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Transsinus Implant with Immediate Loading in Full Arch Rehabilitation

Transsinus Implantation and Immediate Function for Full-Arch Reconstruction

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Summary

This case report describes the rehabilitation of an atrophic maxilla in a 67-year-old male patient with a history of osseointegration failure of previous implants. After clinical and tomographic evaluation, two implants were placed: a conventional implant in the region of tooth 22 and a long transsinus implant in the region of tooth 24, due to significant bone loss. The procedure involved the use of angled implants with immediate loading, followed by bone grafting in the maxillary sinus. A fixed prosthesis was installed two days after surgery. After 18 months of follow-up, the implants showed primary stability, bone levels remained stable, and no complications were observed. This case demonstrates that the angled implant technique, including the transsinus approach with immediate loading, can be an effective alternative for the rehabilitation of atrophic maxillae.

Keywords: Immediate loading; Tilted implants; Transsinus implants; Atrophic maxilla; Full arch rehabilitation.

Abstract

This case report describes the rehabilitation of an atrophic maxilla in a 67-year-old male patient with a history of osseointegration failure of previous implants. After clinical and tomographic evaluation, two implants were placed: a conventional implant in the region of tooth 22 and a long transsinus implant in the region of tooth 24, due to significant bone loss. The procedure involved the use of angled implants with immediate loading, followed by bone grafting in the maxillary sinus. A fixed prosthesis was installed two days after surgery. After 18 months of follow-up, the implants showed primary stability, bone levels remained stable, and no complications were observed. This case demonstrates that the angled implant technique, including the transsinus approach, with immediate loading, can be an effective alternative for the rehabilitation of atrophic maxillae.

Keywords: Immediate loading; Angled implants; Transsinus implants; Atrophic maxilla; Full arch rehabilitation.

1. Introduction

Severe bone atrophy in the posterior maxilla is a common condition in edentulous patients.
result of bone resorption after tooth loss and pneumatization of the maxillary sinus.(1) This
This characteristic limits the conventional placement of implants, requiring specific techniques for...
to overcome this limitation. One of these techniques is maxillary sinus lift with bone grafting, which is
It is widely performed; however, it has the disadvantage of a longer treatment time and greater...

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morbidity.(2,3) The transsinus implant technique was developed to overcome these limitations, allowing anchorage in regions of greater bone volume, such as the canine pillar, which reduces the treatment time and reduces morbidity.(4,5) Recent studies show that this technique achieves an efficacy rate of 97.2% in patients with severe maxillary atrophy.(6)

The transsinus implant technique was introduced in 2012 and has evolved since then.(5) In this technique, the implants are inserted at specific angles, achieving anchorage in region of greater bone support, reducing the *cantilever* of the prosthesis.(7) Studies show a high rate The surgical technique is very similar to that of implants placed in the breast area. maxillary.(8,9) In addition, immediate loading has been validated in selected cases where the Minimum primary stability reaches 32 N (Newtons) and there is an absence of infection at the site. surgical.(10) In 2022, a study indicated that transsinus implants may be an alternative viable for zygomatic implants in cases of insufficient alveolar height.(6)

The indication for transsinus implants is based on computed tomography (CT) scan analysis. (CT), which allows for the evaluation of residual bone thickness and height, maxillary sinus anatomy, and the path ideal up to the anchorage area.(11) Canine pillar anchorage, for example, allows support biomechanically suitable for immediate loading, even in severely atrophic jaws.(12) In addition Furthermore, biomechanical studies demonstrate that the occlusal load distribution is more favorable in tilted implants compared to conventional loads.(7,13)

Despite its advantages, the transsinus implant technique also presents complications. The most frequent complications are sinusitis, implant fracture, and perforation of the sinus membrane during the procedure. technique.(14,15) Complication rates can range from 5% to 10%.(16) Success is linked to Careful patient selection, the use of an appropriate implant design, and post-operative monitoring are all crucial. rigorous operative.(14) A 2013 case series reported a survival rate of 98.6% after one year in 35 patients treated with angled transsinus implants.(17)

2. **Transsinus Implant with Immediate Loading in Full Arch Rehabilitation**

A 67-year-old male patient sought treatment at the Ilapeo Faculty clinic. for the installation of two implants in the regions corresponding to teeth 22 and 24, after failure in Osseointegration of implants previously placed via guided surgery in the maxilla. During the According to the patient's medical history, no systemic problems were reported. On clinical examination, the patient... She presented with a well-fitting complete denture (figs 1 and 2). The tomographic examination revealed... presence of previously installed implants in the region of teeth 12 and 14 and absence of implants in the regions of teeth 22 and 24 and significant loss of bone volume in the region of tooth 24 (fig 3).

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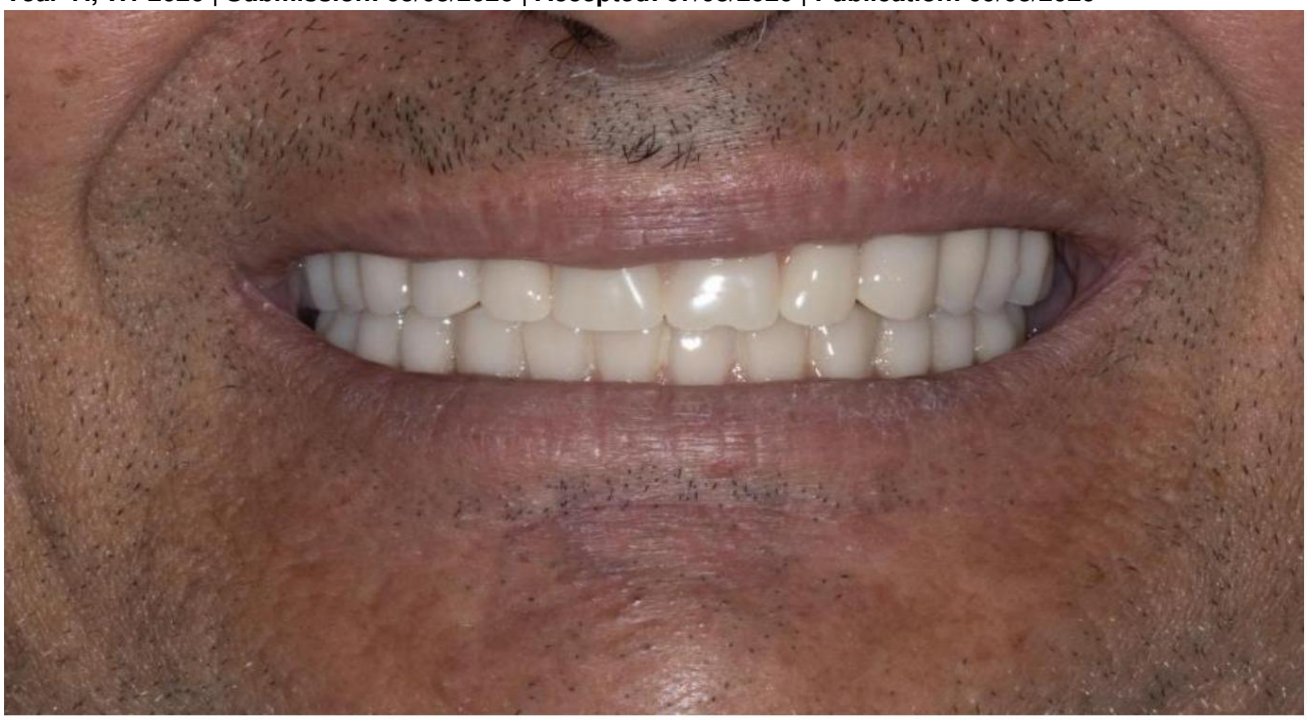

Fig 01 – Smile of a patient with a complete upper denture.

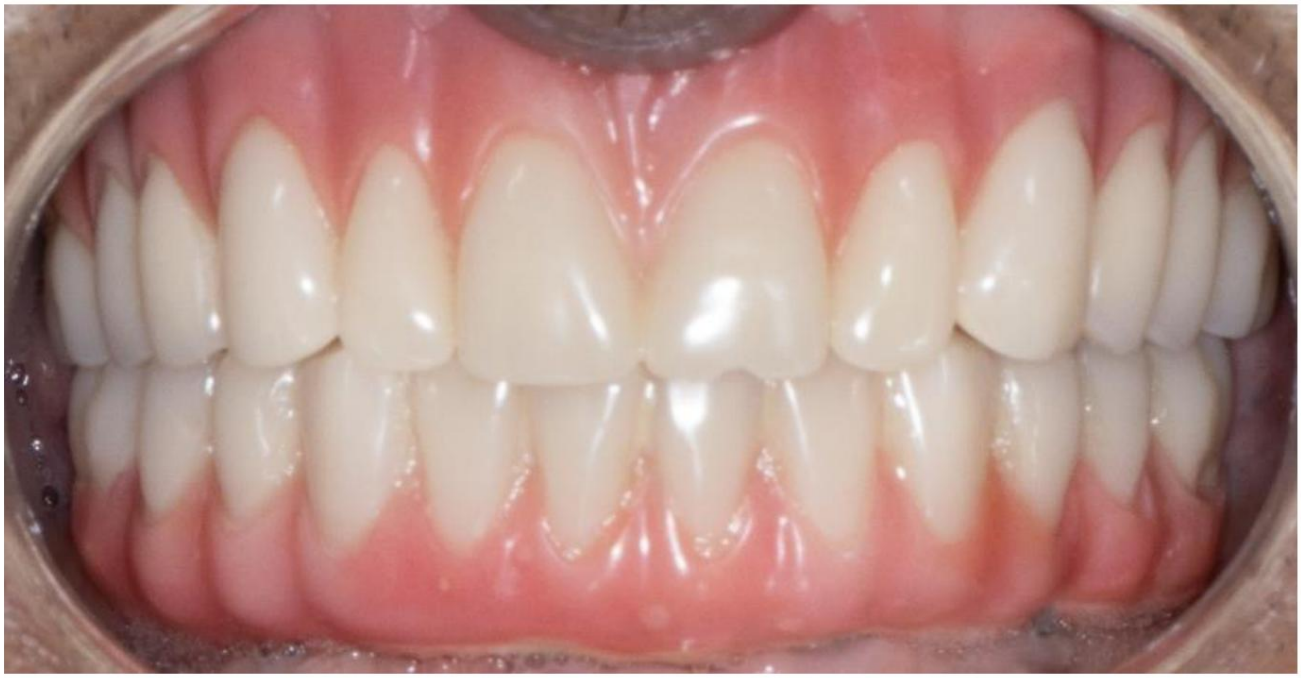

Fig 02 – Intraoral photograph of the prostheses with gingival retractor

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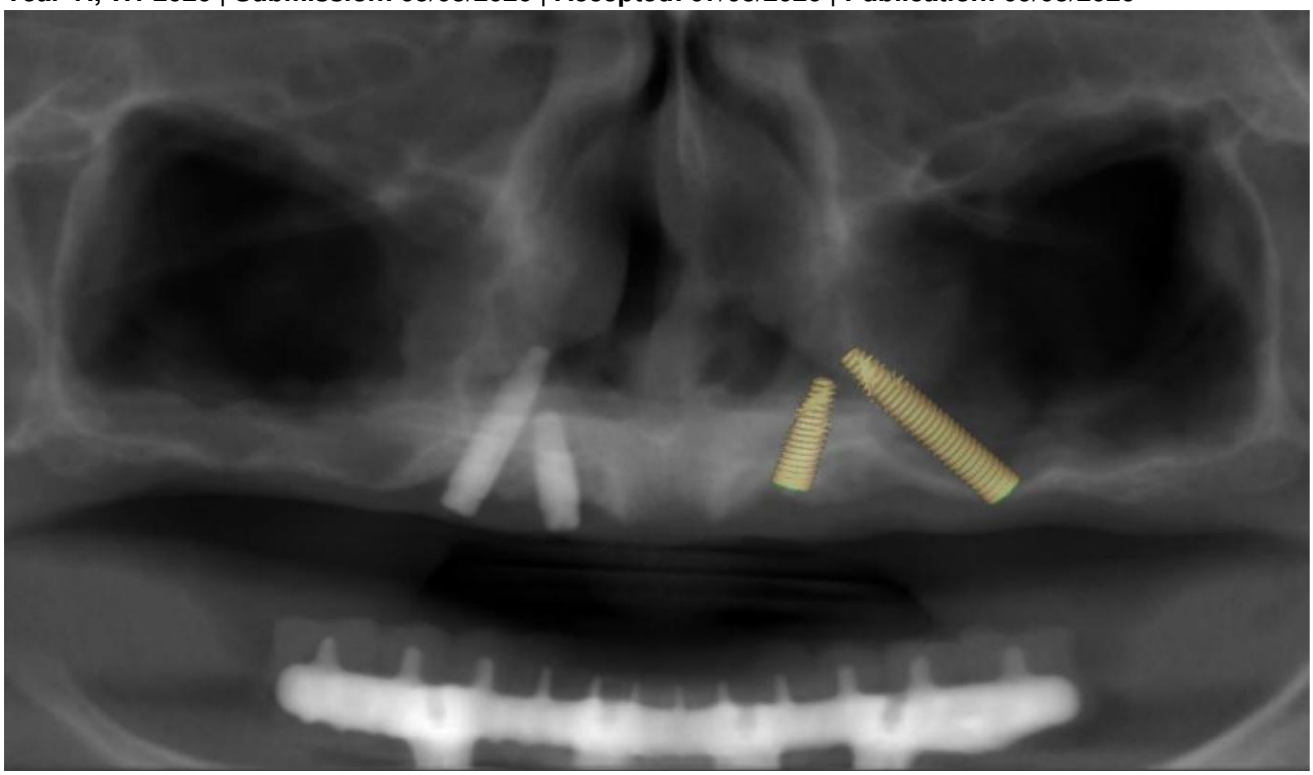
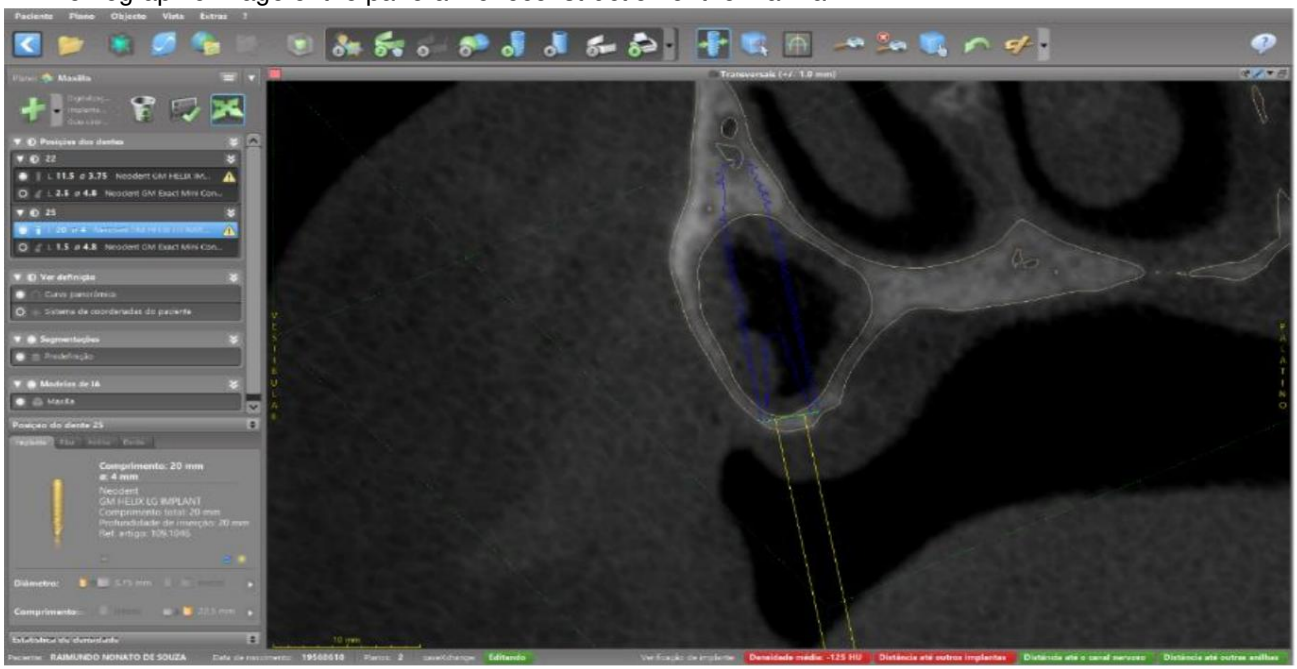


A – Tomographic image of the panoramic reconstruction of the maxilla.



B – Tomographic image of the cross-section of the implant planning 24.

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C - Tomographic image of the cross-section of the implant planning 22.

Fig 03 – Surgical planning performed with the aid of Codiagnostix® software.

A – Tomographic image of the panoramic reconstruction of the maxilla.

B – Tomographic image of the cross-section of the implant planning 24.

C - Tomographic image of the cross-section of the implant planning 22.

Surgical planning, based on clinical and tomographic evaluation, determined that for the

For the region of tooth 22, the installation of a conventional implant; however, for the region of tooth 24, due to...

Due to bone limitation, a long transsinus implant was chosen. fig codiagnostix (fig 3).

Prior to surgery, facial asepsis and intraoral asepsis with mouthwash were performed.

oral Bluem®. Then the greater palatine, nasopalatine, and superior alveolar nerves were...

anesthetized with 2% mepivacaine (DFL).

The surgical procedure began with an incision in the bony crest that extended from the line.

The incision extends from the middle to the posterior region of the left maxilla. Then a vertical relaxing incision is made.

A full-thickness flap was created along the upper labial frenulum (Fig. 4).

An osteotomy was performed to access the paranasal sinus and retract the membrane.

Schneider, using the Cadwellulc technique in the region of tooth 24 (fig 5).

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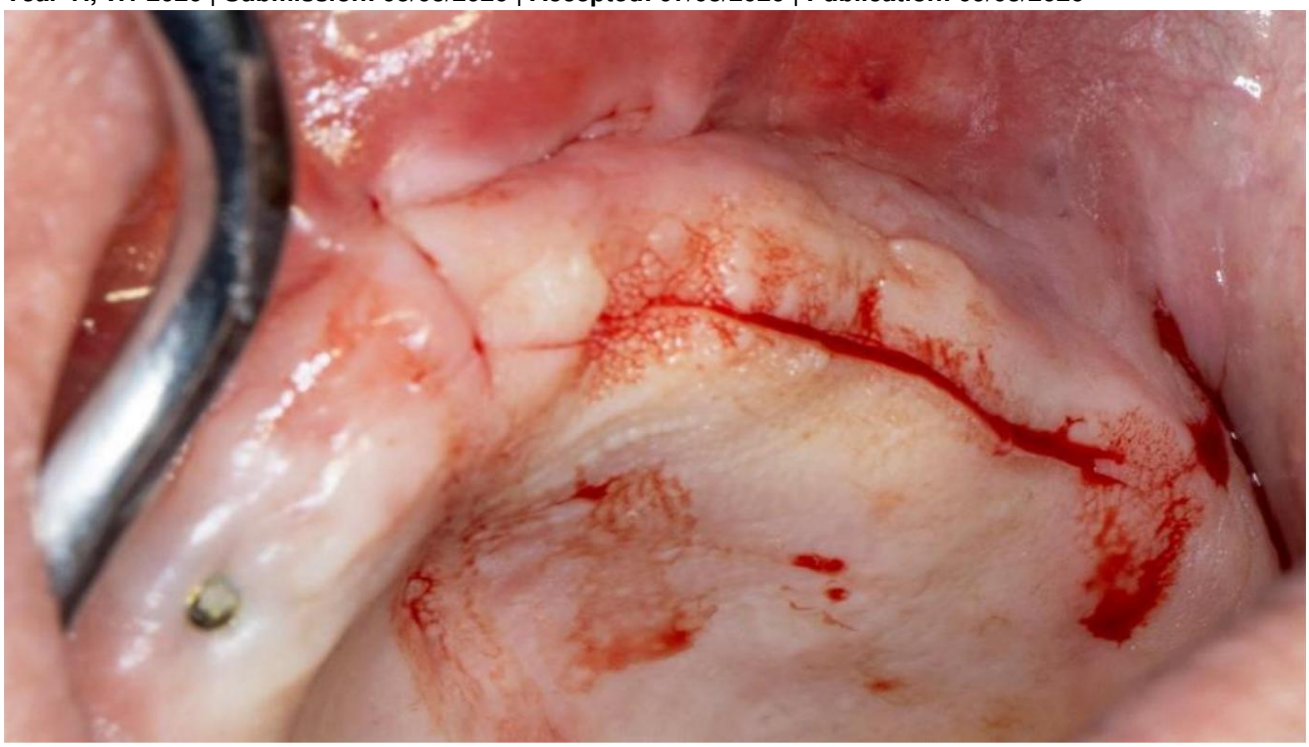
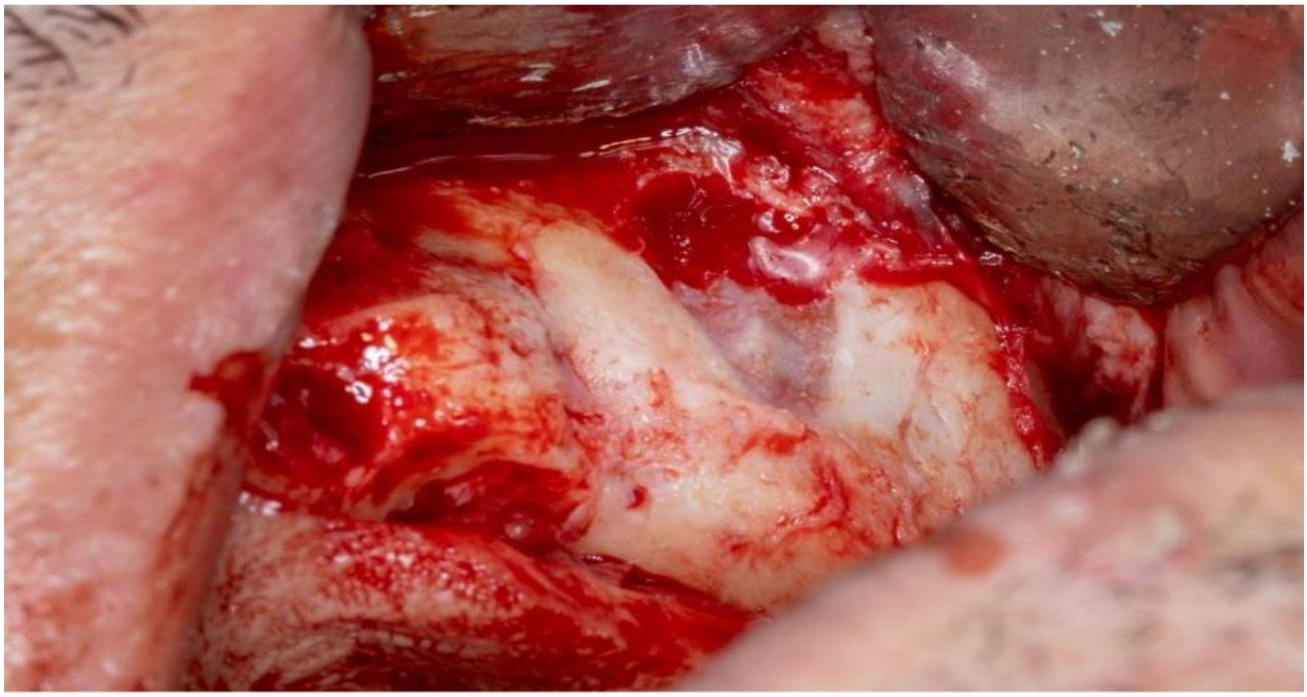


Fig 04 – Incision made in the bony crest and relaxing incision bordering the superior labial frenulum.



