

Computer aided bypass of the inferior alveolar nerve (IAN) for implant placement. A case report.

Zogakis Antonios¹, Barlas Irodis², Veis Alexander³

Aristotle University of Thessaloniki, School of Dental Medicine Department of Dentoalveolar Surgery, Surgical Implantology and Radiology

Objectives: This is a clinical case of a severely resorbed, in vertical dimension, mandible, treated with implants, using cone beam computed tomography (CBCT) and a dental implant planning software (SimPlant®, Materialise Dental, Leuven, Belgium).

Methods: 72 years old, male patient non smoker, with no medical relevant history, was planned to be treated with dental implants. Severely reduced alveolar height at the posterior mandible was clear from clinical examination, and panoramic radiograph. CBCT scan with radiographic template was taken. Data analysis was carried out using SimPlant® planning software and a surgical template stabilized on natural teeth, and implant – specific drilling instrumentation, for the first drills, were produced. Three Implants (XiVE, DENTSPLY FRIADENT®, Mannheim, Germany 3.4 X 9.5 mm, 3.4 X 9.5 mm and 3.0 X 11 mm) were scheduled to be placed at positions #46, #34 and #36 respectively. Inadequate height at position #36 (7mm) and adequate crestal width at IAN's canal plane, resulted in planning implant insertion bypassing lingually the IAN. All implants were inserted under local anesthesia in full thickness flap approach. 3 months later, the patient came in, and prosthetic rehabilitation took place.

Results: Three implants (XiVE, DENTSPLY FRIADENT®) were placed. All planned implants were placed successfully using the surgical template. A second after implant placement CBCT revealed close proximity with IAN without any paresthesia or other postoperative complications. The patient was restored according to the prosthodontic plan, with one screw – retained porcelain fused to metal (PFM) crown at position #46 and one cemented PFM bridge at #34 to #36 position.

Conclusions: Guided surgery, with the use of computer aided implant placement (CT scan and SimPlant software for data analysis), allowed to treat a patient with edentulous posterior mandible and reduced height of alveolar ridge, with implants and fixed prosthodontic restorations. One implant was inserted “by passing” the IAN in lingual orientation.

¹ D.D.S., M.Sc of Dentoalveolar Surgery, Surgical Implantology and Radiology, Aristotle University of Thessaloniki, Greece

² D.D.S., Post graduate student of Dentoalveolar Surgery, Surgical Implantology and Radiology, Aristotle University of Thessaloniki, Greece

³ D.D.S., P.h.D., Assistant Professor of Dentoalveolar Surgery, Surgical Implantology and Radiology, Aristotle University of Thessaloniki, Greece

Acknowledgments

All radiological examinations were performed by Prof. Angelopoulos Christos, in “OPIS” maxillofacial radiology center, Tsimiski 78, Thessaloniki, Greece

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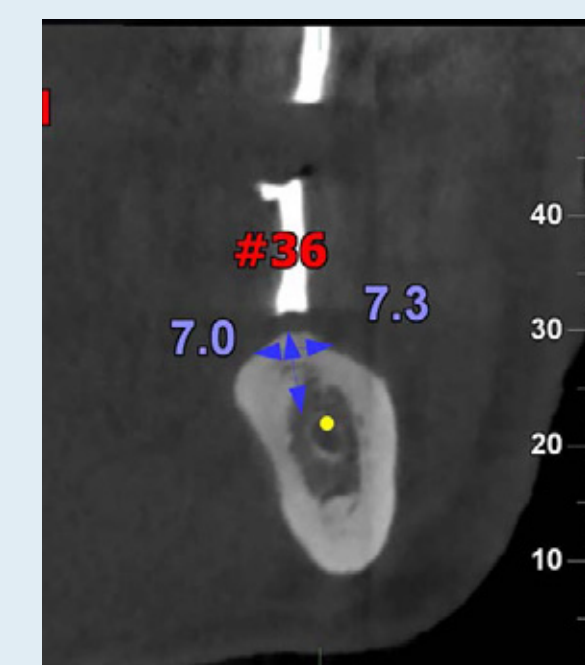


Fig.1 First Cone Beam Computed Tomography before the surgery planning. Note the reduced alveolar height as well as the sufficient bone width lingually to the IAN in the position of the lower left 1st molar (#36).

