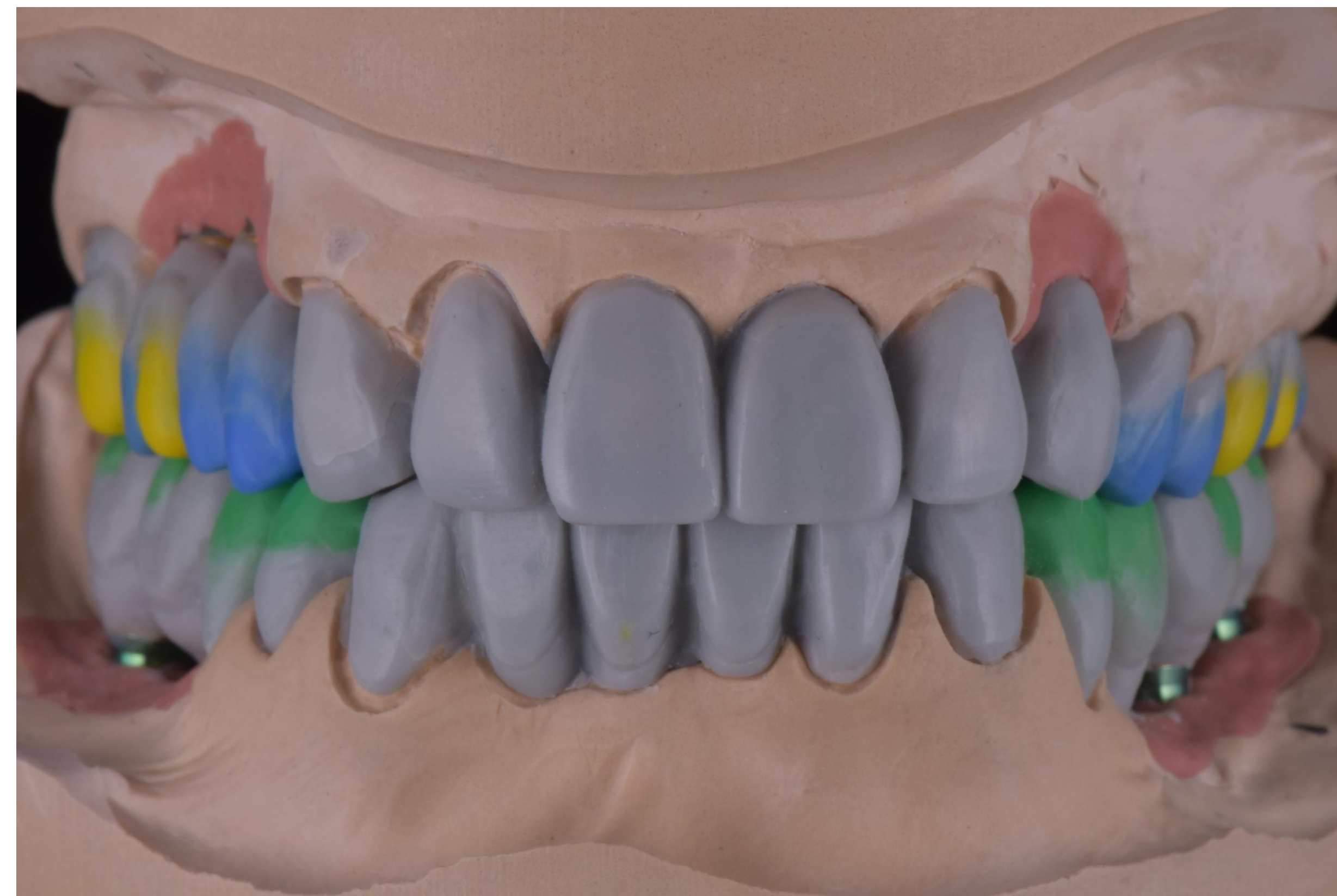
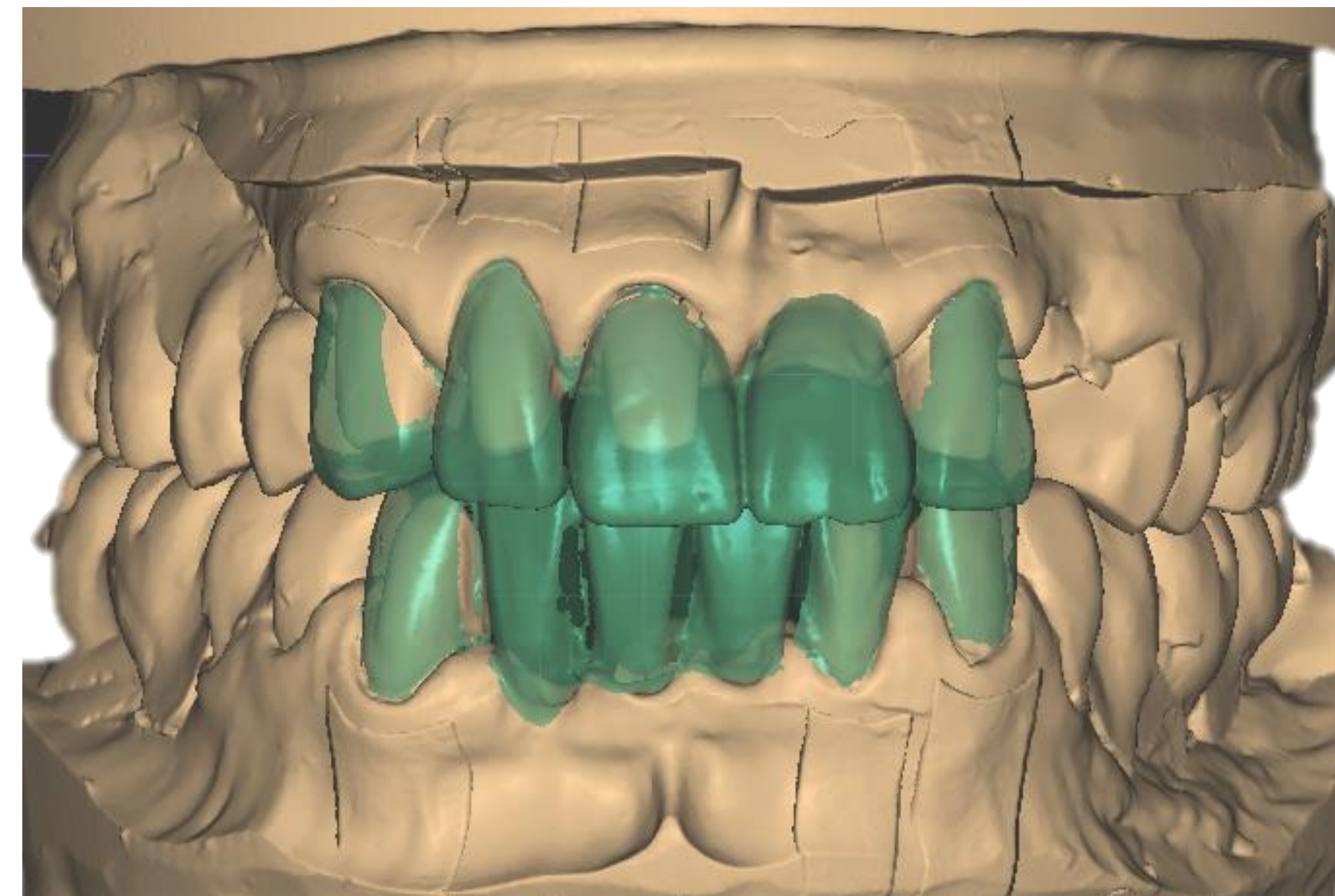