A – Osteotomy performed to access the maxillary sinus.

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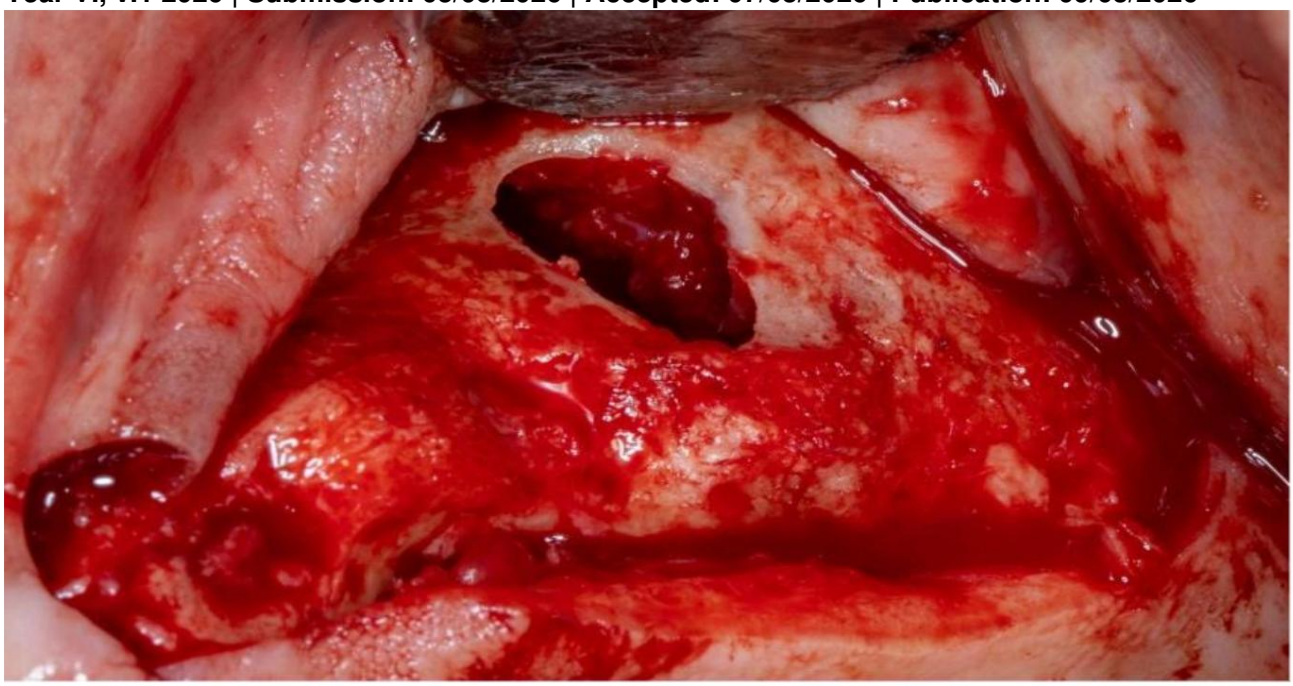

B – Detachment of Schneiderian membrane.

Fig 05

A – Osteotomy performed to access the maxillary sinus.

B – Detachment of Schneiderian membrane.

Next, with the aid of a multi-functional guide, milling began for the Implant placement in the region of tooth 24 (Helix GM Long – Neodent 3.75 x 20). This was positioned at an angle of approximately 45 degrees, with the implant platform at region of tooth 26 and the apex directed anteriorly, in a transsinusal approach, anchored in canine pillar region. The implant achieved an anchorage torque of 40 N (fig 6).

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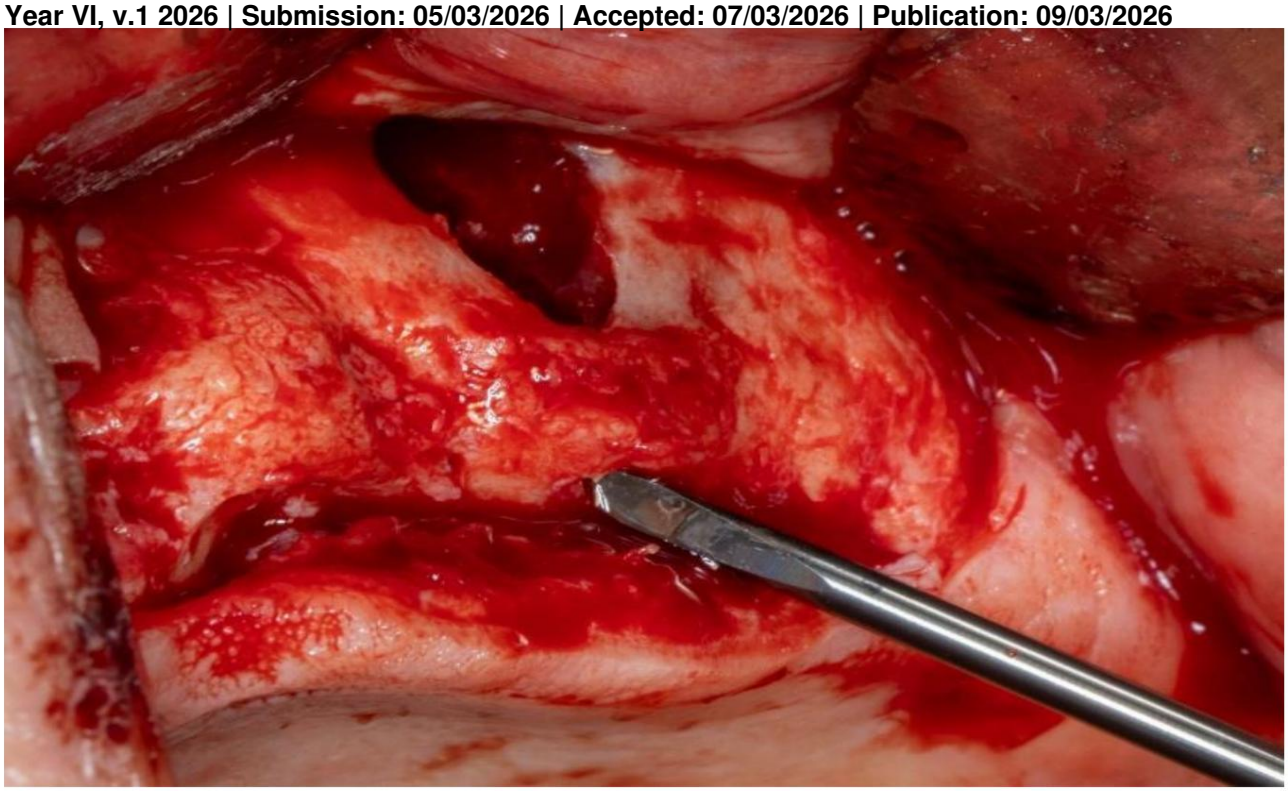
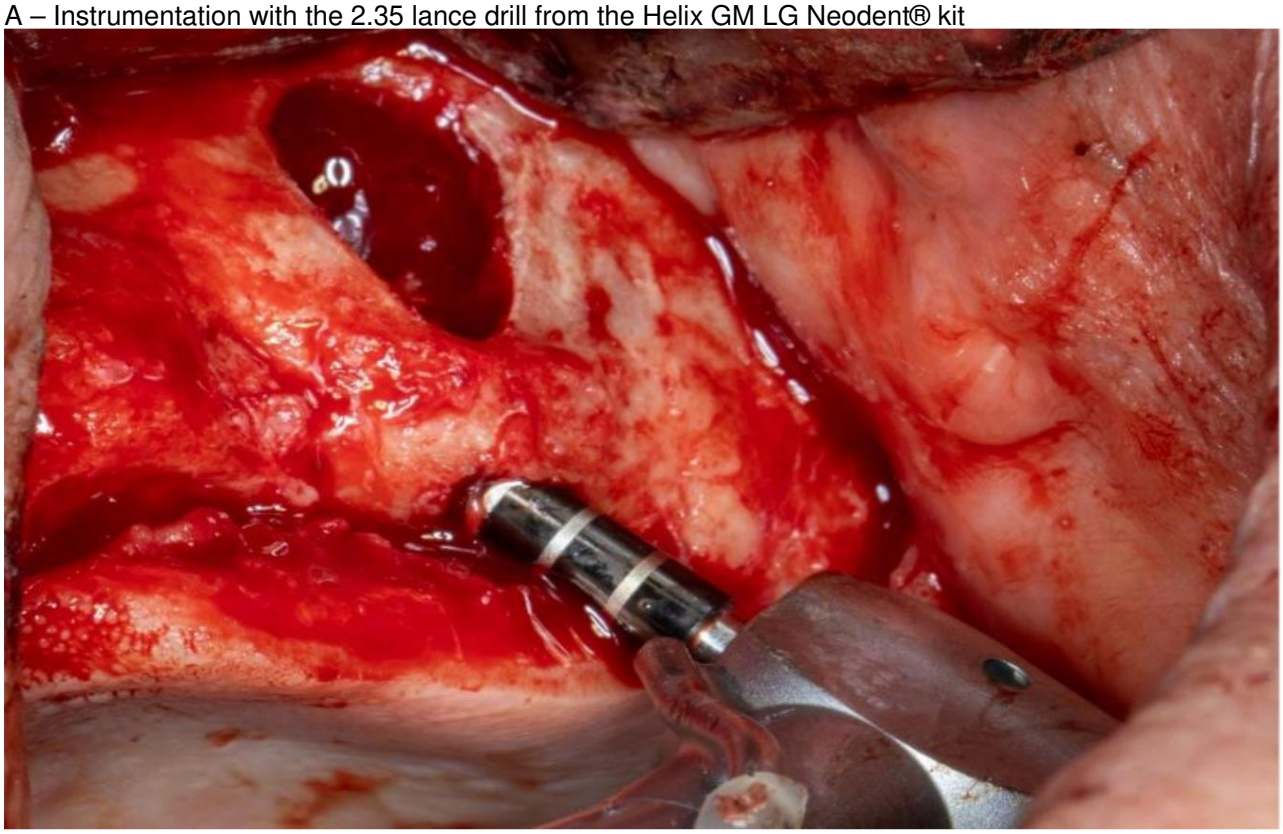


A – Instrumentation with the 2.35 lance drill from the Helix GM LG Neodent® kit



B - Instrumentation with the 3.75 lance drill from the Helix GM LG Neodent® kit.

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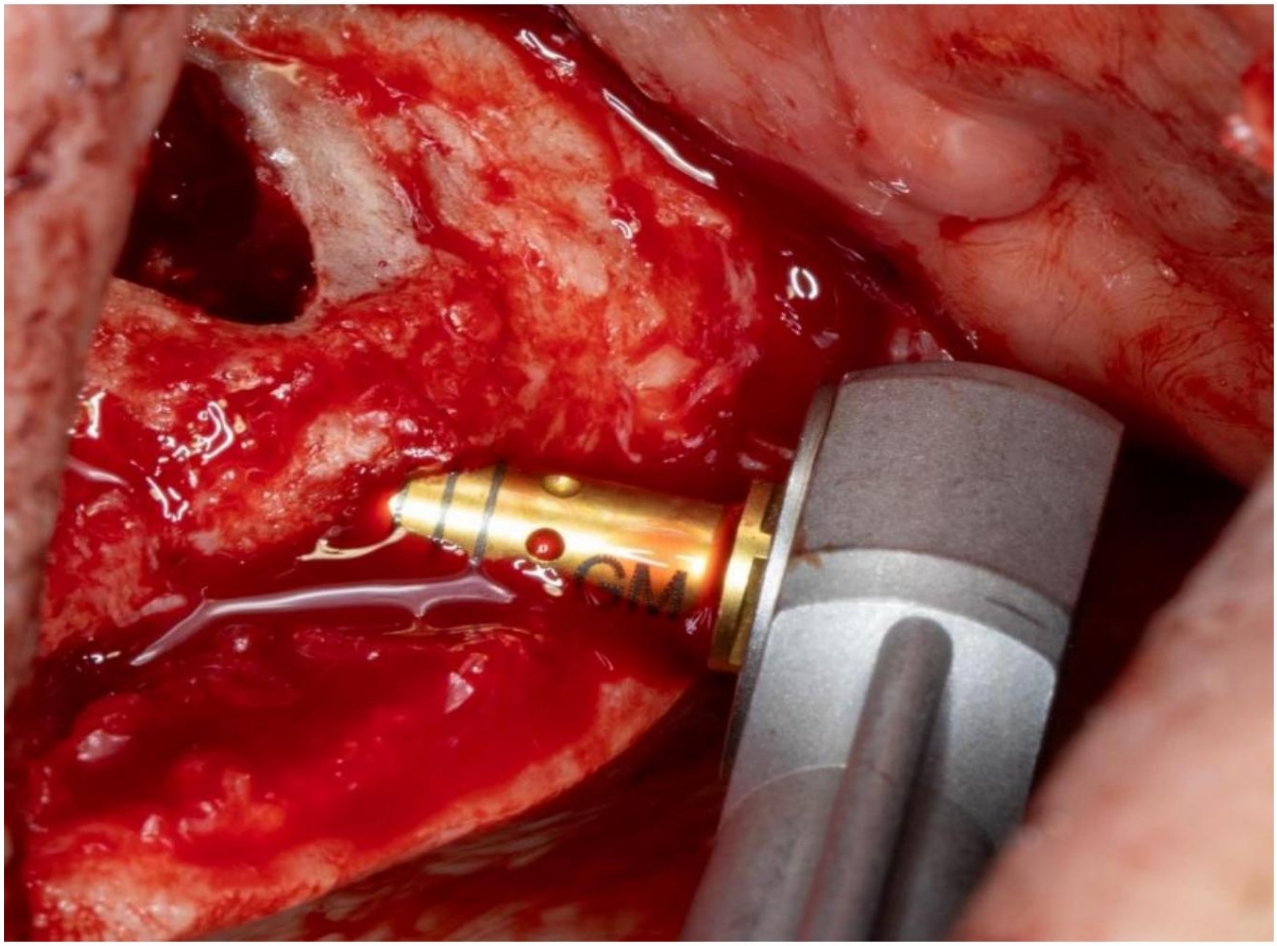
C – Image of the LG Neodent® GM Helix Implant 3.75 x 20mm.



D – Implant placement using a Neodent® ratchet

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Fig 06 – Implant placement in the region of tooth 24.

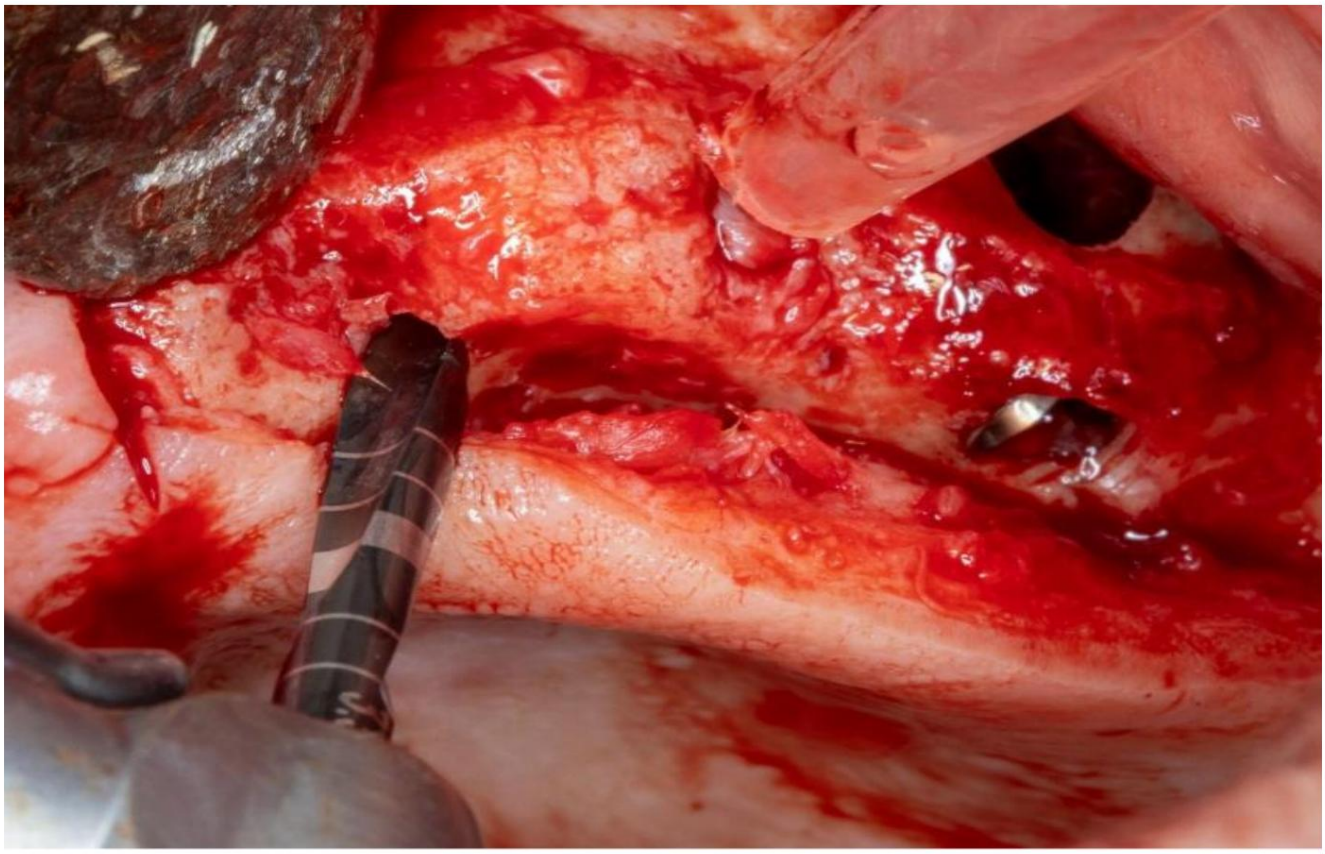
A – Instrumentation with the 2.35 lance drill from the Helix GM LG Neodent® kit

B - Instrumentation with the 3.75 lance drill from the Helix GM LG Neodent® kit.

C – Image of the LG Neodent® GM Helix Implant 3.75 x 20mm.

D – Implant placement using a Neodent® ratchet

The implant in the region of tooth 22 (Helix GM – Neodent 3.75 x 11.5) was installed with 30-degree angle with its apex pointing towards the distal region, with an insertion torque of 60 N. Both implants showed primary stability consistent with immediate loading (Fig. 7).



A - Instrumentation with the 3.5 lance drill from the Helix GM Neodent® kit

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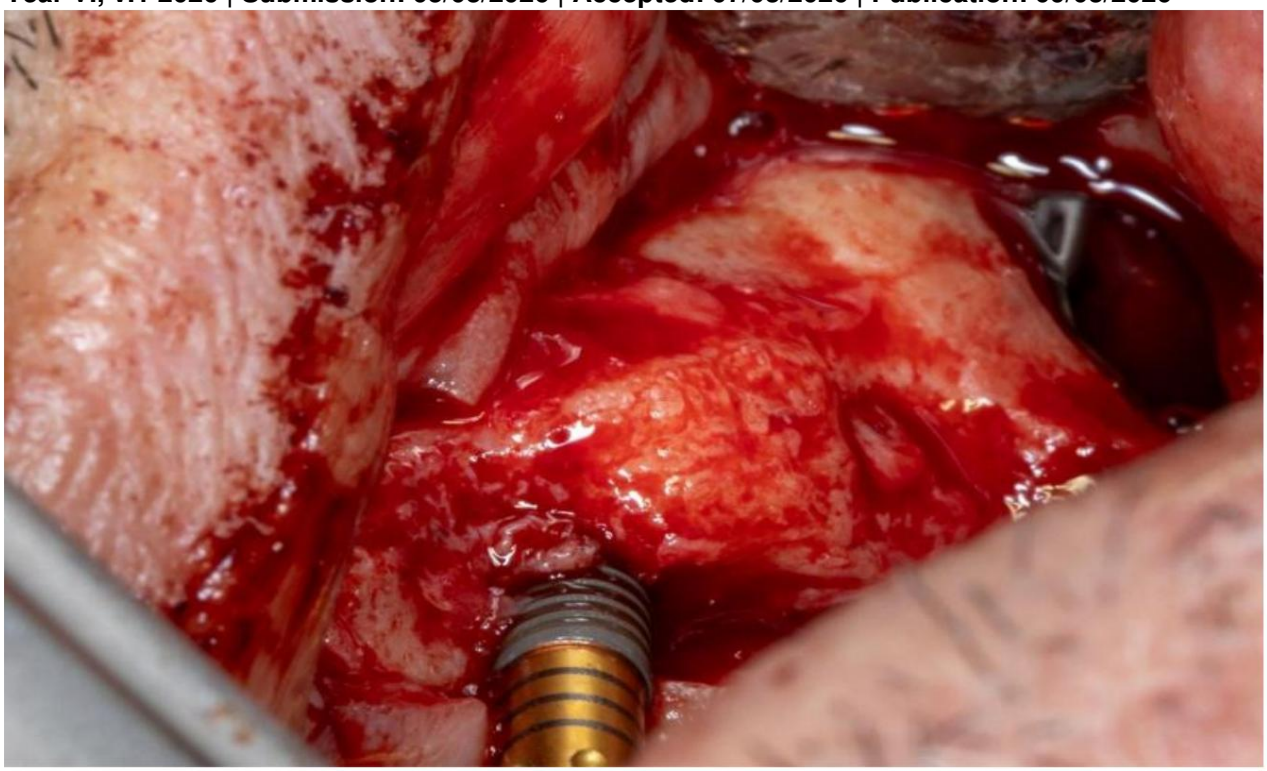

B – Installation of the 3.75 x 11.5 Helix GM Neodent® implant

Fig 07 – Implant placement in the region of tooth 22.

A - Instrumentation with the 3.5 lance drill from the Helix GM Neodent® kit

B – Installation of the 3.75 x 11.5 Helix GM Neodent® implant

After the implants were installed, bone grafting was performed using Cerabone - Straumann. filling the spaces inside the paranasal sinus between the implant, the sinus walls and the elevated Schneider membrane (fig 8).

