15-year follow-up clinical case

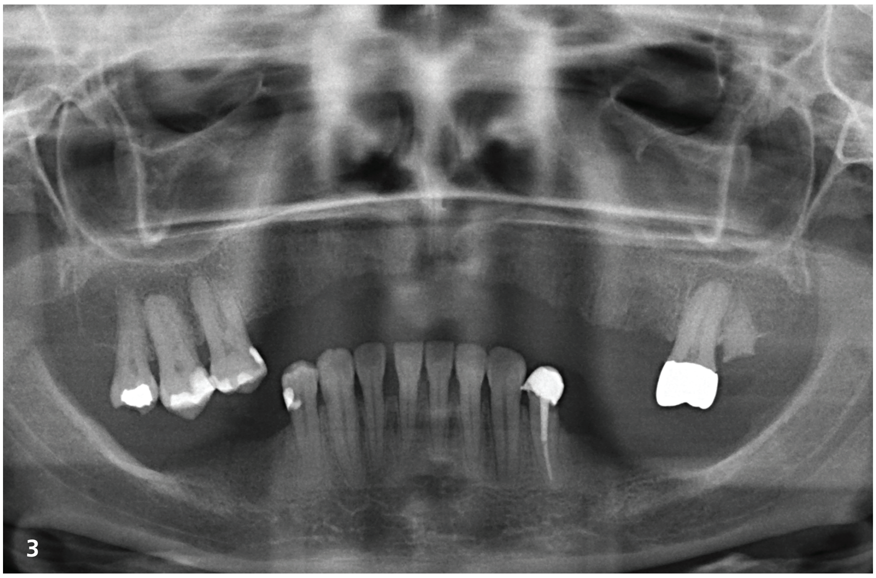
Rehabilitation of severe maxillary ridge atrophy with short mandibular implants