Full mouth rehabilitation with implant-supported prostheses in a patient with reduced vertical dimension due to numerous tooth loss and excessive worn dentition: A case report



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INTRODUCTION

Patients with reduced vertical dimension of occlusion (VDO) due to loss of posterior teeth and excessive wear of remaining teeth can be treated with implants. The fixed implant supported prosthesis has better masticatory efficiency than the removable prosthesis, and can provide psychological stability to the patient. Implant should be placed at an ideal position and angle, which is more important when placing multiple implants. Implants can be placed at a more accurate position and angle using a surgical guide. CAD-CAM technology is popular because it is straightforward to use, accurate, and predictable. In particular, the CAD-CAM double-scanning method can fabricate a restoration that reflects patient-specific information by superimposing an provisional restoration and an abutment. In addition, equipments that can measure the movement of the mandible and equipments that can measure the strength of occlusion can also be used for treatment. In the present report, a patient with reduced VDO and difficulty in mastication due to loss of multiple teeth and excessive wear of remaining teeth was treated with implant-supported prostheses. The reduced VDO was carefully evaluated and properly restored, and the advantages of digital technology were utilized in this process.

CASE REPORT

Patient evaluation & Treatment planning



Figure 1. Preoperative intraoral photographs. (A) Right lateral view, (B) Frontal view, (C) Left lateral view.

