



Figure 1.

## Getting the best from digital dentistry for implant reconstruction

By MDT Oliver Tilch

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**T**he patient presented with loss of the lower anterior teeth due to idiopathic root resorption. He had been told that teeth 32, 33 and 45 were also affected by the resorption and were scheduled for extraction. Tooth 45 was thermally sensitive. Teeth had been extracted over the previous 5 years tooth-by-tooth, resulting in considerable hard and soft tissue loss (Figures 2-3). He'd had a lower partial denture made but found it unwearable.

Clinical evaluation revealed a Class III skeletal tendency with a Class I incisal relationship and bilateral posterior cross bite. The lower anterior residual ridge was knife-edge and there had been loss of tissue vertically of 3-4mm and horizontally of 2-3mm. Teeth 31-44 were missing as was tooth 34. Teeth 32 and 33 displayed lingual resorptive lesions and tooth 45 showed external resorption from the buccal (Figures 2-3).

All treatment options were discussed with the patient, for both tooth replacement and correction of the occlusion. The patient decided to pursue an implant-supported restoration replacement without correction of the occlusion.



Figure 2. Significant hard and soft tissue loss.

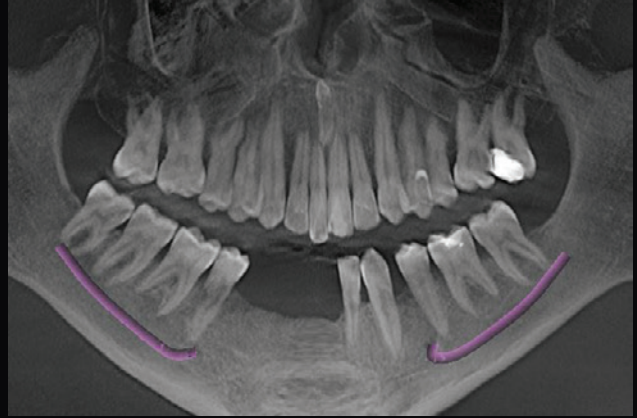


Figure 3. Resorption evident at 32, 33 and 45.



Figure 4. Diagnostic wax try-in.



Figure 5. Ideal lower incised edge position.

Teeth 32, 33 and 45 were to be extracted so teeth 34-45 would need to be replaced. It was clear that grafting would not be able to replace all the hard and soft tissue and that pink replacement would be part of the prosthesis. Implant planning then began.

Impressions, photographs and a CBCT was taken. A diagnostic setup was tried in with teeth 32, 33 and 45 still in place (Figures 4 and 5). Having collected this, definitive planning was commenced. It was clear that soft and hard tissue would need to be replaced and that a total of 7 teeth would require replacement, even though 8 teeth were missing. The restoration would be screw retained on uni-abutments and constructed in ceramic for ideal aesthetics, cleaning and strength. The aim was also to extract the teeth and place the implants in the one surgical procedure with the option to immediately load a provisional fixed prosthesis should primary stability be satisfactory.

The diagnostic setup was returned to the study model (Figures 6 and 7).

Teeth 45, 32 and 33 were removed from a duplicated lower model and then added to the setup. The adjusted model and the setup were also scanned and the information imported into

SIMPLANT as an STL file along with CBCT DICOM data (Figures 10 and 11) This allowed the creation of several masks; the bone, the teeth, the soft tissue and the setup (Figures 8-12). Ideal implant planning without the need to rescan the patient or construct a separate radiographic guide was now possible (Figure 12).

As the bone quantity and quality was not ideal and implant placement was tight, it was decided to construct a fully guided tooth supported SIMPLANT guide (Figures 13-16). Implants could be placed without the need for grafting.

The ridge was narrow so a tooth-supported fully-guided surgical guide enabled ideal positioning and control. Despite this, the 31 site was not suitable based on unsatisfactory bone volume and the implant was placed instead at the 41 region. The 43 and 34 were placed as per the fully guided protocol. Fortunately, a backup conventional guide (Figure 18) had been constructed which was employed when the newly located 41 implant was placed. The post-operative radiograph (Figure 19) shows the precise fully-guided placement of the 34 and 43 implants and the conventionally placed 41 implant.



