Prosthetically driven zygomatic implant therapy

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Prosthetically driven zygomatic implant placement results in an ideal implant emergence within the tooth-alveolar envelope of the definitive prosthesis.

Prostheses supported by zygomatic implants offer patients with an edentulous maxilla a graft-less treatment option. Initially, the goal of zygomatic implant placement was to achieve bi-cortical stabilization at the apical and coronal ends of the implant. This resulted in implants that traversed the sinus and emerged in the palate. The surgical technique has been modified to include an extra-sinus implant pathway, which allows for implant emergence within the tooth-alveolar envelope. The outcome of this treatment modality may be greatly improved if the surgical placement of zygomatic implants is prosthetically driven.

Edentulous patients report an increased oral health related quality of life with fixed prostheses compared to removable prostheses. However, a severely atrophic maxilla may preclude endosseous implant placement unless extensive alveolar bone grafting is performed. This typically requires extended treatment time, numerous appointments, and increased costs. Zygomatic implants offer such patients a timely, graft-less, fixed treatment option for rehabilitation.

The original Brånemark protocol for zygomatic implant placement is characterized by an intra-sinus approach. The resulting prostheses frequently infringed upon the tongue space due to the palatal emergence of the implants, which led to hygiene difficulties, tongue irritation, and speech challenges. Over time, the methodology of this treatment has evolved. The current goal of the surgical technique is to achieve a prosthetically-driven coronal emergence of the implant. As a result, the implant may take an intra-sinus or extra-sinus trajectory depending on the patient's anatomy. Aparicio (2011) developed the Zygoma Anatomy Guided Approach (ZAGA) classification system to categorize the implant pathway and patient anatomy based on the present surgical technique. A finite element analysis by Ishak (2013) revealed that the majority of the occlusal forces on the zygomatic implants were absorbed by the zygoma, lending support to the concept that zygomatic implant success is independent of the presence of maxillary anchorage. Without the anatomical constraints of bi-cortical stabilization, zygomatic implants can be placed such that their emergence is based on the ideal tooth position.

A restoratively-driven approach requires collaboration between the prosthodontist and surgeon during treatment planning. The ultimate tooth position dictates the zygomatic implant trajectory, depth, and rotation.

This results in a prosthetic rehabilitation that recreates the missing hard and soft tissue anatomy, and offers improved phonetics, esthetics, function, and hygiene for the patient. The purpose of this case report is to demonstrate the value of prosthetically driven zygomatic implant placement.

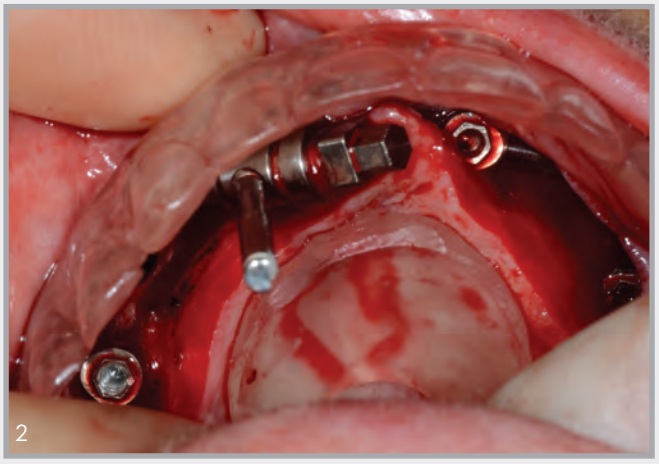
Case Report

A 68-year-old female patient presented with the desire for a fixed rehabilitation of her edentulous maxillary arch. The patient was given the options of sinus augmentation and grafting of the anterior region, or two zygomatic implants placed bilaterally. She chose the treatment plan which included zygomatic implants because of the reduced treatment time and fewer surgical interventions.

A new maxillary complete denture was fabricated with prosthetic dentition positioned to idealize esthetics and phonetics. After the patient had used the prosthesis for one month and expressed complete satisfaction with the tooth position, the complete denture was duplicated using a poly-methyl methacrylate (PMMA) material. The lateral palatal region and lingual tooth portion were removed so that this prosthesis could serve as a surgical guide demarcating the ideal tooth position. A centric relation record using poly-vinyl siloxane material was captured to maintain the occlusal relationship during conversion of the complete denture to a fixed provisional restoration.

The patient was evaluated by an otolaryngologist, who obtained a maxillofacial computed tomography (CT) scan. The osteomeatal complex was confirmed to be patent, and the patient was diagnosed to be free of maxillary sinus pathology. The CT scan was then evaluated by the oral surgeons and prosthodontists to plan the trajectory of the zygomatic implants.

Surgery was performed under general anesthesia administered by an anesthesiologist. After the oral surgeon reflected a mucoperiosteal flap to visualize the zygomatic bones, the surgical stent was seated to prosthetically guide the implant placement. Involvement of the prosthodontic team is critical at this point, as the zygomatic implant trajectory, depth, and rotation have significant manifestations on the ultimate prosthetic rehabilitation.



