

Full-arch Implant Treatment for Maxilla With Insufficient Bone Volume for a Stable Long-Term Prognosis

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Introduction

In recent years, fixed implant treatment for full arch cases has get stable prognosis due to the development of digital implant treatment and the use CAD/CAM prosthesis. However, despite advances in implant treatment, no clear guidelines have been established for full-arch cases with insufficient bone volume. Several articles has been reported that fixed superstructures have a good prognosis in cases with insufficient bone case¹⁾.

Aim

We considered prognosis from a full-arch implant treatment using **guided implant surgery**, **tilting implant placement**, and **GBR bone augmentation** with insufficient bone case.

Case summary

The patient was a 62-year-old female with a chief complaint of discomfort in her maxillary complete denture (Fig. 1). She had a sinus infection and a pollen allergy. She strongly requested a fixed implant prosthesis in her maxilla.

Radiographic Examination

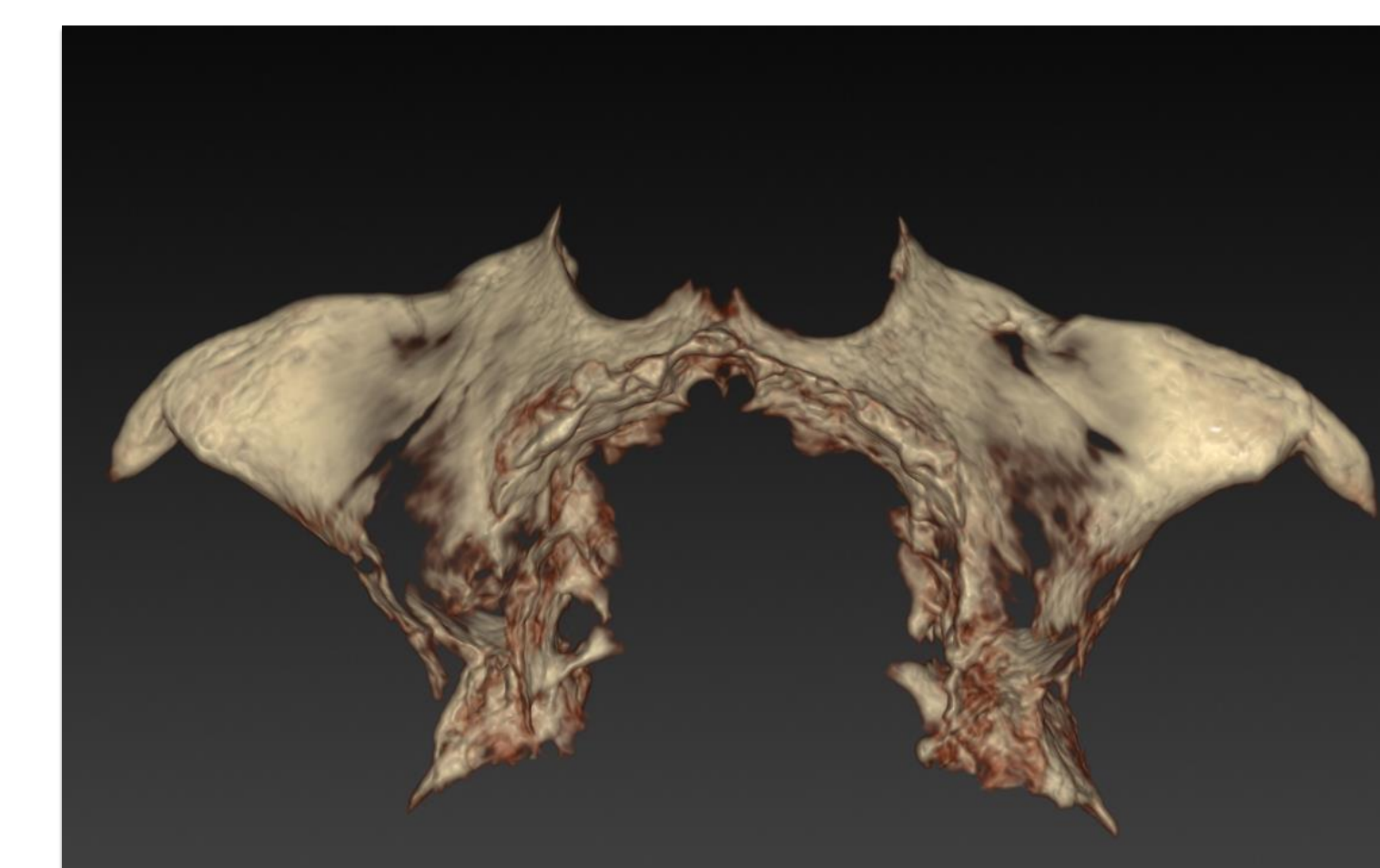
Panoramic examination showed sevier bone resorption in the molar area in the maxilla (Fig. 2). In the mandible, hopeless teeth #35 and #44 were found. And also, peri-implantitis was found at the lower right implant site.