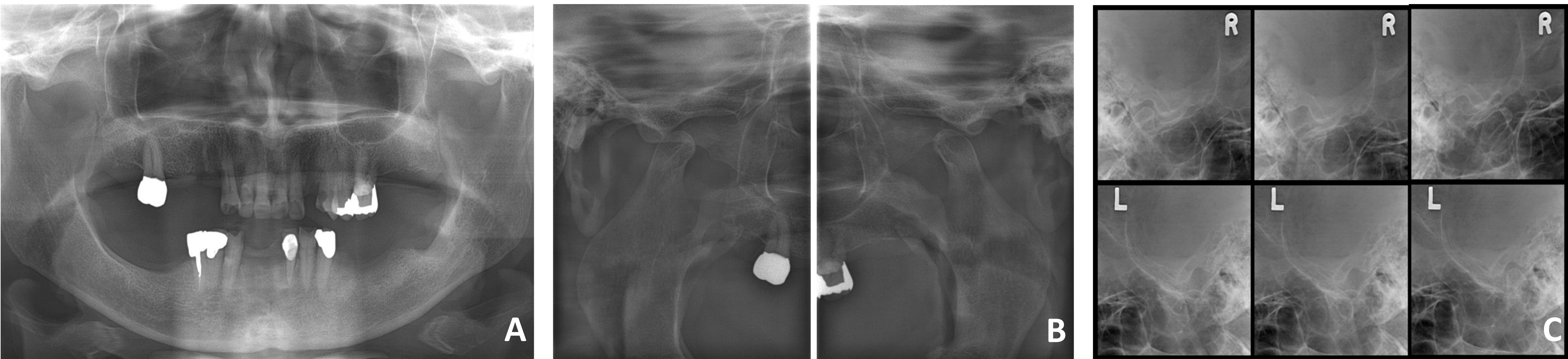
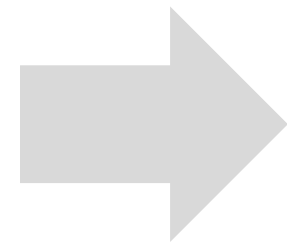


Figure 2. Radiographic evaluation. (A) Panoramic radiograph, (B) Panoramic radiography for TMJ evaluation, (C) Transcranial view.

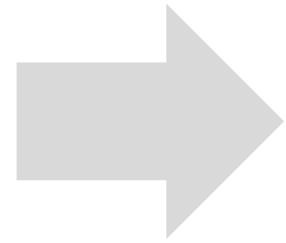
Problem list (Fig. 1, 2)

- Multiple dental caries
- Loss of posterior support
- Supra-eruption of posterior teeth
- Improper occlusal plane
- Lack of restoration space
- Labioversion of anterior teeth



Treatment goal

- Vertical dimension rehabilitation
- Proper occlusal plane
- Proper anterior guidance
- Recovery of masticatory ability
- Esthetic restoration



Treatment plan

- Evaluation of vertical dimension
- Centric relation (CR) recording
- Periodontal treatment
- Provisionalization
- Implant surgery
- Second Provisionalization
- Definitive restoration

Second Provisionalization

Fixed provisional restorations were fabricated (Fig. 8). Anatomical shapes of teeth were created using Naturgemäße Aufwachs-Technik (NAT) technique, and natural wear surfaces were formed using Natural functional reconstruction (NFR) technique. Provisional restorations made by milling PMMA block were fabricated by using the CAD-CAM double-scanning method. The anterior provisional restoration was carefully adjusted for esthetic treatment results (Fig. 9).



Figure 8. Provisional restorations. (A) Diagnostic wax-up, (B) Provisional restorations made by milling a PMMA block, (C) Intraoral photographs of provisional restorations.



Figure 9. Adjustment process of anterior provisional restoration. (A) The process of fitting the cervical line of the anterior teeth using ovate pontic, (B) The pink esthetic of the mandibular incisor obtained by adjusting the contour of cervical embrasure and using ovate pontic, (C) ovate pontic adjustment process at the chair side, (D) The process of fabricating customized pick-up copings after gingival molding to adjust the cervical line of the canine(#23) where implant installed.

Definitive Restoration

Definitive restorations that replicates the shape of the provisional restorations were fabricated by using the CAD-CAM double-scanning method (Fig. 10). The posterior restorations were manufactured by milling the zirconia block, and the anterior restorations were fabricated by building-up porcelain on the zirconia copings. Definitive restorations were stable when the mandible was in the centric position, had no interference during eccentric movement, and were esthetically satisfactory (Fig. 11). There was no abnormal findings on radiographs (Fig. 12).

