

Single implant-borne reconstruction in the aesthetic area

Daniel S Thoma outlines the treatment undertaken for a patient with fractured central incisors using ridge preservation

A 52-year woman presented with pain in her two central incisors. The patient had fractured both central incisors in her youth. They were subsequently restored with two porcelain-fused-to-metal crowns (Figure 1). At the day of the first examination, CBCT analysis and clinical inspection revealed that tooth UR1 was endodontically treated and had increased periodontal pockets depths with bleeding on probing.

Several treatment options were discussed following the tooth's extraction:

1. Crown UL1 with a cantilevered UR1
2. Fixed dental prostheses UR2 to UL1
3. Implant placement at UR1 and new crown UL1.

A decision was taken to opt for the third treatment modality, which included the replacement of tooth UR1 with a dental implant.

Pre-surgical phase

A full wax-up for teeth UR1 and UL1 was performed on casts by the dental technician to optimise the aesthetic outcome prior to implant therapy. This wax-up was transferred to a mock-up that was tried-in intraorally.

Surgical phase

Two weeks later, tooth UR1 was carefully extracted without damaging the surrounding tissues and leaving the papillae intact (Figure 2). The epithelium at the extraction socket was removed using a diamond burr. Subsequently, the height of the buccal and palatal bone plate was measured with a periodontal probe. This revealed that, while on the buccal side the bone plate was almost

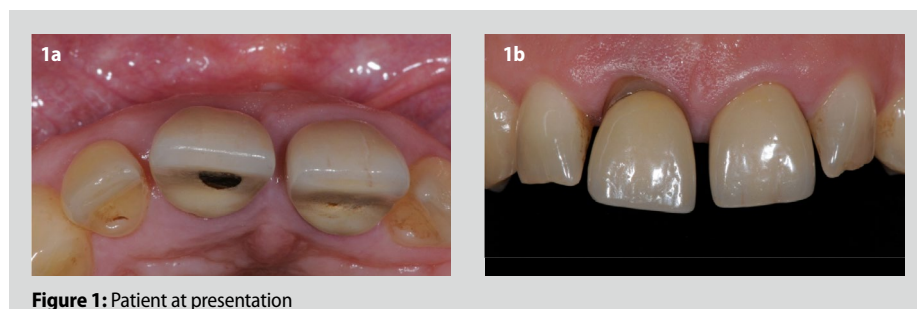


Figure 1: Patient at presentation



Figure 2: Careful extraction of the UR1

fully present, the palatal height was reduced by 40%.

According to Jung and colleagues (2013), a ridge preservation procedure allows bone volume to be maintained by 80% over six months. For that reason, a ridge preservation procedure was defined as being appropriate for optimising the clinical situation, including the hard and soft tissue aspects.

The treatment (Figure 3) consisted of placement of a collagen sponge consisting of 10% collagen and deproteinised bovine bone mineral (DBBM) granules and a soft tissue punch. The bone substitute material

was placed within the extraction socket flush with the bone crest on the buccal side, and exceeding the palatal bone plate by roughly 4mm and to a level of 3mm below the mucosal margin. Subsequently, a free gingival graft (FGG) with a thickness of 3mm and a diameter of 8mm was harvested at the palate.

This FGG was sutured on top of the extraction socket using non-resorbable sutures (Figure 4) in keeping with the method described by Jung, Siegenthaler and Hämmerle (2004). The crown on tooth UL1 was removed and replaced with a provisional restoration including a cantilever to replace