Dr Eduardo Anitua, Spain

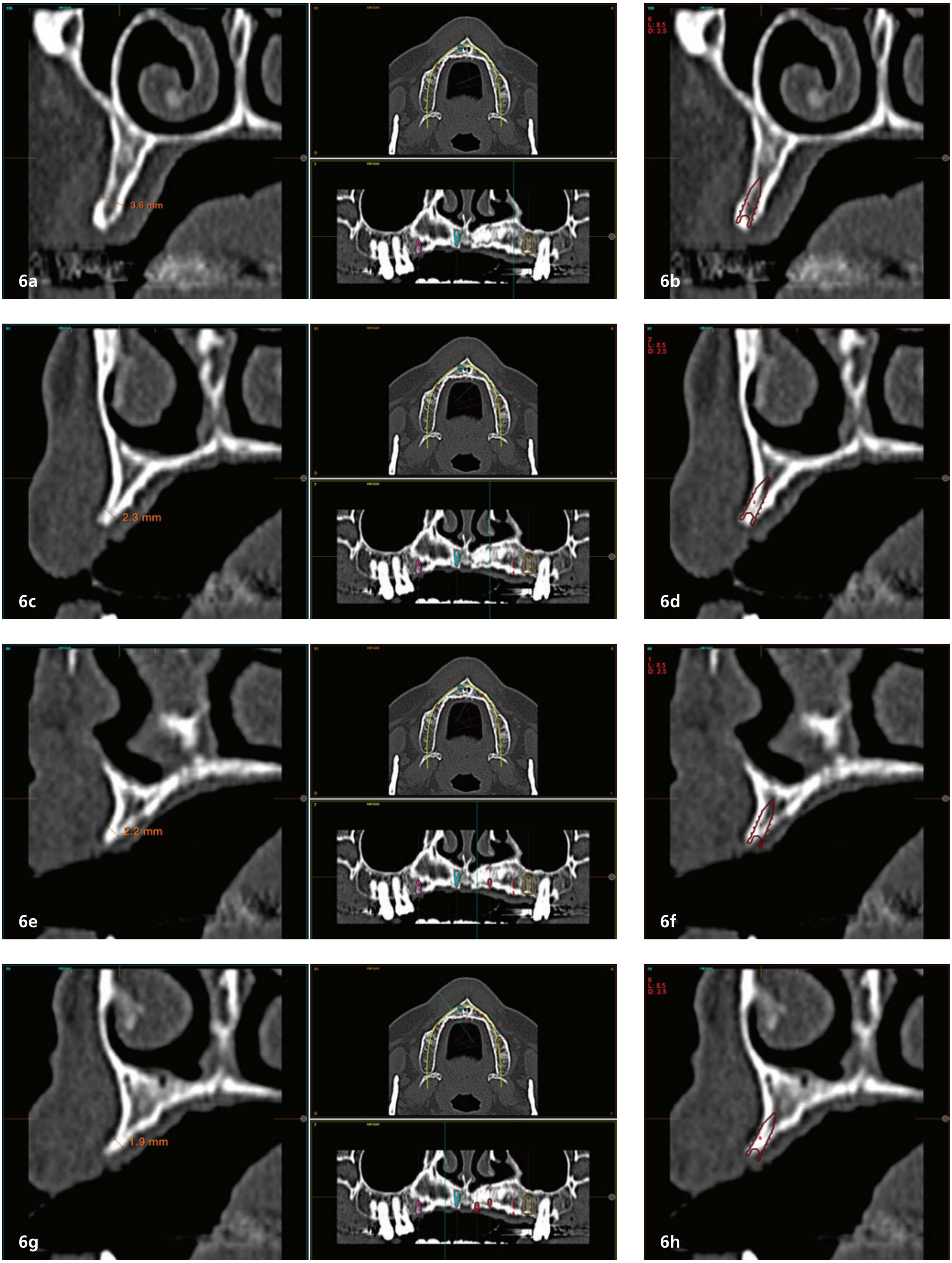
Oral implantology has experienced significant development in recent decades, offering increasingly effective and less invasive solutions for the rehabilitation of patients with bone atrophies.[1–3] In our practice, we frequently observe cases of vertical, horizontal, and mixed bone atrophies that require advanced techniques for their rehabilitation using dental implants.[4,5] Surgical and rehabilitative techniques for the maxilla and mandible have evolved considerably, adopting a minimally invasive approach in line with other medical disciplines.[6,7] Procedures that were considered innovative just a decade ago have now become standard in daily clinical practice. The optimisation of these techniques has improved treatment predictability, reduced patient morbidity, and shortened recovery times, transforming the landscape of modern implantology.[8]

One of the most significant advances in this field has been the two-phase ridge expansion or split technique with transitional implants, described by our research group in 2011.[10] This procedure was designed to treat severe horizontal bone atrophies, achieving an increase in total bone volume and a better final implant position compared to the conventional split method.[10,11] The validation of this technique was supported by the publication of a pilot study, and today, 14 years later, it has become a routine practice in implant rehabilitation.[10–13]