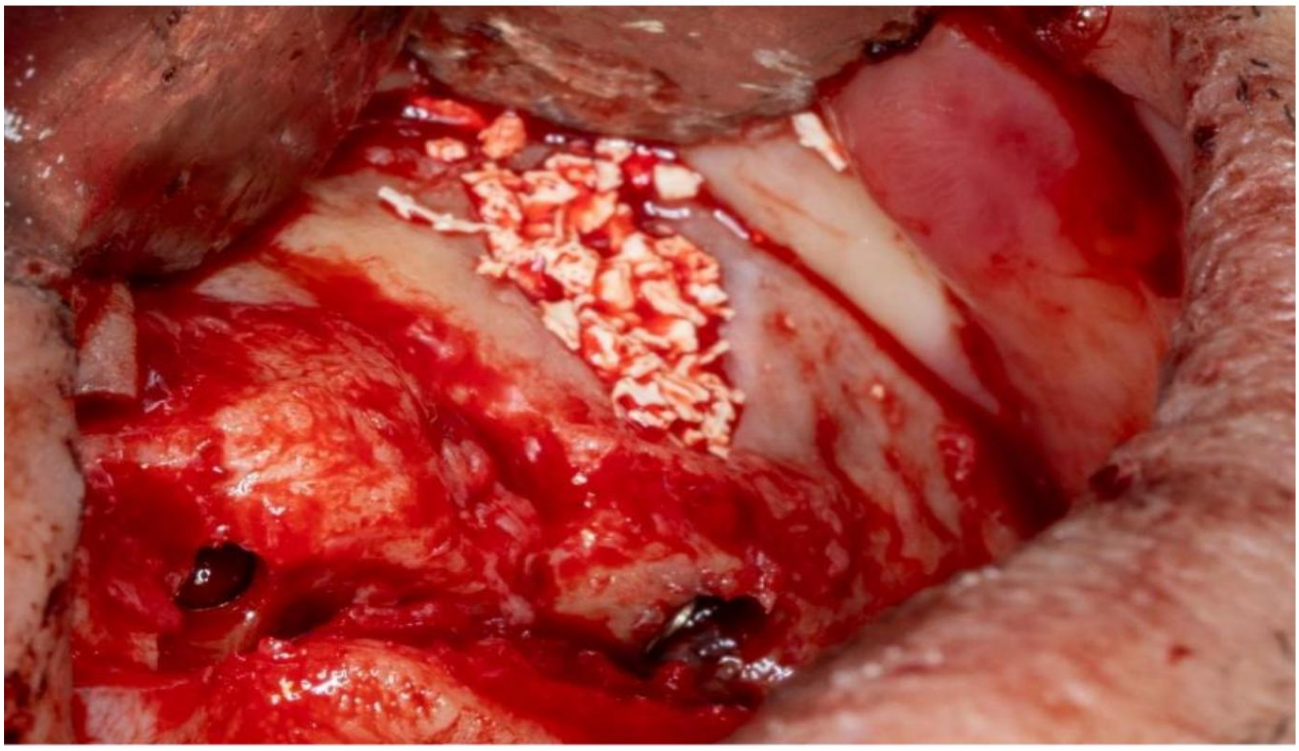

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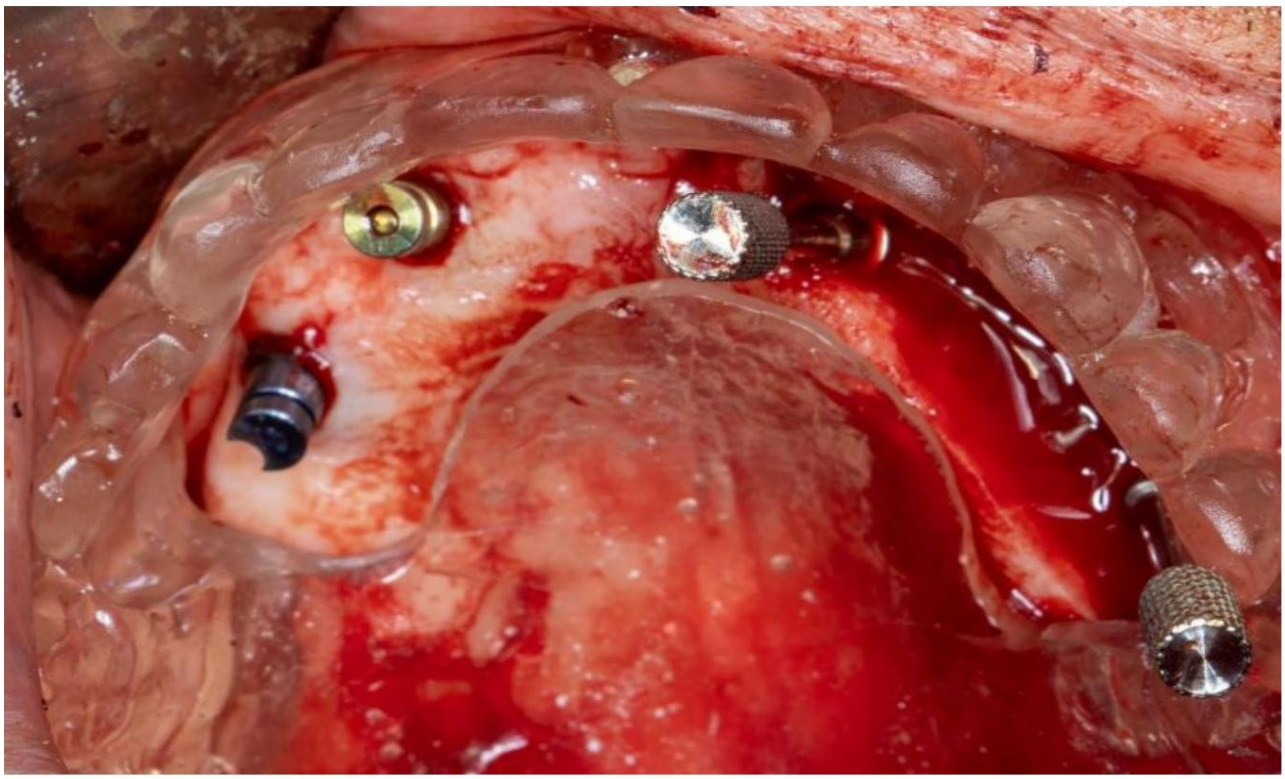
Fig 08 – Bone grafting in the maxillary sinus after implant placement with Cerabone Straumann®.

The mini-abutments were selected and installed on implants 22 and 24 according to the Manufacturer's recommendations. In implant 22, the component angled at 30 degrees was used and with a transmucosal height of 3.5mm, while in implant 24, the angled component was chosen.

The flap was angled at 45 degrees and 1.5 mm high transmucosally. It was repositioned using simple sutures. (softblue -Techsuture® 4.0) (Fig 9).



A – Installation of angled mini-abutments on implants 22 and 24.

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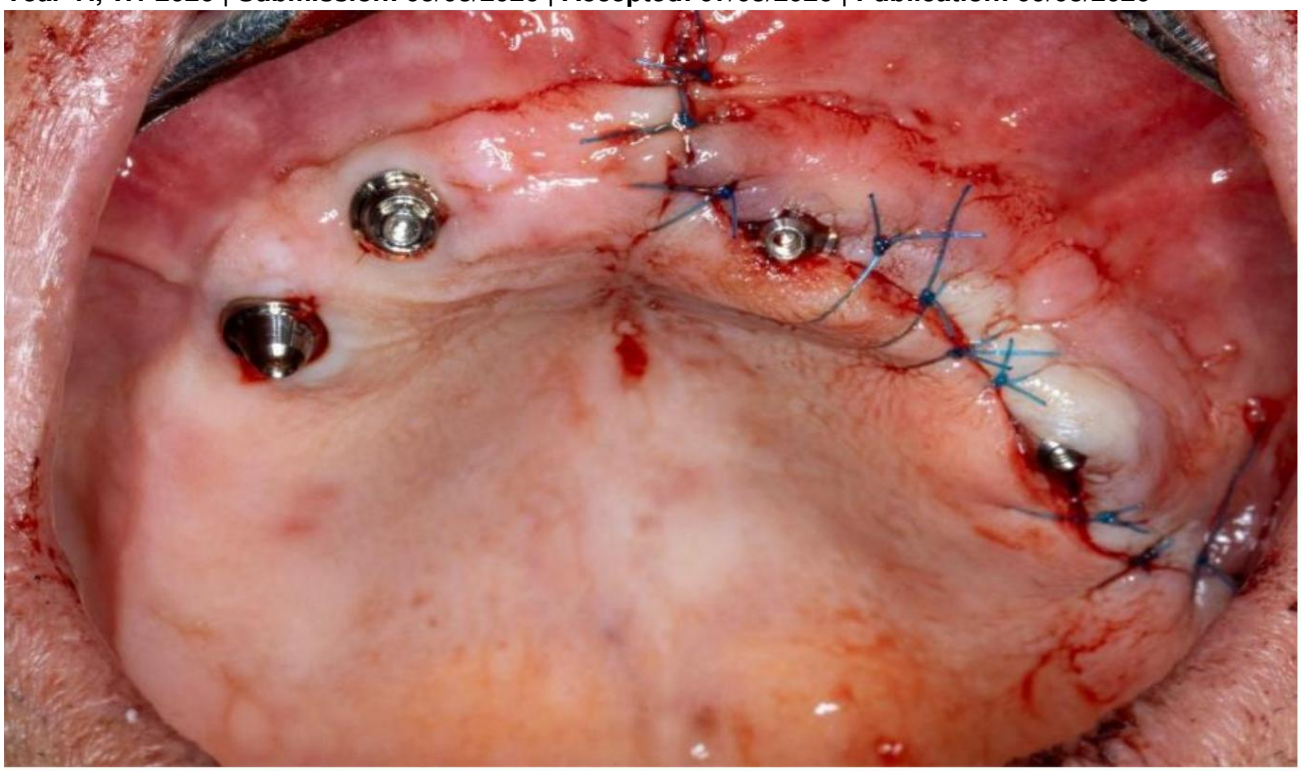

B – Suture with softblue thread - Techsuture® 4.0.

Fig 09

A – Installation of angled mini-abutments on implants 22 and 24.

B – Suture with softblue thread - Techsuture® 4.0.

Prior to molding, an occlusal registration was performed using a multifunctional resin guide. Acrylic Pattern GC. Next, the transfers were installed and bonded with acrylic resin. Pattern GC. The multifunctional guide has been adapted to a position compatible with the occlusal records. previously acquired. The molding was performed with Scan Light fluid addition silicone (Yller). incorporating both the implants previously installed in regions 14 and 12 and the new ones implants (Fig 10).

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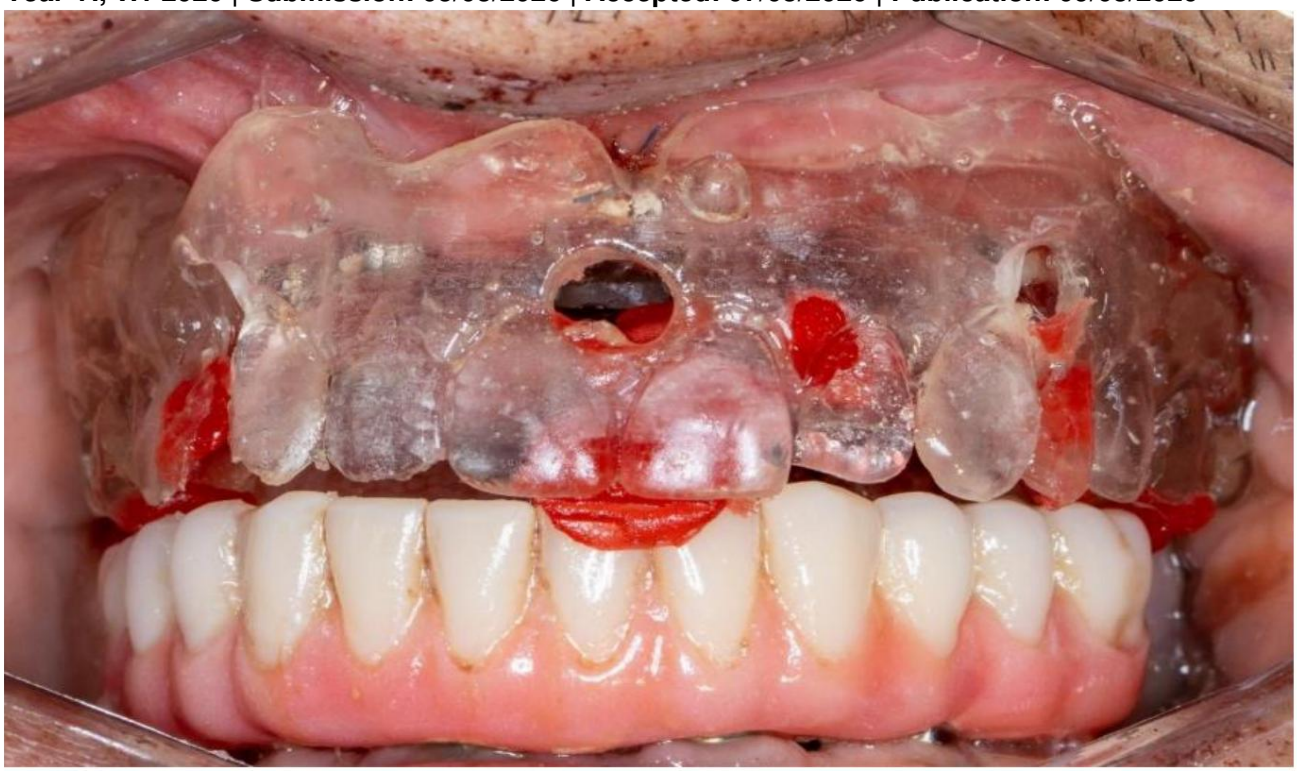
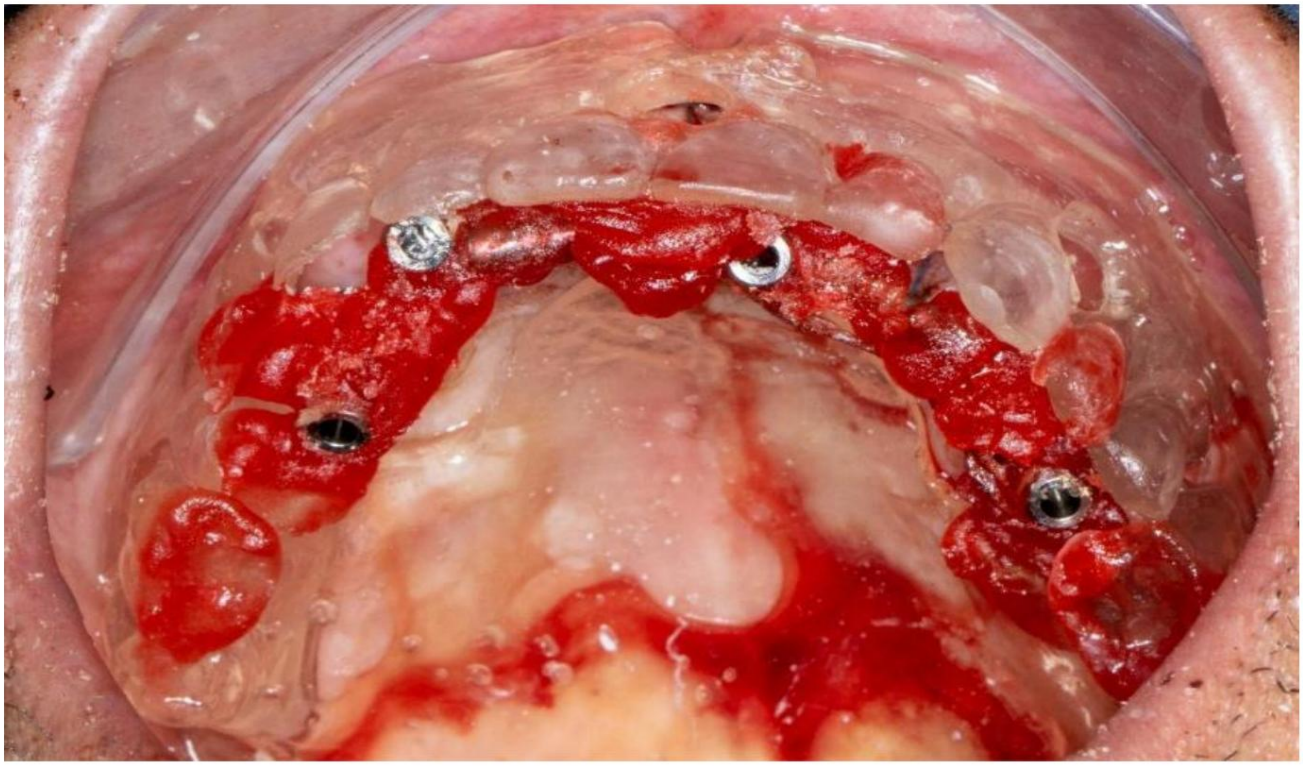


A – Occlusion registration using Pattern GC® resin multi-functional guide.



B – Fixing the molding transfers with Pattern GC® resin in the multi-functional guide.

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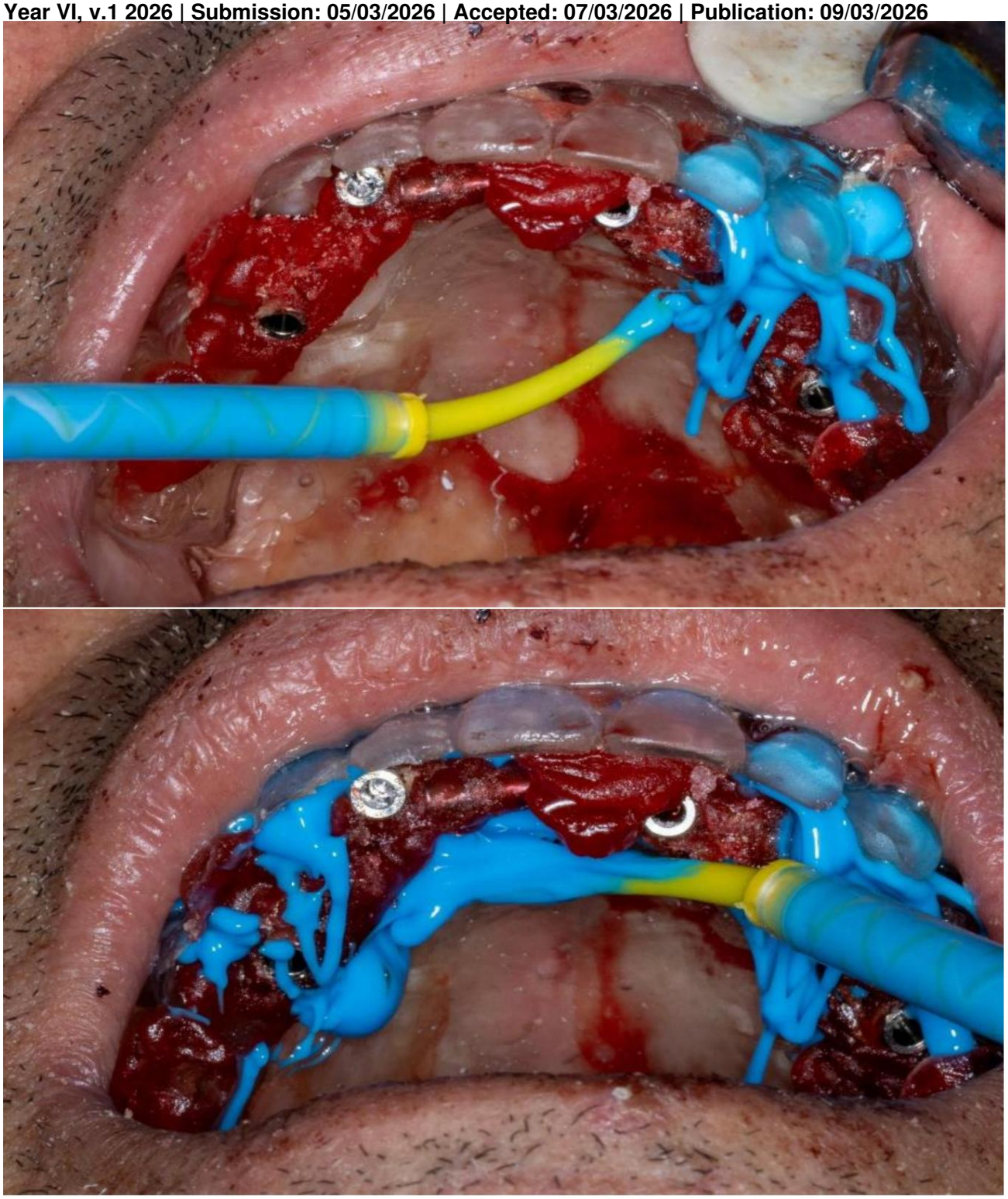

C and D – Molding with Scan Light Yller® addition silicone using a gun and tip.
mixer.

Fig 10 – Sequence of implant molding.

A – Occlusion registration using Pattern GC® resin multi-functional guide.

B – Fixing the molding transfers with Pattern GC® resin in the multi-functional guide.

C and D – Molding with Scan Light Yller® addition silicone using a gun and tip.
mixer.

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As postoperative medication, dipyrone 500mg and amoxicillin 500mg were prescribed.

Two days after the impression was taken, the upper dentogingival prosthesis was installed.

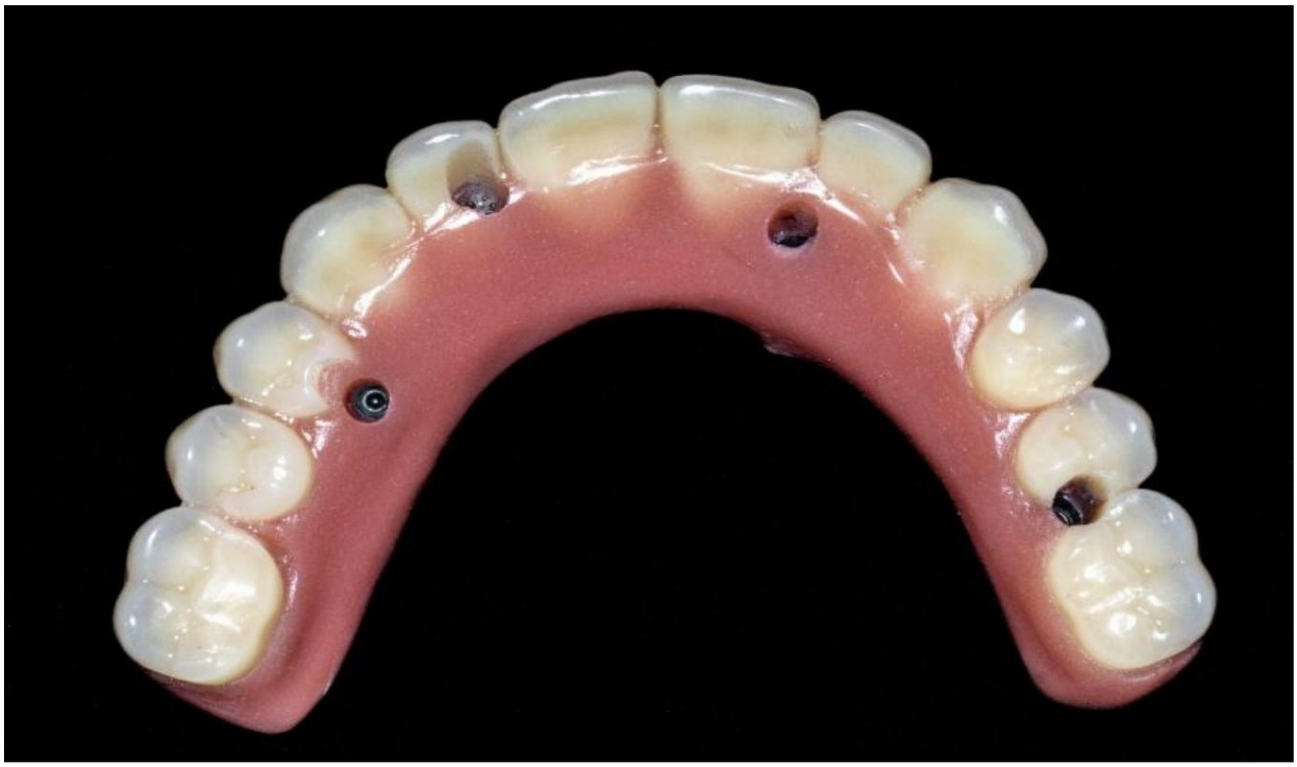
acrylic technique in which an improvement in cantilever function was observed in the operated area compared to the acrylic technique.

previously performed in the opposite quadrant (Fig 11). The occlusion was checked using carbon paper.

Accufilm (Parkell). After the examination, it was determined that no occlusal adjustment was necessary.

The screws were protected with Teflon tape and the access channels were sealed with resin.

provisional Bioplic (Biodynamics) (Fig 12).