Figure 6.



Figure 7.



Figure 8.

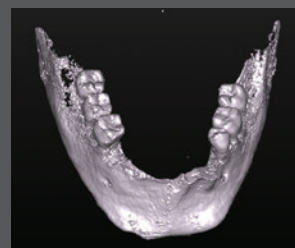


Figure 9.

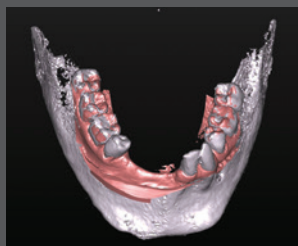


Figure 10.

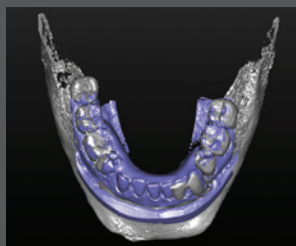


Figure 11.

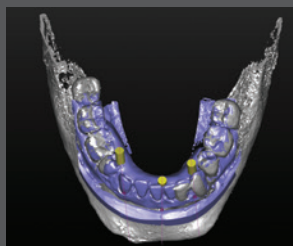


Figure 12.

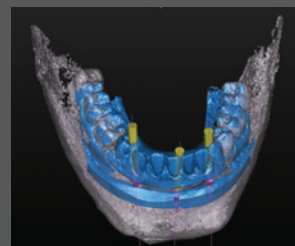


Figure 13.

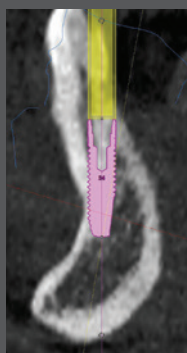


Figure 14.

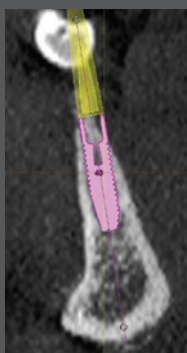


Figure 15.

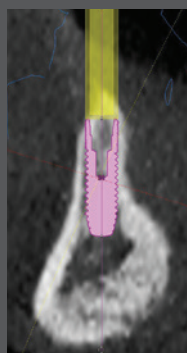


Figure 16.

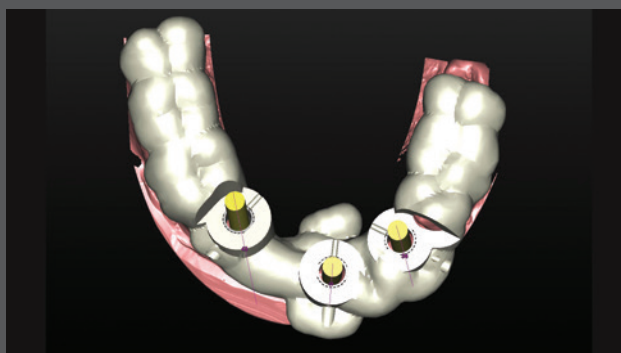


Figure 17.

It was decided not to immediately load the implants but to follow a standard healing protocol of 12 weeks. During integration, the patient was happy to not wear any removable appliance. At second stage surgery, osseointegration was confirmed and uni-abutments placed. Following conventional impression taking with splinted open tray copings and a special tray, a resin prototype was tried in. (Figures 20-23) This confirmed aesthetics, phonetics, pink and white proportions and cleansibility. This was scanned for construction of a zirconia framework with titanium sleeves and buccal layering for aesthetics.

The framework followed the prototype with lingual straight screw access and minimal buccal cutback to minimise the risk of ceramic chipping and maximise the framework dimensions (Figures 24-26).

An excellent result was achieved with good hard and soft tissue integration (Figures 27-30). Careful planning, surgical flexibility and excellent communication from the initial treatment planning stage between the surgeon, prosthodontist and ceramist ensured the predicted result. SIMPLANT and clinical laboratory protocols minimised the radiation exposure to the patient and kept the clinical time to a minimum.

