

IMPLANT-SUPPORTED PROSTHETIC REHABILITATION OF THE EDENTULOUS MAXILLA USING THE OT BRIDGE EQUATOR SYSTEM: A CASE REPORT

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ABSTRACT

Edentulism of the maxilla presents significant clinical and functional challenges due to limited bone quality, anatomical constraints, and inadequate retention commonly associated with conventional dentures. Low-profile abutment systems, such as OT Equator and OT Bridge, enable the fabrication of fixed full-arch prostheses with improved mechanical stability and simplified maintenance. A 60-year-old male patient with terminal-stage periodontitis in the maxilla underwent full-arch implant-supported rehabilitation. After the extraction of compromised teeth, six implants were placed in strategic positions and allowed to heal. Upon radiographic confirmation of osseointegration, OT Equator abutments were selected based on soft-tissue height and installed according to the manufacturer's recommendations. A two-phase open-tray impression was taken, followed by fabrication of a Co-Cr framework and a zirconia-based definitive prosthesis. The prosthesis was retained using the OT Bridge system, combining elastic primary retention via Seeger rings with secondary screw retention. Standard and angulated extragrade abutments were used to compensate for implant divergence and ensure passive fit. The patient reported excellent aesthetic and functional satisfaction using the OT Bridge Equator System. Follow-up examinations showed stable soft-tissue healing, absence of inflammation, and no mechanical complications. The applied system provided predictable retention, favorable stress distribution, and facilitated oral hygiene. This case demonstrates that the OT Equator and OT Bridge systems offer a reliable solution for full-arch fixed rehabilitation of the edentulous maxilla. Their low-profile design, divergence compensation, and dual-retention mechanism support predictable outcomes and represent a valuable alternative to traditional multi-unit abutments in anatomically demanding cases.

Keywords: Maxillary implant rehabilitation, OT Bridge System, full-arch implant rehabilitation, dental implants.



INTRODUCTION

The state of toothlessness, especially in the upper jaw, represents a significant clinical and functional problem that can have profound consequences for patients' quality of life. Conventional complete dentures in this region often fail to provide satisfactory retention and stability, and palatal extension can lead to discomfort, a gag reflex, as well as a decrease in taste and masticatory function (1, 2).

Using dental implants, the prosthetic rehabilitation of edentulous patients has been significantly improved. Implant-supported dental restorations provide greater stability, better functionality, and greater psychological security for patients. These benefits are especially important in complex clinical conditions; therefore, implant-supported restorations are the therapy of choice for patients with advanced ridge resorption and unfavorable anatomy (3, 4). Unlike the lower jaw, in the upper jaw, due to the lower bone density and different distribution of forces, it is usually recommended to install four or more implants for optimal load distribution and long-term success of therapy (5, 6). Additionally, retention elements such as locators/equators enable a stable, predictable, and easily maintainable prosthetic restoration. Among retention systems, low-profile OT equators stand out for their extremely low height (about 2.1 mm total height with housing), especially useful in situations with reduced interocclusal space. In addition to good mechanical resistance and the ability to compensate for implant divergence up to 80°, they are characterized by simple replaceability, multiple retention values, and durability (7, 8).

The manufacturer's specification states that the components are made of high-quality titanium with a titanium-nitride coating (hardness ~ 1600 Vickers), are compatible with most implant systems, and offer matrices with different levels of retention (600-2700 g), enabling personalized adjustment and simple chairside servicing. Contemporary studies also indicate that resilient or elastic retention mechanisms improve load distribution within implant-supported prostheses, resulting in lower peri-implant microstrain and reduced mechanical stress transferred to the implant-prosthesis assembly (9). This system also shows a low affinity for plaque accumulation, which contributes to better gingival healing, especially in cases where immediate loading is applied. This establishes a stable biological barrier between the abutment and soft tissue, which over time prevents the penetration of bacteria and significantly reduces the risk of developing peri-implant complications, including peri-implantitis (10, 11, 12).

However, in recent decades, innovative retention concepts have emerged that allow the fabrication of fixed restorations on OT Equator abutments, which were previously used mainly for mobile restorations. This approach combines the functionality of fixed work with the advantages of low-profile abutments, allowing compensation of implant divergences, stress reduction, and a simpler technical approach during fabrication and maintenance (13, 14). A special

advantage of the OT Equator system in fixed restorations is the possibility of combining passive retention (via seeger) and secondary retention (via screwing), which achieves a high degree of stability, simple oral hygiene maintenance, such as aesthetics without compromise (15, 16).

Regarding all the data above, the present study aimed to provide a clinical presentation of the implant-prosthetic rehabilitation of the edentulous upper jaw using the OT bridge equator system.