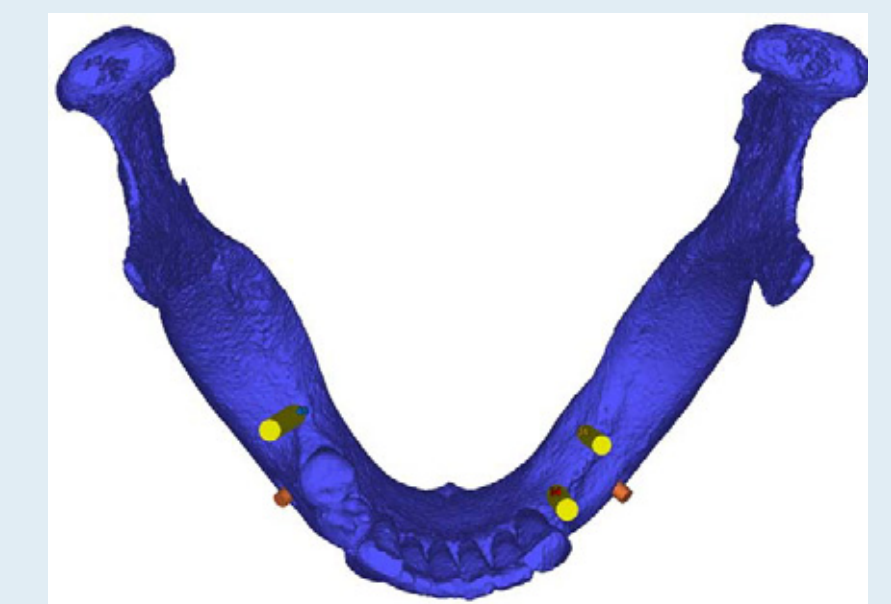


Fig.2 Guided 3 implants' surgery planning of the patient for the mandible. Simplant® software was used (Materialise Dental, Leuven, Belgium).

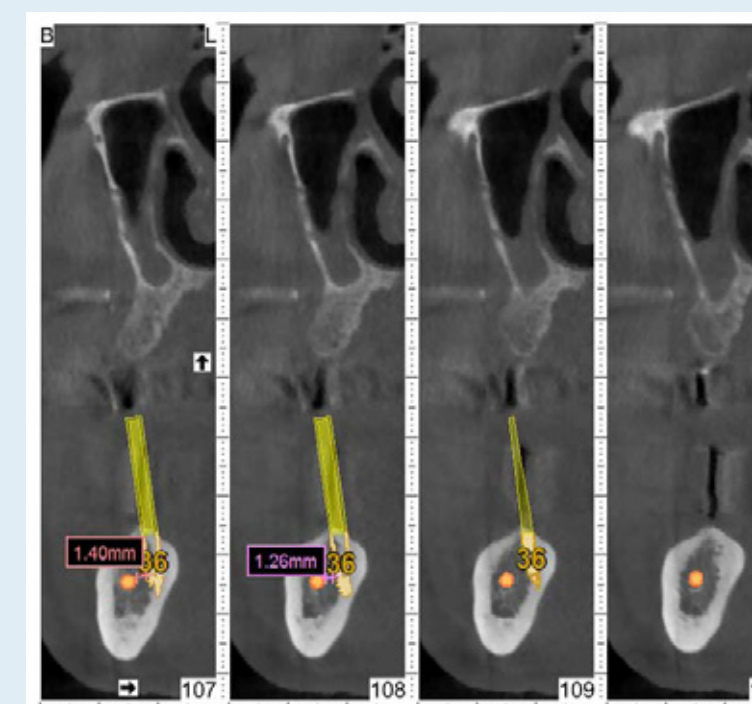


Fig.3 Virtual implant placement in position #36. Note the virtually lingual implant placement, resulting in bypassing the IAN.