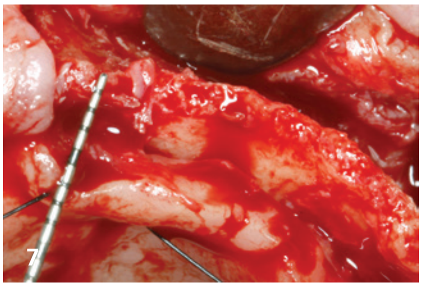


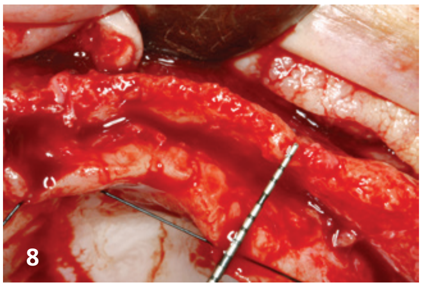


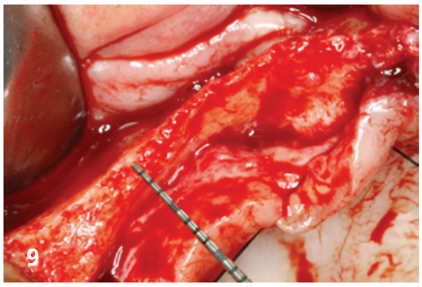
Figs. 1+2: Intra-oral images of the patient without the prosthesis, showing a thin mucosa covering the upper alveolar ridge, which appears narrow. – **Fig. 3:** Initial radiograph of the patient. It shows vertical atrophy in both posterior mandibular sectors and an edentulous section in the upper maxilla, which the patient wishes to rehabilitate with dental implants. – **Figs. 4+5:** Images of the initial diagnostic wax-up with the teeth to be replaced.

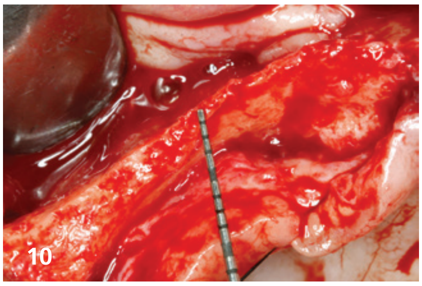


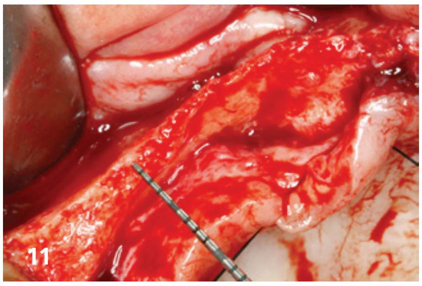
Figs. 6a–h: Cone-beam scans of the entire anterior maxillary region, revealing severe horizontal atrophy and the possibility of performing a two-phase split to achieve the necessary width for placing conventional-diameter implants in the correct axis.