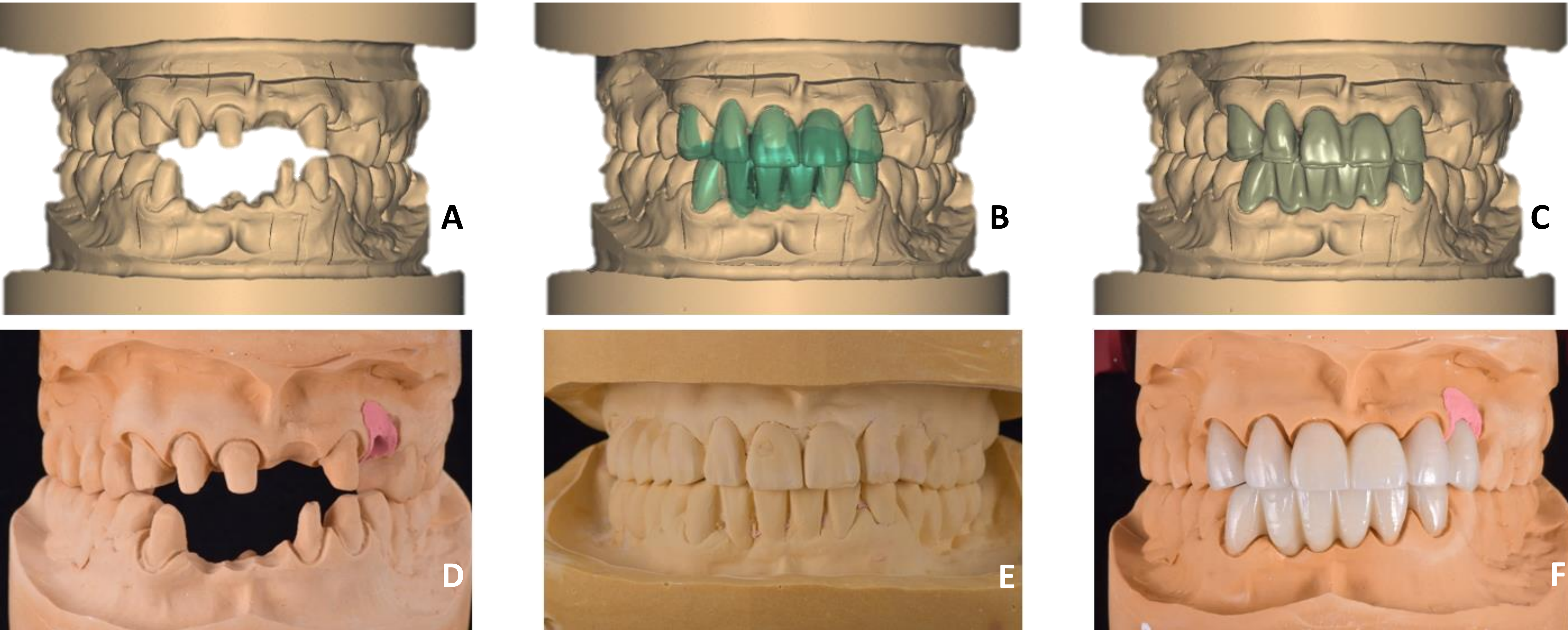


Figure 10. Definitive prosthesis design procedure. (A, D) Master cast and its scanned data, (B, D) Model of provisional restoration and its scanned data, (C, E) Definitive prosthesis fabricated by double scan technique.



Figure 11. Postoperative intraoral photographs. (A) Right lateral view, (B) Frontal view, (C) Left lateral view.