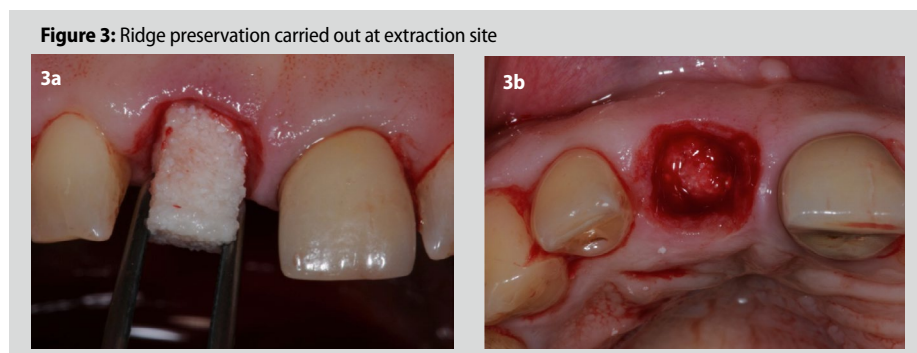


Figure 3: Ridge preservation carried out at extraction site

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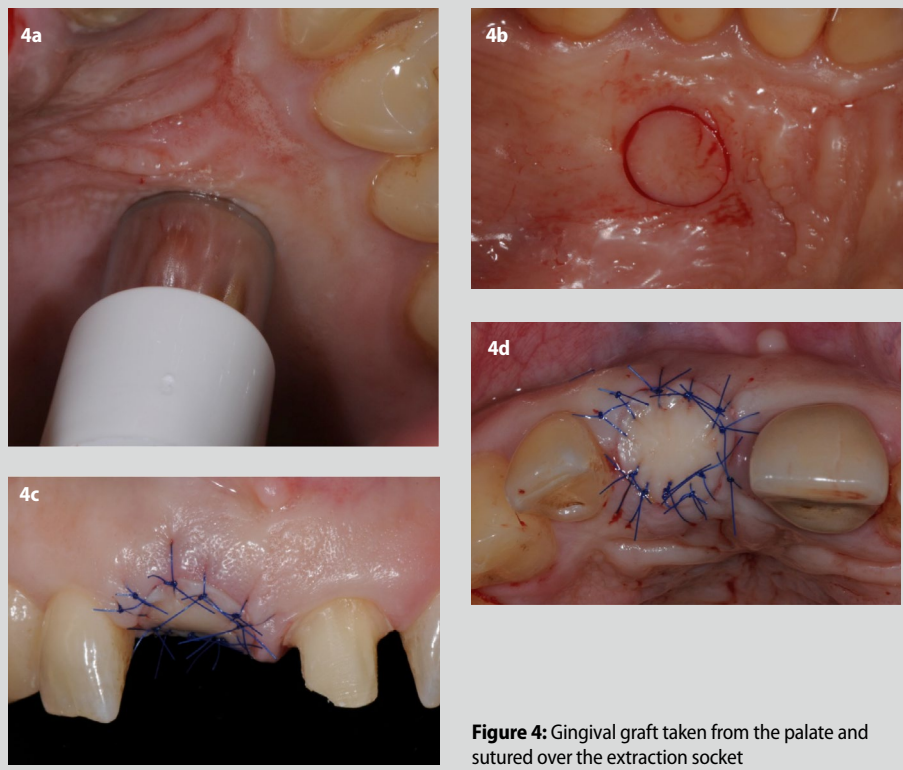


Figure 4: Gingival graft taken from the palate and sutured over the extraction socket

tooth UR1 (Figure 5). Six weeks later, the clinical situation was healthy and the former extraction socket was completely closed. A CBCT was taken to assess the bone dimension and to decide whether or not implant placement could be performed. The CBCT revealed that, with an ideal implant position, a dehiscence defect at the palatal aspect would be present. Due to the fact that guided bone regeneration (GBR)

on the palatal side cannot be performed predictably, a longer healing time was discussed with the patient. Four months later, a second CBCT was taken (Figure 7), and again, the implant position was defined using digital planning software (SMOP Swissmeda AG, Switzerland). A digital scan of the initial clinical situation was matched and superimposed with the CBCT data in the planning software. At this point, the height of the palatal and buccal

Figure 6: CBCT at six weeks showing a dehiscence or at least immature bone substitute material at the palatal aspect with an ideal position

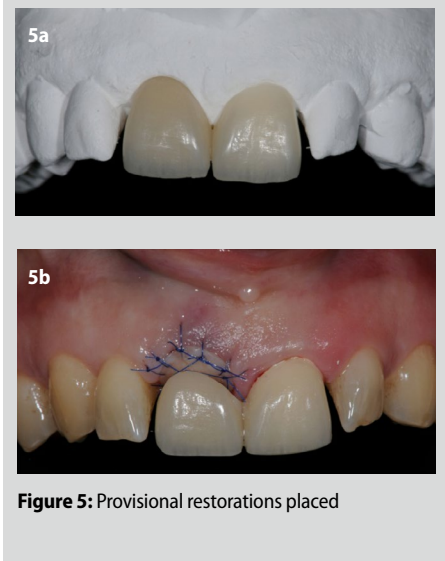
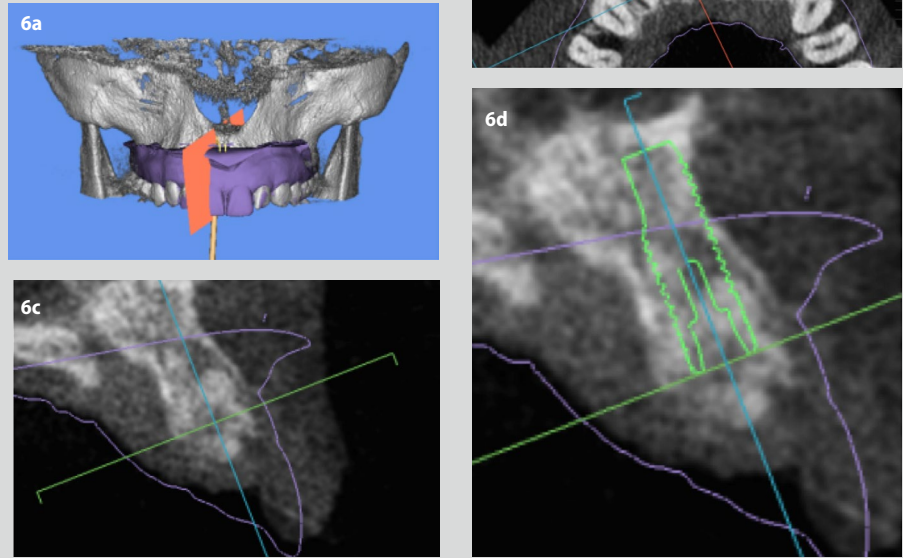


