

Maxillary fixed **full-arch** rehabilitation

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The use of zygomatic implants inserted in immediate function through the extra-maxillary technique presents a viable solution for patients with insufficient bone volume in the maxilla. This article presents a clinical case of an upper maxillary implant-supported fixed rehabilitation in a woman with atrophic maxilla, employing the All-on-4 hybrid concept. This rehabilitative approach offers numerous advantages over alternative therapeutic strategies, including enhanced predictability, increased simplicity, and a superior success rate.

Introduction

The use of zygomatic implants has become a good treatment alternative for the rehabilitation of the severely atrophic maxilla,^{1–3} eliminating donor graft site morbidity, and reducing the overall cost of surgical and prosthetic treatment while maintaining excellent patient satisfaction outcomes.^{4,5}

There is generally a low frequency of complications reported in the literature with the use of zygomatic implants: the most prevalent complication seems to be sinus infections,^{1,2,6–10} followed by mechanical complications^{10,11} and, to a smaller degree, functional complications.^{12,13} This group of complications may have a connection to classi-

cal surgical techniques for inserting zygomatic implants.¹⁴ For example, the internal technique¹⁵ consists in the insertion of the zygomatic implant intra-sinus, with a potential increased probability of sinus complications and a bulky prosthesis caused by the palatal emergence. The extra-maxillary surgical technique aims to overcome these limitations, by placing the zygomatic implant extra-maxillary (external to the maxillary sinus before anchoring in the zygomatic bone, covered only by soft tissue along its lateral maxillary surface)¹⁶ providing the preservation of the Schneiderian membrane and a decreased vestibular-palatine width of the prosthesis due to the more crestal emergence of the zygomatic implant. The aim of the present case report is to describe the short-term outcome of a fixed prosthetic rehabilitation of the atrophic maxillae supported by standard and zygomatic implants placed through the extra-maxillary surgical technique.

Case report

A 64-year-old Caucasian woman has been under our care since 2004, following the successful placement of an All-on-4 implant in the mandible (Fig. 1). She had been completely edentulous in the upper arch for over 30 years and expressed a strong motivation to undergo surgical

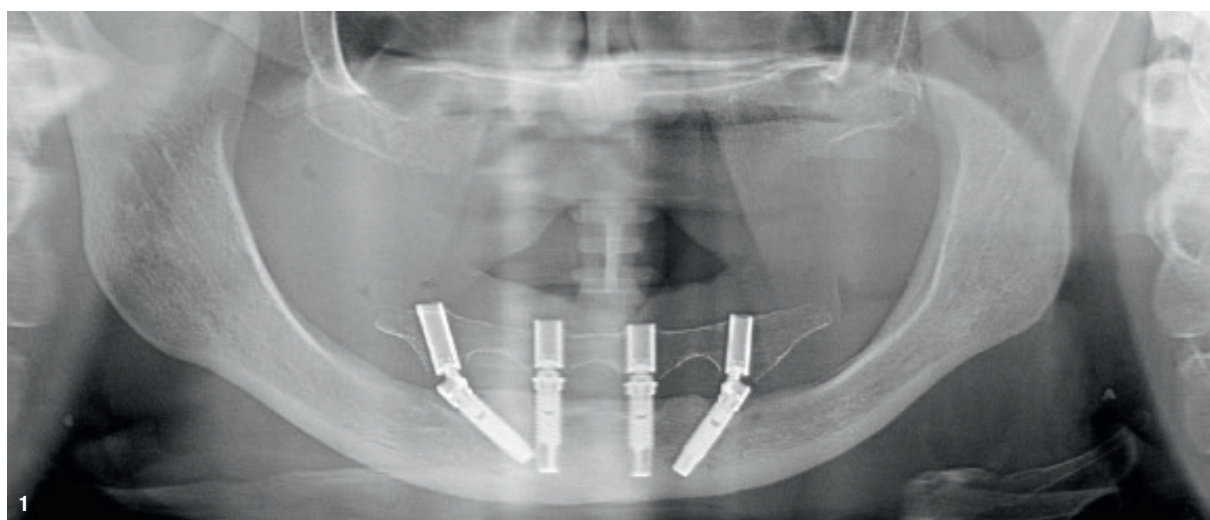


Fig. 1: Pre-operative orthopantomogram.

intervention to restore her upper jaw. Her primary objectives were to secure fixed prosthetic teeth and to restore both masticatory function and aesthetic appearance (Fig. 2).

