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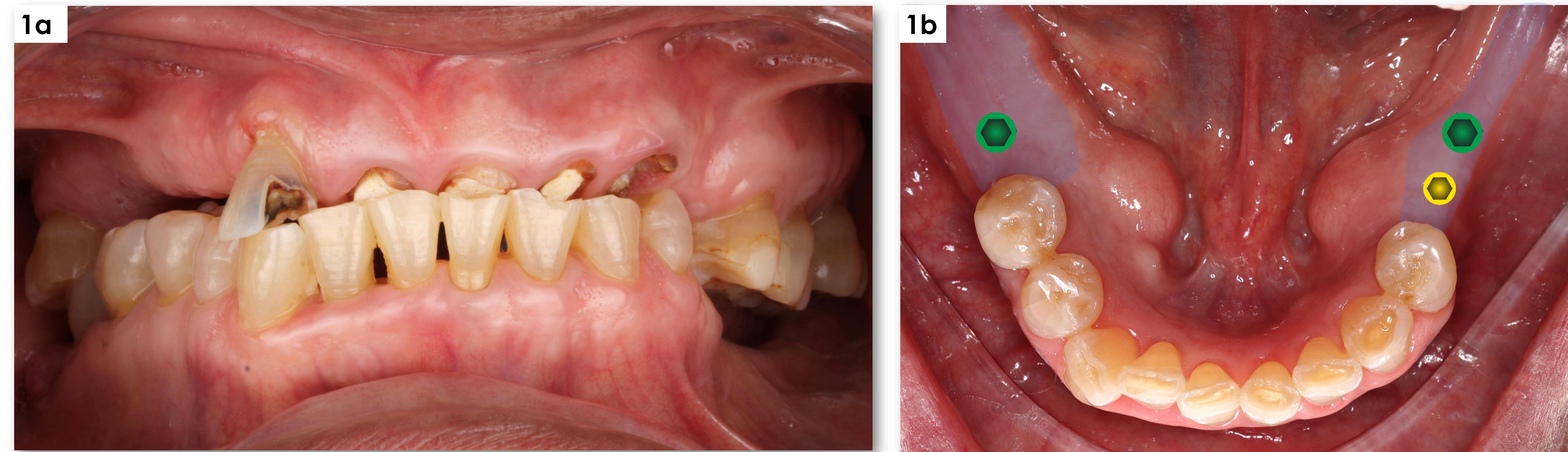
INTRODUCTION

Tooth loss leads to a gradual reduction in both horizontal and vertical dimensions of the alveolar ridge (1,2). Consequently, implant rehabilitation in such conditions may face limitations, increasing the risk of damaging crucial anatomical structures (3). In this context, guided bone regeneration and simultaneous implant placement techniques, along with digital planning of guided surgery, have been employed to enhance the safety and efficiency of surgical procedures (4). The purpose of this presentation is to depict a clinical case exemplifying the application of digital planning in guided surgery for implant placement and simultaneous bone regeneration in a patient with an atrophic alveolar ridge.

CASE PRESENTATION

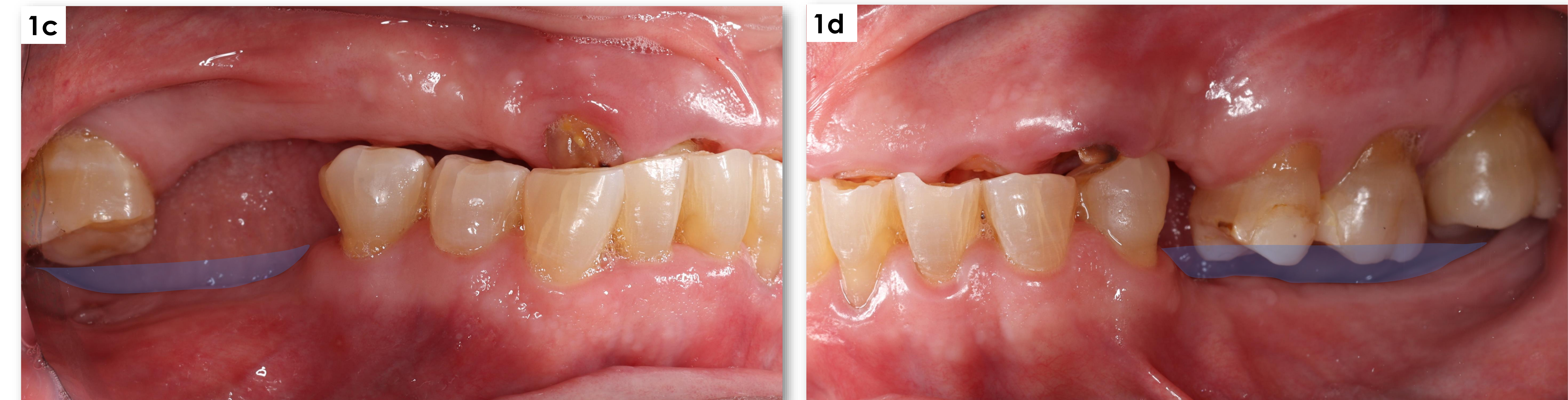
A 64-year-old female patient, referred for an implant placement evaluation, was evaluated. Clinically, it presents a thick flat periodontal phenotype, loss of vertical dimension and atrophy of the right and left mandibular edentulous posterior ridge, class II and III respectively, according to Seibert (5). The placement of 3 implants was planned in the areas of teeth 3.5, 3.6 and 4.6, in the lower posterior sector, after a healing period of 6 months due to a previous alveolar ridge preservation treatment.