A – Occlusal view of the dentogingival prosthesis.

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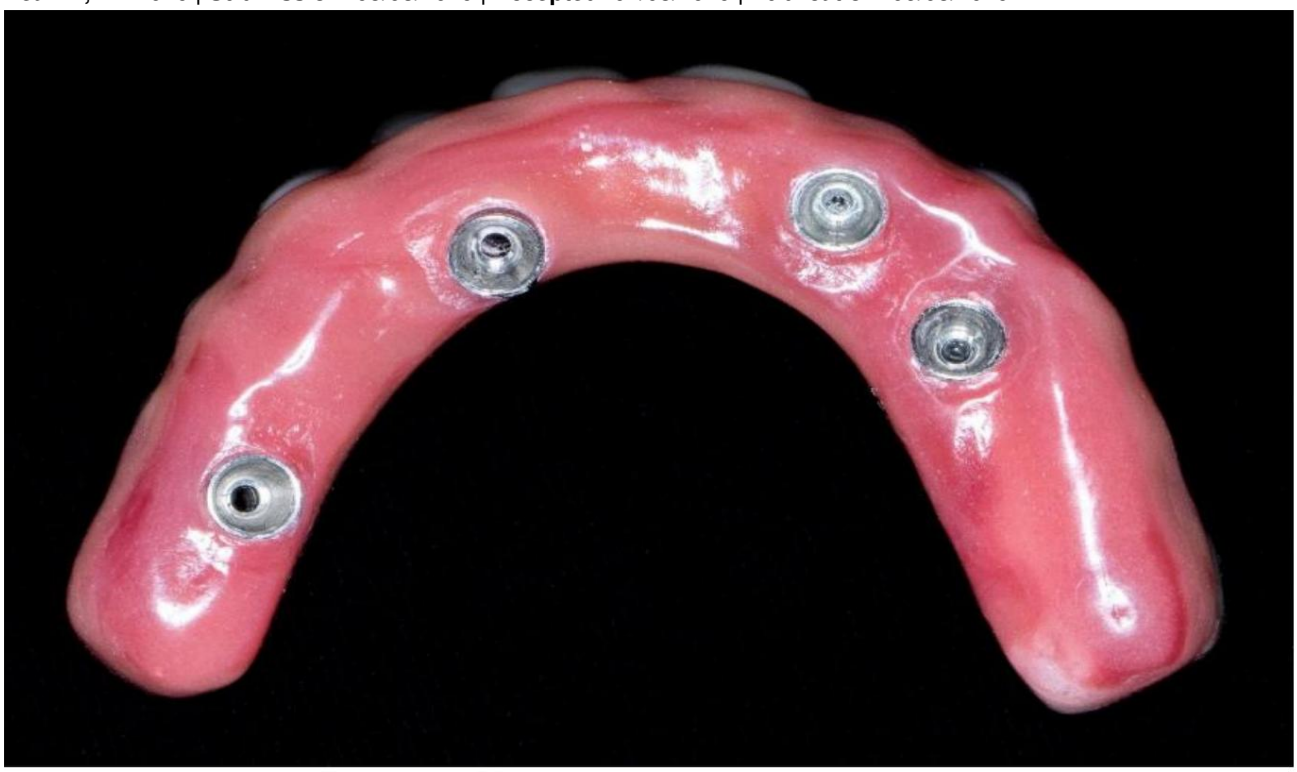
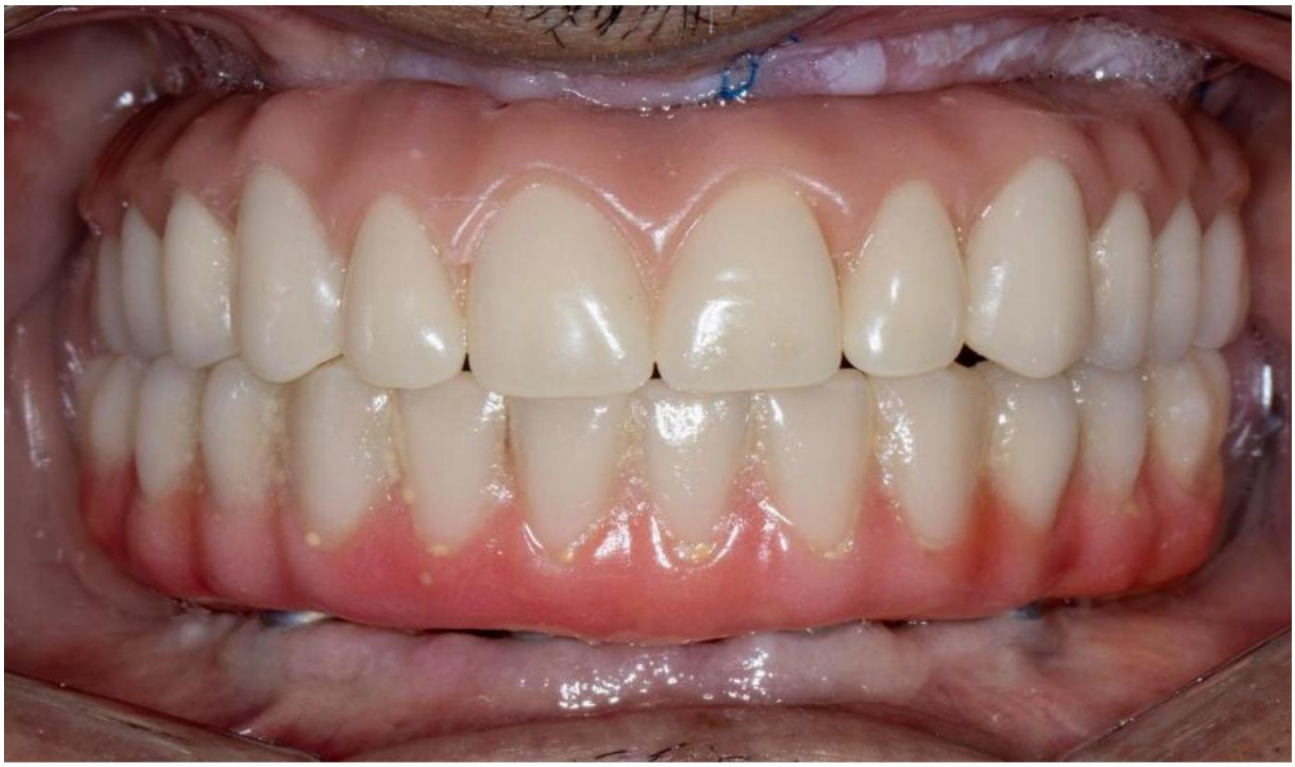


B – Basal view of the dentogingival prosthesis. Difference in cantilever between the implant installed in a way conventional (14) and implant (24)

Fig 11

A – Occlusal view of the dentogingival prosthesis.

B – Basal view of the dentogingival prosthesis. Difference in cantilever between the implant installed in a way conventional (14) and implant (24)



A – Intraoral photograph of the dentogingival prosthesis.

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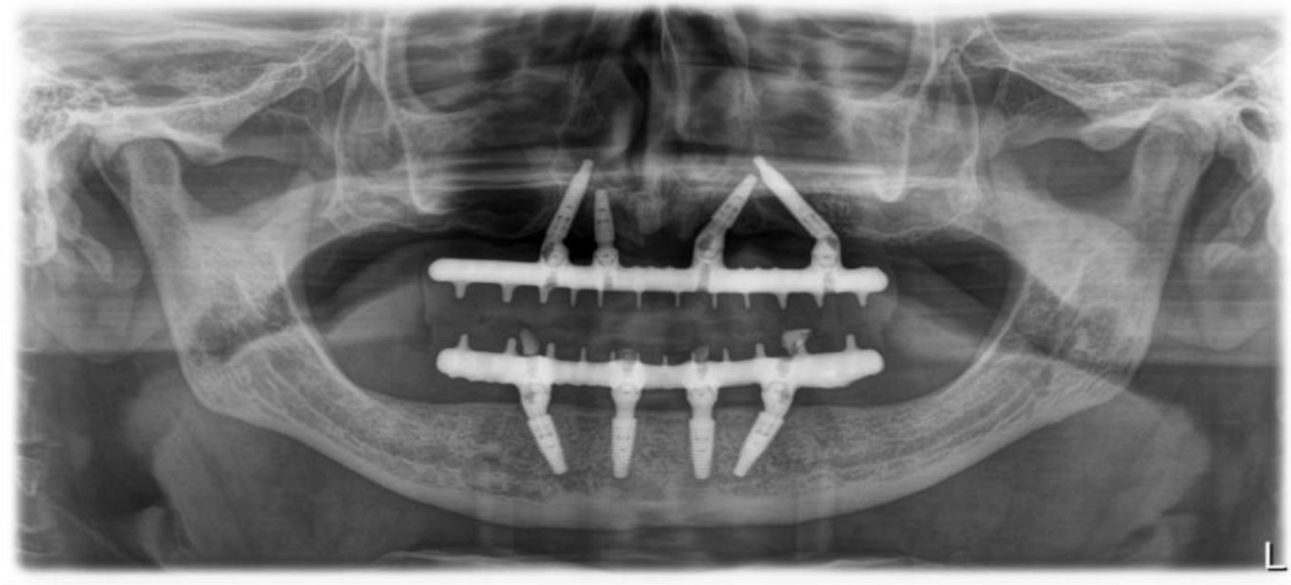

B – Final panoramic X-ray.

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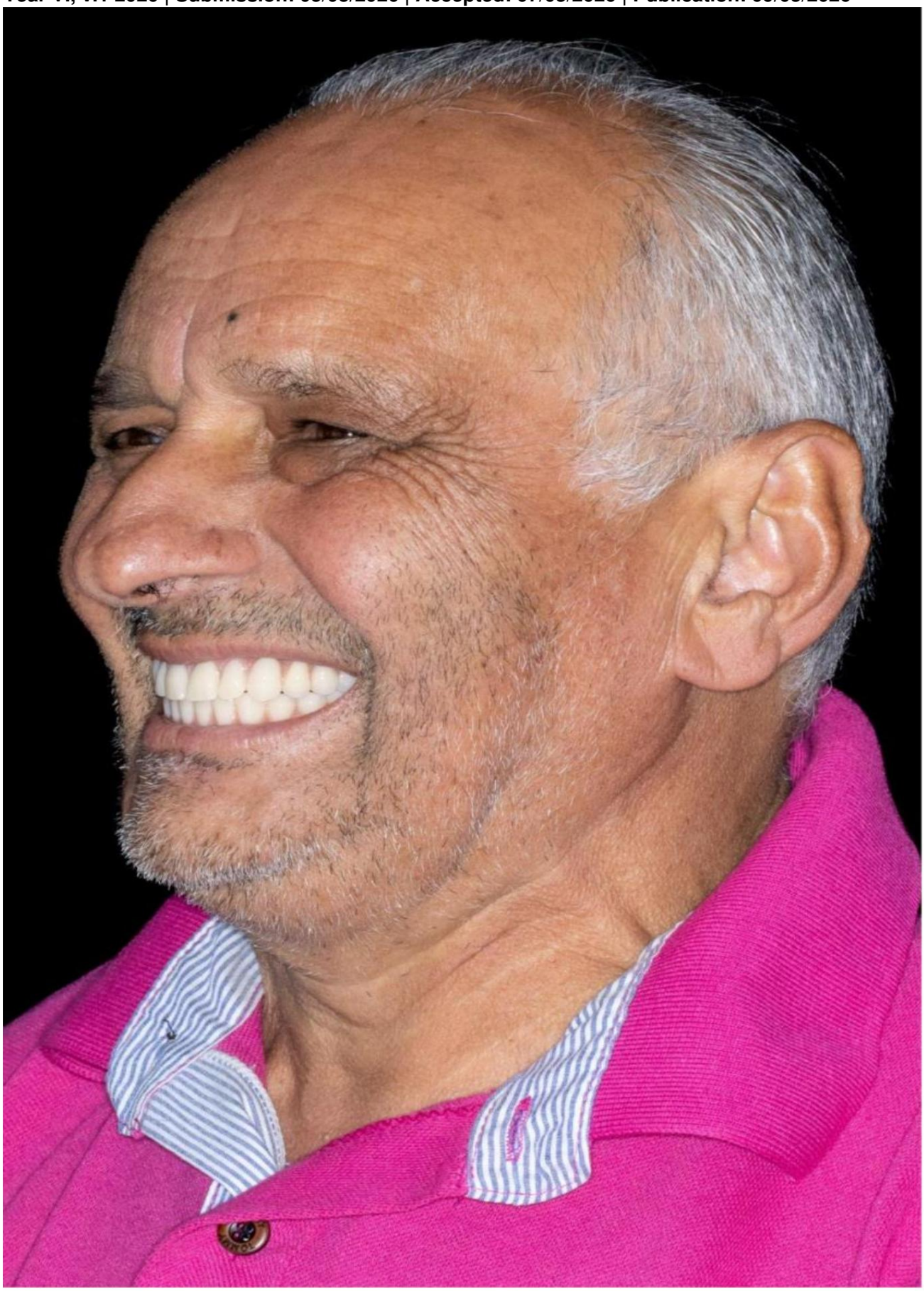

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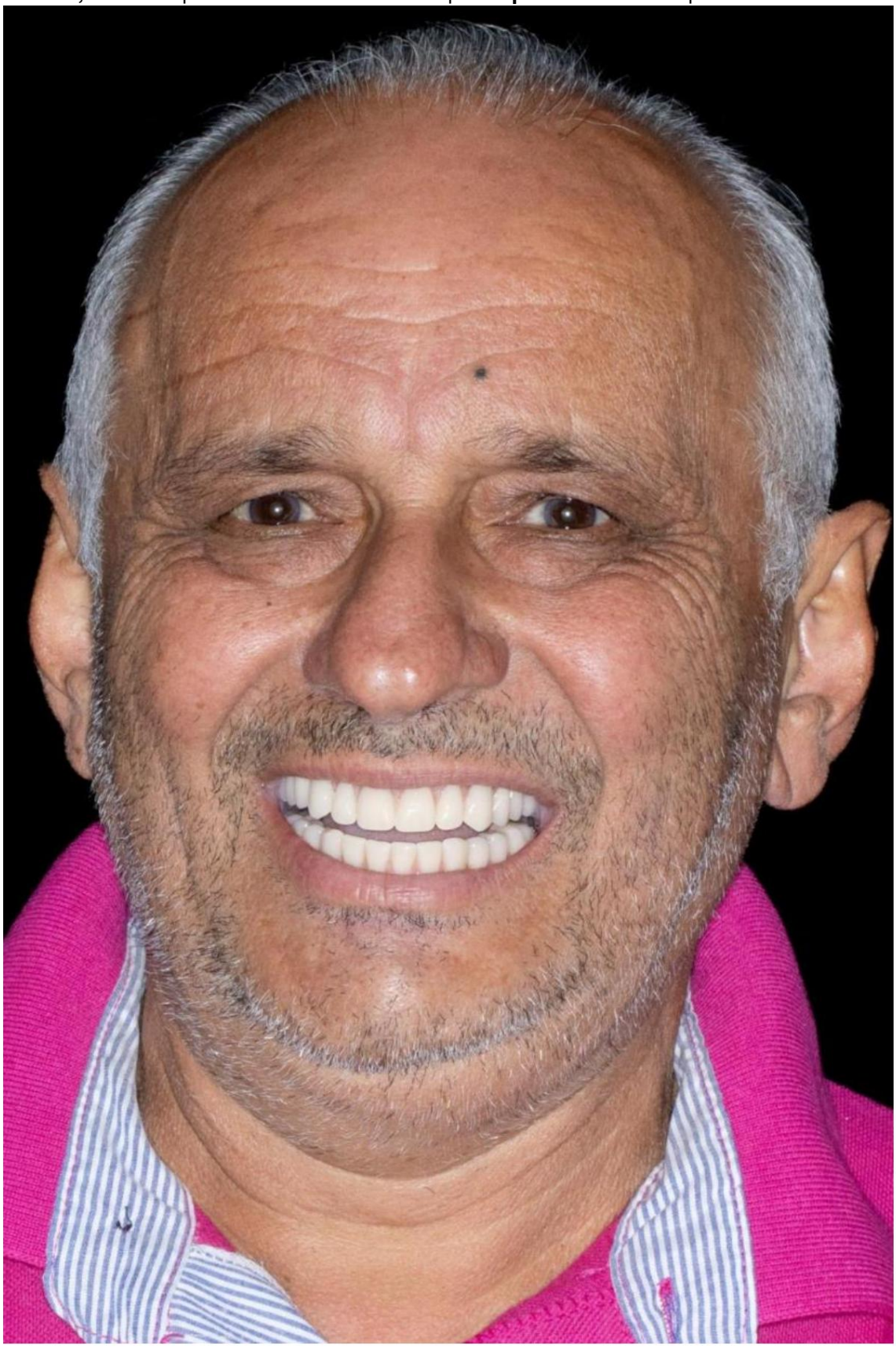

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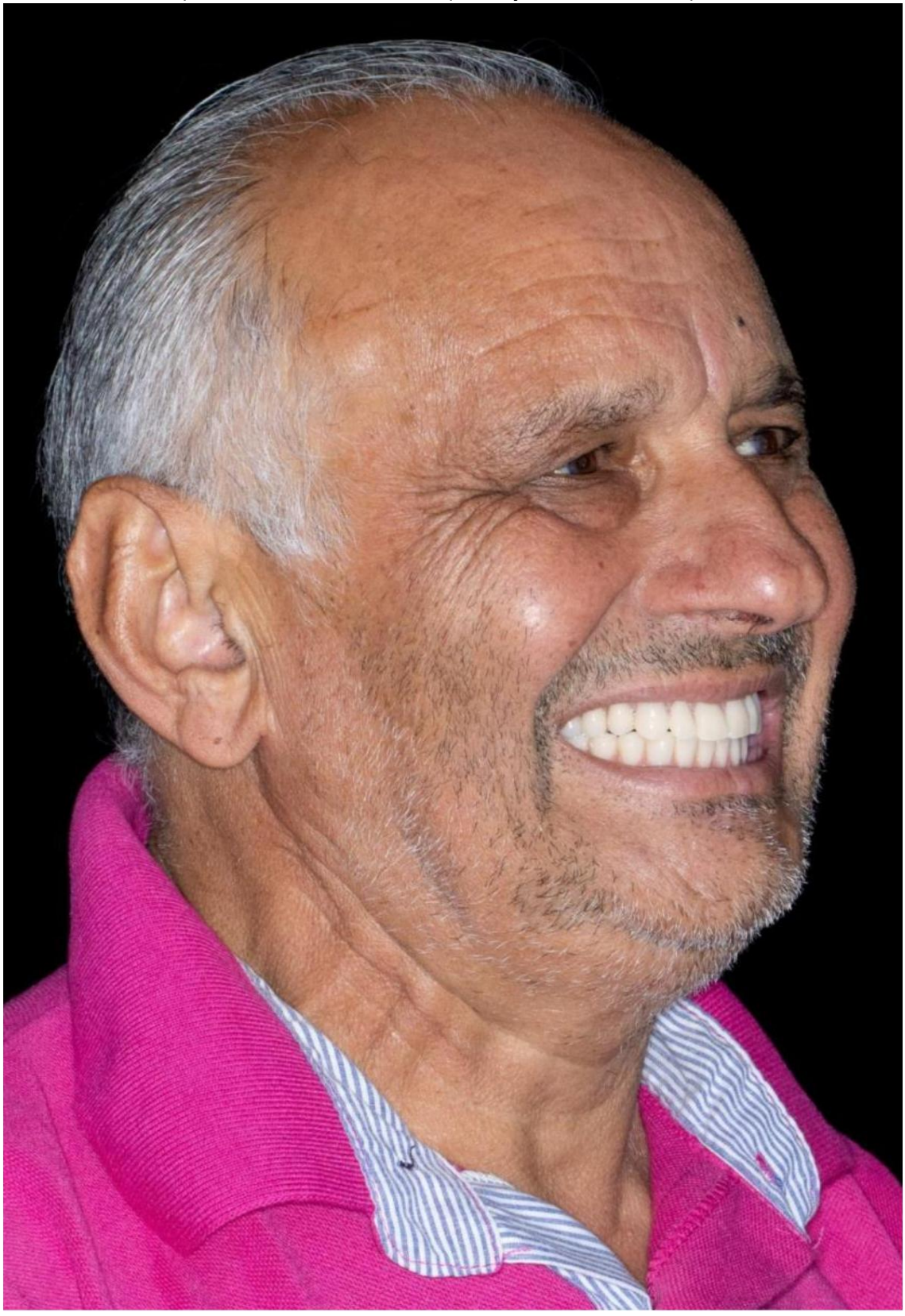

C, D and E – Patient's smile with the new prosthesis.

Fig 12

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A – Intraoral photograph of the dentogingival prosthesis.

B – Final panoramic X-ray.

C, D and E – Patient's smile with the new prosthesis.

3. Results and Discussion

The aim of this clinical case was to demonstrate the feasibility of installing a Transsinusal implant with immediate loading in an atrophic maxilla, as an alternative to conventional bone grafting procedures. The choice of this technique was based on the limitation of Bone volume in the posterior region of the maxilla, a condition that contraindicates conventional straight implants. and demands solutions that reduce morbidity and treatment time.

The transsinusal technique proved advantageous by allowing the implant to be anchored in the region. from the canine pillar, an area of greater bone density. This biomechanical strategy makes it possible to Installation of long, angled implants, favoring the distribution of occlusal loads and reducing the prosthetic cantilever. This result is consistent with the literature, which indicates a greater biomechanical efficiency of angled implants in All-on-4 and transsinus type rehabilitations when compared to straight implants in areas of severe resorption18,19,20,21 .

One relevant point to be discussed is the application of immediate loading to implants. installed, especially the transsinusal. The literature is still scarce regarding the application of immediate loading in transsinus implants. However, the few existing studies demonstrate Good results were observed with immediate loading in the short and medium term, but further studies are needed to evaluate... in the long term (22). According to the work of Tettamanti, et al; 2017, the clinical success of this technique It depends heavily on several factors: patient selection, bone quality and quantity, number and Implant design, primary implant stability, occlusal load, and surgical skill of surgeon. Among these, the primary stability of the implant is undoubtedly the most important. A A systematic review indicated that, when selection criteria are rigorously observed, the workload... immediate results can be favorable even in more complex situations (23). In In this case, the insertion torques were 40 N and 60 N, respectively, demonstrating Primary stability consistent with this treatment philosophy. Good bicortical locking, particularly in transsinus implantation, it contributed to the stability and predictability of the treatment. even in challenging bone conditions. However, the absence of frequency assessment of Magnetic resonance imaging (RFA) can be considered a methodological limitation.

Another observed clinical benefit was the significant reduction in the need for bone grafting. The biomaterial used (Cerabone®) served only as a passive filler of the sinus space. without the need for extensive volumetric reconstruction, which is in line with proposals

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minimally invasive procedures described in recent systematic reviews(20).

The use of angled mini-abutments in this clinical case helped to correct Disparallelism between implants facilitates a common insertion path and promotes... Prosthetic passivity. Studies indicate that, although angled abutments may be associated with a increased marginal bone loss and mechanical complications, such as screw loosening, they do not significantly compromise the survival of the prostheses. Furthermore, analyses Biomechanical studies suggest that the inclination of the implants and the use of angled mini-abutments may... to influence the stress distribution around the implants, which should be considered in prosthetic planning (24).