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Figure 18.

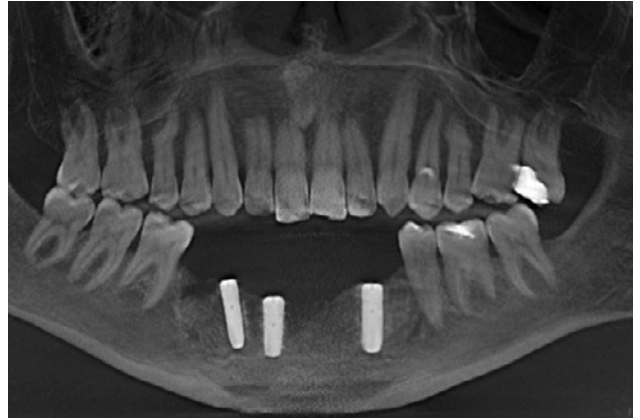


Figure 19.



Figure 20.



Figure 21.



Figure 22.



Figure 23.

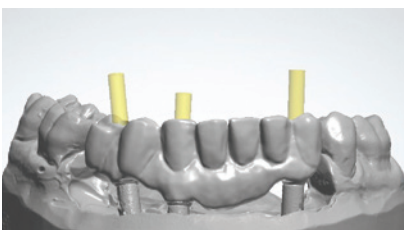


Figure 24. Lingual emergence and smooth.

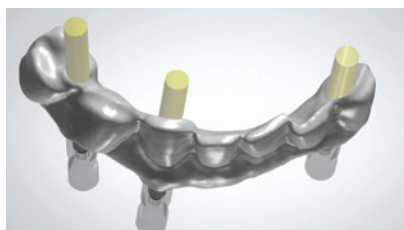


Figure 25. Lingual screw access and buccal cutback.

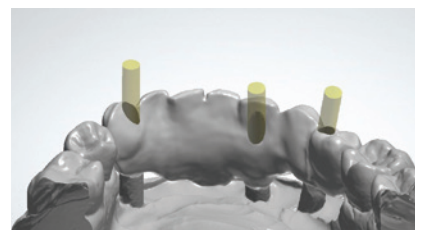


Figure 26. Lingual emergence and minimal framework dimension-layering porcelain.



Figure 20.



Figure 21.



Figure 22.



Figure 23.

### About the authors



Oliver Tilch,  
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Oliver Tilch trained at one of Germany's leading dental schools, the Trade Academy Freiburg and has over 20 years of dental laboratory experience. He has worked closely with prosthodontists and surgeons in the last 9 years which has strengthened his understanding and passion for complex procedures, particularly in implantology. Oliver opened SYD dental laboratory in the Sydney suburb of Willoughby in 2018 with his Business-partner Sebastian Braunwarth. For more information, visit [www.syddentallaboratory.com.au](http://www.syddentallaboratory.com.au), email [contact@syddentallaboratory.com.au](mailto:contact@syddentallaboratory.com.au) or call (02) 9967-0378.



Dr David  
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David Leinkram graduated dentistry from the University of Melbourne and medicine from The University of Sydney. He now practices the full scope of his specialty including maxillofacial trauma, pathology and orthognathic and oral surgery. David is particularly passionate about functional oral rehabilitation with implant-supported prostheses. This can be following tooth loss with significant bone loss as well as following head and neck ablative procedures. He works in Private Practice in Bondi Junction and is a Visiting Medical Officer at the Chris O'Brien Lifehouse and Westmead Hospitals.



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Stephen Travis has been a registered specialist prosthodontist since 1994. He attended The University of Sydney at both undergraduate and postgraduate levels. He is currently a member of the International College of Prosthodontists, Academy of Australasian Prosthodontists, Australian Society of Prosthodontics and Australasian Osseointegration Society. He has been president of the Dental Aesthetics and Ceramics Society and the Australasian Osseointegration Society. His prosthodontic interests lie in comprehensive treatment planning, digital dentistry, ceramic materials and implant restorations.