CASE REPORT

A 60-year-old male patient was referred to the Department of Dentistry, Faculty of Medical Sciences, University of Kragujevac, due to prosthetic rehabilitation in the upper jaw. In medical history, it was observed that the patient had arterial hypertension, which the attending specialist adequately treated. In family history, the patient indicated the absence of the same or similar diseases.

Intraoral examination and radiographic analysis showed the presence of teeth 11, 21, 13, 15, and 23, of low biological value, in the terminal stage of periodontitis, and the presence of a metal ceramic prosthetic bridge in regio 35-45. To better assess the density and volume of the bone, the patient underwent a Cone Beam Computer Tomography (CBCT) scan (Sirona Dental Systems GmbH, Bensheim, Germany) (Figure 1). Based on the medical history, clinical and radiographic examination, implant prosthetic therapy of the upper jaw - full arch fixed implant-supported prostheses was proposed.



Figure 1. Pre-surgical CBCT images.

After the CBCT image analysis determined the possibility of implementing the planned implant-prosthetic therapy, and the patient's consent to it, oral-surgical intervention was initiated. As part of the above intervention, periodontally affected teeth in the upper jaw were extracted, and dental implants (B&B Dental, Bologna, Italy) were placed in the following positions: 11 (4.0x10), 21 (4.0x10), 13 (4.0x10), 23 (4.0x10), 14 (3.5x10), and 25 (3.5x10) (Figure 2). Primary closure was achieved using sutures. After radiographic confirmation of osseointegration of the implants after a period of 4 months, they were opened, and sulcus formers were placed.

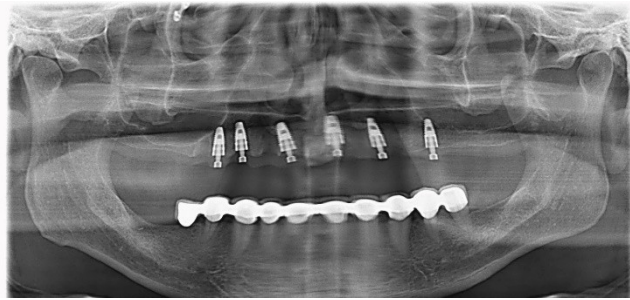


Figure 2. Post-surgical orthopantomography.

As the prosthetic treatment plan included the use of the OT Bridge® system and the use of an OT Equator abutment (Rhein 83, Bologna, Italy), a universal “C.H.” gauge (Rhein 83, Bologna, Italy) was used to determine the tissue height above the implant. Six low-profile OT Equator abutments were selected and placed in the appropriate positions, and tightened according to the manufacturer's instructions to 25 Ncm (Figure 3).

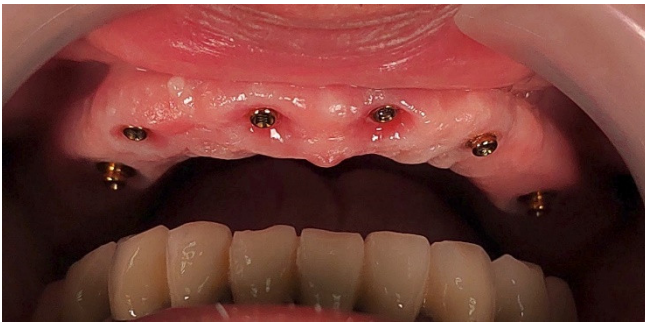


Figure 3. Intraoral image of an OT Equator abutment placed in the appropriate position in the upper jaw.

In the next phase, an analog two-phase simultaneous impression in an open tray was taken at the level of the abutments, after previously splinting them with the help of a self-polymerizing acrylic resin (Pattern Resin LS, GC, Tokyo, Japan). An additional silicone combination of DMG Honigum Pro Putty Soft and DMG Honigum Pro regular (DMG Chemisch-Pharmazeutische Fabrik GmbH, Hamburg, Germany) mass was used for impression taking (Figure 4).

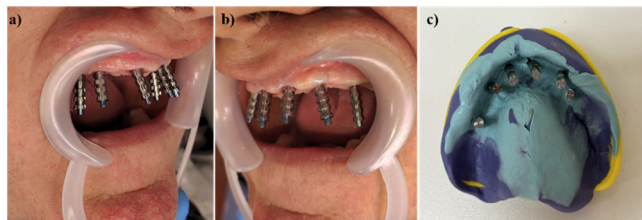


Figure 4: OT Equator abutment level impression: (a) intraoral right lateral view with transfer impression coping, (b) intraoral left lateral view with transfer impression coping, (c) extraoral analog two-phase simultaneous impression of the upper jaw.