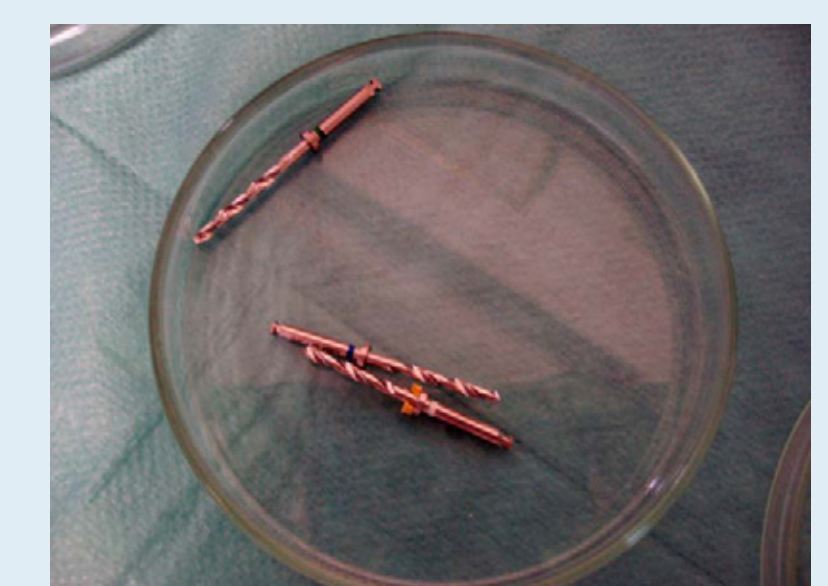


Fig.4. The Initial custom made drills that have been prepared for the patient by Materialise Dental. Note the stoppers at the top of the drills designed to limit them up to the desired insertion depth. Total length of the drills equals the implant length plus the cylinder length of the surgical template