The proposed treatment plan entailed total rehabilitation of the upper jaw with the All-on-4 hybrid technique and was presented in February 2024. The surgical procedure in the upper jaw began with a mucoperiosteal incision performed along the crest of the ridge, slightly palatal (in each quadrant) from the region corresponding to the second molar to the canine. Relieving incisions were done in the first molar area to access the corresponding zygomatic bone. Full thickness flap reflection was performed, and the flap was stabilised using a full arch retractor (Carl Martin) exposing the inferior edge of the zygomatic bone and the insertion of the masseter fascia in the zygomatic arch (distal limit). A second retractor, the zygoma retractor (Carl Martin) was used to access the zygomatic bone body and reflect the soft tissues in this higher level (Fig. 3). The zygomatic implant site was then prepared using a round bur as posterior as possible on both sides, to reduce the cantilever to a minimum. This was followed by 2.9 mm drill (Nobel Biocare), a depth indicator to verify the correct length of the implant, and drills of 3.5 mm, 4.0 mm, and 4.4 mm (Nobel Biocare) used sequentially. During preparation, the soft tissues were reflected and protected, with particular attention being paid to the base of orbit to prevent damage to its contents.

One zygomatic implant (Nobel Zygoma 0°, Nobel Biocare) measuring 5 mm in diameter and 42.5 mm in length was placed with an insertion torque of >50 Ncm in each quadrant in the position of the second premolar (Fig. 4). To compensate for the slope of the implants, 45°/6 mm angulated abutments were used (Multi-Unit Abutment, Nobel Biocare) with a torque tightened at 30 Ncm.¹⁷ Two straight implants (Nobel Speedy Groovy, Nobel Biocare) measuring 3.3 mm in diameter and 11.5 mm in length were placed with an insertion torque >50 Ncm in the anterior region (13 and 21) and two straight abutments of 3 mm (13) and 2 mm (21) were used (Multi-Unit Abutment, Nobel Biocare) with a torque tightened at 25 Ncm (Fig. 5). The flap was repositioned and sutured (4/0 silk; B. Braun Medical; Fig. 6).

The patient's existing PEEK denture was captured directly in the mouth and converted into an immediate fixed prosthesis.

Fig. 2: Intra-oral preoperative occlusal photograph of the maxilla. **Fig. 3:** Intra-oral photograph capturing the inferior view of the zygomatic bone. **Fig. 4:** Intra-oral occlusal photograph demonstrating the placement of a 42.5 mm zygoma implant at 0° in the second quadrant, with flap retraction supported by a zygomatic retractor and a full arch retractor (Carl Martin). **Fig. 5:** Intra-oral occlusal photograph displaying implants and abutments positioned according to the All-on-4® hybrid protocol. **Fig. 6:** Intra-oral occlusal photograph following suturing.

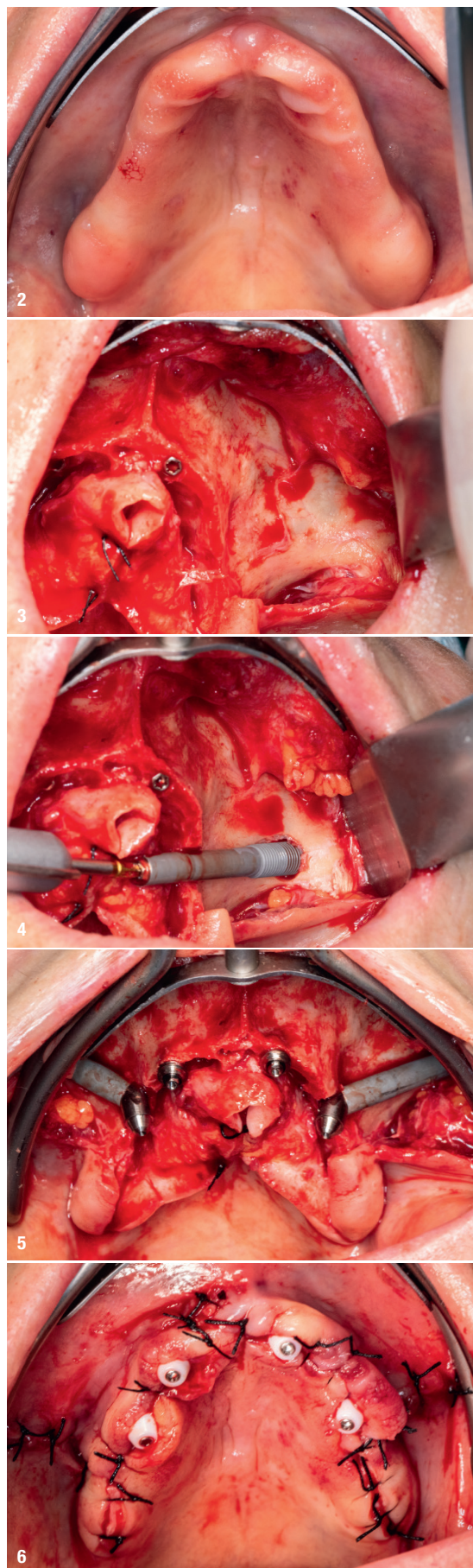




Fig. 7: Intra-oral occlusal photograph of the provisional fixed prosthesis post-delivery. **Fig. 8:** Extra-oral smile photograph showcasing the provisional fixed prosthesis after delivery.

