Journal of Oral Medicine and Dental Research

Genesis-JOMDR-7(2)-122
Volume 7 | Issue 2
Open Access
ISSN: 2583-4061

Segmental Maxillary Rehabilitation with Pterygoid Implants: Early Loading Protocol in a Compromised Maxilla

Henri Diederich*
Doctor in dental medicine, 114 av de la Faiencerie, L-1511 Luxembourg

***Corresponding author:** Henri Diederich, Doctor in dental medicine, 114 av de la Faiencerie, L-1511 Luxembourg

Citation: Diederich H. Segmental Maxillary Rehabilitation with Pterygoid Implants: Early Loading Protocol in a Compromised Maxilla. J Oral Med and Dent Res. 7(2):1-06.

Received: July 24, 2026 | **Published:** August 08, 2026

Abstract

Rehabilitating an atrophied or severely compromised maxilla presents a significant challenge in implant dentistry due to limited bone volume, low bone density, and the proximity of the maxillary sinus. Traditional treatments involving bone augmentation and sinus floor elevation often entail extended healing times, increased surgical morbidity, and higher financial costs. Pterygoid implants offer a predictable, graftless anchorage strategy by engaging the dense cortical plates of the pterygoid process, thereby bypassing sinus floor elevation while providing high primary mechanical stability.

Keywords

Implant prosthesis; Pterygoid implants; ROOTT P; Full-arch rehabilitation; Early loading; Atrophied maxilla; Bicortical engagement; Graftless protocol.

Introduction

The atrophic posterior maxilla presents a well-documented challenge for implant-based rehabilitation. Reduced alveolar bone height, poor trabecular bone quality (frequently classified as D3 or D4 bone), and pneumatization of the maxillary sinus often complicate conventional implant placement. Traditionally,

management of these conditions required sinus floor elevation, onlay bone grafting, or guided bone regeneration. While effective, these invasive procedures prolong treatment duration, increase morbidity, and raise overall costs for the patient.

To overcome these constraints, remote anchorage techniques have gained widespread clinical acceptance. Pterygoid implants offer a compelling alternative strategy by utilizing the cortical bone of the pterygoid process of the sphenoid bone and the pyramidal process of the palatine bone. By engaging these dense cortical structures, pterygoid implants achieve high primary stability through bicortical fixation, eliminating the need for sinus grafting procedures.

The ROOTT P implant (ROOTT Implants, Switzerland) is specifically engineered for this anatomical region. Featuring extended body lengths, an aggressive self-tapping thread design, and an optimized trajectory profile, the system is designed to maximize insertion torque and facilitate immediate or early loading protocols in compromised maxillary sites.

Case Presentation

A 63-year-old male patient presented with a compromised maxillary dentition and a chief complaint of desiring a fixed, stable prosthetic restoration. Clinical examination revealed a partially edentulous maxilla with heavily restored, failing teeth demonstrating poor long-term prognosis. Radiographic evaluation confirmed substantial posterior bone loss and reduced vertical height beneath the maxillary sinuses **(Figure 1)**.

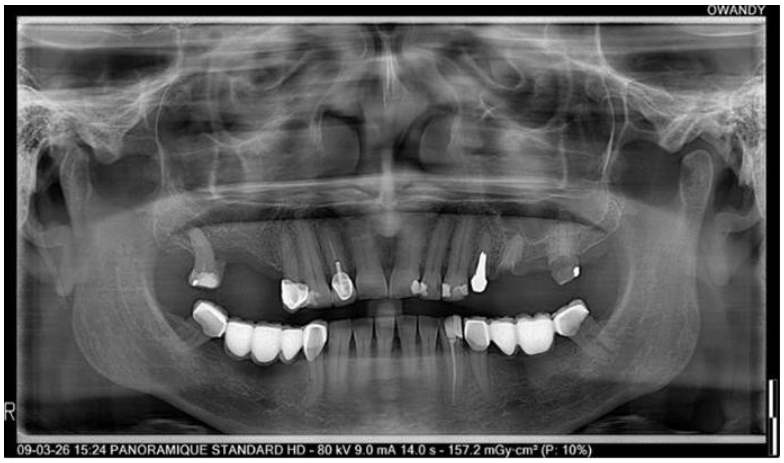

Figure 1: Preoperative panoramic radiograph (09-03-26) demonstrating a partially edentulous maxilla with failing restorations and reduced posterior bone height.