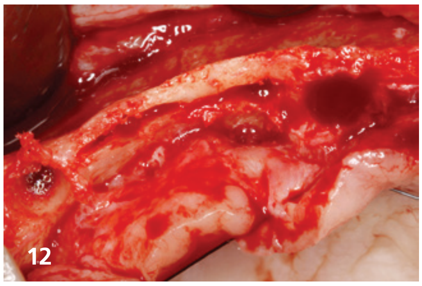


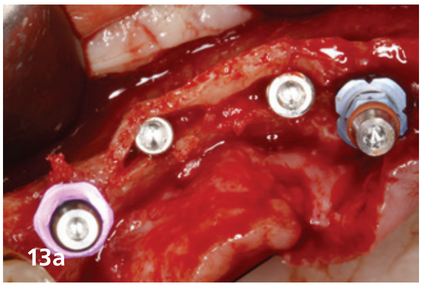


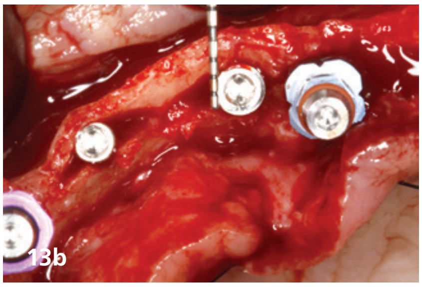


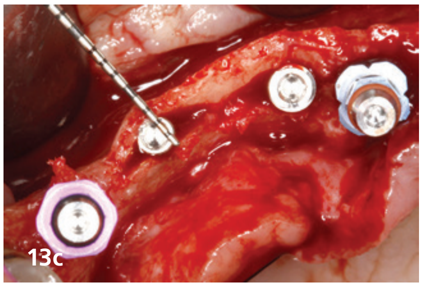


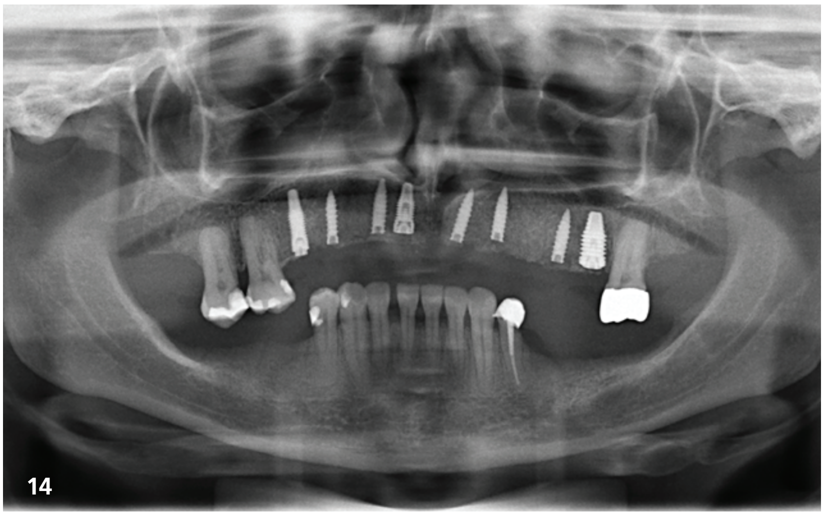


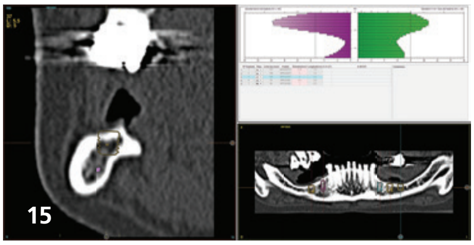


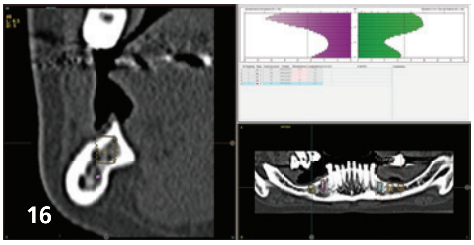












Figs. 7–10: Intraoperative ridge width measurements using a periodontal probe. These images show a ridge width between 2 and 3 mm. – **Figs. 11+12:** Residual bone crest before and after the initial perforations for the transitional implants, following the use of the first expander and separation of the cortical plates. – **Figs. 13a–c:** Placement of the transitional implants and final bone width after the procedure, which, as seen, has doubled compared to the initial measurement. – **Fig. 14:** Panoramic radiograph taken after the initial surgery, showing the two-phase split procedure and the placement of transitional implants. – **Figs. 15+16:** Cone-beam planning scans of the mandible for the placement of short implants in both posterior mandibular sectors.

Likewise, short and extra-short implants have represented a crucial advancement in the treatment of height atrophies in the maxilla and mandible. With extensive clinical experience and long-term follow-up, these implants have proven to be an effective alternative to avoid more invasive procedures such as bone grafts or sinus lifts, significantly reducing the surgical impact on the patient.[14–16]

When both procedures are used together, they provide a highly effective solution for the most challenging cases, where vertical and horizontal bone atrophies coexist. This combination allows for easier management of complex situations, ensuring predictable rehabilitation with a lower rate of postoperative complications.

