Clinical

‘Technical triumph’ restores function and aesthetics

Chris Mercier and Colin Wilson

replace a patient’s failing upper teeth with an implant-supported, screw-retained angled hybrid denture using an Heraeus Kulzer Cara I-Bridge suprastructure

A retired 62-year-old male patient came to the Chris Mercier Dental Practice for a consultation because he was interested in having his missing teeth replaced. He had been an irregular attendee for dental care. He had smoked ten cigarettes a day for 40 years, but was willing to give up. There were no other relevant health issues.

Diagnosis and treatment planning

The initial examination showed the patient had advanced chronic periodontal disease and inadequate posterior support (Figures 1-4). He also had incisal wear which was consistent with bruxism and insufficient posterior support (Figure 5).

Figures 1-3: The patient had advanced chronic adult periodontal disease and inadequate posterior support

The patient was made aware that any treatment would initially require management of the periodontal disease. Treatment options discussed included upper and lower partial dentures, upper and lower traditional full dentures, implant-retained dentures, implant-supported fixed bridgework and an implant-supported screw-retained bridge.

Following consideration of his treatment options, the patient elected for restoration of the upper arch with a screw-retained hybrid denture. A 3D scan was carried out to check he had adequate bone volume for implant placement in the upper arch. The results of the scan were positive; indicating the requirement for only small, indirect sinus lifts using the Summers’ technique. Study models were taken to confirm there was sufficient vertical bone dimension available for the proposed treatment plan.

Surgical treatment

The patient’s oral hygiene would require long-term review and maintenance. At the first treatment appointment, the consequences of periodontal disease were discussed with the patient. He was given oral hygiene information and advice on smoking cessation.

Periodontal therapy was provided for the lower

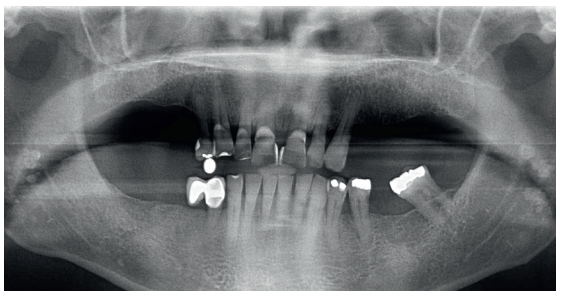
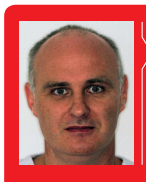


Figure 4: Initial assessment OPG



Dr Christopher Mercier BDS MFGDP (UK) MSc (Dental Implantology)
Chris Mercier is principal of his own private practice in Liverpool providing advanced dentistry. After completing initial dental implant training, he studied advanced bone grafting and aesthetic implant placement under Professors Danny Buser and Urs Belser at the University of Bern, Switzerland. Chris has also completed an MSc in Dental Implantology through the University of Warwick.

Colin Wilson RDT
Colin Wilson is the director of Active Dental Laboratory, which he founded after having the desire to produce the highest quality and natural-looking dental implant prosthetic devices possible. He has been a qualified dental technician for over 12 years. Colin regularly attends courses and study clubs to increase his knowledge with the most up-to-date materials and techniques.

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Figure 5: He also had incisal wear which was consistent with bruxism and insufficient post support

arch, including gross and fine ultrasonic scaling. Pocket charting was also carried out. Root surface debridement was performed for pockets greater than 5mm in depth. All his remaining upper teeth were removed at the same appointment, and a full arch temporary denture was placed.

Six weeks later, six bone level Straumann Roxolid SLA Implants were placed using a simple surgical guide (Figure 6). Good primary stability was achieved with bone grade D2/3. Small bony defects were repaired with Geistlich Bio-Oss and Bio-Guide. To avoid loading the implants while osseointegration was taking place, it was decided not to convert the denture into a temporary immediate bridge. Instead, the denture was relined with a temporary soft denture liner to protect the implants. The LR4 was extracted.