Martins da Silva (2019) and Bicalho Dias da Silva (2019) report that the use of mini-pillars Angled teeth in a full-arch All-on-Four rehabilitation can compensate for distal angulation of the Posterior implants. In both cases, a 6-month follow-up of complete edentulism. When treated with a hybrid prosthesis, the implants and prostheses remained stable, with Successful osseointegration and high patient satisfaction were observed, with no complications reported. These reports also note that angled mini-pillars reduce cantilever effects and can favorably redistribute occlusal forces (25,26).

Concern about marginal bone loss around implants is a factor of concern. in angled prosthetic components. However, in the study by Sethi, et al.;2000, the comparison statistics from 2 independent and randomized implant groups (with abutments angled between 0 and between 15 degrees and between 20 and 45 degrees) using a log-rank test showed a probability of 0.84 (p-value) that the survival functions are the same for both groups, with good aesthetic and functional results.

After a year and a half of follow-up, maintenance of the marginal bone level was observed. and functional and aesthetic stability of the prosthesis. The panoramic image highlights the integration of implants and the absence of signs of infectious or mechanical complications. Clinical comparison with the opposite quadrant, previously rehabilitated with conventional technique, it reinforces the gain. biomechanical results obtained by reducing the cantilever.

However, it is important to highlight that the transsinus implant technique, although promising, It is not without risks. The most commonly reported complications in the literature include perforation. Schneiderian membrane, maxillary sinusitis, screw loosening, and, in rarer cases, Implant fracture. Such occurrences reinforce the importance of three-dimensional planning. careful, precise surgical execution and rigorous postoperative follow-up (18,20)

Because this is a case report, the conclusions should be interpreted with caution. Although Although the results have been satisfactory, randomized clinical trials with larger samples are needed. larger and longer follow-up studies are needed to validate the efficacy and safety of the transsinus technique with

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Immediate loading.

Final Considerations

This case report demonstrates that the transsinus implant technique, associated with loading...
Immediate treatment can be an effective and predictable alternative in the rehabilitation of atrophic jaws. The choice
a thorough analysis of the case, three-dimensional planning with specific software, and obtaining
Adequate primary stability was crucial for the clinical and aesthetic success observed after
18 months of follow-up.

The minimally invasive approach, with less need for bone grafting and reduced risk of...
The prosthetic cantilever allowed for functional rehabilitation with a shorter treatment time and good results.
patient acceptance. Although the results have been positive, controlled clinical studies and
Long-term studies are needed to validate this technique as a routine protocol in similar cases.

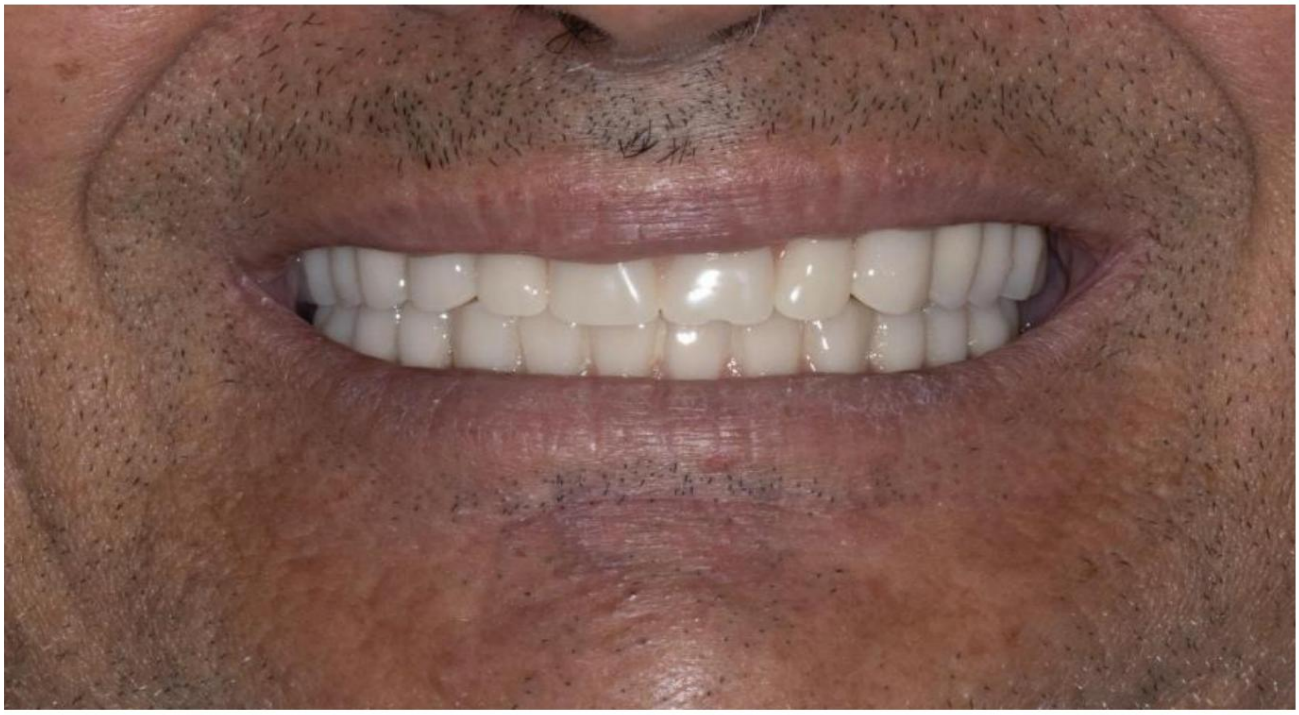

Fig 01 – Smile of a patient with a complete upper denture.

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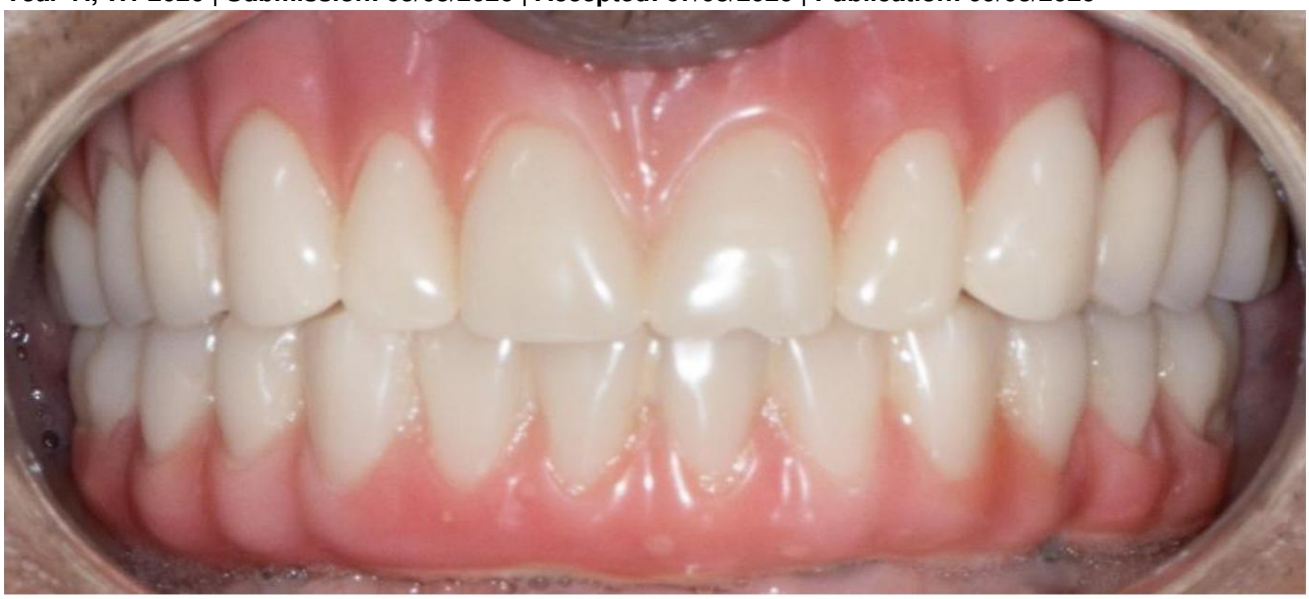
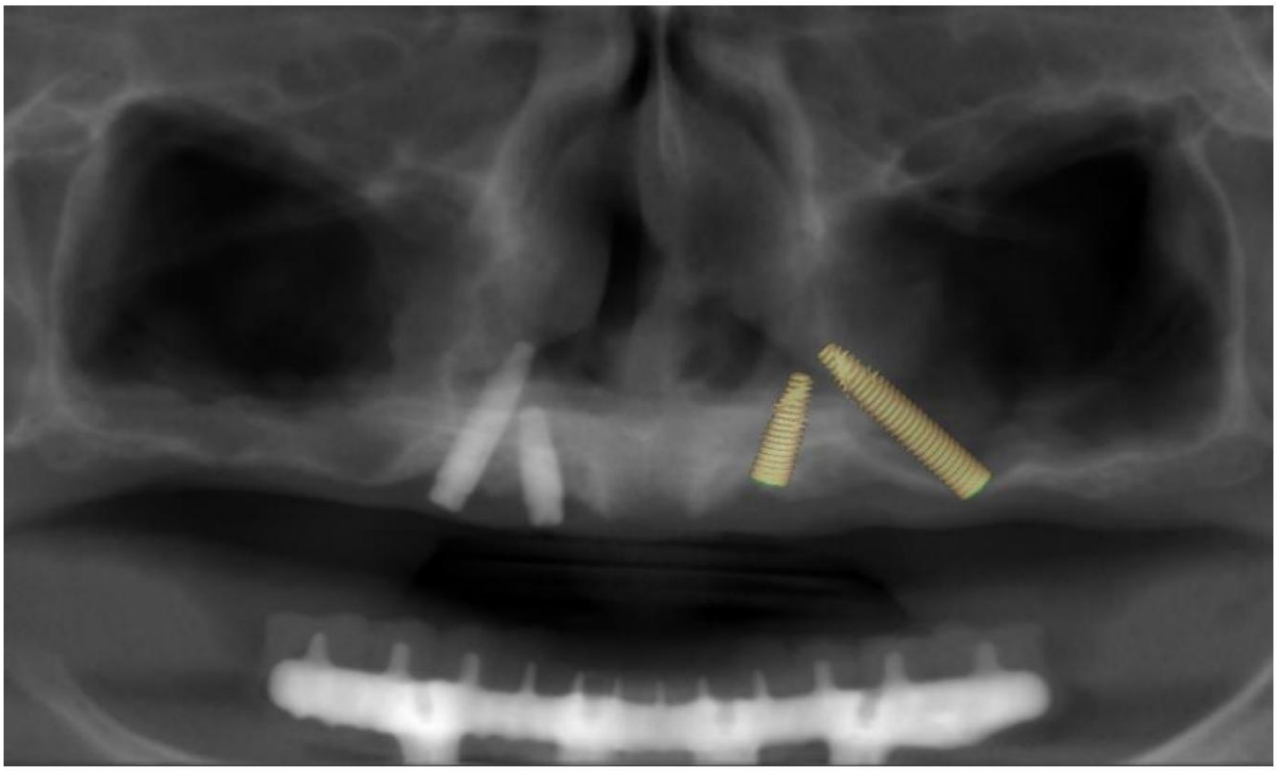


Fig 02 – Intraoral photograph of the prostheses with gingival retractor



A – Tomographic image of the panoramic reconstruction of the maxilla.

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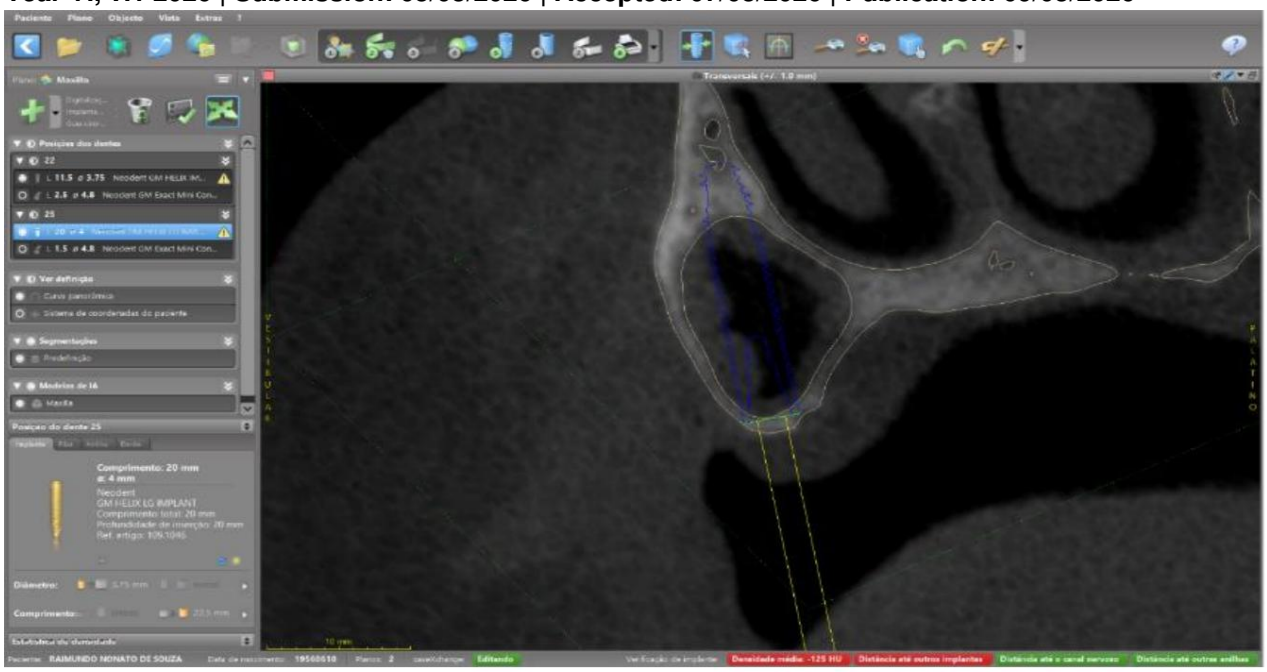
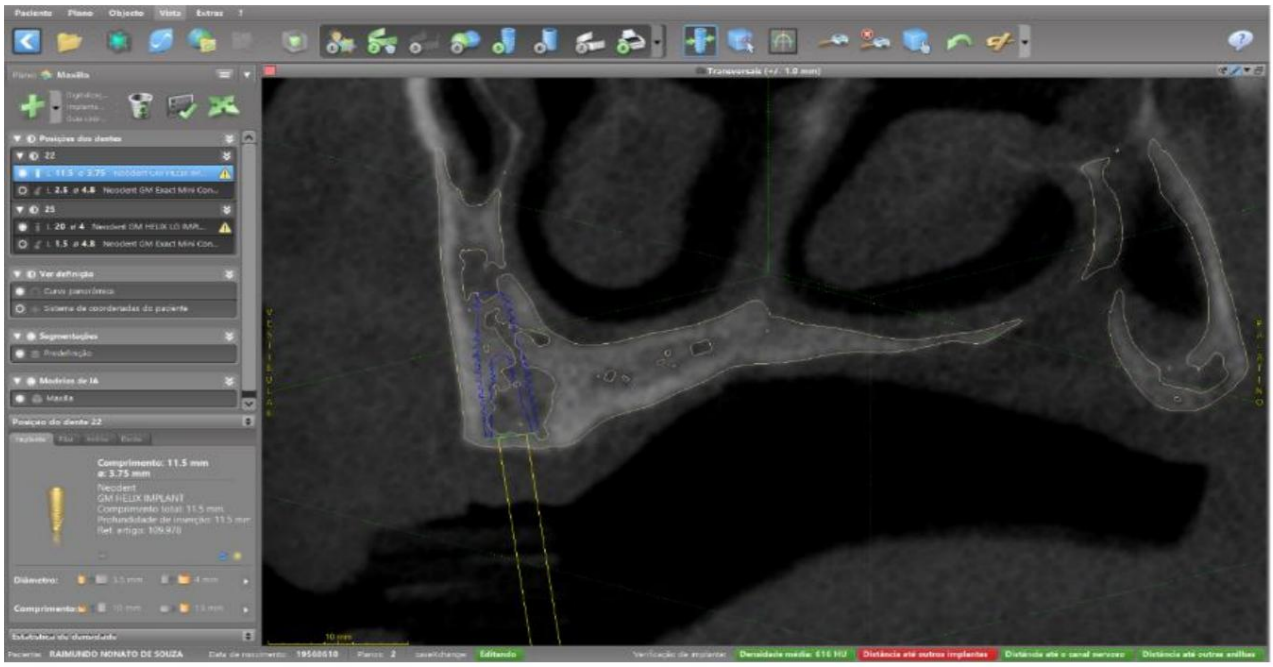


B – Tomographic image of the cross-section of the implant planning 24.



C - Tomographic image of the cross-section of the implant planning 22.

Fig 03 – Surgical planning performed with the aid of Codiagnostix® software.

A – Tomographic image of the panoramic reconstruction of the maxilla.

B – Tomographic image of the cross-section of the implant planning 24.

C - Tomographic image of the cross-section of the implant planning 22.

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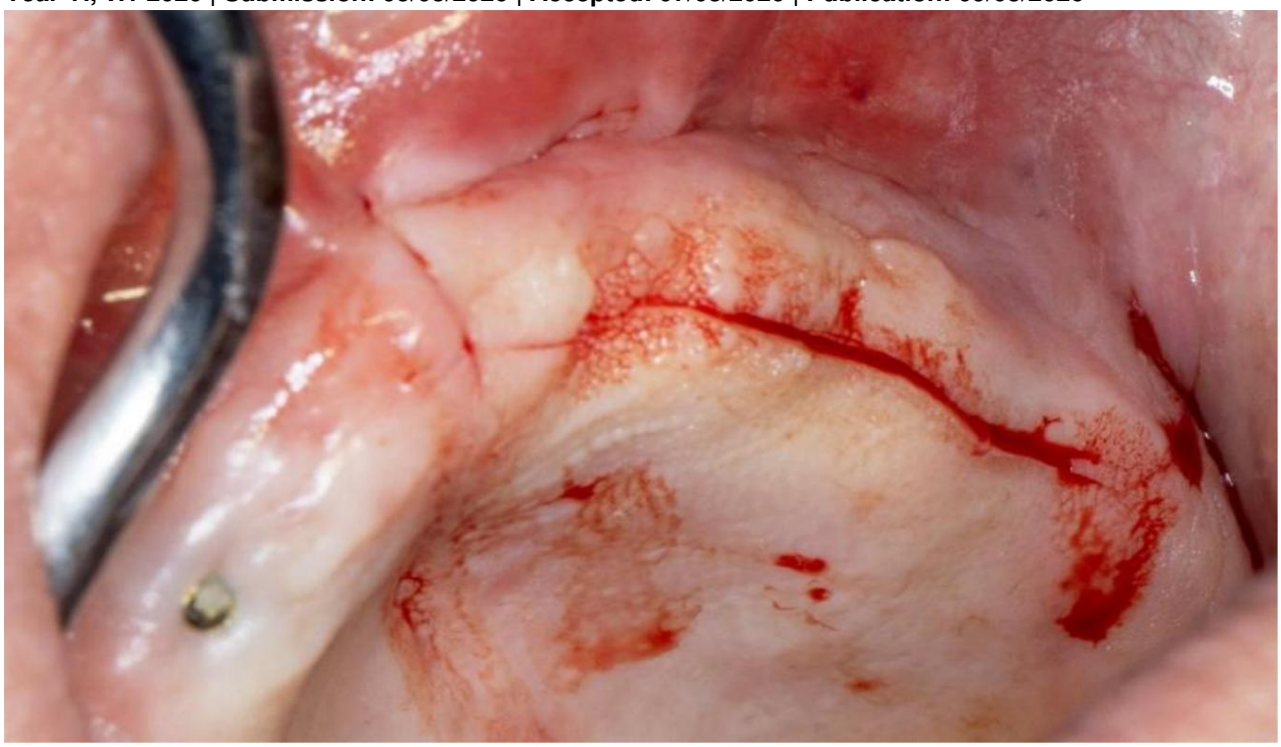
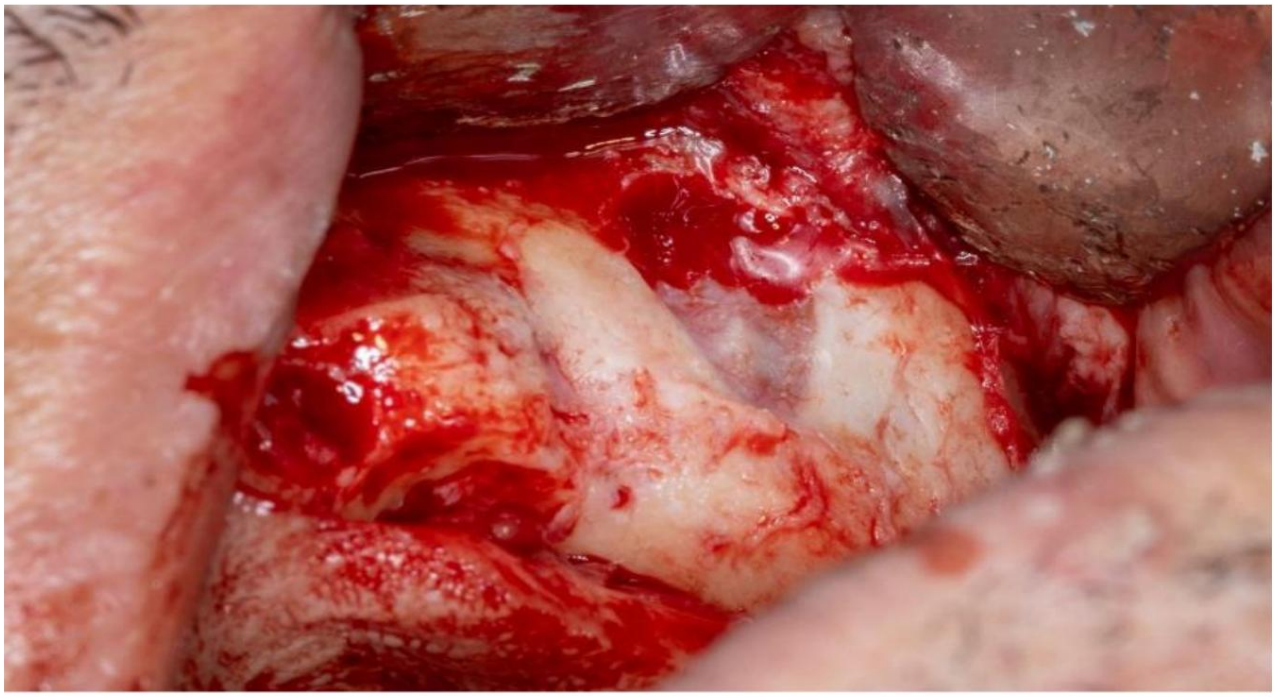


Fig 04 – Incision made in the bony crest and relaxing incision bordering the superior labial frenulum.



A – Osteotomy performed to access the maxillary sinus.