Fig. 1 Extra / Intra Oral View



Fig. 2 Panoramic View



CT Examination

The CT examination showed that insufficient bone width and height were found from the anterior to premolar areas (Fig. 3).

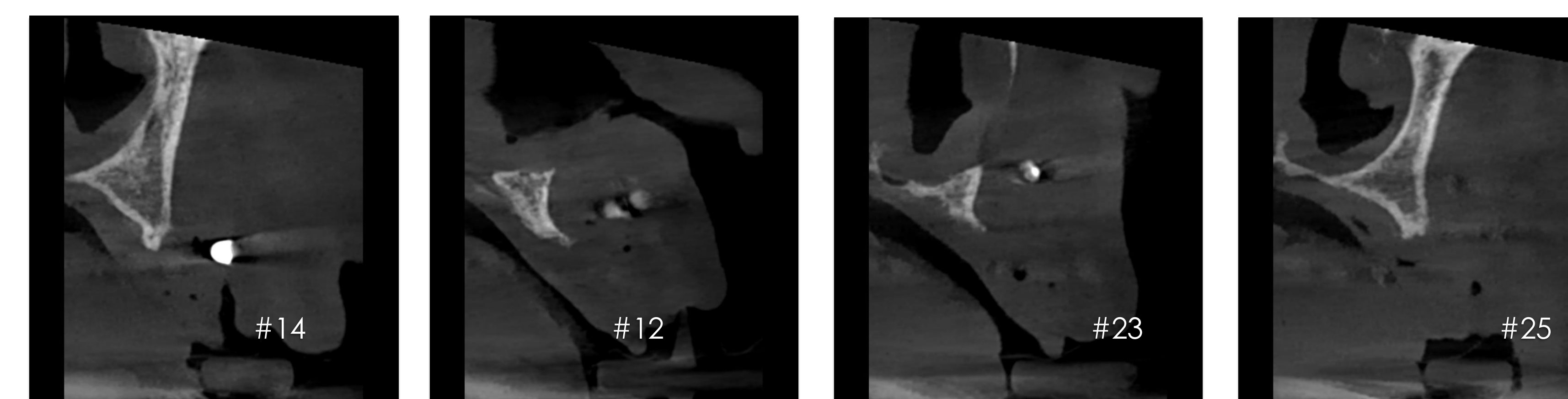


Fig. 3 CT Examination

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Computer Simulation

A computer simulation was performed for the sites where implants could be placed (Fig. 4). In the four anterior sites had the potential to achieve minimum primary stability and perform. In the molar region, we planned to place two implants at tilted in both maxillary tuberosities where bone volume was present. A surgical guide was then designed taking into account the ideal positions of the implant and superstructure.

Guided Implant Surgery

At first, a surgical Nobel guide was used to place tilted implants in the maxillary tuberosity area. By placing implants in the molars, we were able to stabilize the surgical guide (Fig. 5). In the anterior area, drilling mark was performed only at the implant placement position, and the gingival flap was opened. The implants were placed to achieve as much initial stability as possible. Six implants were placed to support a full-arch implant superstructure.

After Surgery and Healing Period

The correct placement of the implants and bone grafts was confirmed (Fig. 6). The posterior implants were placed avoiding the posterior wall of the maxillary sinus. Cover screws were placed on the anterior implants, and multi-unit abutments and healing abutments were placed on the posterior implants.

During the healing period of the implants, a complete maxillary denture was used.

