

# Single Implant In The Aesthetic Zone

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present the clinical stages of a patient treated using contemporary digitally-driven implant techniques



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The rehabilitation of single tooth spaces in the anterior zone with dental implants has become a widely prescribed treatment modality due to its high predictability. However, aesthetic demands have increased, and rehabilitation of anterior teeth is nevertheless still a challenge for surgeons and prosthodontists (Kourkouta et al, 2009). Nonetheless, patients have a high overall satisfaction with implant treatment in the anterior maxilla. In this article, Ashish Soneji and Giovanni Martino summarize the clinical stages of a patient treated by Alfonso Rao using contemporary digitally-driven implant techniques. The laboratory stages were completed by Stephen Lusty.

## History and clinical examination

A 35-year-old female was referred by her general dental practitioner, reporting ongoing treatment since she was seven years old on the UR1. The patient remembered incurring a trauma injury, resulting in the tooth becoming non-vital and requiring root canal treatment. The root canal treatment failed, resulting in a chronic infection and the patient subsequently underwent several apicoectomies.

On initial examination by the referring dentist, the UR1 was palatally positioned, was darker in appearance and symptomatic (Figure 1). The tooth was tender to percussion and a draining sinus was present. Medically, the patient was fit and taking no medication. She was a non-smoker with low alcohol consumption. After diagnosis of chronic apical pathology UR1 (failing RCT and apicectomy) and discussion of the options, the patient and dentist agreed that the best course of action would be to extract the tooth. After a thorough discussion of the space options, the patient requested referral for implant placement and restoration. Prior to referral, the patient had been provided with a temporary partial acrylic denture. When the patient attended our clinic, a clear buccal concavity was present in the alveolar crest of the UR1 extraction site (Figure 2). Three-dimensional imaging identified a clear buccal defect and the expectation was set that given the patient's high smile line, prosthetically driven implant placement using a surgical guide and bone grafting, followed by soft tissue augmentation and a well-designed temporary restoration would be required for the patient to achieve the optimal aesthetic result.



FIGURE 1: Before smile view (recorded by GDP prior to extraction of the UR1)



FIGURE 2: Pre-operative view



FIGURE 3: Raising flap and periosteal relief (occlusal view)



FIGURE 4: Raising flap and periosteal relief (labial view)

## Digital restoratively driven implant planning

When planning implant restorations, it is important to have a clear direction of the restorative outcome. In some instances, a multidisciplinary approach is needed in order to provide a successful restoration, such as the stabilization of periodontal disease, removal of teeth with a poor prognosis, or orthodontics to create adequate spacing for the implant or to improve the overall aesthetics of the final result. Discussions must also be had with the patient to confirm whether further cosmetic treatment is desired, such as adjacent teeth being whitened or veneered to lighten the shade, as this will need to be performed in conjunction with the restoration of the implant.

Occlusal considerations for implants are also essential as they do not facilitate the natural characteristics of the periodontal ligament (PDL) and are therefore more prone to overloading if not planned appropriately. This can lead to screw loosening, restoration fracture, abutment fracture, bone loss and eventual implant loss. In this specific case, referral to the orthodontist was considered prior to planning the implant surgery in case the patient wanted to align the UR2. A fabrication of the wax-up of the tooth as part of the treatment planning is imperative as, in this situation, this helped the patient to accept the position of the UR2 and the crowding of the upper arch and proceed with implant treatment with the teeth in their existing position.

The next step in planning the surgery relates to hard and soft tissue grafting. This is needed to ensure an optimum aesthetic result of the soft tissue in terms of shade and shape. The most commonly used index for assessing the aesthetics of soft tissue was proposed by Belser et al (2009). This index has been validated in several studies that assessed implant restorations (Jemt, 1997). Indeed, the presence and form of the interdental papilla is a key feature in the soft tissue architecture.