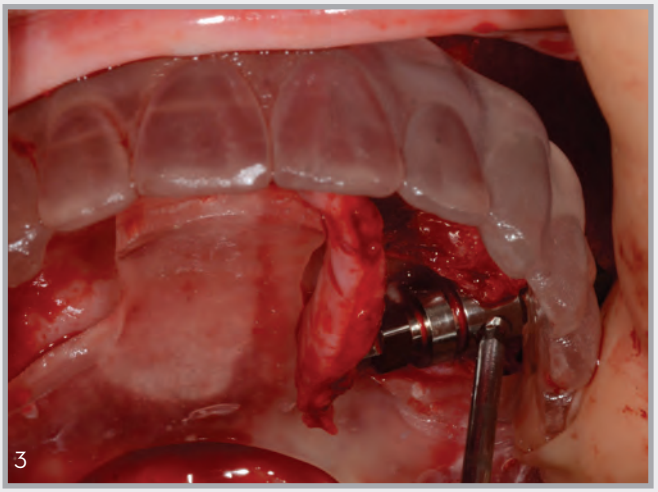
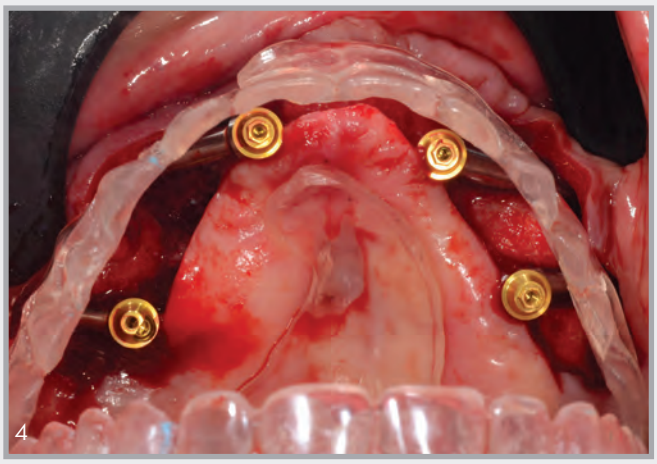
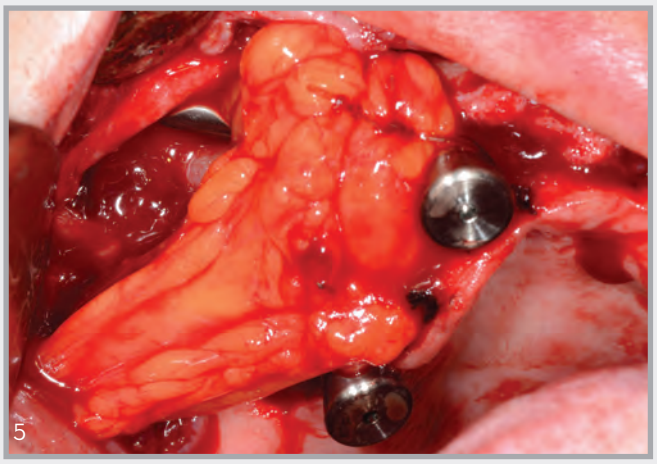


Fig. 1: Atrophic maxilla prior to implant placement.

Figs. 2 and 3: Surgical guide seated to ensure zygomatic implant emergence within the tooth-alveolar envelope.





Zygomatic implant therapy is a predictable treatment for a patient with an atrophic maxilla. The extra sinus implant placement, implant coverage with the buccal fat pad, and definitive zirconia prosthesis have contributed to the success of this treatment modality.

Fig. 4: Final zygomatic implant position with transmucosal abutments.

Fig. 5: Buccal fat pad covering implants to aid in healing of soft tissue.

Fig. 6: CT scan after zygomatic implant placement.

Figs. 7 and 8: Definitive monolithic zirconia prosthesis.

After zygomatic implant placement, appropriate transmucosal abutments were torqued to the fixtures. The implants were covered by the buccal fat pads prior to closure of the flap to reduce the risk of soft tissue complications and to provide increased comfort to the patient.

Following flap closure, the patient's maxillary complete denture was converted to an implant supported fixed provisional prosthesis. Titanium temporary cylinders were fastened to the complete denture using PMMA. The patient was guided into occlusion using the interocclusal registration made prior to surgery. The palate and the flanges of the denture were removed. The prosthesis was further contoured to create a smooth, convex intaglio surface. The patient was instructed to follow a soft diet during the healing period.

After 6 months, the provisional prosthesis was removed, revealing healthy soft tissue that was minimally resorbed. A final maxillary impression was made, master cast verified, and a PMMA try-in of the definitive prosthesis was performed. The patient wore the PMMA prototype for two weeks to assess esthetics, phonetics, function, and home care. The PMMA prototype was copy-milled to create a definitive monolithic zirconia, screw-retained prosthesis. The patient was comfortable and very pleased with the new prosthesis.

Zygomatic implant therapy is a predictable treatment for a patient with an atrophic maxilla. The extra sinus implant placement, implant coverage with the buccal fat pad, and definitive zirconia prosthesis have contributed to the success of this treatment modality. When zygomatic implant placement is prosthetically driven, patient esthetics, hygiene, speech, and comfort can be idealized. ■

Special thanks to Jay Neugarten, DDS, MD, FACS, and Ben Brovnick, CDT, MDT in private practice in New York City.

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