary process that takes into account many areas of dentistry and medicine. Foremost in the treatment planning process is consideration of the patient's medical history and a determination as to whether he or she is a candidate for the surgical appointments needed for dental implant placement. The health benefits that a patient could gain from an implant-supported prosthesis must be weighed against the risks of surgical treatment.2

This article explains in detail the treatment planning, surgical, and prosthetic steps taken to reconstruct a medically compromised patient's mouth with dental implants in the maxillary and mandibular arches.

Treatment planning

An 86-year-old male with ill-fitting maxillary and mandibular dentures presented for dental implant treatment to replace his existing prostheses. A review of his medical history indicated he had a pacemaker and was under the care of a cardiologist. He was on several cardiac drugs and had a stabilized but elevated blood pressure of 140/90. The rest of the patient's medical history was unremarkable, and the patient appeared to be in good health. The patient did not smoke, and he maintained a healthy lifestyle.

The patient explained that he could not wear his dentures and they had been remade numerous times. It was decided after a review of the study models and a computerized tomographic (CT) image that a bar-supported overdenture on the maxillary arch and a nonremovable fixed prosthesis on the mandibular arch would be treatment planned.

It was explained to the patient that there would be increased chewing ability, increased stability, and improved phonetics versus the existing tissue-supported dentures,3 and that clearance from his cardiologist and minimally invasive surgery would be required.After re-evaluation of the patient by his cardiologist and a review of the needed surgery for dental implant placement, the cardiologist provided clearance. The pharmacological protocol consisted of 4 tabs of 500-mg amoxicillin one hour prior to the surgical appointments, then 1 tab TID of amoxicillin for 2 weeks; 800 mg of ibuprofen one hour before the surgery, then 1 tab TID for 7 days; and Peridex as directed.

Figure 1. *Plan of maxillary arch in SimPlant interactive software.*

Figure 2. *Plan of mandibular arch in SimPlant interactive software.*

Figure 3. *Maxillary radiographic stent so tooth position can be seen on interactive*

Figure 4. *Mandibular radiographic stent.*

CT.

Figure 5. *Relationship of position of bone to final prosthetic position.*

In order to reduce surgical time and the amount of tissue reflection needed, a maxillary and mandibular CT scan was performed. The CT information was formatted in SimPlant (Materialise), an interactive CT imaging program. Through visualization of the maxillary and mandibular arches in SimPlant prior to surgery, the width, height, density, and angulation of the patient's bone can be ascertained prior to surgery4 (Figures 1 and 2).

Prior to the CT being captured, the patient's present dentures were used to create a radiographic guide for visualization on the CTs (Implant Logic Systems; Figures 3 and 4). Although the patient couldn't wear his existing dentures, the dentures did have good aesthetics and maintained the correct vertical dimension. The CT taken with the radiographic guides in place allows for planning dental implant placement with respect to the final prosthetic position. The information on the interactive CT also allows for planning of the correct implant size with respect to available bone.5

The information on the CT showed that the final prosthetic position on the maxillary arch was not ideal for a fixed prosthesis (Figure 5). A fixed prosthesis would have too large a buccal-lingual cantilever and not be supportive enough of the patient's lips. Due to the occlusal relationship and interarch space, the mandibular prosthesis was planned to be screw-retained with distal cantilevers. The patient favored this option over a bar-retained overdenture.

The final benefit of utilizing a CT would be seen during surgery when the data planned in SimPlant was turned into a surgical guide (Implant Logic Systems). This surgical guide allows for minimal or no tissue reflection, therefore reducing the in-vasiveness when the implants are placed.

Treatment Protocol

Figure 6. *Implant placement using tissue punches to minimize trauma to the mandibular arch.*

Figure 7. *Minimal tissue reflection on maxillary arch.*

Figure 8. *Transmucosal healing caps post surgery.*

Figure 9. *Three-month postoperative healing.*

Figure 10. *Open-tray transfer impression of maxillary arch.*

Figure 11. *Wax set-up try-in of maxillary and mandibular arches.*

Figure 12. *Try-in of acrylic jig for verification of bar fit.*

Figure 13. *Final bar to support maxillary bar overdenture.*

Figure 14. *Final mandibular fixed prosthesis.*

Figure 15. *Post-treatment panograph.*

It was determined that 2 separate surgeries for the maxillary and mandibular arch would be done to minimize cardiovascular stress on the patient.6 The surgeries for the maxillary and mandibular arch followed the identical sequence with respect to pharmacological and surgical protocol.