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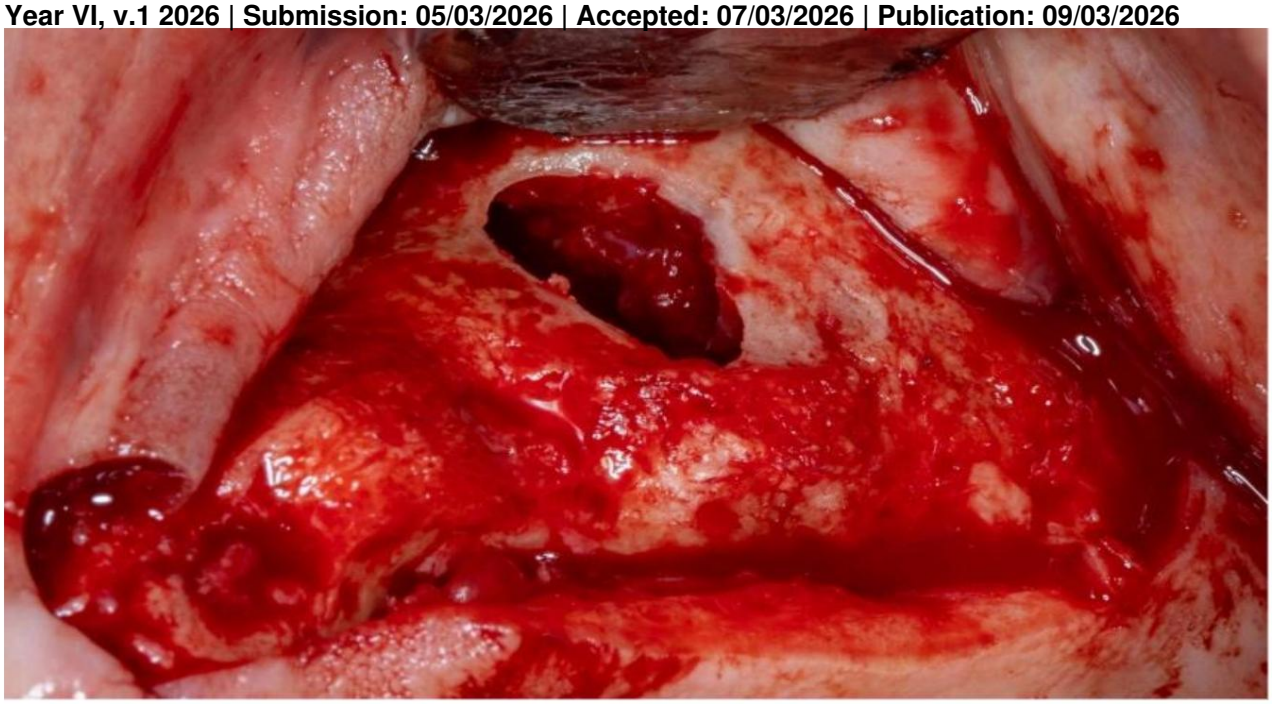
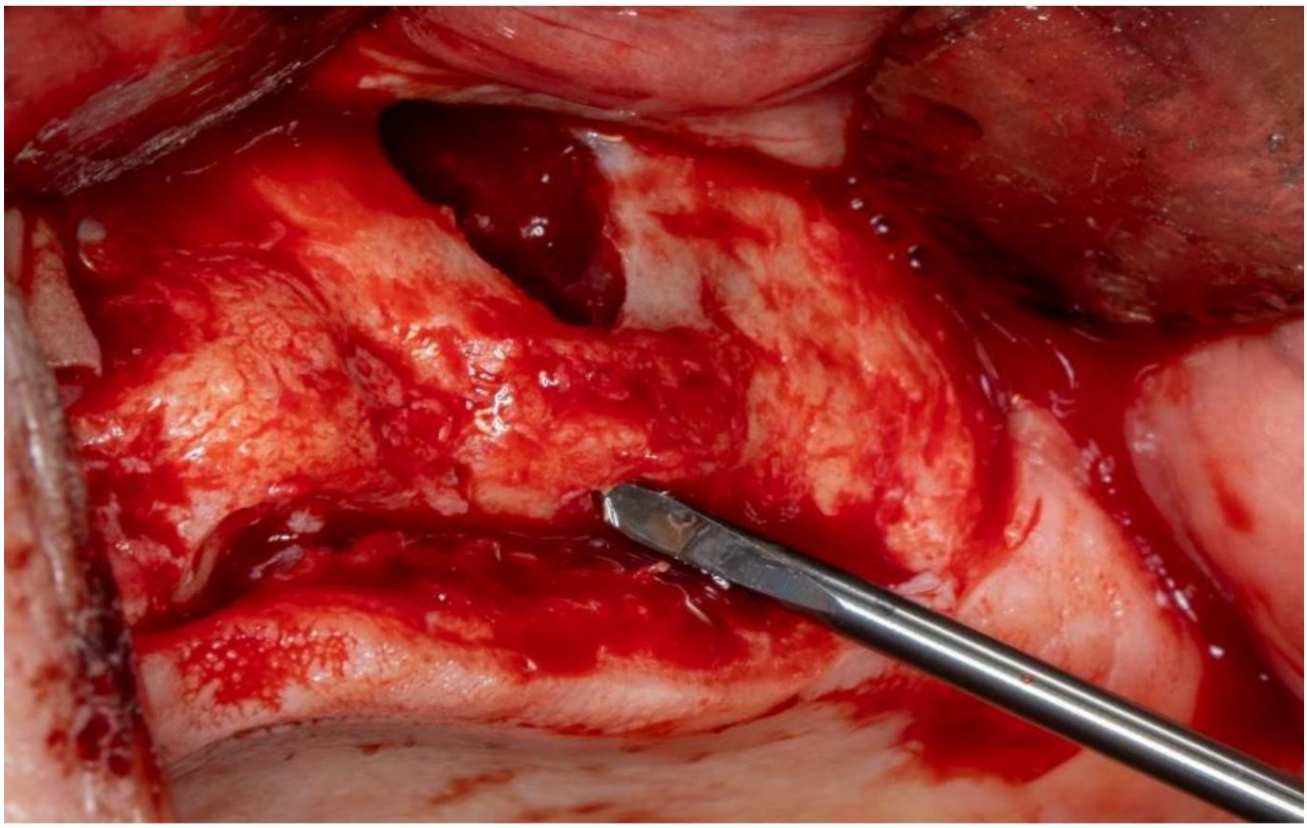


B – Detachment of Schneiderian membrane.

Fig 05

A – Osteotomy performed to access the maxillary sinus.

B – Detachment of Schneiderian membrane.



A – Instrumentation with the 2.35 lance drill from the Helix GM LG Neodent® kit

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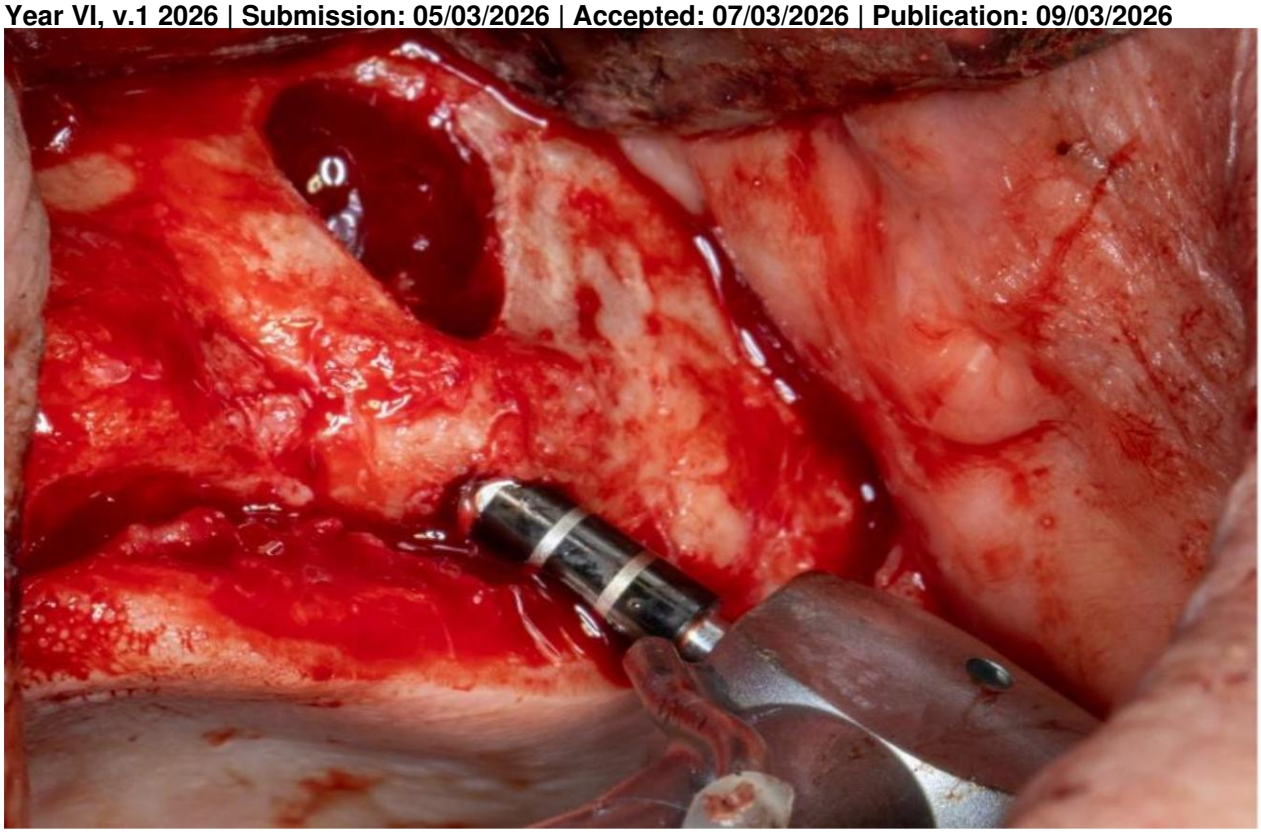
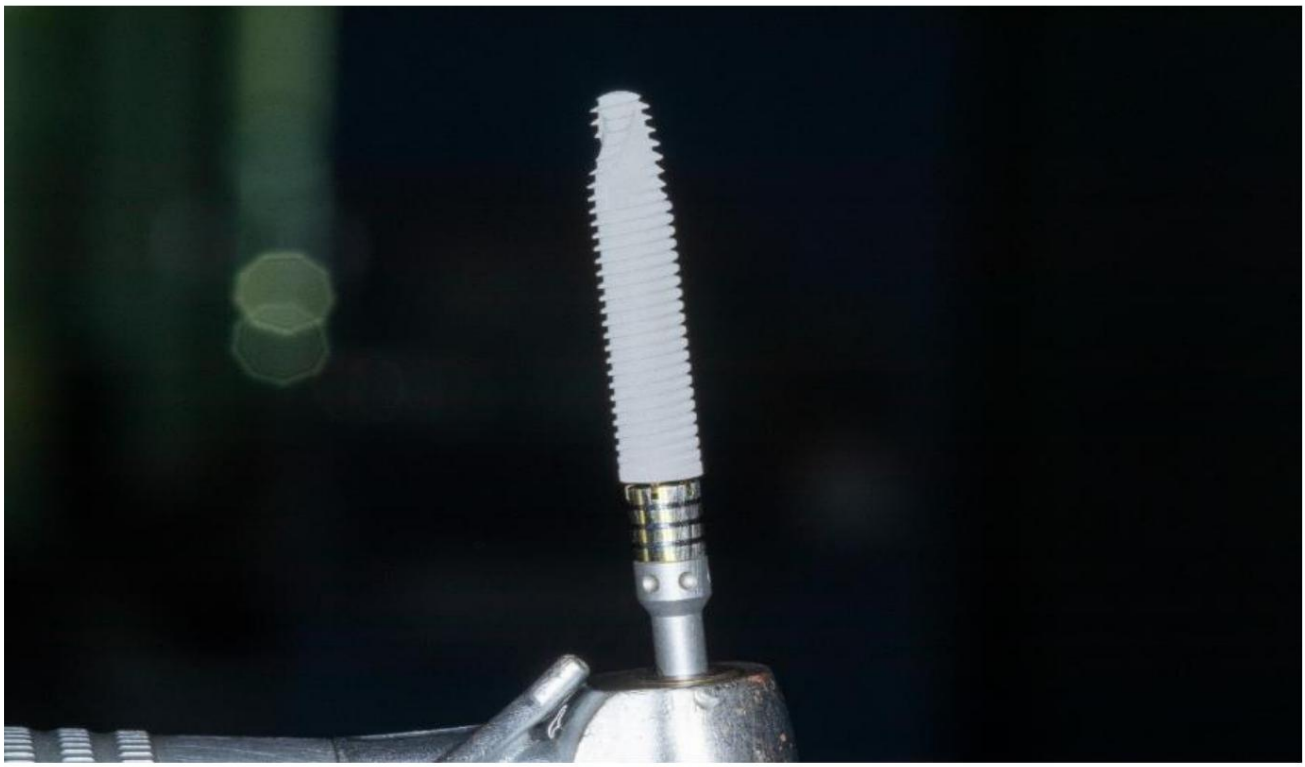


B - Instrumentation with the 3.75 lance drill from the Helix GM LG Neodent® kit.



C – Image of the LG Neodent® GM Helix Implant 3.75 x 20mm.

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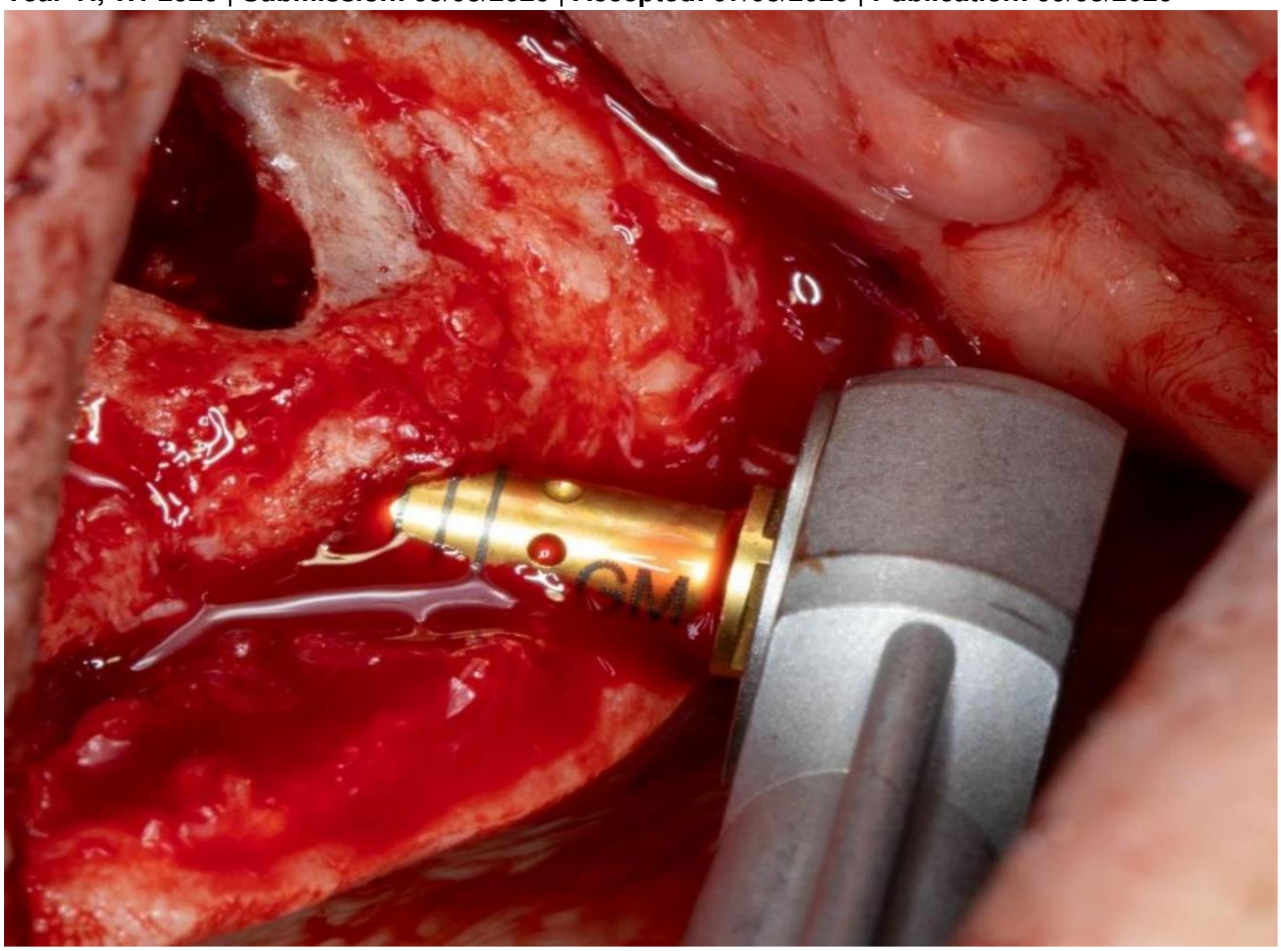

D – Implant placement using a Neodent® ratchet

Fig 06 – Implant placement in the region of tooth 24.

A – Instrumentation with the 2.35 lance drill from the Helix GM LG Neodent® kit

B - Instrumentation with the 3.75 lance drill from the Helix GM LG Neodent® kit.

C – Image of the LG Neodent® GM Helix Implant 3.75 x 20mm.

D – Implant placement using a Neodent® ratchet

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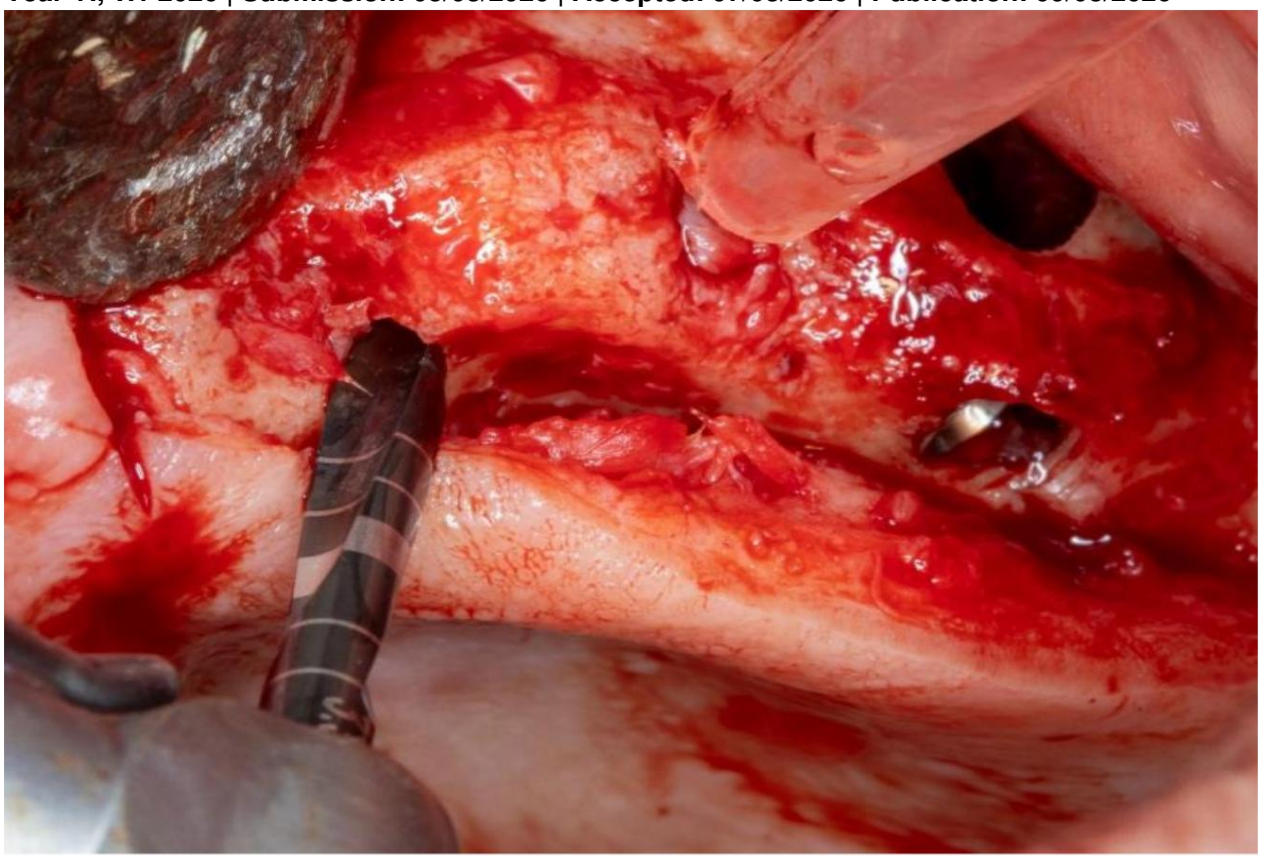
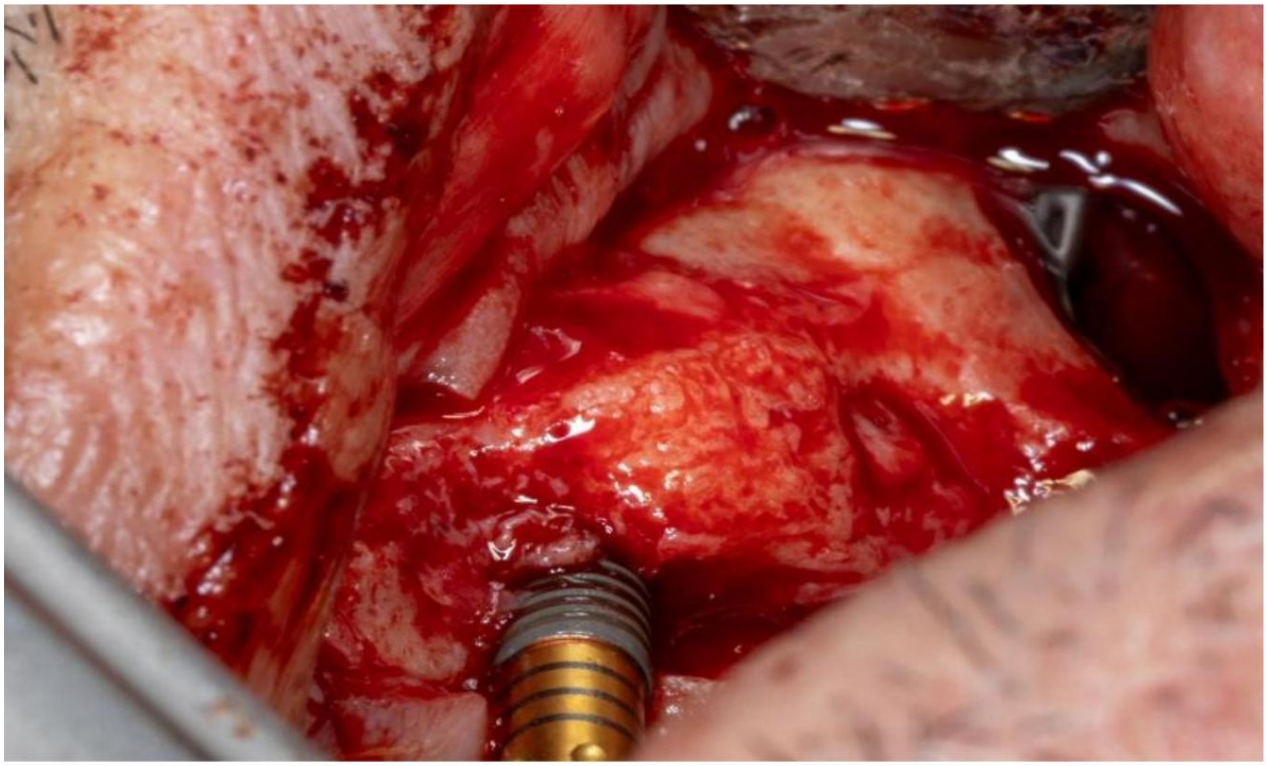


A - Instrumentation with the 3.5 lance drill from the Helix GM Neodent® kit



B – Installation of the 3.75 x 11.5 Helix GM Neodent® implant

Fig 07 – Implant placement in the region of tooth 22.