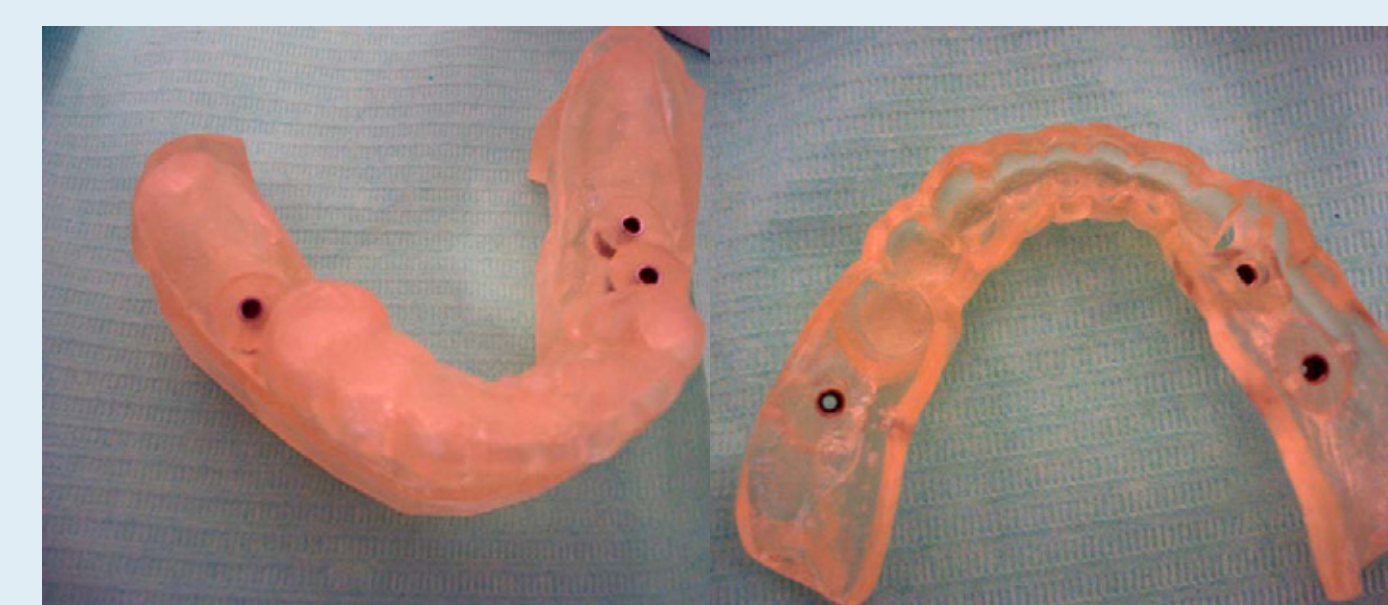


Fig.5 Tooth supported surgical template produced by Materialise Dental®, upper and lower side

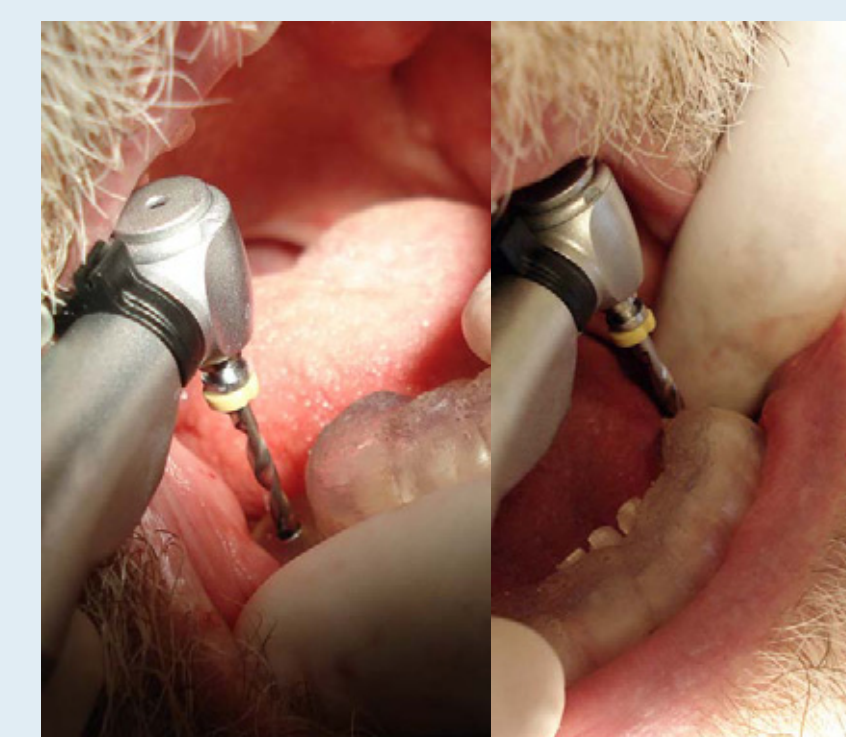


Fig. 6 Right and left side, pilot drilling using the surgical template



Fig. 7 New CBCT of the mandible before proceeding to wider drills to check drilling orientation in relation to IAN



Fig. 8 Sequence of drilling after the removal of the template using wider sizes of drills in conjunction with the Dentsply- Friadent XiVe® drill stoppers and implant placement