Upon determination of intermaxillary relationship, a framework made of Co-Cr alloy was tested, with indirect seating achieved using extragrade abutments. Due to the greater angulation of the implants in the anterior segment, extragrade abutments inclined at 15 degrees were used in positions 11, 21, 13, 23, while standard extragrade abutments

were used in regions 14 and 25. The passive fit of the framework was assessed through clinical and radiographic evaluations (Figure 5 a, b).

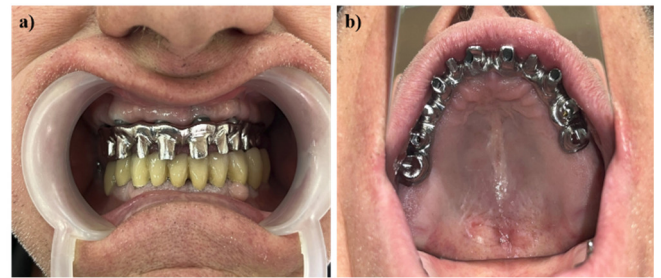


Figure 5. Intraoral image of a framework made of Co-Cr material with extragrade abutments in the upper jaw: (a) frontal view, (b) occlusal view.

A prototype of the future teeth was made in polymer (BreCam, Multicom, Bredent srl, Bolzano, Italy) and tried on; the previously registered intermaxillary relationships were confirmed, and the occlusion was corrected (Figure 6).



Figure 6. Intraoral image of a prototype of the future teeth in the upper jaw.

During this phase, tooth and gingiva shade selection was also performed. Definitive superstructure of fixed implant-supported prosthesis was made of zirconium-oxide ceramic, while gingiva characterization was performed by composite (Figure 7a,b).

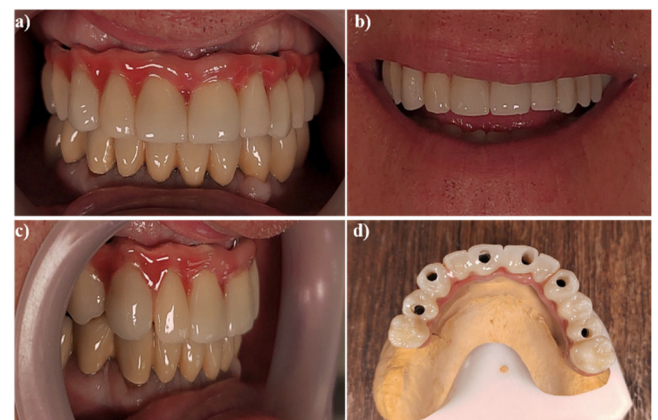


Figure 7. Intraoral image of the definitive superstructure of a fixed implant-supported prosthesis: (a, b) frontal view, (c) lateral view and (d) extraoral image of the definitive superstructure of a fixed implant-supported prosthesis: occlusal view.



The specificity during the delivery of the definitive restoration - OT Bridge fixed prosthesis involved the placement of white Seeger rings (standard) that provide primary retention of the restoration (Figure 8). In contrast, secondary retention is based on a screw. Retention screws were tightened according to manufacturer instructions (15 Ncm).



Figure 8. Extraoral image of the definitive superstructure of a fixed implant-supported prosthesis with Seeger rings, a palatal view.

Access holes are protected with Teflon tape and closed with composite. Additionally, the specific feature of the present OT-Bridge superstructure supported by six implants was the presence of four connection screws, two of which (at positions 11 and 15) were omitted, with the connection being entrusted solely to the Seeger system (Figure 9).



Figure 9. Orthopantomography control at the definitive superstructure of a fixed implant-supported prosthesis.

At follow-up, the patient received a protective night guard and oral hygiene instructions. The patient reported full functional and esthetic satisfaction post-rehabilitation.

DISCUSSION

This case demonstrates that carefully planned implant-supported prosthetic rehabilitation of the edentulous maxilla can give predictable and stable outcomes, even under conditions of limited interocclusal space and unfavorable anatomy. In this patient, six strategically positioned implants using the OT Bridge Equator system provided optimal occlusal load distribution and mechanical stability, along with high-quality esthetic characterization.