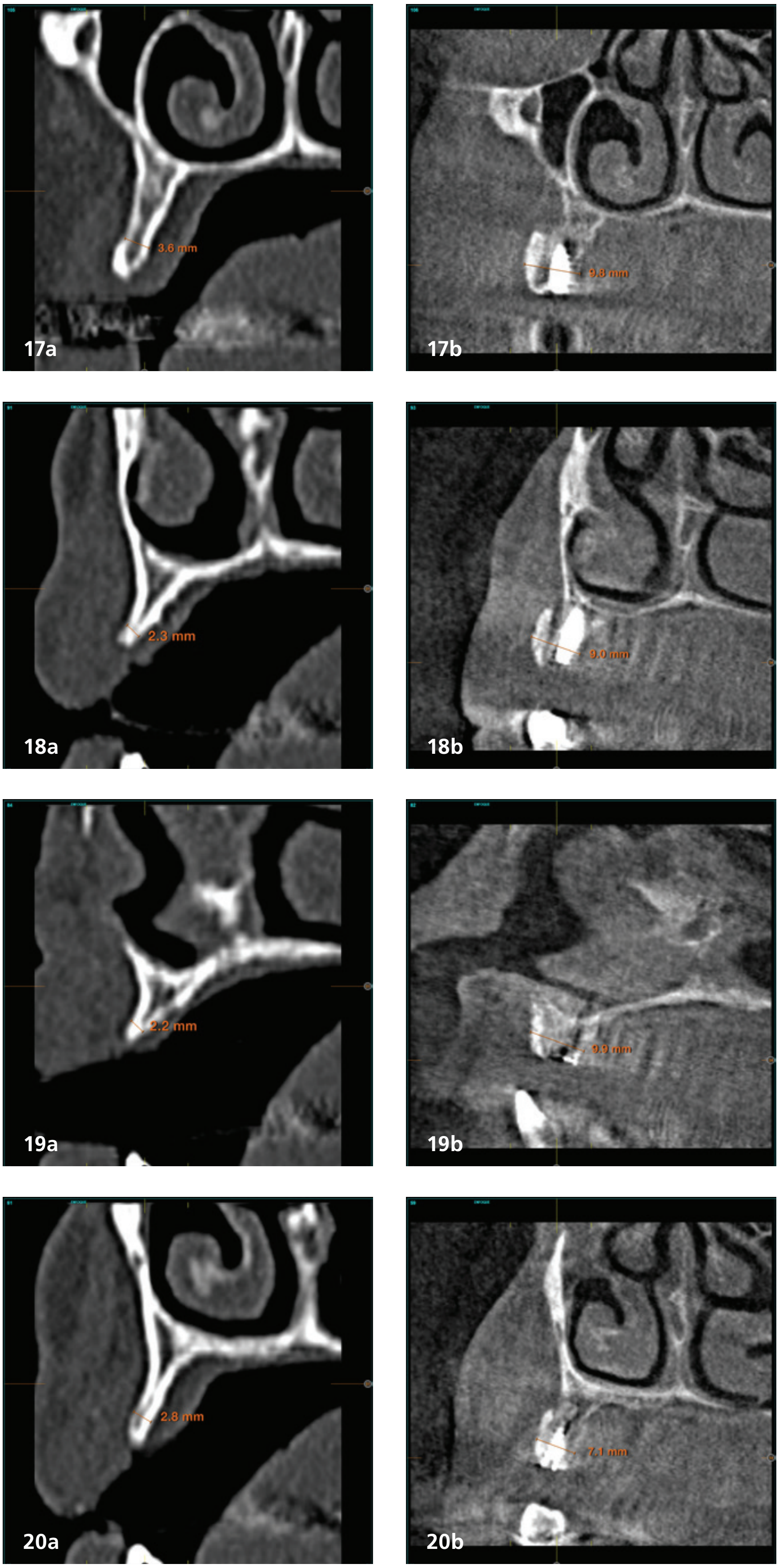
We present a clinical case demonstrating a successful 15-year rehabilitation using a two-phase expansion with transitional implants in areas of severe horizontal atrophy and extra-short implants for height loss (Figs. 1–34). The outcome has been successful after a 15-year follow-up period, ensuring stable long-term rehabilitation without incidents or complications, further reinforcing the effectiveness of these techniques in addressing complex cases.