Given the patient's desire for a rapid, fixed rehabilitation and the presence of posterior maxillary atrophy, a comprehensive treatment plan was formulated:

DOI: *https://doi.org/10.52793/JOMDR.2026.7(2)-122*

1. Atraumatic extraction of remaining non-restorable maxillary teeth.
2. Strategic placement of ROOTT P pterygoid implants engaged in the pterygoid plates via an oblique trajectory.
3. Fabrication and delivery of a screw-retained fixed full-arch prosthesis utilizing an early loading protocol.

Surgical protocol

Under local anesthesia, remaining failing maxillary teeth were extracted atraumatically. Minimal alveoloplasty was carried out to smooth irregular bony margins and establish an ideal prosthetic bed.

Osteotomies for the pterygoid implants were prepared through the maxillary tuberosity, following an oblique posterior-superior trajectory directed toward the pterygoid plates of the sphenoid bone. ROOTT P pterygoid implants were inserted into the prepared sites. The deep, aggressive thread geometry and tapered body design permitted self-tapping engagement into the dense cortical bone of the pterygoid process. High insertion torque was achieved across all implant sites via bicortical engagement, providing the baseline primary stability necessary to implement an early loading workflow.

Prosthetic workflow

Following implant placement and an initial uneventful healing period, master impressions were captured at the implant level using rigid open-tray impression copings. Implant analogs were attached, and master casts were poured in high-precision stone **(Figure 2)**.

Figure 2: Master cast with implant analogs mounted for prosthesis fabrication and positioning for framework design.

A verification key **(Figure 3)** was utilized on the cast to verify accurate positional transfer prior to framework milling. A rigid bar framework was designed using CAD/CAM software to ensure passivity. Cobalt-chromium (CoCr) was chosen as the framework material for its rigidity, biocompatibility, and long-term structural integrity **(Figure 4).**

DOI: *https://doi.org/10.52793/JOMDR.2026.7(2)-122*

Figure 3: Maxillary model with the bar framework in place for verification of fit and passivity.

Figure 4: Milled cobalt-chromium (CoCr) frameworks shown before prosthesis application.

After verifying the passive fit intraorally, aesthetic and functional evaluations (including bite registration, phonetics, and smile line analysis) were completed. The definitive screw-retained fixed prosthesis was finalized with high-grade prosthetic acrylic/composite materials **(Figure 5)**.

Figure 5: Definitive screw-retained fixed prostheses ready for delivery.

DOI: *https://doi.org/10.52793/JOMDR.2026.7(2)-122*

Results

The definitive screw-retained prosthesis was secured using prosthetic screws. Occlusion was carefully adjusted to ensure balanced contacts during centric and eccentric jaw movements.

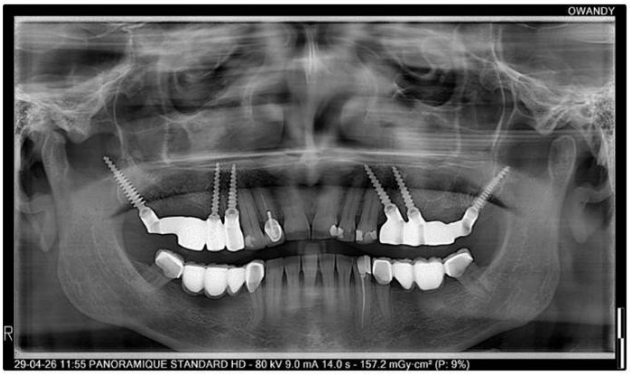

Figure 6: Postoperative panoramic radiograph (29-04-26) showing quad pterygoid/zygomatic implant placement supporting a full-arch fixed prosthesis.

Postoperative panoramic radiography **(Figure 6)** confirmed optimal bicortical engagement of the pterygoid implants within the posterior cortical plates, without sinus perforation or surgical complications. Clinically, peri-implant soft tissues healed predictably. The early loading protocol yielded a stable, esthetic, and functionally restored maxillary dentition with high patient satisfaction.

Discussion

Rehabilitation of the severely compromised posterior maxilla without extensive bone grafting remains one of the primary goals of modern implantology. Pterygoid implants eliminate the necessity of sinus lift procedures, thereby markedly reducing surgical morbidity, overall costs, and treatment timeframes.

