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Two Milling Techniques for Dental Implant Placement in a Fully Recovered Patient

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Abstract

Introduction: Total edentulism represents a condition that significantly affects masticatory function, aesthetics, and the patient's quality of life. Modern implantology offers predictable rehabilitative solutions through the use of osseointegrated implants. Among the surgical variables that influence treatment success, the bone bed milling technique—whether biological or traditional—plays a determining role in bone preservation and osseointegration.

Objective: To restore masticatory function in a completely edentulous patient by placing two upper implants using the biological milling technique and two lower implants with traditional milling, for subsequent adaptation of an implant-mucosa-supported prosthesis.

Material and Methods: A 68-year-old male patient, completely edentulous. A Cone Beam Computed Tomography (CBCT) scan was performed to analyze bone density in Hounsfield units. Four Adin Touareg® implants (4.2 × 10 mm) were placed: two in the maxilla using the biological milling technique (50 rpm without irrigation) and two in the mandible using the traditional technique (800-1200 rpm with irrigation), applying a torque of 35 Ncm. After three months, healing screws (4.5 × 4 mm) were placed for 30 days to shape the emergence profile, subsequently replaced by 3 mm Grip® attachments. Finally, the implant-mucosa-supported prosthesis was installed.

Results: Adequate soft tissue healing and proper osseointegration of the implants were observed. No complications were reported during the procedure or in the postoperative period. Both techniques proved effective, with prosthetic stability and good masticatory function.

Conclusion: The application of biological and traditional milling techniques allowed for the successful placement of implants in a completely edentulous patient. The combination of both strategies, selected according to bone density, offers predictable long-term functional and aesthetic rehabilitation.

Keywords: Total edentulism; Dental implant; Biological milling technique; Traditional milling technique; Implant-mucosa-supported prosthesis

Introduction

Total edentulism is an irreversible condition characterized by the complete loss of teeth in one or both dental arches, affecting chewing function, phonetics, and facial aesthetics. Its etiology includes advanced caries, periodontal disease, and trauma, as well as systemic factors such as diabetes.

Traditional treatment with mucosa-supported prostheses, although functional, presents limitations such as progressive bone resorption and loss of stability. Oral implantology has revolutionized the management of edentulism through osseointegrated implants, which offer more stable and durable rehabilitations.

The success of an implant depends on adequate osseointegration, a biological process that requires proper preparation of the bone bed. In this context, there are two main drilling techniques: the traditional one (high speed with irrigation) and the biological one (low speed without irrigation). The choice between the two depends on the bone density and the patient's anatomical characteristics.

This clinical case evaluates the placement of implants in a completely edentulous patient using both techniques, with the aim of comparing their clinical performance and postoperative results.

Case Report

Pre-surgical Phase

Patient: 68-year-old male, completely edentulous, with no serious systemic history.

Diagnosis: Total maxillary and mandibular edentulism.

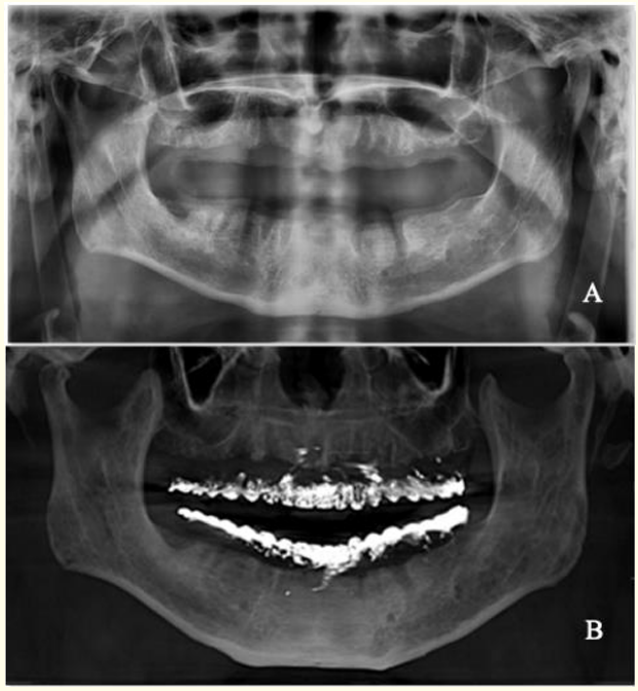
Intraoral photographs. Maxilla, mandible, ridge occlusion. Direct source.