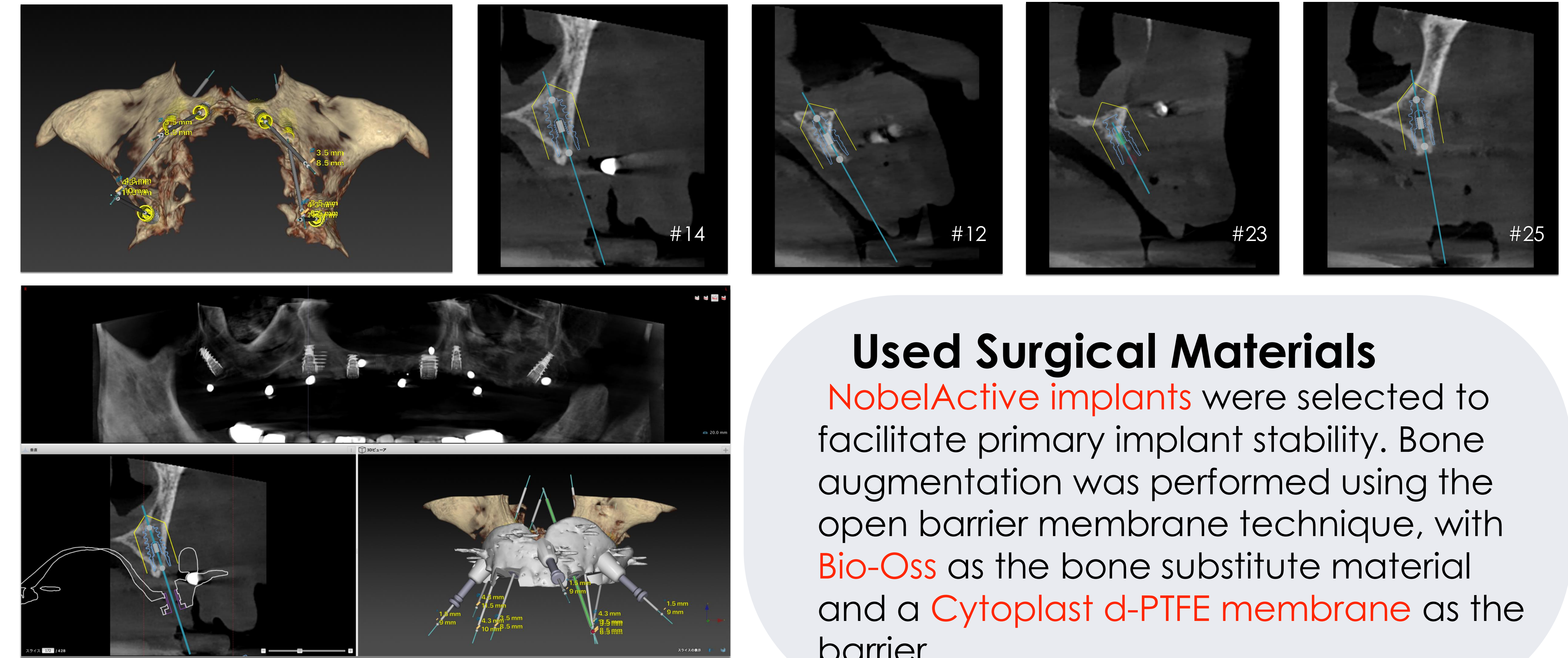


Fig. 4 Computer Simulation

Used Surgical Materials

NobelActive implants were selected to facilitate primary implant stability. Bone augmentation was performed using the open barrier membrane technique, with **Bio-Oss** as the bone substitute material and a **Cytoplast d-PTFE membrane** as the barrier.