The provisional bridge was finished in the dental laboratory and delivered to the patient's mouth 90 minutes after the surgery ended, achieving immediate function (Figs. 7 & 8).

On day ten post-operation, the patient was seen in the follow-up clinic for removal of sutures; the wound was noted to be healing well and a system for patient follow-up at two, four and six months post-surgery was established (Fig. 9).

Discussion

The present clinical case reports the short-term outcome of a fixed prosthesis supported by immediate function zygomatic implants inserted extra-maxillary with 45-degrees angulated abutments in conjunction with standard implants for the rehabilitation of a severely atrophic maxillae, with high success rates for prosthesis, implants, and abutments. This concept of rehabilitation

has several advantages over other therapeutic strategies, namely bone grafts: higher predictability, more simplicity, higher success rate, higher patient comfort and aesthetics, and the possibility of immediate function through provisional low-cost prostheses.^{6,18,19} The biggest advantage of applying the All-on-4 extra-maxilla hybrid technique over other techniques lies in the high success rate it can achieve, in contrast to bone grafting techniques (from iliac crest, for example). Using extra-long implants placed externally anchored into the maxilla and zygomatic bone allowed overcoming the anatomical limitations posed, thus opening a new approach to use fixed implant-supported rehabilitation in extreme situations.^{6,20}

The importance of planning in advance the rehabilitation of totally edentulous cases with implants must be stressed: whether carried out pre-surgically (using anamnesis, clinical examination and imaging), surgically (through non-guided or guided surgery—static or dynamic) or post-surgically (using an appropriate follow-up regimen).

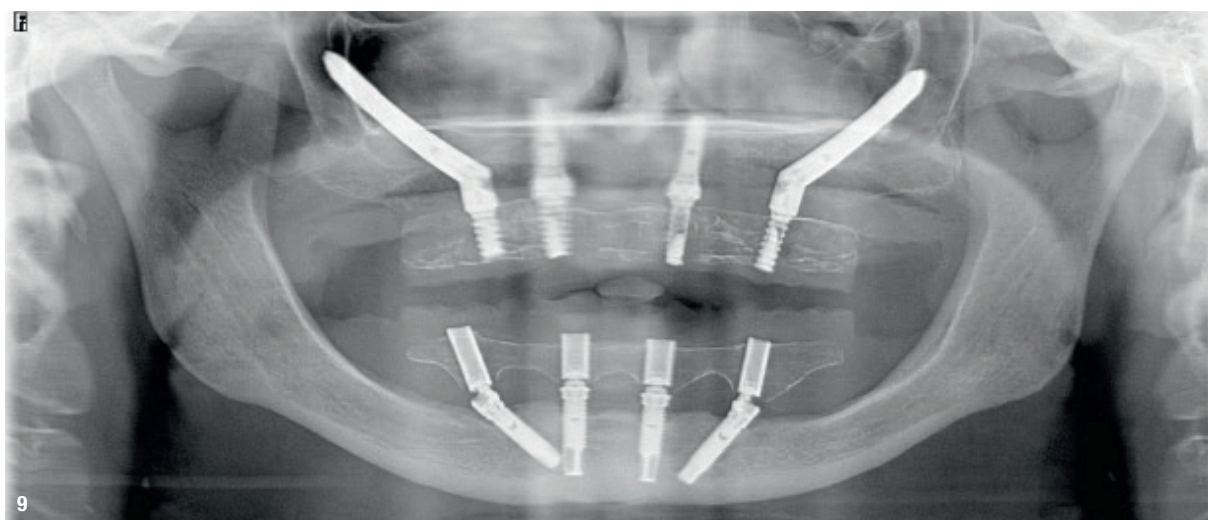


Fig. 9: Post-operative orthopantomogram.

Conclusion

This case study illustrates that the All-on-4 hybrid concept is a viable treatment option for patients with significant atrophy in the upper jaw. Despite the challenges posed by extensive bone loss, this innovative approach enables effective rehabilitation, providing patients with a functional and aesthetically pleasing solution. The All-on-4 protocol utilises only four strategically placed implants to support a complete arch of prosthetic teeth, which minimises the need for bone grafting and other invasive procedures.



about the authors



Dr Armando Lopes graduated from the University of Lisbon in 2003 and joined MALO CLINIC in 2004 as Director. He specialises in oral surgery and implant rehabilitation, particularly in MALO CLINIC and All-on-4 protocols. He holds a Master's (2013) and PhD (2019) from the University of Granada and has published several scientific works.



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