Discussion

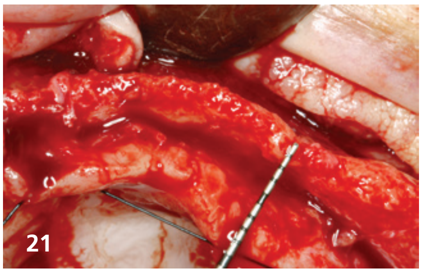
Implantology, both in its surgical and prosthetic aspects, is in constant evolution, with modifications in procedures aimed at optimising long-term outcomes.[17, 18] Severe bone atrophies, such as those presented in this clinical case, represent a considerable challenge in implant rehabilitation, yet their incidence in daily practice has been increasing. This trend may be attributed both to the failure of previous implant treatments and to the growing demand from long-term edentulous patients seeking to benefit from implant placement.[19]

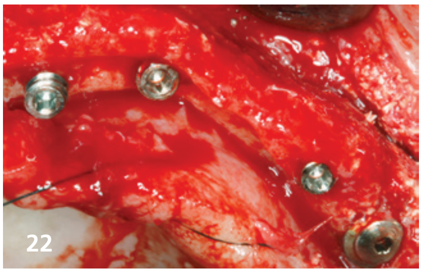
Traditionally, these cases relied on advanced bone regeneration procedures, such as autologous grafts, guided bone regeneration techniques, or maxillary sinus lifts.[20] However, these approaches present certain limitations, including the waiting period for bone integration, donor site morbidity in the case of autologous grafts, and an increased risk of complications.[19–22] Therefore, having resources such as short and extra-short implants, as well as two-phase split techniques, is essential for offering less invasive therapeutic approaches with long-term successful outcomes, as demonstrated in the follow-up of this case.

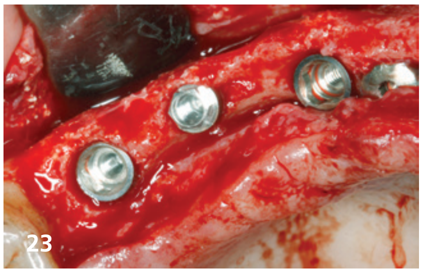
Current studies have shown that reduced-length implants can achieve success rates comparable to or even superior to those of conventional implants when applied

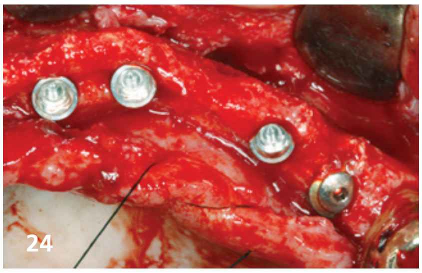


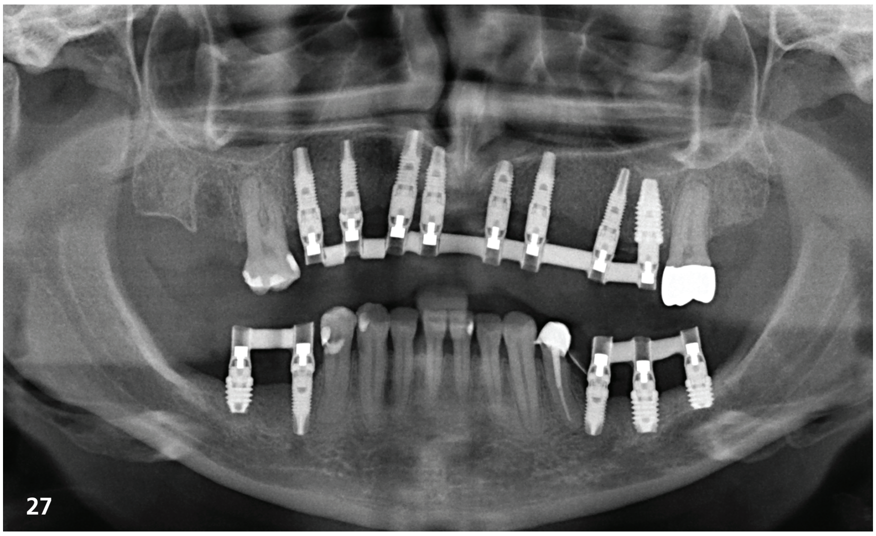
Figs. 17a–20b: Initial images and follow-up cone-beam scans showing the achieved width after the two-phase expansion.