Figure 1. Initial photographs



A) Initial front photograph

B) Lower occlusal view, shaded area delimiting the keratinized gingiva, simulation of implant location.



C) Right lateral view, shaded area delimits the ridge's vertical bone loss.

D) Left lateral view, shaded area delimits the ridge's vertical bone loss.

Digital Planning for Guided Surgery in Simultaneous Implant Placement and Bone Regeneration in an Atrophic Ridge: a Case Report

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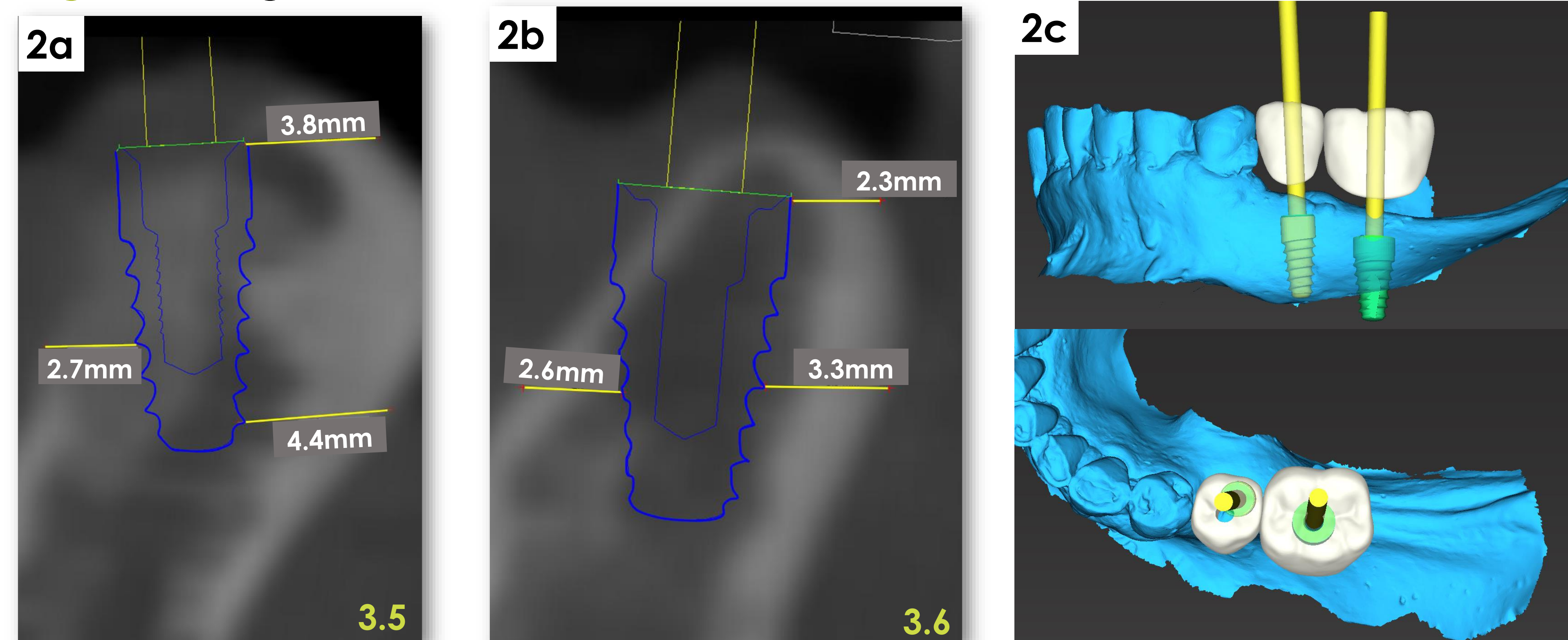
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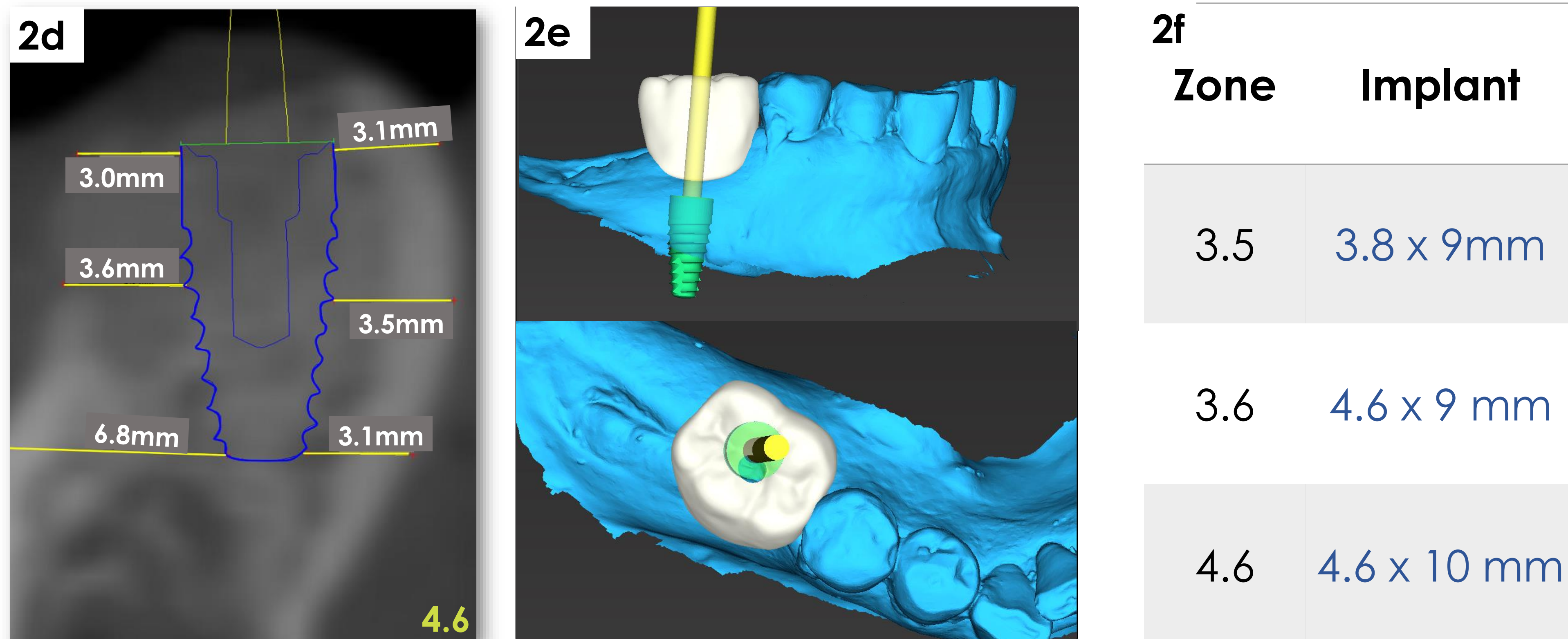
Figure 2. Digital workflow



A) CBCT sagittal section in zone 3.5, measured toward buccal and lingual walls

B) CBCT sagittal section in zone 3.6, measured toward buccal and lingual walls

C) Digital prosthetic planning and diagnostic wax-up in software for teeth 3.5 and 3.6



D) CBCT sagittal section in zone 4.6, measured toward buccal and lingual walls

E) Digital prosthetic planning and diagnostic wax-up in software for teeth 4.6

F) Diameter and length of the implants placed

DIGITAL PLANNING

Software, cone beam computed tomography (CBCT), intraoral scanning and a digital wax-up were used to define the correct prosthetically guided implant position, the distance between implants and teeth, and care for important anatomical structures, without leaving behind the conditions of the atrophic ridge. Guided placement is planned and a surgical guide is prepared to perform the procedure.