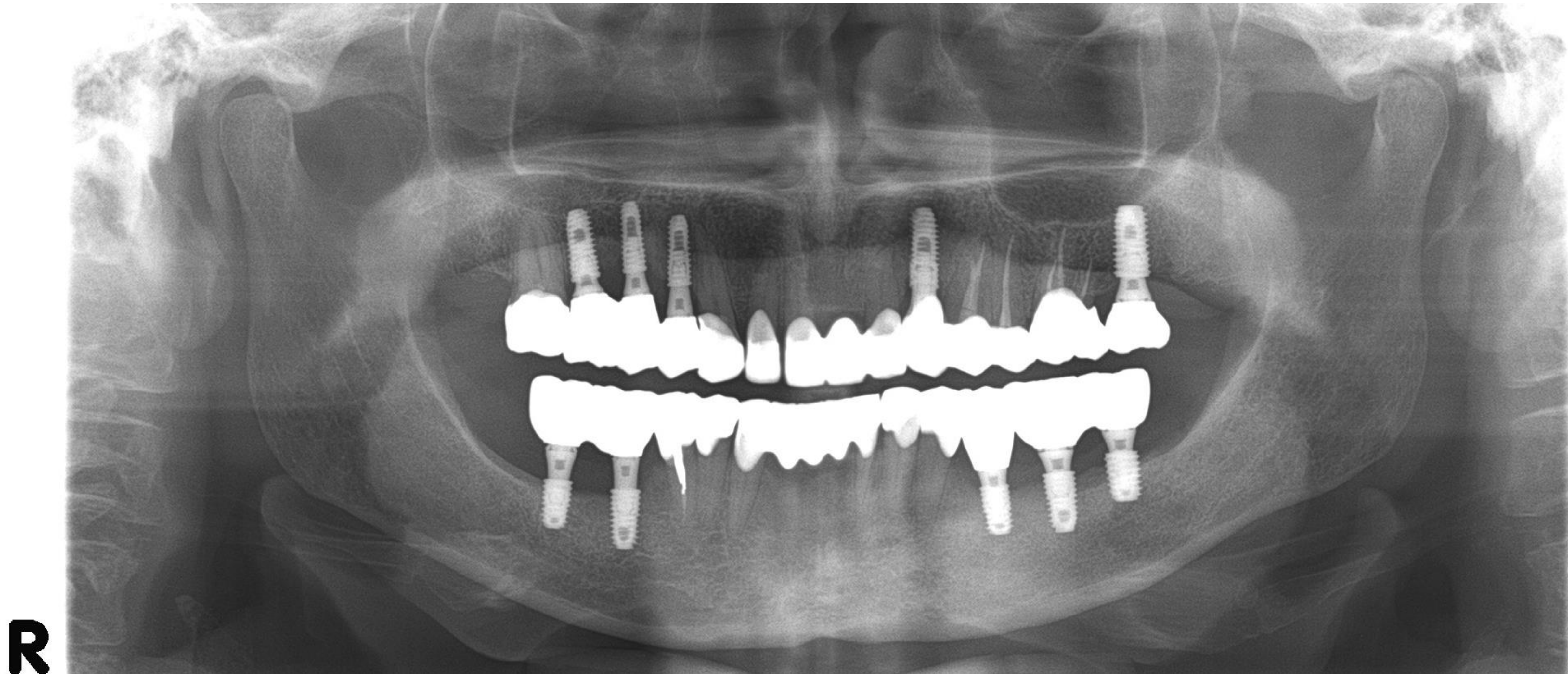


Figure 12. Postoperative panoramic radiograph

The 2.5 mm increased during the evaluation and determination of VDO did not change during the long-term treatment procedure. During the treatment process, it was confirmed that there were no symptoms and signs, and care was taken not to cause an unintentional change in VDO depending on the treatment steps (Fig. 13).

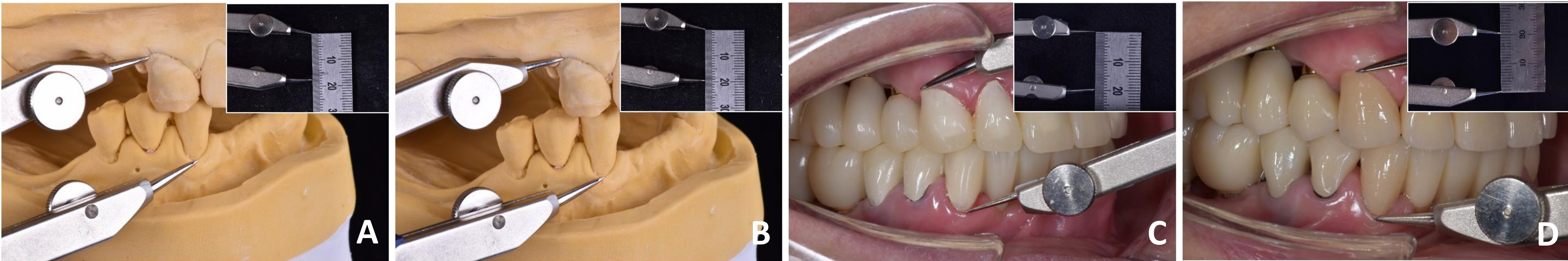


Figure 13. Distance between zenith of canine is increased 2.5mm and It was maintained without change during treatment procedure. (A) Distance between zenith of canine is 17.5mm before rehabilitation of vertical dimension, (B) Distance between zenith of canine is 20.0mm at newly determined centric relation, (C) Distance between zenith of canine is 20.0mm at provisional restoration, (D) Distance between zenith of canine is 20.0mm at final restoration.

CONCLUSION

Digital dentistry technologies such as ultrasound device, implant surgical guide, and CAD-CAM double-scanning method can be usefully used to restore the VDO.