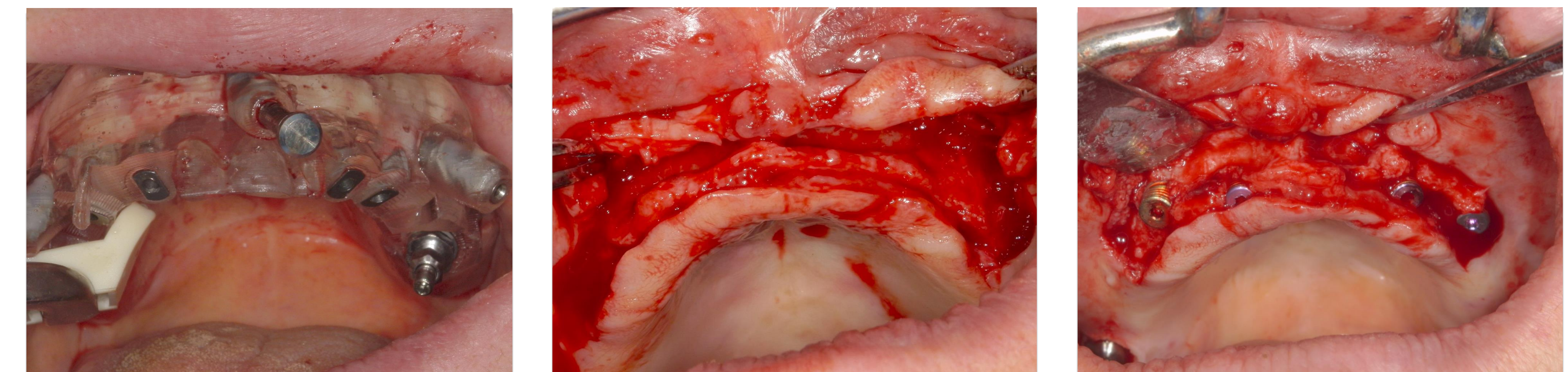


Fig. 5 Guided Implant Surgery

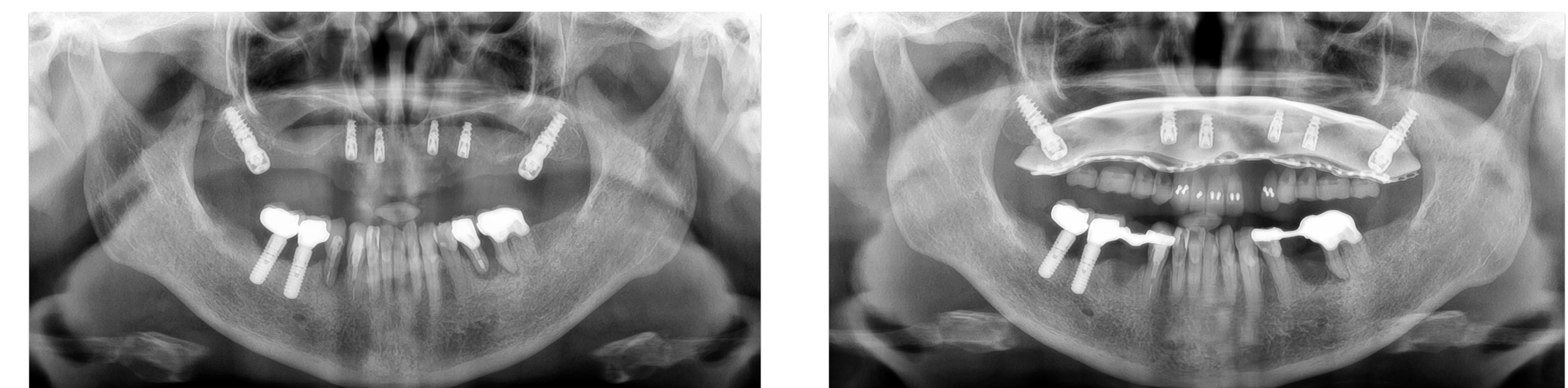


Fig. 6 After Surgery and Healing Period

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After Healing Period

After the implants were placed, healing period of eight months was allowed. Post CT examination showed an increase in bone volume around the implants in the anterior teeth (Fig. 7). Multi-unit abutments were attached to the four anterior implants that had achieved osseointegration (Fig. 8).

Fabrication of full-arch implant superstructure

After taking impressions of the implants, the fixed provisional restoration was designed (Fig. 9). The shape and esthetics were confirmed with a screw-retain provisional restoration.

Collaboration with dental technician

In the production of full-arch implant superstructures, sharing information between the patient and the prosthesis is essential ²⁾. A precise impression of the implant positions and bite registration are performed, a fixed provisional restoration is attached, and the shape, bite, and esthetics of the superstructure are evaluated (Fig. 10). The results are then used to produce the final superstructure with high precision using intra and extra oral photographs and an intraoral scanner.