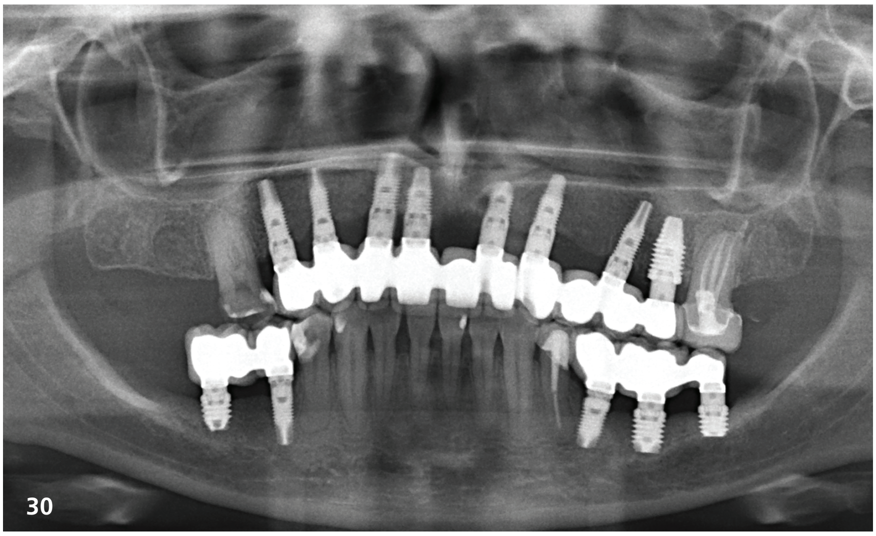












Figs. 21+22: Initial and re-entry images for the removal of transitional implants and placement of the definitive implants. – **Figs. 23+24:** Images showing the placement of the definitive implants after the removal of the transitional implants. – **Figs. 25+26:** Clinical images of the patient with the progressively loaded prosthesis, fabricated and placed hours after implant insertion. – **Fig. 27:** Radiograph of the newly placed prosthesis. – **Figs. 28+29:** Definitive prostheses placed in the patient. – **Fig. 30:** Radiograph taken at the time of definitive prosthesis placement. – **Figs. 31+32:** Initial and final images of the case at 15 years of follow-up.

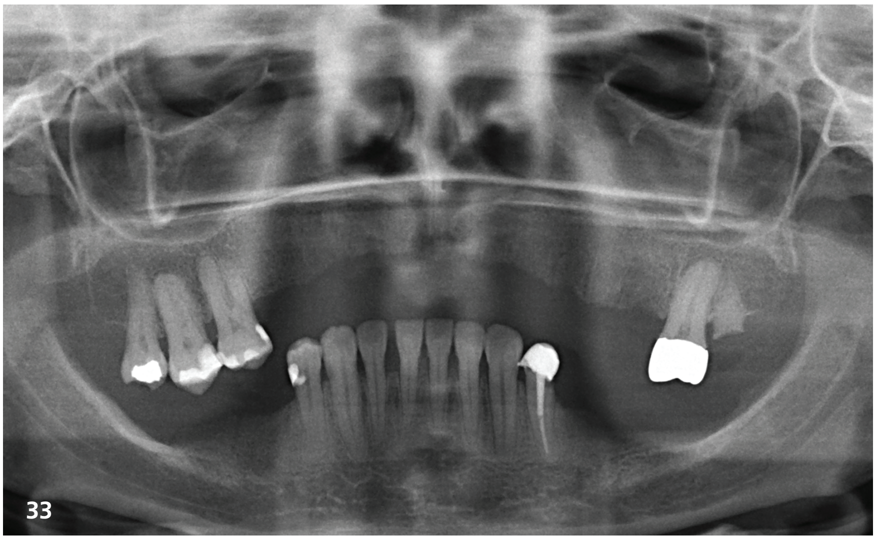
under appropriate biomechanical criteria.[23,24] The optimised design of these implants, featuring treated surfaces that enhance osseointegration and specific geometries that optimise load distribution, has been key to their establishment as a valid alternative in modern implantology.