Figure 5: Provisional restorations placed

bone plates returned to a regular height. Bone regeneration had taken place and the former extraction socket was completely filled with bone substitute material and newly formed bone. This allowed implant surgery planning and the production of a surgical stent for guided surgery. On the day of implant placement, a full thickness flap was elevated and a dental implant (Bone Level, Straumann) was placed using guided surgery, and a surgical guide printed using a three-dimensional printer.

Figure 7: Second CBCT taken at six months

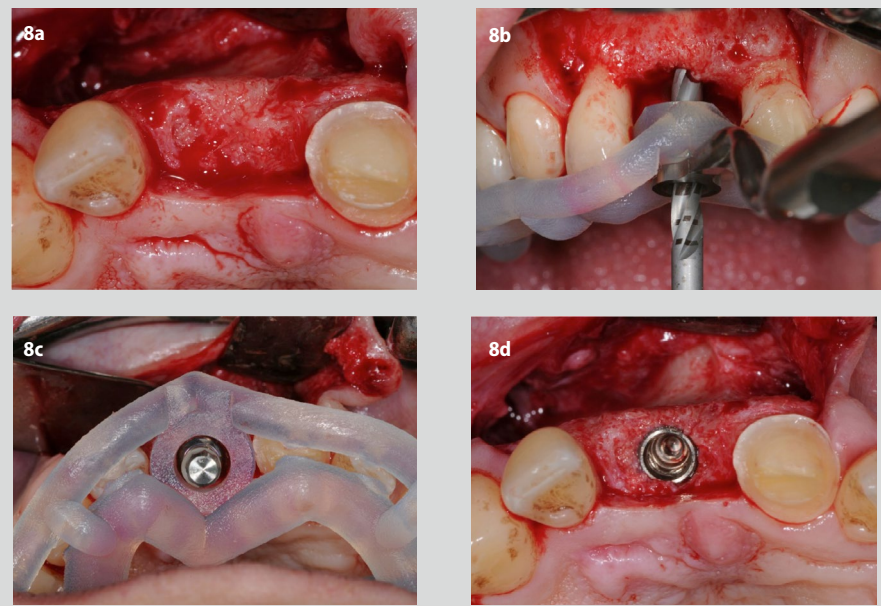
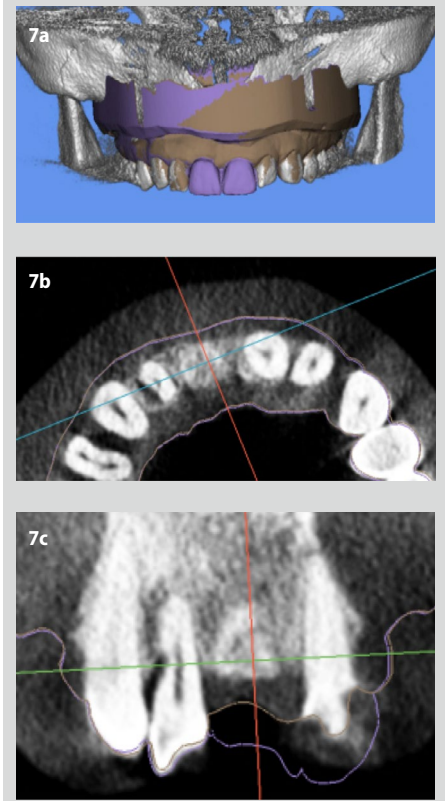


Figure 8: Implant placed using guided surgery

The implant was placed in an ideal position, vertically and horizontally (Figure 8). In order to compensate for an expected loss of volume on the buccal side, GBR with DBBM and a resorbable collagen membrane was performed to optimise the contour (Figure 9). Primary wound closure was obtained. Three months later, the clinical situation revealed a slight loss of the buccal contour. According to a recent clinical study on 16 patients, GBR may contribute for up to 57% of the volume, whereas soft tissue

augmentation compensates the remaining 43% of the volume deficiency (Schneider et al, 2011). Soft tissue volume augmentation surgery was performed using a classic approach (Figure 10). The patient agreed to be part of an ongoing clinical study comparing autogenous soft tissue grafts to a prototype three-dimensional collagen matrix. For that purpose, a split thickness flap was elevated, a pouch on the buccal aspect of the implant site prepared and a three-dimensional collagen matrix inserted and sutured in place. Again, primary wound closure was obtained. Three months later, abutment connection was performed using a U-shaped incision and the preparation of a small flap was placed underneath the buccal flap. Following an impression with a standardised impression post, a healing abutment was inserted.