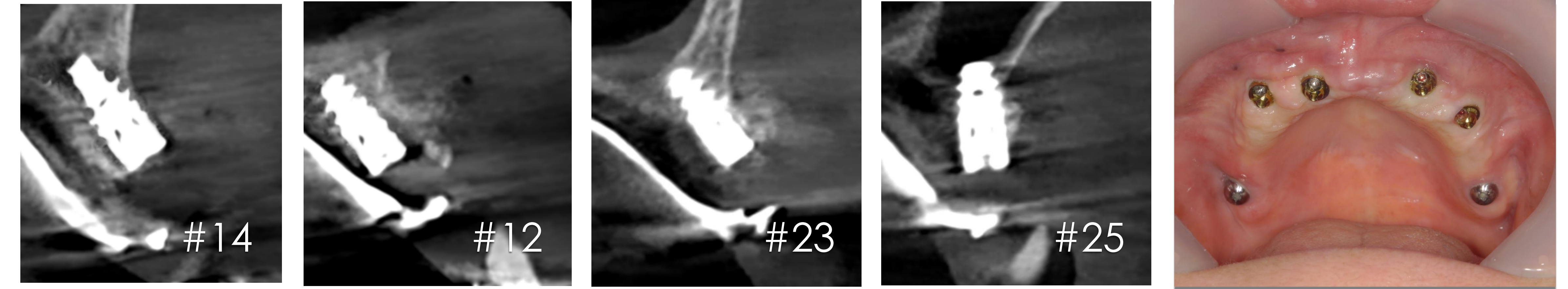


Fig. 7 Post CT Examination

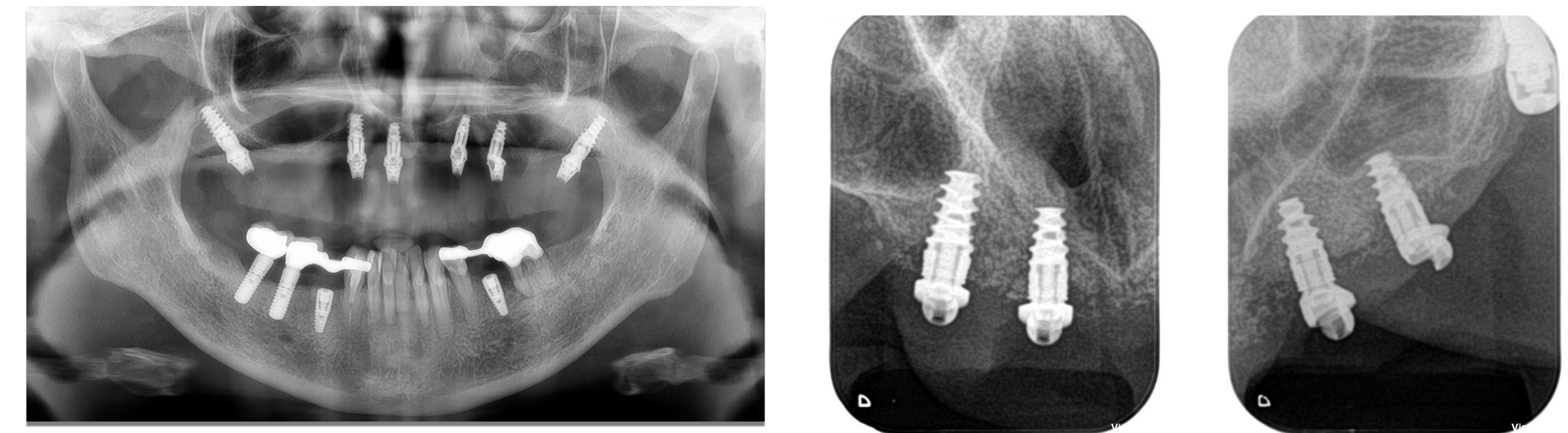


Fig. 8 Multi-unit abutments on the six implants



Fig. 9 Fixed Provisional Restoration designed

Fig. 10 Designed Resin Frame try-in

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Final full arch superstructure prosthesis

Final screw-retaining fixed zirconia superstructure with gum was delivered to six implant on maxilla. Several try-in of the resin frame was performed in advance to improve the fit of the superstructure (Fig. 11).

When fitted in the patients mouth, aesthetic and functional results were achieved. Panoramic x-rays also show a highly accurate fitting (Fig. 12). After the final superstructure was delivered, it matched in with the patient's smile (Fig. 13).

In order to ensure a stable prognosis of full-arch implant treatment, careful planning and practice are required from the preoperative diagnosis to the fitting of the final superstructure ³⁾.