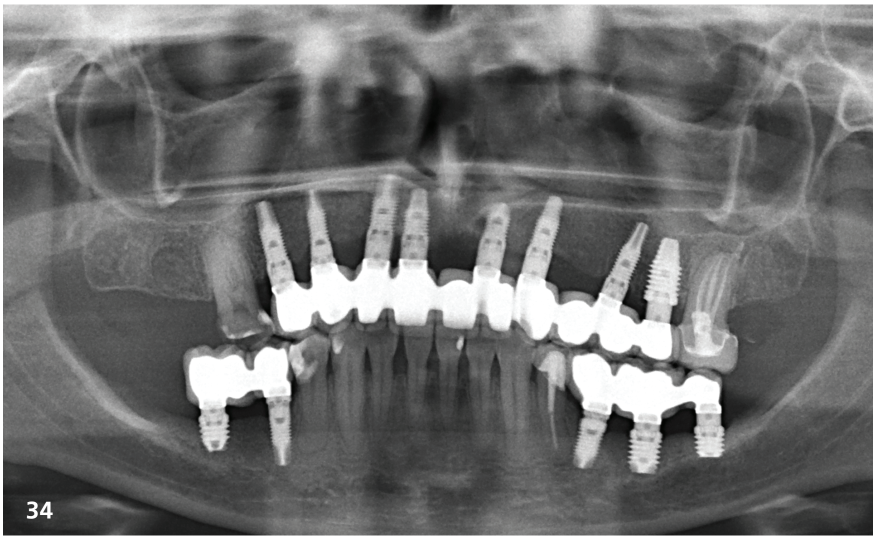
Meanwhile, the split crest technique allows for an increase in bone bed volume without the need for additional grafts in many cases. This technique is particularly useful in patients with moderate to severe horizontal atrophy, where the available bone width is insufficient for the placement of conventional implants.[25] One of the primary benefits of the split crest technique is that it allows for the immediate insertion of implants within the same surgical session, reducing treatment times compared to guided bone regeneration techniques or autologous grafts, which require prolonged waiting periods for bone consolidation. Additionally, by preserving the vascularisation of the expanded segment and minimising surgical trauma, better healing and long-term implant stability are promoted.

With the description of this technique variant using a transitional implant, the vestibular inclination of the implant—one of the main issues of the original technique—can be reduced.[10,11] The combined use of both procedures can be an effective and predictable alternative, as demonstrated in this clinical case with extensive follow-up and excellent results in terms of treatment stability and implant survival.

Conclusions

The most severe cases of combined atrophies require solutions that integrate multiple surgical techniques, always prioritising those with lower morbidity for the patient to ensure a comfortable and predictable long-term procedure. As demonstrated in the presented clinical case, the bone gains achieved through the two-phase split technique and transitional implants have been maintained throughout the follow-up period, allowing them to be considered predictable and stable over time.





Figs. 33+34: Initial and final radiographs at 15 years of follow-up.

Author details

References

Contact address
Eduardo Anitua DDS, MD, PhD
Eduardo Anitua Foundation
Vitoria, Spain
eduardo@fundacioneduardoanitua.org
www.fundacioneduardoanitua.org