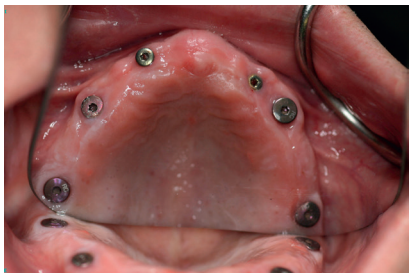


Figure 9: The implants were uncovered and healing caps were placed

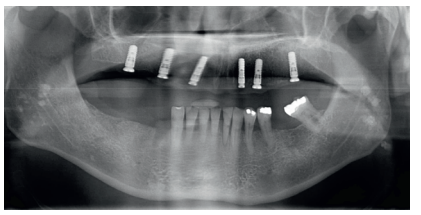
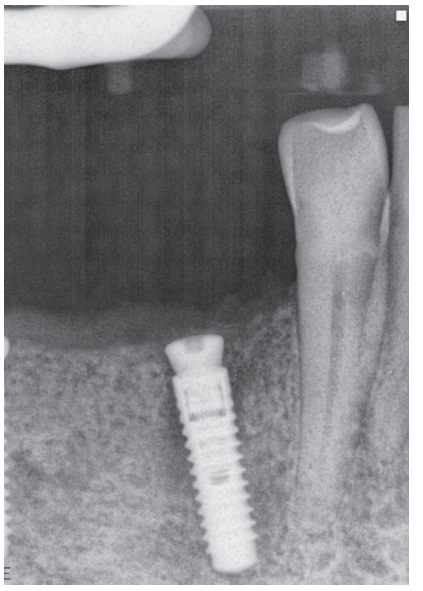


Figure 6: Six bone level Straumann Roxolid SLA Implants were placed

After a further six weeks, healing in the upper jaw was checked. Two more bone level Straumann Roxolid implants were placed in the LR4 and LR6 positions using a surgical guide (Figures 7 and 8). Tooth whitening and composite repairs were carried out to the worn surfaces of the remaining lower anterior teeth. Four months after final placement the implants were uncovered and healing caps were fitted (Figure 9).



Initial fitting

Two weeks later, fixture head impressions were taken for the upper arch, using Heraeus Kulzer Flexitime (Figures 10 – 12). Using this primary impression, the laboratory provided a verification jig, in order that definitive impressions could be taken to construct the screw-retained bar (Figures 13 and 14). An initial jaw registration and the tooth shade were also obtained (Figure 15).

The laboratory returned a screw-retained try-in, and a passive fit was confirmed. The occlusion required some modification, so new records were made and the try-in was sent back for adjustment. The re-try was correct and the patient was pleased with the proposed appearance of his upper teeth. Fixture head impressions were then taken for the construction of a three-unit implant-supported bridge to replace LR4, 5 and 6 (Figures 16 – 18).

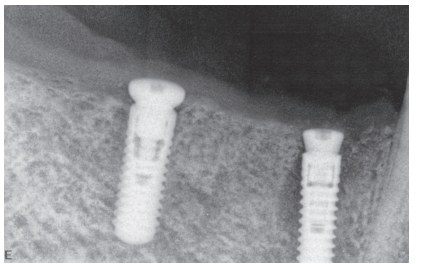
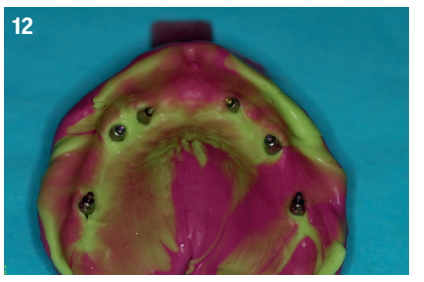


