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CASE PRESENTATION

Narrow-Diameter Overdenture Implant Placement Using a 3D-Printed Surgical Guide

A healthy 70-year-old female presented with a loose mandibular complete denture and saying that she was unable to chew hard and crunchy foods. She requested minimally invasive narrow diameter implants to stabilize her loose mandibular denture.

A radiopaque PVS (Green-Mousse, Parkell) was applied to the intaglio of the mandibular complete denture and a CBCT scan (PreXion3D Eclipse, Prexion) of the patient was made using cotton rolls for occlusal and soft-tissue separation. The denture with radiopaque PVS was removed and scanned in the CBCT scanner. The DICOM files were opened within an implant planning software (Blue Sky Plan, Blue Sky Bio) and four 2.9mm x 12mm overdenture implants (LOCATOR Overdenture Implants, Zest Dental Solutions) were planned. A surgical guide was designed and exported into a 3D printable file. The guide design file was printed using a 3D printer (Form 2, Formlabs) and biocompatible surgi-

cal guide material (Dental SG, Formlabs).

The patient was anesthetized. The pilot osteotomy was prepared through the 3D-printed surgical guide using the drill stop as a guide. The guide was removed and sequential osteotomies were prepared free-hand. Four implants were placed using a minimally invasive technique and fully inserted using a torque wrench. Abutments (LOCATOR, Zest Dental Solutions) were placed onto each implant and torqued to 30Ncm. Recesses in the denture were prepared using acrylic burs (Denture Prep & Polish Kit, Zest Dental Solutions).

The patient preferred not to immediately attach the implants, so a soft liner (CHAIRSIDE Soft Reline Material, Zest Dental Solutions) was injected into the intaglio of the denture and placed onto the edentulous ridge. After complete polymerization, the denture was removed, trimmed, and inserted back onto the ridge. The patient returned 3 months after the procedure for definitive prosthetic procedures.



Figure 1—A patient presented with existing dentures and requested implants to improve the stability of her mandibular denture.

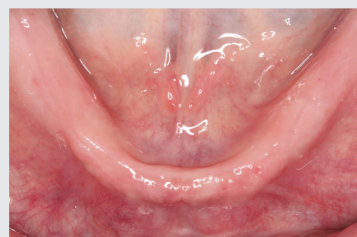


Figure 2—The patient's mandibular edentulous ridge has sufficient bone volume to permit flapless implant placement.

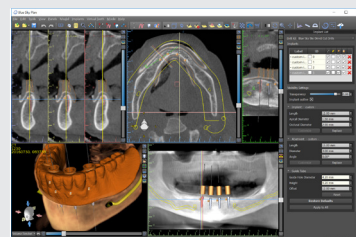


Figure 3—Four overdenture implants and a surgical guide were designed in a dental implant planning software.

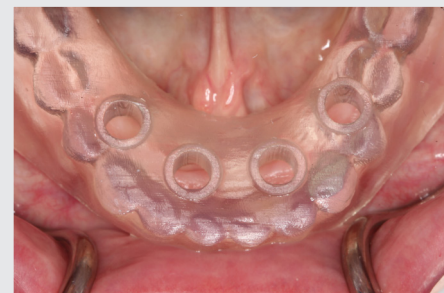


Figure 4—The surgical guide was printed using a 3D printer (Form2, Formlabs) and biocompatible material (Dental SG, Formlabs). The guide was placed onto the edentulous arch, confirming complete adaptation.

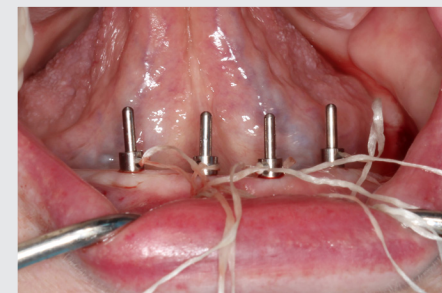


Figure 5—The pilot osteotomy was performed through the surgical guide and parallelism was confirmed using directional indicators.

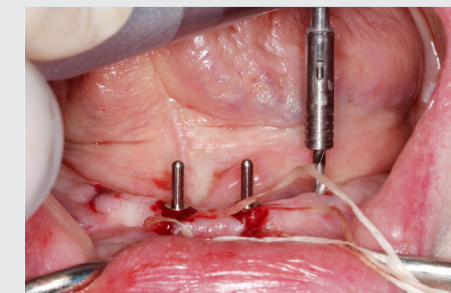


Figure 6—Sequential osteotomy preparation was completed ensuring parallelism during preparation procedures.

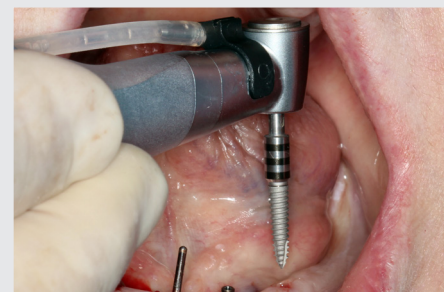


Figure 7—The implants were placed into the osteotomies until resistance was met.



Figure 8—The implants and each was fully inserted with the assistance of a torque wrench, confirming insertion torque of each implant.



Figure 9—Abutments (LOCATOR, Zest Dental Solutions) were placed onto each implant and torqued to 30Ncm.



Figure 10—Interformal placement of implants is predictable and, due to favorable bone density, often results in a high insertion torque.



Figure 11—Recesses were prepared using acrylic burs (Denture Prep & Polish Kit, Zest Dental Solutions) and a soft relining material (CHAIRSIDE Soft Reline Material) was injected into the intaglio surface of the denture and seated onto the edentulous ridge.



Figure 12—After complete polymerization, the denture was removed, adjustments made, and was inserted back onto the edentulous ridge.