A - Instrumentation with the 3.5 lance drill from the Helix GM Neodent® kit

B – Installation of the 3.75 x 11.5 Helix GM Neodent® implant

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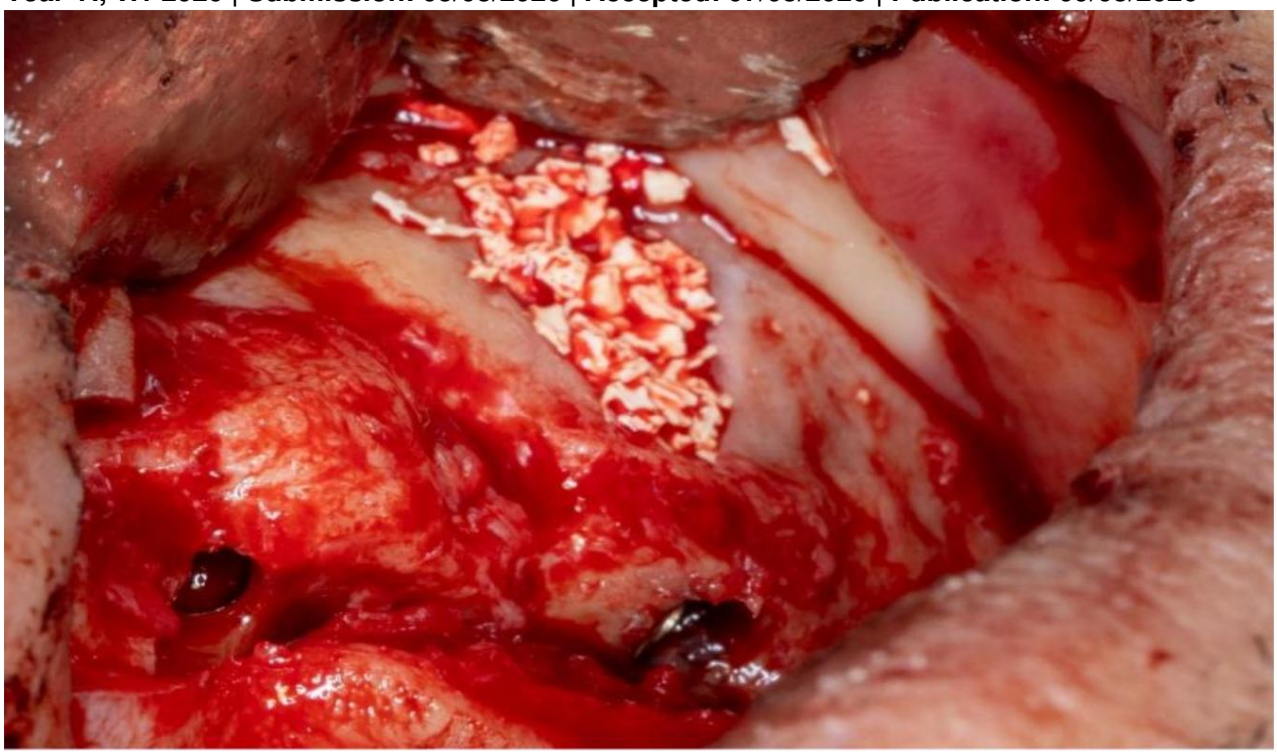
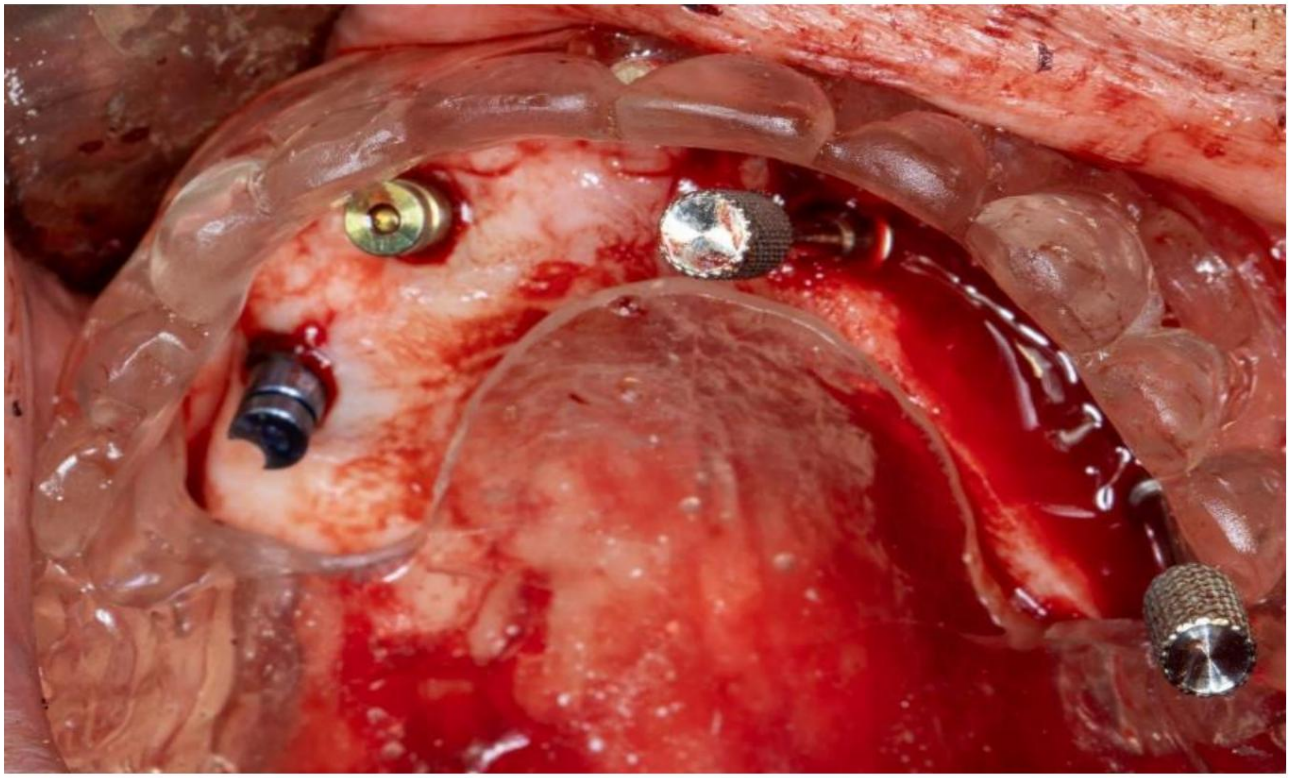


Fig 08 – Bone grafting in the maxillary sinus after implant placement with Cerabone Straumann®.



A – Installation of angled mini-abutments on implants 22 and 24.

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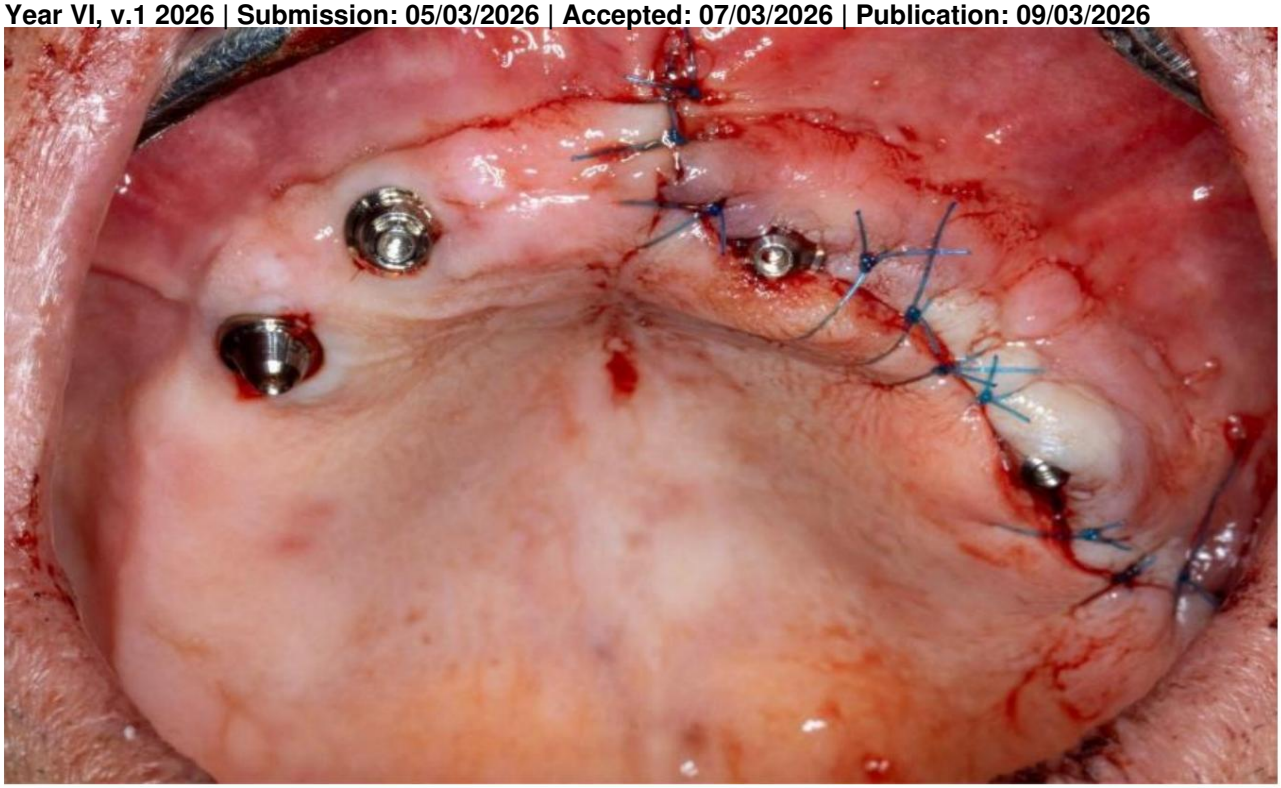
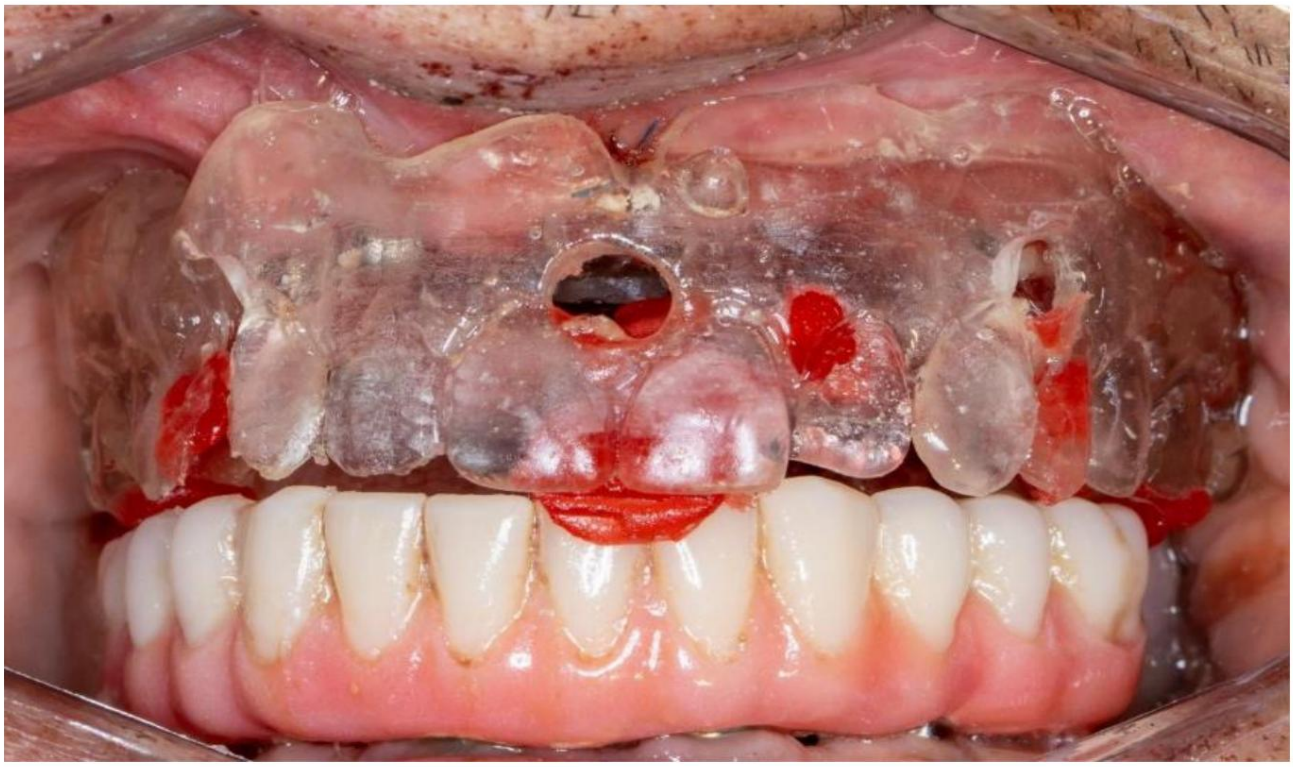


B – Suture with softblue thread - Techsuture® 4.0.

Fig 09

A – Installation of angled mini-abutments on implants 22 and 24.

B – Suture with softblue thread - Techsuture® 4.0.



A – Occlusion registration using Pattern GC® resin multi-functional guide.

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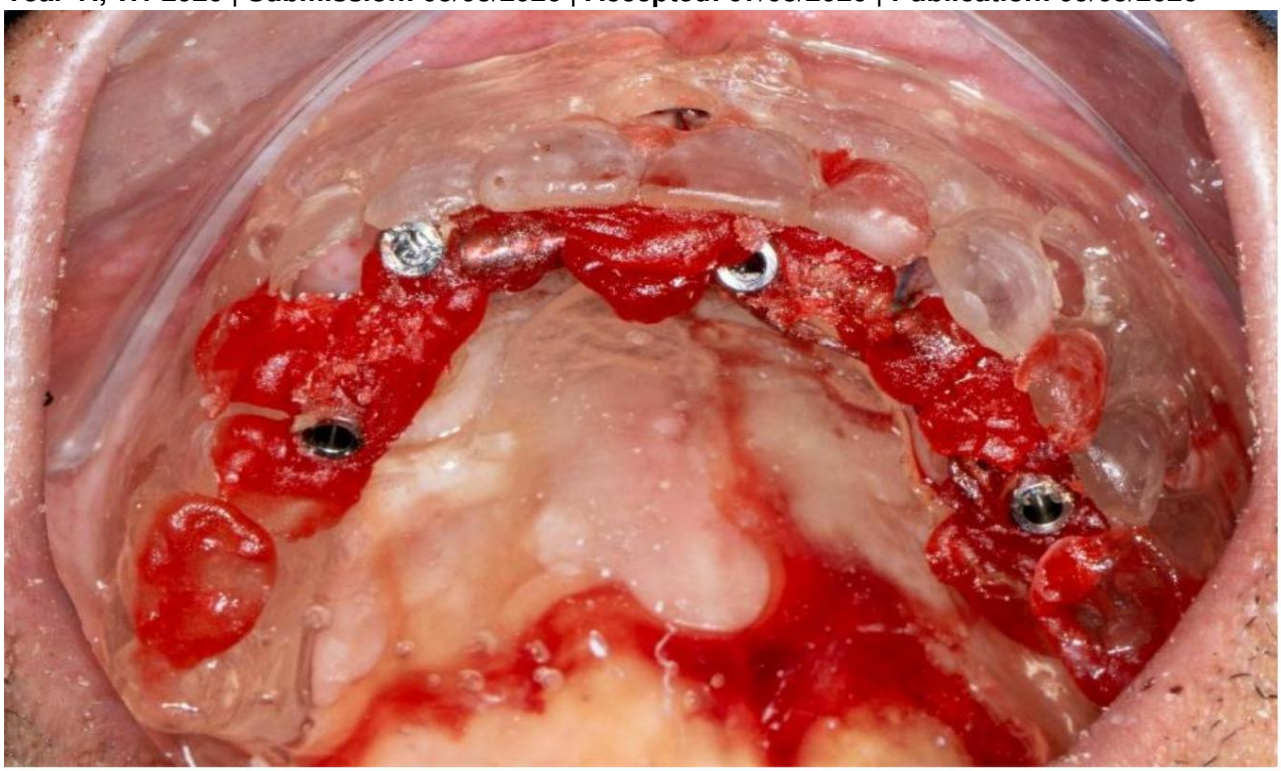
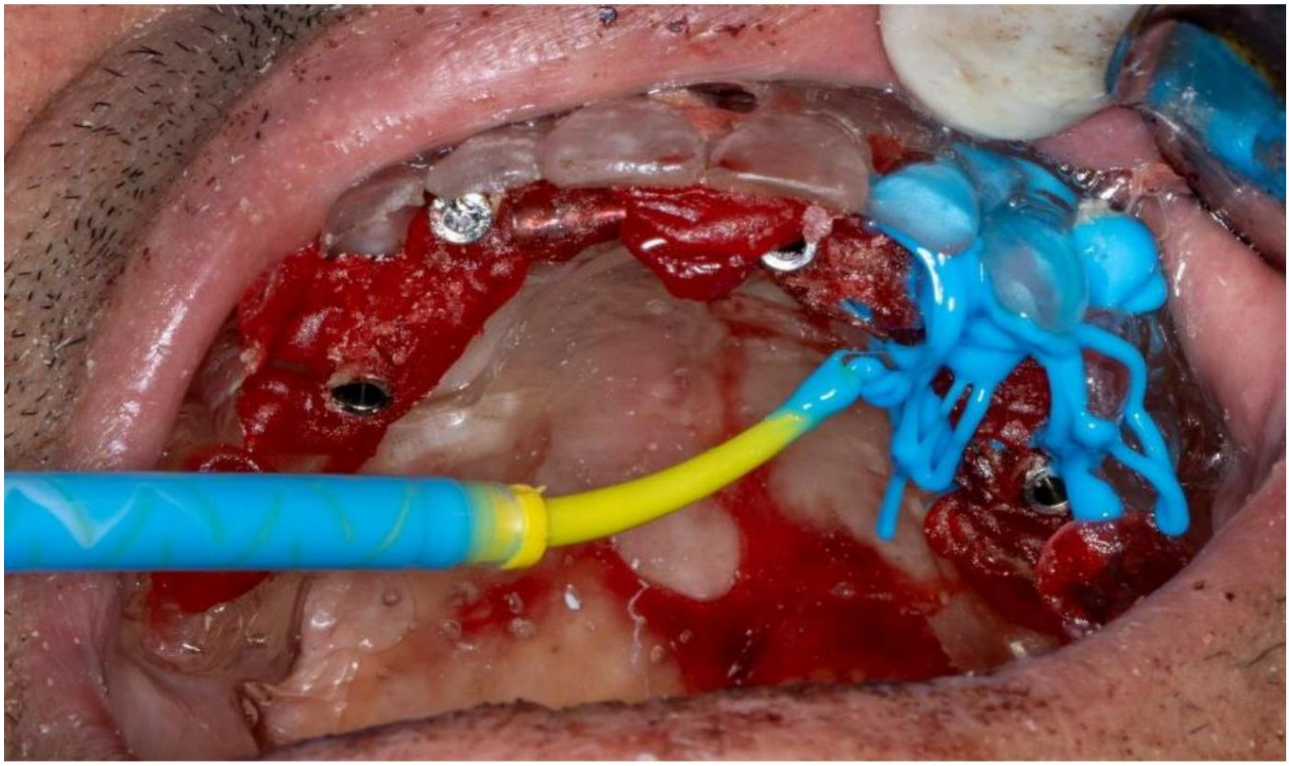


B – Fixing the molding transfers with Pattern GC® resin in the multi-functional guide.



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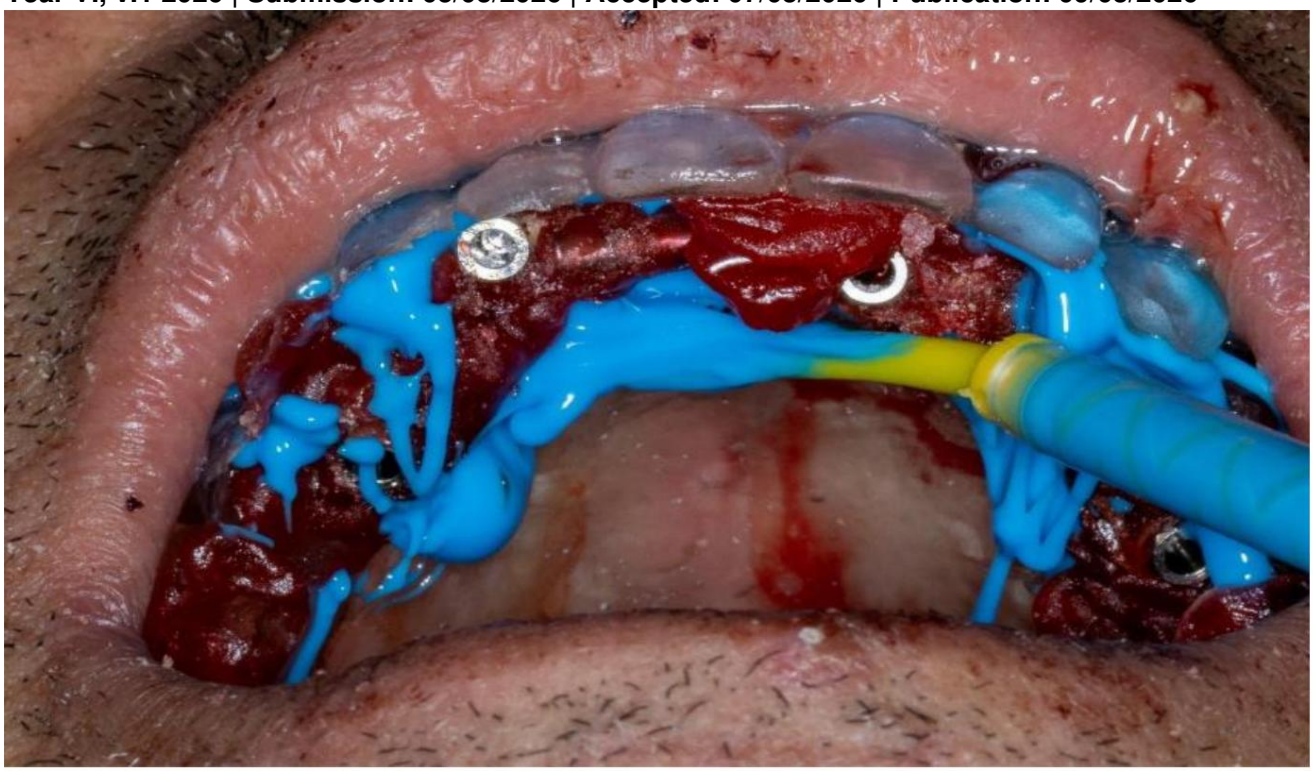


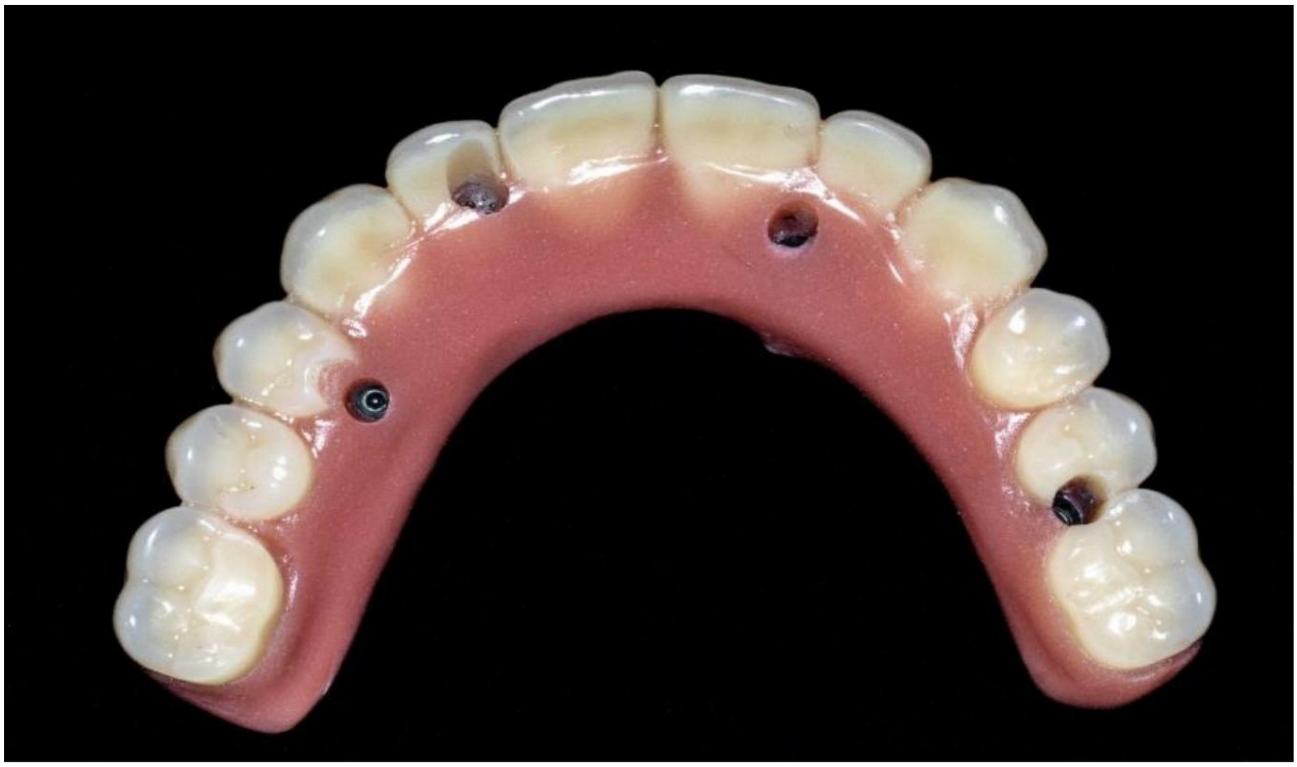
C and D – Molding with Scan Light Yller® addition silicone using a gun and tip.
mixer.