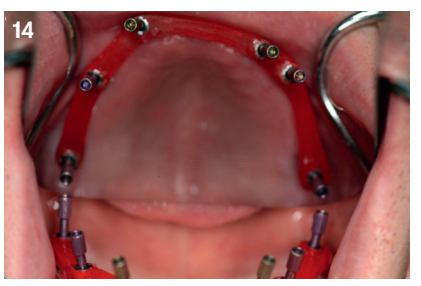
Figure 7 (left) and 8 (above): Two more bone level Straumann Roxolid Implants were placed in the LR4 and LR6 positions

The lower bridge was returned. This was tried in to confirm fit and occlusion against the unfinished upper try-in. Fit and occlusion were good, so the lower bridge and abutments were fixed as per the manufacturer's guidelines (Figure 19).

New bite and Denar records were acquired against the newly-cemented lower bridge and the unfinished upper screw-retained hybrid denture. The laboratory was requested to finish the denture, ensuring balanced articulation and occlusion.

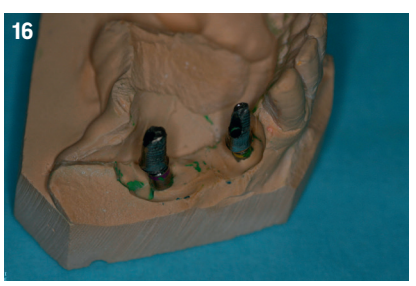


Figures 10-12: Two weeks later, fixture head impressions were taken



Figures 13-14: The laboratory provided a verification jig, in order that definitive impressions could be taken to construct the screw-retained bar

Figure 15: The tooth shade was obtained



Figures 16-18: A three-unit implant-supported bridge was constructed to replace LR4, 5 and 6

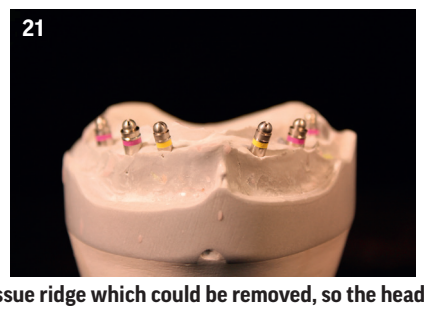
Colin Wilson describes the laboratory procedures

Initially, the laboratory produced a standard full upper denture and a surgical stent. Once Dr Mercier was happy with the osseointegration, a special open tray pickup and a bite registration were taken.

A model was cast with a soft tissue ridge (Zhermack Gingifast), which could be removed, so the head of the analogues could be seen clearly (Figures 20-22). A verification jig was made, to allow Dr Mercier to cross check the position of the implants in the mouth with the position of the analogues in the model, before the framework was milled.

A wax bridge try-in was made to confirm the occlusion was balanced and aesthetically pleasing. At this stage, it became apparent that the implants were

Figure 19: The lower bridge and abutments were fixed as per the manufacturer's guidelines



Figures 20-22: A model was cast with a soft tissue ridge which could be removed, so the head of the analogues could be seen clearly

Figure 23: Heraeus Kulzer's Cara I-Bridge was the ideal solution

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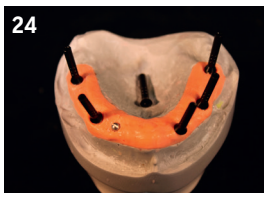

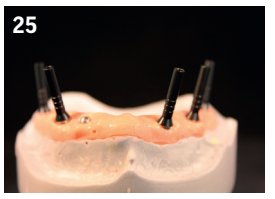

Figures 24-25: The frame work is designed by fitting the compatible I-Flex components to the implants

Figure 26: Once the angle of the cylinders has been established, they are locked together using pattern resin

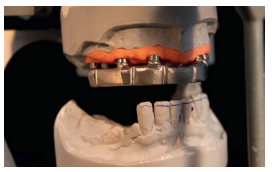

Figure 27: The digitally fabricated framework is returned in around one week

Figure 28: The wax try-in is set up again, around the framework

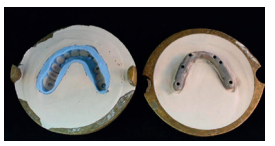

Figure 29: We proceeded with colour toning, packing and finishing the bridge in a flask, ready to be fitted

angled more buccally than desired. As a consequence, the try-in pushed the teeth past the patient's natural lip support position.