Case planning

Preoperative study: A CBCT scan was performed to analyze bone density. Type III bone (500- 800 HU) was identified in the upper canine region, and type II bone (850-1000 HU) in the lower canine region, according to the Lekholm and Zarb classification.

Using tomography, the corresponding measurements of the width and height of the alveolar process were taken in the areas where teeth 13, 23, 33, and 43 were located (to determine the sizes of the implants to be placed). Likewise, during this planning stage, the Hounsfield units (HU) were obtained: in the upper canine area (type 3 bone), with a range of 500 to 800 HU; and in the mandibular canine area (type 2 bone), with a range of 850 to 1000 HU. These are a determining factor for the viability of the treatment (Figures

5 and 6). Subsequently, the virtual placement of the implants in the selected areas and the fabrication of the restrictive guides were carried out.

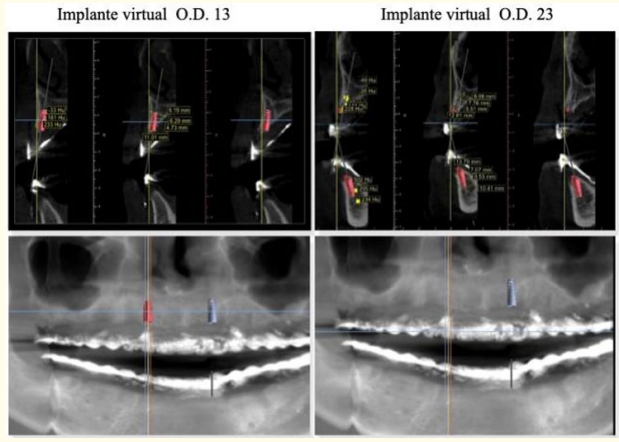


Panoramic radiograph and radiograph.

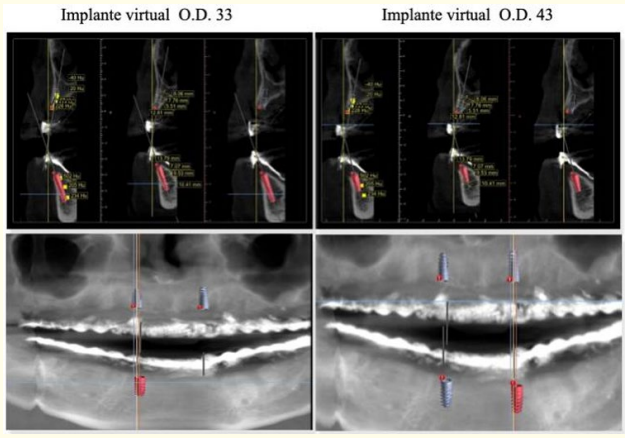
Non-restrictive surgical guides, upper and lower.

Surgical plan:

- Placement of four Adin Touareg® implants (4.2 × 10 mm).
- Biological technique in the upper jaw.
- Traditional technique in the mandible.
- Implant-mucosa-supported prosthesis with Grip® system.



Virtual implant placement.



Virtual implant placement.

Surgical procedure

Under local anesthesia with 2% mepivacaine with epinephrine, the implant sites were prepared.

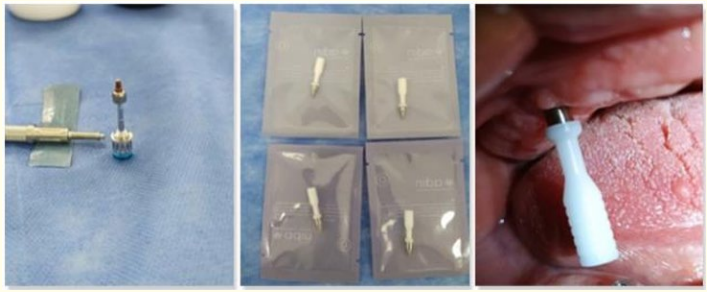
- In the maxilla, the biological drilling technique was applied, using helical burs at 50 rpm without irrigation, allowing for the harvesting of autologous bone.
- In the mandible, the traditional drilling technique was used, at 1000 rpm with continuous irrigation of physiological saline solution to prevent overheating.