Fig 10 – Sequence of implant molding.

A – Occlusion registration using Pattern GC® resin multi-functional guide.

B – Fixing the molding transfers with Pattern GC® resin in the multi-functional guide.

C and D – Molding with Scan Light Yller® addition silicone using a gun and tip.
mixer.



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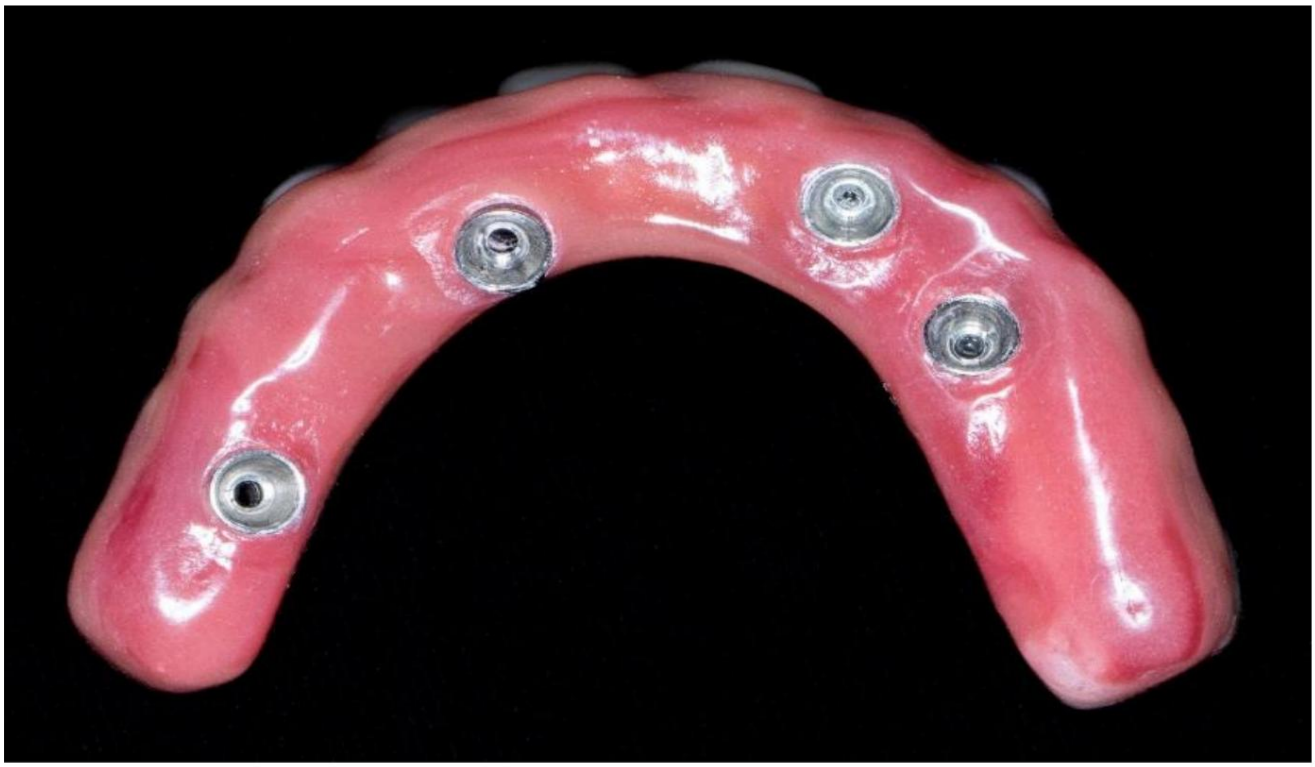
A – Occlusal view of the dentogingival prosthesis.

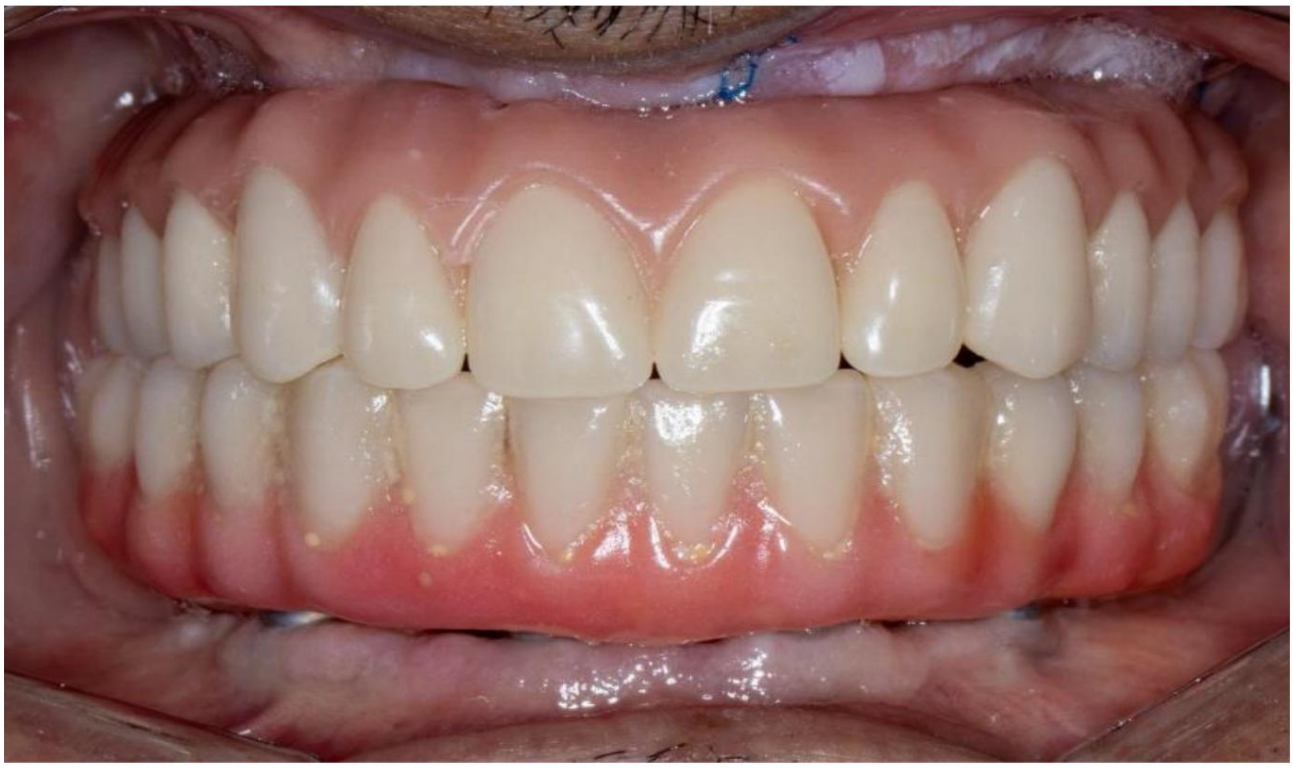


B – Basal view of the dentogingival prosthesis. Difference in cantilever between the implant installed in a way conventional (14) and implant (24)

Fig 11

A – Occlusal view of the dentogingival prosthesis.

B – Basal view of the dentogingival prosthesis. Difference in cantilever between the implant installed in a way conventional (14) and implant (24)



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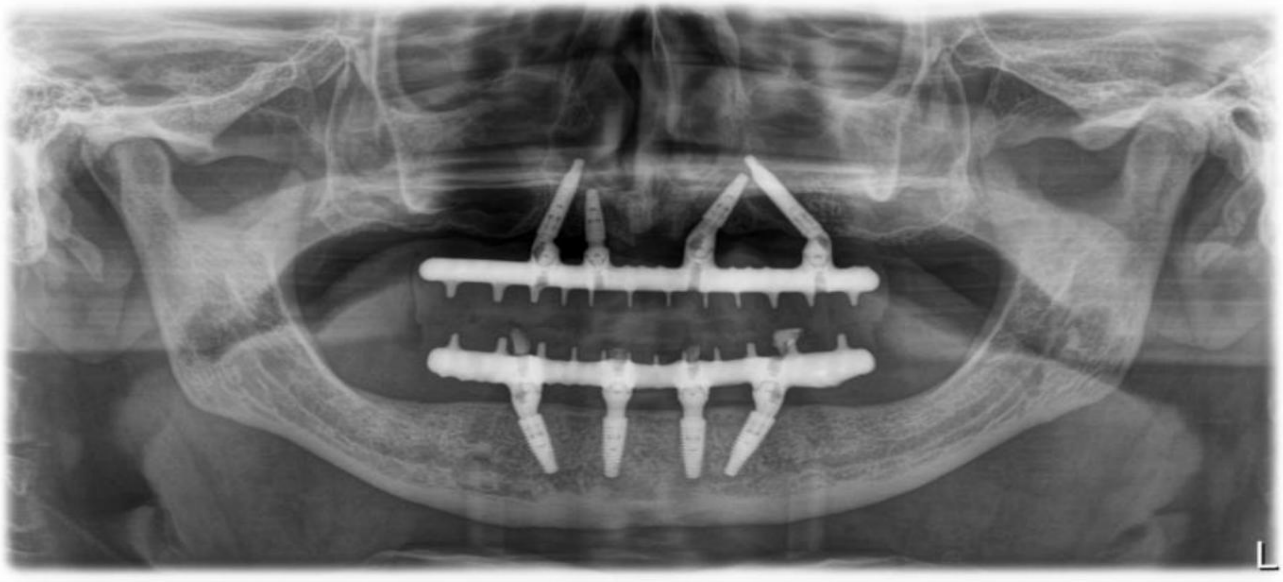
A – Intraoral photograph of the dentogingival prosthesis.



B – Final panoramic X-ray.

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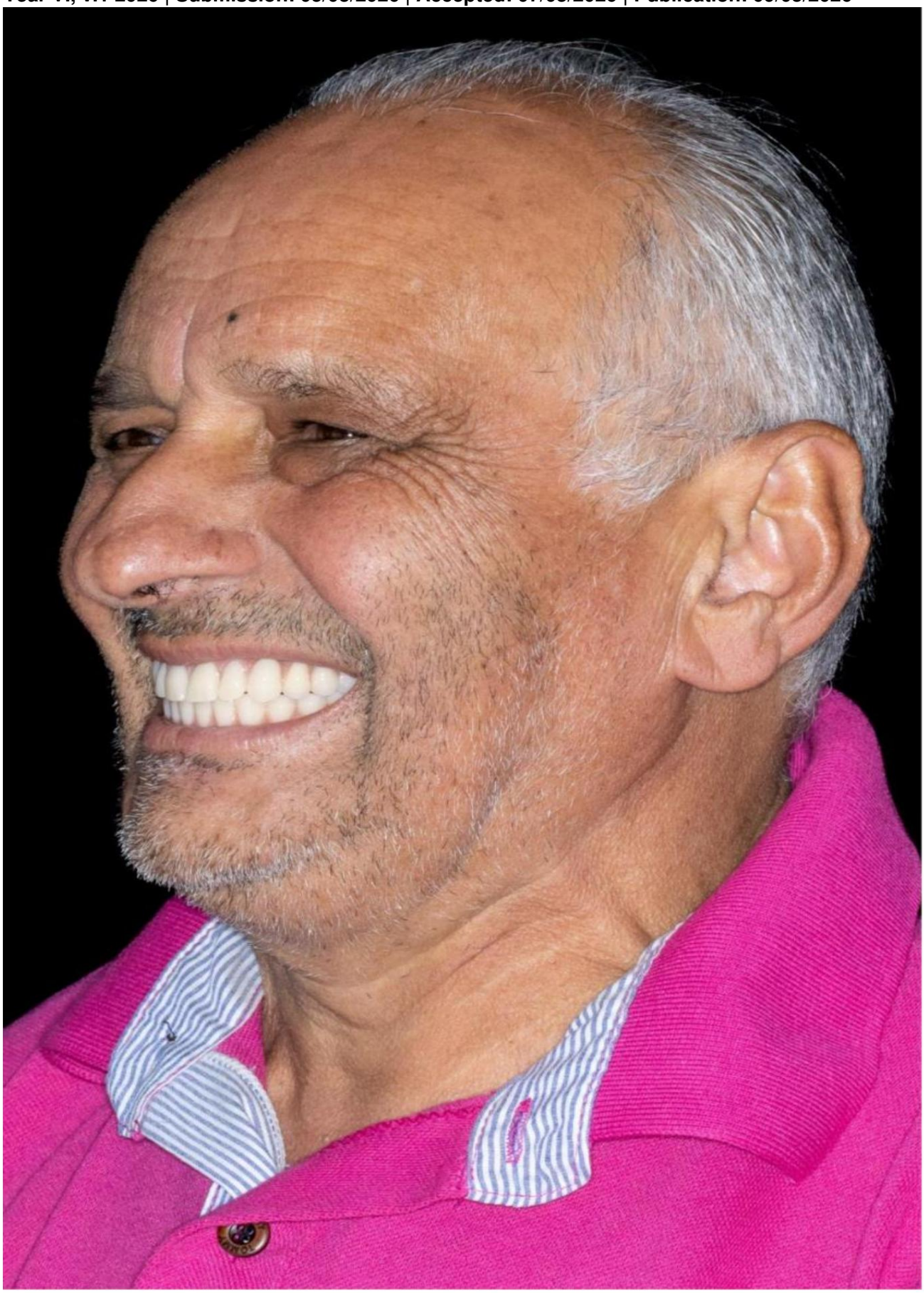

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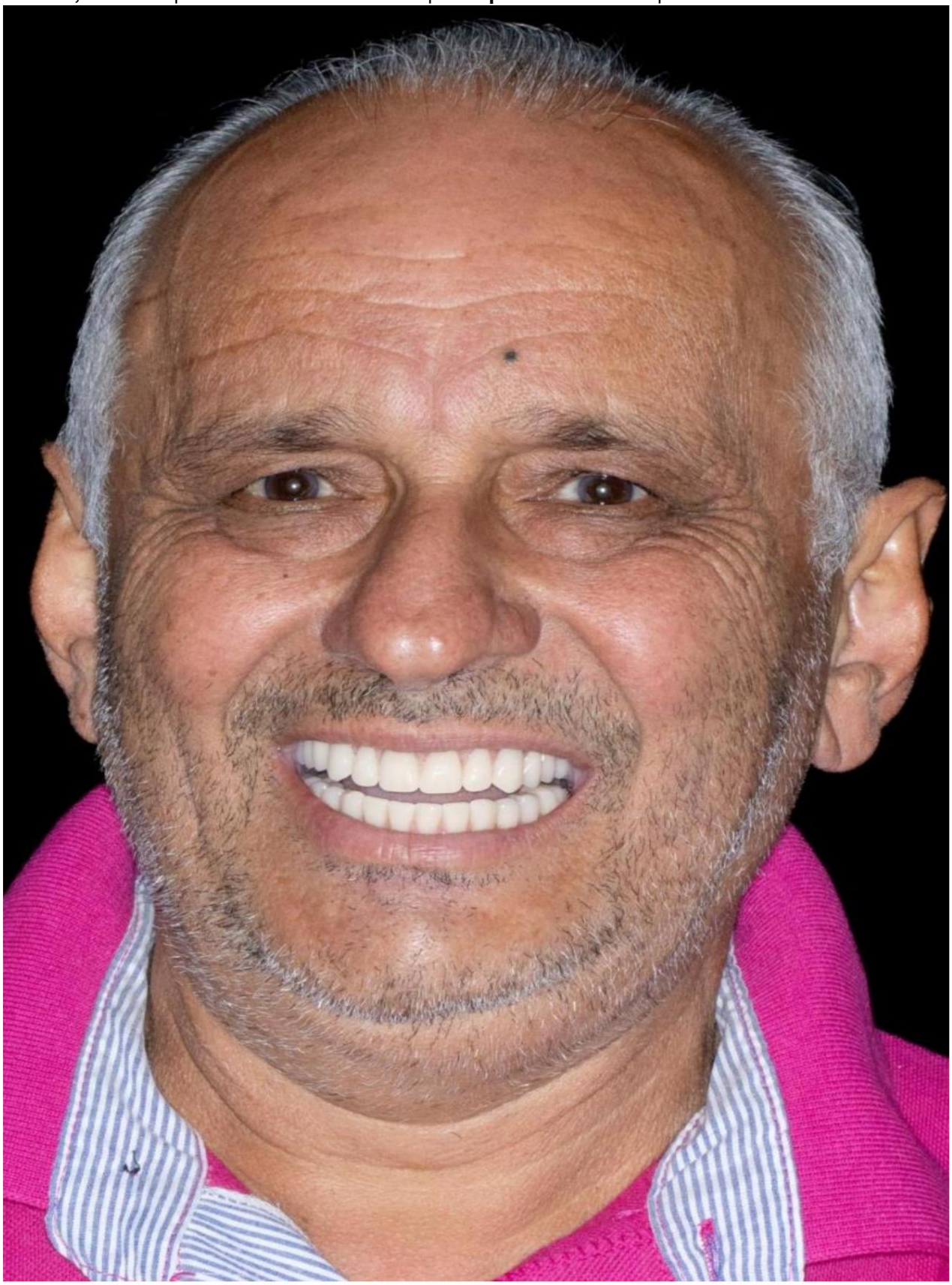

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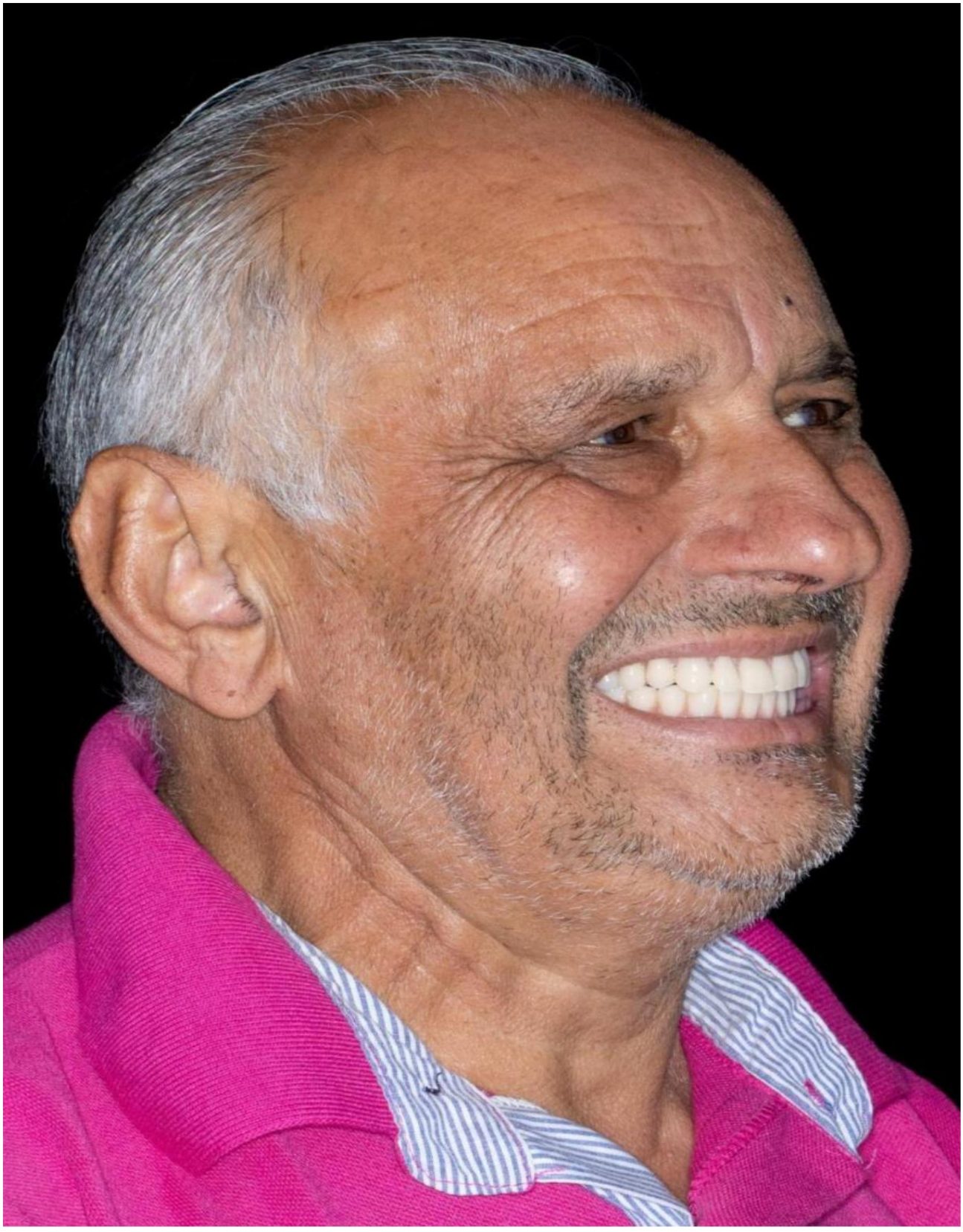

C, D and E – Patient's smile with the new prosthesis.

Fig 12

A – Intraoral photograph of the dentogingival prosthesis.

B – Final panoramic X-ray.

C, D and E – Patient's smile with the new prosthesis.

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Reduced use of grafts

Comparison of inclined and straight lines

Transsinus implants

All on 4 – straight to inclined

Transnasal implants

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