Without the option of angled abutments, the Heraeus Kulzer's Cara I-Bridge was the ideal solution (Figure 23). This would allow the access holes of the framework to be moved from a buccal to a palatal position, facilitating a reduction in the breadth of the framework. This, in turn, would enable me to pull the teeth back in line with the natural lip support and keep the thickness of the teeth.

Framework design

With the I-Bridge angled implant bridge, the angle of the screw channel can be altered in any direction up to 20 degrees. This allows optimal positioning of the implant without costly abutments. Screw-retained bridges can be removed and re-attached at any time. In addition, the associated risk of peri-implantitis is very low.

The framework is designed by fitting the compatible I-Flex components to the implants (Figures 24 and 25). A plastic cylinder is then placed, which rotates and pivots 360 degrees on a ball, up to 20 degrees from the angle of the implant.

Once the angle of the cylinders has been established, they are locked together using pattern resin (Figure 26). The framework is then modelled within the parameters of the wax try-in, by using a two-part putty matrix. When the resin framework has been constructed, the case is booked in for collection via the Heraeus Kulzer Cara I-Bridge website.

Digital fabrication offers many advantages. It eliminates material inclusions, faulty casts and changes in material structure, as well as costly traditional steps in the manufacturing process. The titanium or cobalt-chrome framework is returned from Heraeus Kulzer in around one week (Figure 27).

New lab screws and titanium prosthetic screws are included, which allow the driver to engage with the screw at the desired angles. The wax try-in is then set up again, around the framework (Figure 28). This enables the framework to be Sheffield tested, to make sure the occlusion is balanced and aesthetically pleasing.

In this case, the bar was causing the anterior teeth to be too buccal, so I reduced the size of the bar to allow me to pull back the anterior teeth. Dr Mercier re-tried the bridge and both he and the patient were 100% happy. We proceeded with colour toning, packing and finishing the bridge in a flask, ready to be fitted (Figures 29 and 30).

Clinical outcome

When the finished bridge was returned to be fitted the screws were tightened to 20Ncm, as per the manufacturer's instructions. The screw access cavities were sealed with cotton wool and Venus Pearl composite (Figure 31).

The patient now has functional and aesthetic dentition. The I-Bridge system provides a fixed restoration, which is screw-retained and, therefore, retrievable. It can be used with all the major implant systems. The cosmetics are excellent and no cement is required. The suprastructure splints all the implants, providing mutual support (Figure 32).

This was a costly and time-consuming treatment option, but the patient was very pleased with the final result (Figure 33). He explains: 'I consider the treatment to have been a technical triumph. I believe particular care was taken in ensuring that the bite was as good as it could be.'

The patient was given further oral hygiene information, as a hybrid denture can be difficult to clean. He was also provided with a Waterpik water flosser to help maintain a high standard of cleanliness. He is currently on long-term, three-monthly hygiene review appointments. **D**

Figure 30: The finished bridge

Figure 31: Screw access cavities were sealed with cotton wool and Venus composite

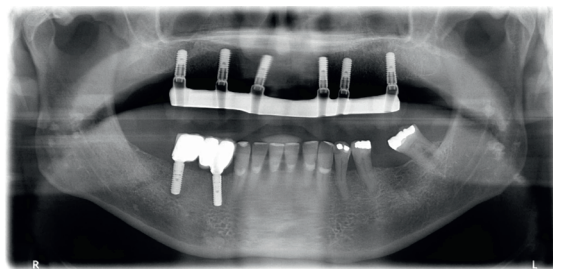

Figure 32: The suprastructure splints all the implants, providing mutual support

Figure 33: The patient was very pleased with the final result