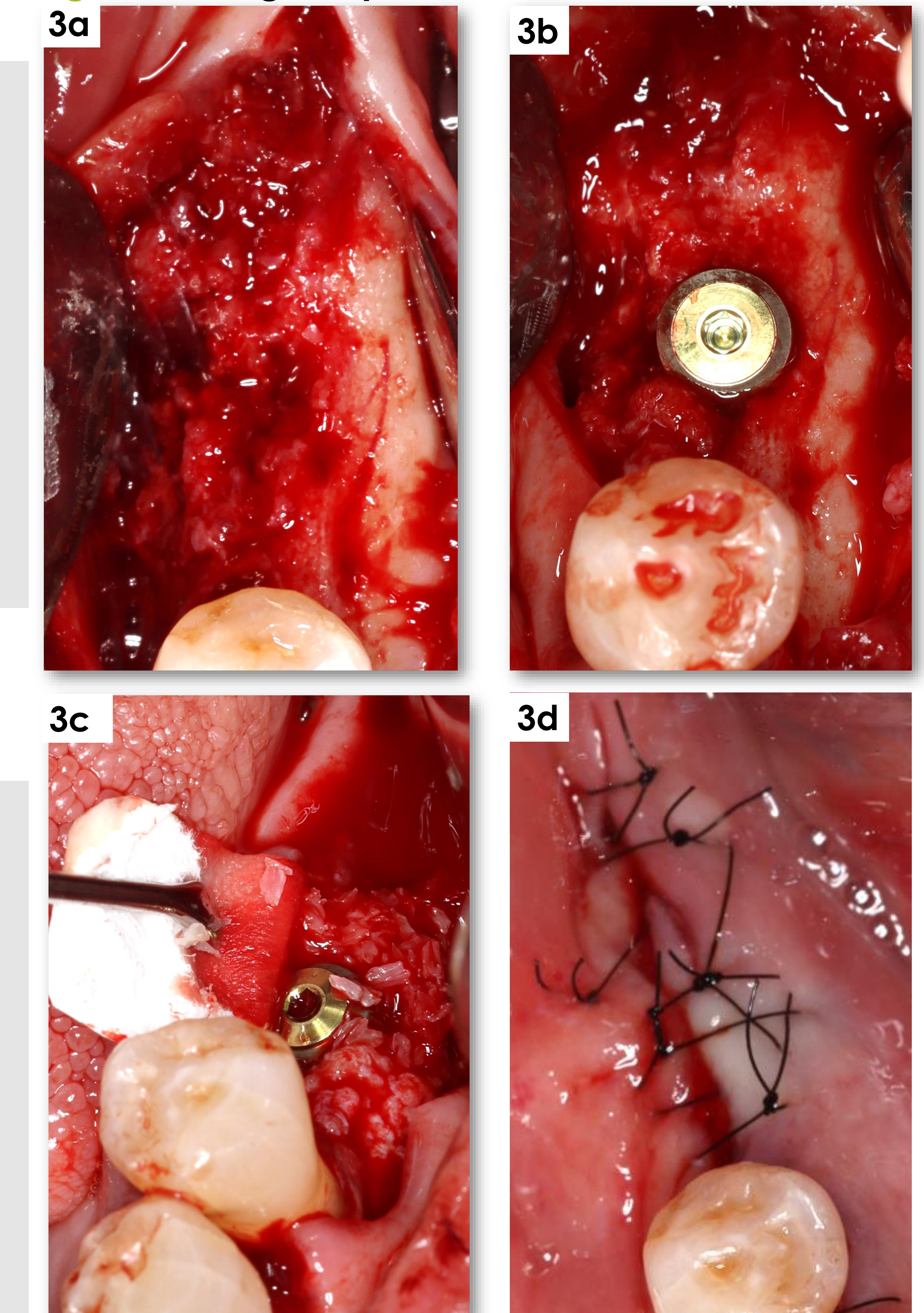
Additionally, soft tissue grafting was considered to compensate for crown size relative to implant length.