Parameter	Conventional Grafting / Sinus Lift PDF+ 1	Pterygoid Implant Protocol (ROOTT P) PDF
Surgical Invasiveness	High (Sinus floor elevation/Grafting)	Graftless / Minimally invasive
Parameter	**Conventional Grafting / Sinus Lift PDF+ 1**	**Pterygoid Implant Protocol (ROOTT P) PDF**
Treatment Timeline	6–12 months (Delayed loading)	Immediate to Early loading (Weeks)
Primary Anchorage	Augmentation bed / Trabecular bone	Bicortical (Pterygoid cortical plates)
Surgical Morbidity	Moderate to High	Reduced

The structural design of the ROOTT P implant (ROOTT Implants, Switzerland) are engineered in achieving high insertion torque for this indication. Its aggressive thread pitch, combined with a tapered body and thin apex, allows effective cutting and compression during insertion into D3/D4 bone. The resulting

DOI: *https://doi.org/10.52793/JOMDR.2026.7(2)-122*

bicortical engagement in the pterygoid plates delivers superior mechanical stability capable of supporting immediate or early functional loading.

When compared to zygomatic implant protocols, pterygoid implants offer several clinical advantages. While zygomatic implants provide robust remote anchorage, they demand a longer surgical path and carry risks of orbital or maxillary sinus complications. Pterygoid implants follow a more posterior intraoral trajectory, simplifying the surgical procedure while preserving equivalent anchorage potential. In cases of extreme jaw atrophy, hybrid or quad pterygoid-zygomatic protocols can be effectively combined to achieve stable full-arch restoration.

References

1. Penarrocha-Diago M, Peñarrocha-Diago M, Zaragozí-Alonso R, Soto-Peñaloza D. (2012) Implants placed in the pterygoid region: a retrospective study of 71 implants. Int J Oral Maxillofac Implants. 27(6):1453-59.
2. Henri Diederich. (2025) Breaking Barriers in Maxillary Rehabilitation: Evolving Treatment Strategies. Genesis Jrnl of Dental Reports. 1(1)4-5. 7-13.
3. Henri Diederich, Mohamed Seghir Babouche, Jimoh Olubanwo Agbaje (2023). Minimal Invasive Approaches to Maxillary Atrophy. J of MAR Dental Sciences. 4 (11) P3-11.
4. Curi MM, Dib LL, Kowalski LP, Landman G, Mangones R, (2020) Use of pterygoid implants in the atrophic posterior maxilla: a systematic review. J Craniomaxillofac Surg. 2020;48(7):689-96.
5. Balshi TJ, Wolfinger GJ, Stein BE. Zygomatic bone: an alternate dental implant anchor. J Oral Implantol. 24(3):147-53.
6. Henri Diederich, Jimoh Olubanwo Agbaje. (2022) Full Arch Rehabilitation of Edentulous Space with One Piece Tissue Level Implants. J of MAR Dental Sciences. 6 (1) P4-9.
7. Aparicio C, Ouazzani A, García R, Arevalo X, Mancebo J, et al. (2001) The zygomatic implant: preliminary experiences on 10 consecutively treated patients. Eur J Prosthodont Restor Dent. 9(1):35-39.
8. Davó R, Pons R, Rojas J, Carpio P. (2013) Quad zygomatic implants: a new concept for the rehabilitation of the atrophic maxilla. Br J Oral Maxillofac Surg. 51(7):e89-e93.
9. Chow J, Hwang M, Shen E, Weng J, Teng A, Kuan C. (2019) Zygomatic implants-pterygoid implant: a graftless solution for the compromised maxilla. In: Jensen OT, ed. The Sinus Bone Graft. 3rd ed. Quintessence. 213-224.
10. Bedrossian E. (2010) Rehabilitation of the edentulous maxilla with the zygoma concept: a retrospective study. Int J Oral Maxillofac Implants. 25(6):1203-08.
11. Stella JP, Warner MR. (2000) Sinus slot technique for simplification and improved orientation of zygomaticus dental implants: a technical note. Int J Oral Maxillofac Implants.15(6):889-93.
12. Parel SM, Brånemark PI, Ohrnell LO, Svensson B. (2001) Remote implant anchorage for the rehabilitation of maxillary defects. J Prosthet Dent. 86(4):377-81.
13. Goiato MC, Shibli JA, Pellizzer EP, Santiago JF Jr, Moreno A, (2015). Implants in the pterygoid region: a systematic review. Med Oral Patol Oral Cir Bucal. 20(4):e451-e458.