Fig. 9 Final implant placement

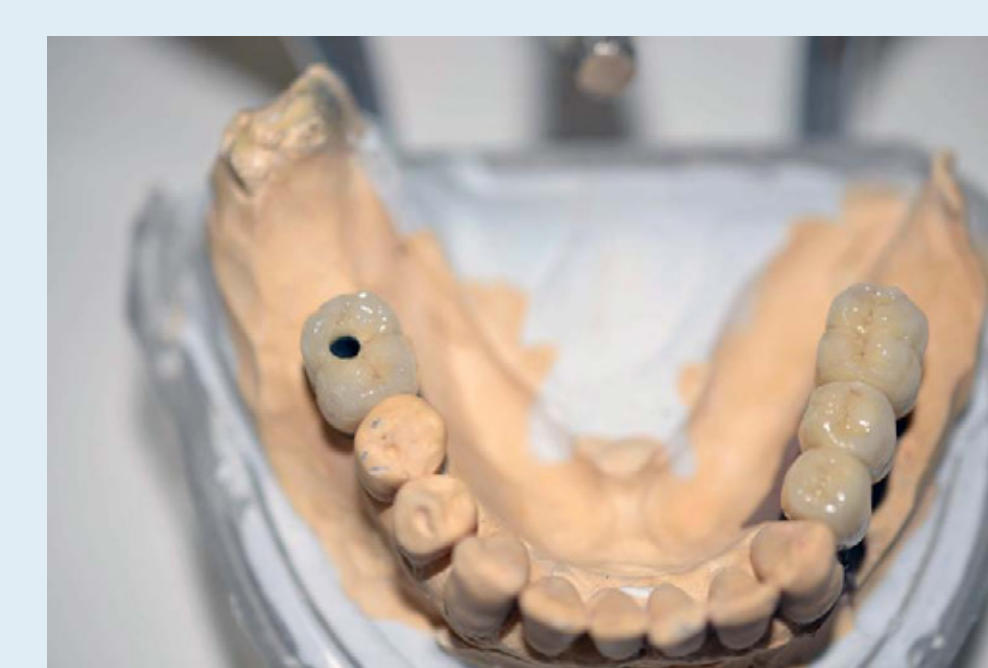


Fig.10 Final restoration in the mandible, 4 months later

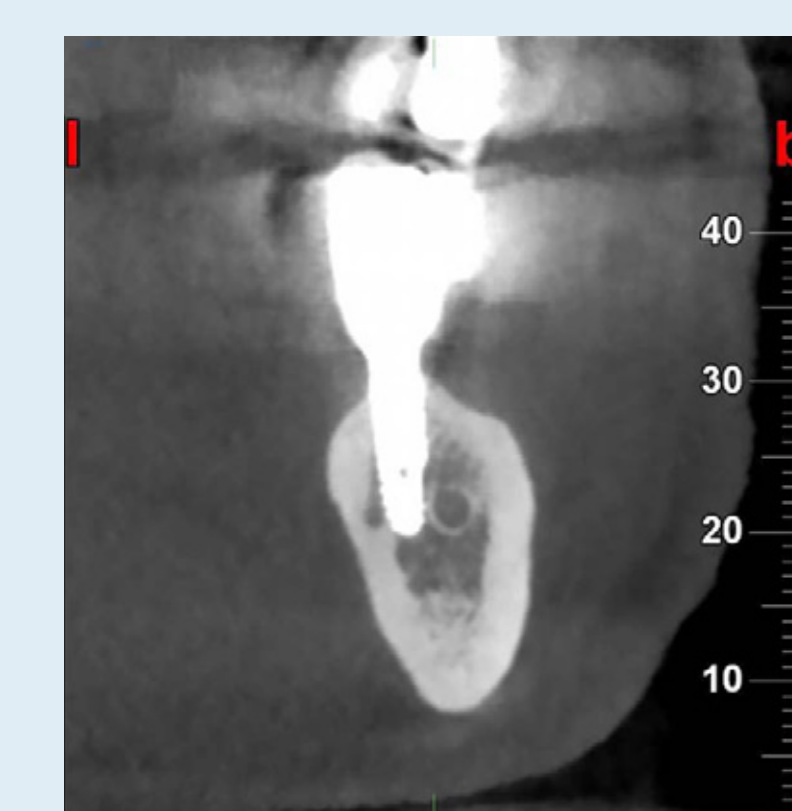


Fig. 11 Final CBCT of the mandible, note the bypass of the IAN in position of tooth #36



Fig. 12 Final Panoramic X-ray of the patient. The 3 implants in the maxilla (XiVe®, Dentsply-Friadent®, Mannheim, Germany) were placed without any implant software