In each case the treatment room was surgically draped for asepsis, and the patient was anesthetized utilizing Carbocaine with Neo-Cobefrin to reduce cardiac effects.

Utilizing the surgical stents created from SimPlant, initial osteotomy sites were started transmucosal with 2-mm drills. These initial osteotomy preparations created the correct angulation and depth as determined previously by the SimPlant study. Tissue punches were used to minimize trauma to the mandible (Figure 6). Minimal tissue reflection was used on the maxillary arch.

Following removal of the surgical stent, internal hexed dental implants were placed following the manufacturer's osteotomy protocol (Bio-Horizons). The company's included abutments can be seen at the time of surgery in Figure 7. The left 3 distal maxillary implants required osteotome lifting of the sinus membrane as per the CT information.

After surgery on each arch, transmucosal healing caps were placed, allowing a one-stage surgery and proper tissue healing (Figure 8). Excellent 3-month postoperative healing was observed (Figure 9). This further reduced trauma to the patient by avoiding a second-stage surgery. The patient did not wear his dentures throughout the 3-month healing period. The inability of the patient to wear tissue-borne dentures facilitated healing of the implants via reduced loading.

After a 3-month healing period an open-tray impression was taken on each arch (Figure 10). A subsequent wax rim try-in was followed by a wax tooth denture try-in on the maxillary arch and mandibular arch (Figure 11). Creating a denture prior to processing allows fabrication of the bar with respect to space considerations. The overdenture bar is created based on functional and aesthetic aspects of the case. Once the wax tooth try-in was verified, an acrylic jig was tried in that represented the bar on the maxillary arch and the framework on the mandibular arch (Figure 12). After verification, the final maxillary bar and mandibular framework were created (Figure 13). The final mandibular fixed prosthesis was also created (Figure 14). The final maxillary and mandibular prostheses were delivered 4 months after surgical placement of dental implants. The post-treatment panograph shows the maxillary and mandibular implant-supported results (Figure 15).

Conclusion

Figure 16. *Satisfied patient.*

Through planning full-mouth reconstruction utilizing dental implants with an interactive CT program, minimally invasive surgery was performed on a medically compromised patient. The guidance of the case based on the prosthetic end result was the key. Utilizing the patient's existing dentures as a guide, the position of the implants and final result were facilitated. The end result was a satisfied patient with im-proved function and aesthetics (Figure 16).

References

1. Elsubeihi ES, Attard NJ. Clinical benefits of dental implant treatment. Int J Prosthodont. 2003;16(suppl):36-38, 47-51.
2. Beikler T, Flemmig TF. Implants in the medically compromised patient. Crit Rev Oral Biol Med. 2003;14:305-316.
3. Schwartz-Arad D, Kidron N, Dolev E. A long-term study of implants supporting overdentures as a model for implant success. J Periodontol. 2005;76:1431-1435.
4. Tischler M. Interactive computerized tomography for dental implants: treatment planning from the prosthetic end result. Dent Today. Mar 2004;23:90-93.
5. Zitzmann NU, Marinello CP. Treatment plan for restoring the edentulous maxilla with implant-supported restorations: removable overdenture versus fixed partial denture design. J Prosthet Dent. 1999;82:188-196.
6. Smith RA, Berger R, Dodson TB. Risk factors associated with dental implants in healthy and medically compromised patients. Int J Oral Maxillofac Implants. 1992;7:367-372.

Dr. Tischler maintains a private practice in Woodstock, NY. He is a Diplo-mate of the International Congress of Oral Implantologists and the Ameri-can Board of Oral Implantology/Implant Dentistry, a Fellow of the Misch International Implant Institute and the AGD, and an Associate Fellow of the American Academy of Implant Dentistry. He can be reached at (845) 679-3706 or by visiting the Web site tischlerdental.com.