Fig. 11 Final full arch superstructure prosthesis

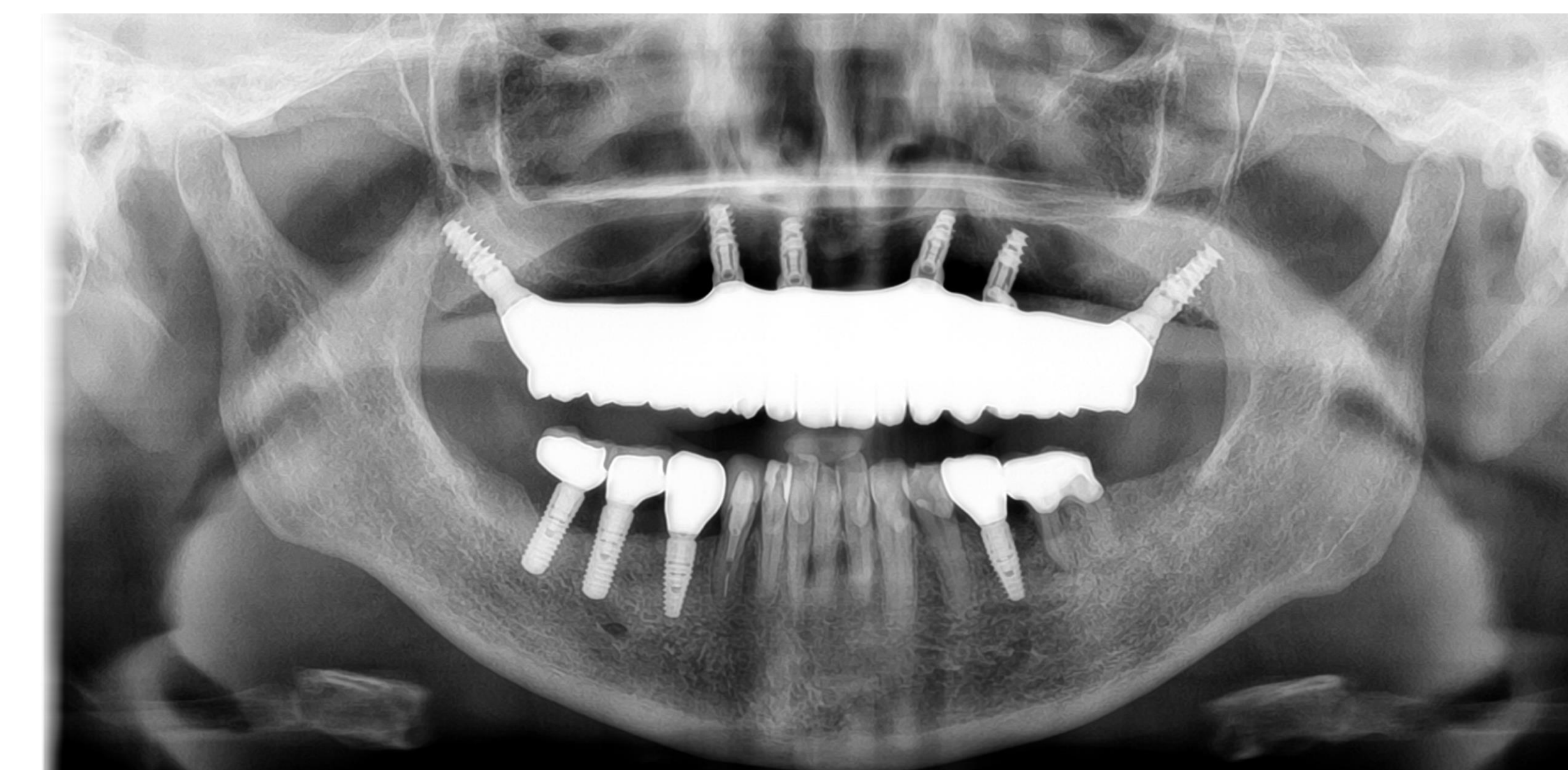


Fig. 12 Final Panoramic View



Fig. 13 Patients Smile

Conclusion

- ✓ In full-arch cases with insufficient bone volume, the **ideal position** and **number of implants** in relation to the final superstructure are important.
- ✓ An implant shape that makes it easy to achieve **initial stability** must be selected.
- ✓ Various **bone augmentation techniques** must be available.
- ✓ When fabricating the superstructure, **digital implant prostheses** must be used effectively.