SURGICAL PROCEDURE

The surgery was performed using implants with laser-lok surface and platform change. For bone regeneration, particulate cortical/cancellous allograft (1.0 cc), autologous bone harvested from the torus mandible, and a bovine collagen membrane were placed at both surgical sites. The flaps were faced passively and simple and horizontal mattress sutures were performed with 5-0 nylon. Post-operative instructions and pharmacotherapy were given.

A late loading protocol was chosen due to the specific conditions.

Figure 3. Surgical procedure



A) Full thickness flap lift **B)** Implant placement **C)** Guided bone regeneration **D)** Passive wound closure, suturing.

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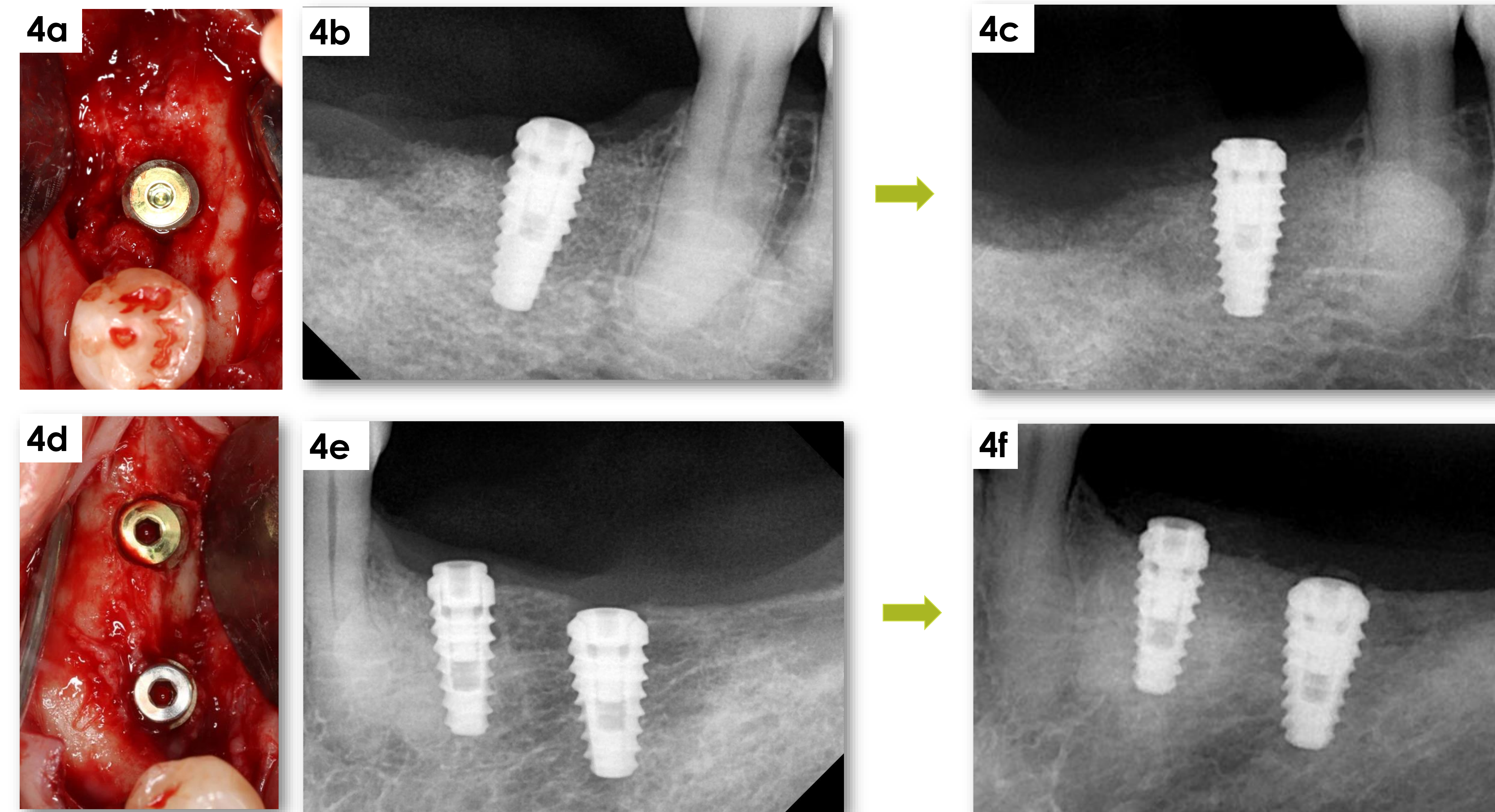
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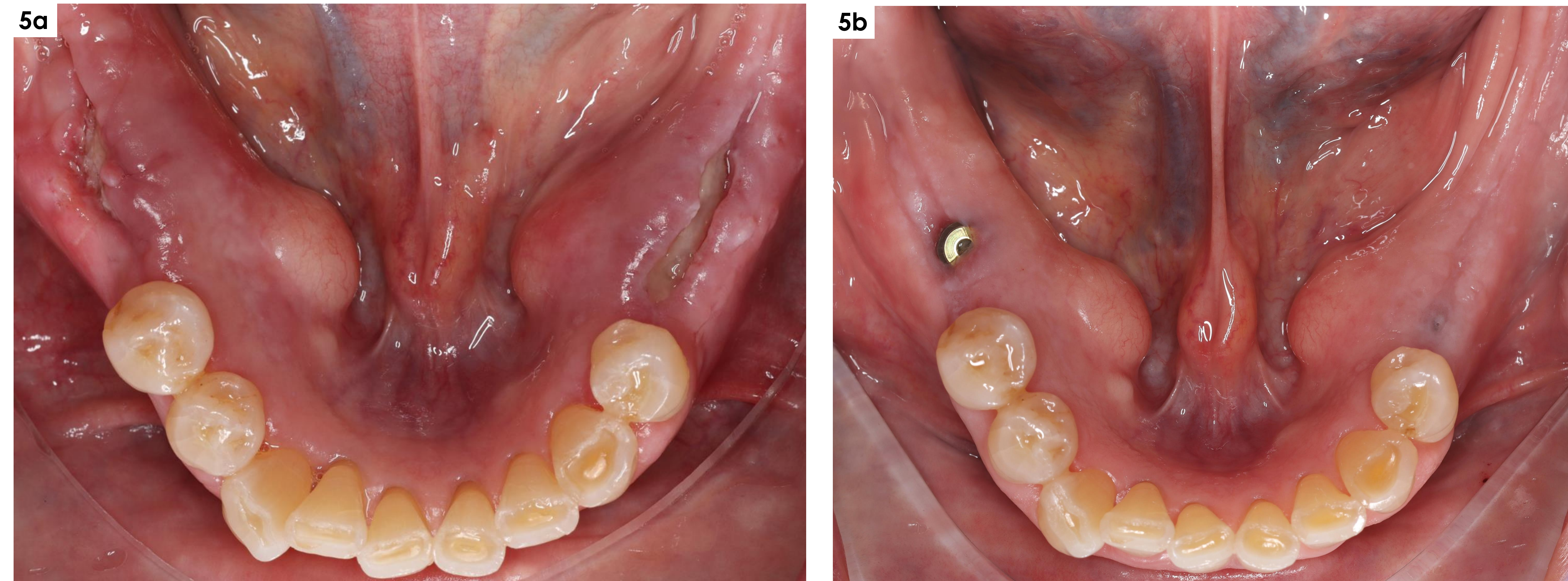


Figure 4. Radiographic results



A) Implant placement in zone 4.6 **B)** Immediate post-surgical **C)** 12 weeks post-surgical
D) Implant placement in zone 3.5 and 3.6 **E)** Immediate post-surgical **F)** 12 weeks post-surgical

Figure 5. Clinical results (healing)



A) 2 weeks post-surgical

B) Postoperative 12 weeks, exposure of the implant platform.

RESULTS

The placement of the 3 implants was carried out successfully, obtaining primary stability and an adequate distance between tooth-implant and implant-implant without any damage to the inferior alveolar nerve. The procedure was carried out at the previously planned site in a digitally and prosthetically guided manner. However, an involvement of the vestibular table was observed where the particulate graft was placed, expecting to achieve bone gain at the level of the implant platform and the alveolar ridge.

CONCLUSION

The implants placement by guided surgery is an effective tool in atrophic ridges when it is carried out under prosthetic planning, anticipating the performance of simultaneous regenerative techniques. For this, adequate management of hard and soft tissues is essential, however, they may arise unexpected incidents during the healing phase that can be resolved later. An important factor to consider is surgical operative skill to avoid complications requiring additional procedures.

REFERENCES