Prosthetic phase

After one week, a provisional implant-borne reconstruction with a full contour on the buccal side and a concave contour within the soft tissues was inserted (Figure 11). Within two to three appointments, flowable

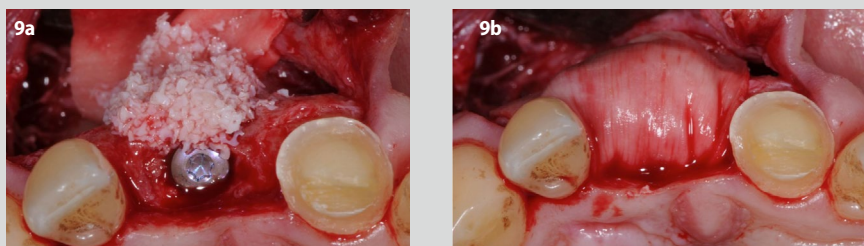


Figure 9: Guided bone regeneration was carried out to compensate for an expected loss in volume

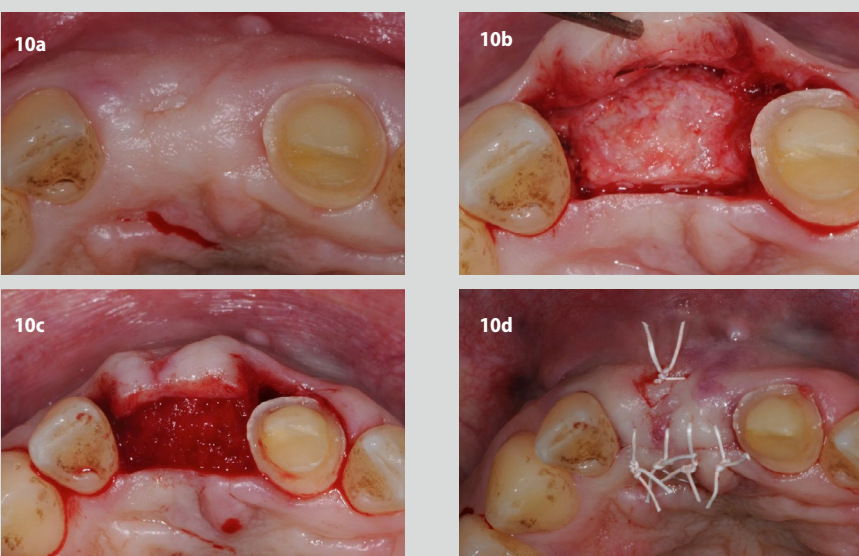


Figure 10: Soft tissue augmentation carried out to address slight loss of buccal contour



Figure 11: Healing abutment removed and provisional placed



Figure 12: Final restoration wax up and framework



Figure 13: Final restoration

composite was added to the transmucosal part of the provisional restoration (at the implant site) to aim for a more convex contour and to create the emergence profile, mimicking one of the neighbouring contralateral tooth UL1.

After a healing period of three months, an individual impression post was prepared and an impression was taken for implant UR1 and tooth UL1. The dental technician fabricated a try-in wax-up, which was inserted during the following appointment. Subsequently, an all-ceramic reconstruction based on a zirconia abutment (Cares, Straumann) for implant UR1 and an all-ceramic single crown for tooth UL1 were prepared by the dental technician (Figure 12). The implant-borne reconstruction was screw-retained and inserted with an insertion torque of 35Ncm. The access hole was closed with composite. The all-ceramic crown on tooth UL1 was cemented with a resin cement.

One week later, the patient was recalled for the follow-up examination. The clinical situation was healthy; no bleeding on probing was observed. The final outcome was judged as being aesthetically pleasing and the patient scheduled for a regular maintenance programme.

Final outcome

The final outcome of the case (Figure 13) was considered to be excellent from an aesthetic and functional point of view, and the patient was satisfied with the results. The ridge preservation procedure performed at the day of tooth extraction allowed for further optimal implant position and enhanced the clinical situation on the hard and soft tissue level, but prolonged the overall treatment time. GBR and soft tissue volume augmentation contributed almost equally to the volume obtained at the end of the treatment.

The reconstructions manufactured by a skilled dental technician were based on all-ceramic materials, which, in this clinical situation, demonstrated high long-term survival and success rates. **IDT**

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