During the past decade, advances in scientific research have markedly improved traditional approaches to implant loading (17). The anatomical limitations of the maxilla, combined with the high esthetic requirements and its distinctive pattern of bone resorption, contribute to the challenges of treatment planning. These elements make optimal implant placement challenging and limit the feasibility of constructing a conventional screw-retained prosthesis (13). Accordingly, the application of the OT Bridge system, using OT Equator abutments and double retention (primary Seeger ring and secondary screw fixation), ensures secure retention while allowing for easy removal of the prosthesis for maintenance (18). A one-year multicenter clinical study (19) demonstrated that the OT Equator system (Rhein'83) for fixed maxillary prostheses on four to six implants provides high therapeutic success, with excellent implant and prosthetic survival rates, minimal complications, high patient satisfaction, and stable biological parameters, with average bone remodeling of only 0.2 mm after one year, which is consistent with the results of our study. In addition, Mohamed et al. (16) reported that the OT Bridge system exhibits biomechanical efficiency even when approximately one-third of the anchoring screws are omitted in an all-on-six configuration. Their findings indicate that the exclusion of certain screws does not compromise prosthetic stability. Nevertheless, both the number and geometric arrangement of the omitted screws were shown to affect stress distribution within the OT Bridge Equator framework. In all-on-six restorations, unilateral removal of two screws was associated with a better stress distribution pattern, which is consistent with the report of the current study.

Furthermore, the present study indicated that early follow-ups showed high esthetic and functional satisfaction, with no signs of soft tissue inflammation or screw loosening. Literature supports that OT Equator systems, owing to their low-profile design and elastic Seeger rings, reduce stress concentration on peri-implant tissues and help preserve marginal bone levels in fixed prostheses (20). Tallarico et al. (21) reported similar clinical and biomechanical advantages of OT Equator abutments over other systems in patients with implant-supported overdentures, highlighting reduced spatial requirements and improved retention properties, contributing to predictable prosthetic rehabilitation. Likewise, Montanari et al. (22) confirmed that a fixed prosthetic system built on OT Equator, which reduces spatial requirements, represented a significant relief in clinical work and laboratory processing, while improved retention properties contributed to greater reliability and predictability of prosthetic rehabilitation.

An additional advantage in the current case was the combination of standard and angulated extragrade abutments, enabling adequate screw fixation even for highly angled implants, thereby correcting implant divergence. Such flexibility is critical in the maxilla, particularly for esthetic considerations where anatomical limitations and screw emergence must be addressed (23). The literature data confirmed that the capacity of extragrade OT Equator abutments to compensate for implant divergence up to 80° using Seeger rings (24). Moreover, in vitro biomechanical studies demonstrated



passive prosthesis seating and stability, even in the absence of screws, through mechanical retention provided by Seeger rings (25). While multi-unit abutments are widely used in implantology for their ability to compensate for implant divergence and facilitate passive fit, studies indicate they may induce localized stress concentrations, increasing the risk of micromovement and potential complications over time (26, 27). Conversely, the OT Bridge system using OT Equator abutments provides more favorable stress distribution and reduces the likelihood of micromotion. Studies show that the OT Bridge system can effectively reduce prosthetic stresses, even when one of four screws is absent, without compromising prosthetic stability (16, 28).

Although the OT Bridge Equator system demonstrated favorable clinical performance in the present case, potential mechanical and biological complications should be acknowledged. As reported in systematic reviews of implant-supported fixed prostheses, mechanical events such as screw loosening, preload loss, or framework-related complications may occur under functional loading (30, 31). Finite element and in vitro studies specific to the OT Bridge system have further indicated that stress distribution may be influenced by the number and position of prosthetic screws, particularly when screw omission protocols are applied (16, 27). From a biological perspective, peri-implant mucositis and peri-implantitis remain risks in all implant-supported rehabilitations, although titanium nitride-coated components have demonstrated a favorable soft-tissue response in experimental studies (10, 11). Therefore, careful prosthetic execution and regular maintenance are essential to ensure long-term stability.

Based on clinical follow-up and patient-reported outcomes, this therapeutic protocol demonstrated high predictability and long-term efficacy with minimal complications. Nonetheless, extensive prospective clinical studies with larger cohorts and longer observation periods are necessary to validate long-term stability and biological safety (29). However, it is important to note that the choice between OT Bridge and multi-unit abutments should be guided by clinical indications, anatomical constraints, and patient-specific esthetic demands, as each system has distinct advantages and limitations.

CONCLUSION

This case report demonstrates that the application of the OT bridge Equator system enabled successful full-arch fixed prosthetic rehabilitation supported by multiple implants. The system provided stable prosthesis retention, simplified screw access and component management, enhanced overall clinical procedures, and improved aesthetic characterization. In addition, the biomechanical performance remains excellent even with the absence of one-third of the anchoring screws. Importantly, this case highlights the clinical value of the OT system by providing evidence of its practicality and reliability in complex full-arch rehabilitations, thereby offering clinicians an effective treatment option in cases requiring fixed, implant-supported restorations.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

INFORMED CONSENT STATEMENT

Informed consent was obtained from the participant or their representatives.

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