The implants were placed with a torque of 35 Ncm, achieving primary stability. No intraoperative complications were observed.

Prosthetic Phase

At three months, the healing screws (4.5 × 4 mm) were placed for 30 days, creating an adequate emergence profile. Subsequently, 3

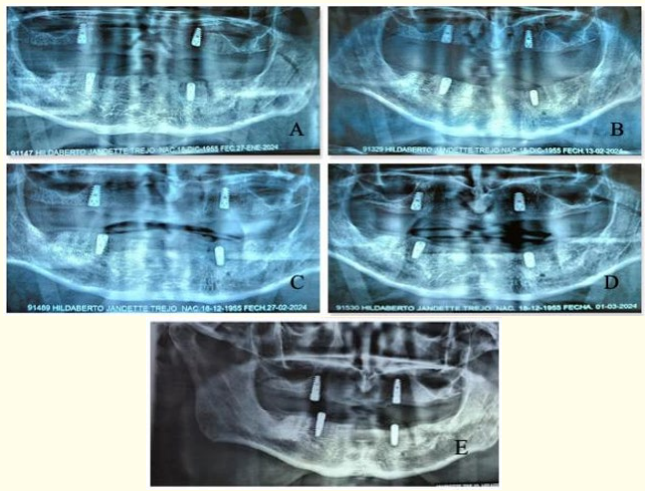
mm Grip® attachments were installed, and the definitive implant-mucosa-supported overdenture was adapted.



Attachment PlacementGrip®.

Results

Clinical and radiographic follow-up showed proper osseointegration and adequate soft tissue coloration. The patient reported a marked improvement in masticatory function and prosthetic stability. No signs of inflammation, mobility, or significant marginal bone loss were evident during the 90-day follow-up period. The implant-mucosa-supported prosthesis provided superior retention, support, and comfort compared to conventional prostheses.



Radiographic Control of Implants.

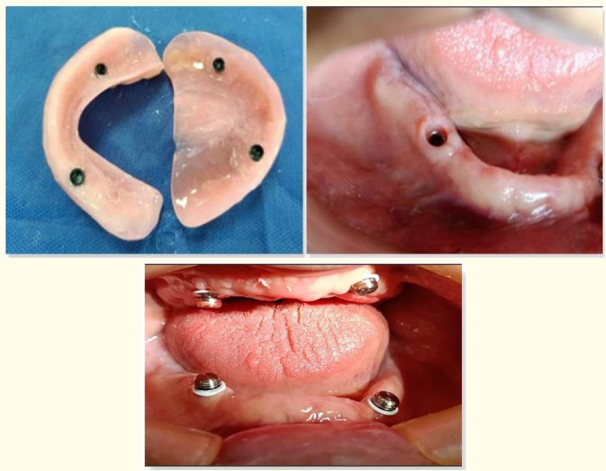
Discussion

Scientific literature indicates that osseointegration depends largely on thermal control during drilling (Bränemark & Adell, 1981; Anitua, 2004). In this case, both techniques proved effective, provided the biological conditions of the recipient bone are respected.

The biological technique favors cell viability by avoiding overheating, also allowing the collection of autologous bone useful for regeneration (Misch, 2008). However, it requires greater surgical experience and operating time. On the other hand, the traditional

technique allows for faster and more controlled drilling in dense bone, reducing the risk of thermal necrosis through adequate irrigation (Pikos, 2014).

The results obtained coincide with the reports of Velazco-Ortega (2015) and Zarb (1998), who highlight that implant-mucosa-supported rehabilitation on two implants in the canine area offers a functional, aesthetic, and economical solution with high predictability.



Attachments in prostheses and in the oral cavity.

Conclusion

The combination of biological and traditional milling techniques, applied according to bone density, allows for proper osseointegration and prosthetic stability in completely edentulous patients. The implant-mucosa-supported overdenture represents an effective, predictable, and accessible rehabilitative alternative that improves the patient's quality of life in terms of function, aesthetics, and comfort.

Happy patient.

This case demonstrates that both milling techniques can coexist in a complementary manner within the same treatment, provided that the protocol is individualized according to the patient's anatomical characteristics.

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