However, obtaining a well-designed papilla around implants remains a challenge for the implant surgeon despite the great deal of techniques that have been described for its preservation, manipulation and reconstruction. With this case, due to the history of chronic infection at the site and the



FIGURE 5: Osteotomy and confirmation of position using surgical guide



FIGURE 6: Implant placed and confirmation of good primary stability



FIGURE 7: Bone grafting (mixed autogenous/xenograft)

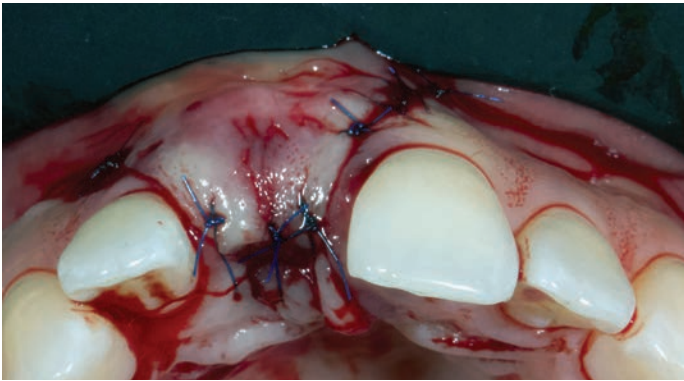


FIGURE 9A: Sutures and tension-free primary closure (occlusal view)

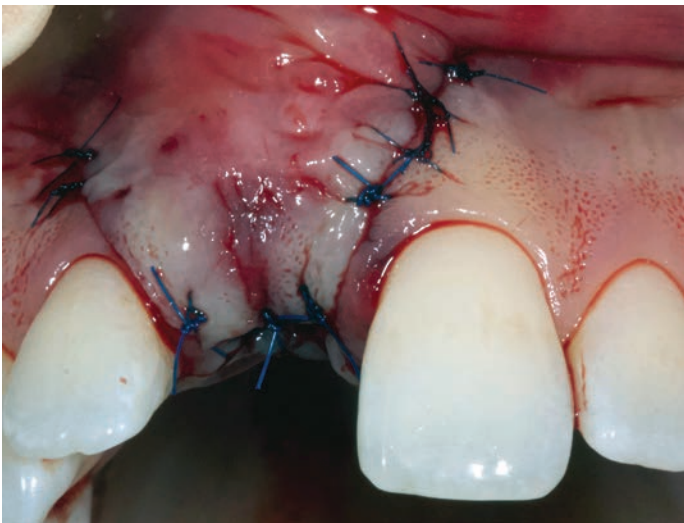


FIGURE 9B: Sutures and tension-free primary closure (labial view)

thin buccal wall prior to extraction, the inadequacy of the hard and soft tissues was identified and discussed with the patient. The patient was therefore fully aware that additional treatments (bone grafting) would be required in order to allow the implant to be placed in the ideal three-dimensional position for the best restorative outcome.

A discussion about what type of definitive restoration was to be fabricated followed, using the diagnostic wax-up with consideration



FIGURE 8: Membrane placed with tacks

given to the advantages and disadvantages of screw - and cement - retained crowns. This case was specifically planned with a prefabricated surgical guide from a digital intraoral scan with a radiographic marker present at the time of the CBCT scan to aid in very accurate restoratively driven placement.

## Clinical surgical and restorative phases of implant treatment

### Stage one surgery

Anaesthesia was achieved with 3ml Septanest 1:100,000 (Septodont), using buccal and palatal infiltrations. The surgical stent was tried in place, and a crestal and intrasulcular incision made with a 15c scalpel from UR2 to UL1, with a distal release and mesial release in order to preserve the interproximal papillae between UR1 and UL1. The surgical flap was then raised, the bone exposed and the granulation tissue removed (Figures 3 and 4). The osteotomy was performed using the Straumann protocol (Figure 5). A BLX 3.75x14 SL Active Roxolid implant was placed and primary stability was achieved, recording 30Ncm torque at insertion. A 3mm closure cap was screwed in (Figure 6). During implant placement, the buccal threads were exposed due to the labial bone dehiscence. The implant threads were covered with a mixture of Bio-Oss (xenograft) and autogenous bone obtained using a bone scraper (Figure 7) then covered with a Bio-Gide membrane to adequately stabilize the labial convexity (Figure 8). The membrane was stabilized with tacks before the flap was closed with a horizontal mattress and simple interrupted non-resorbable monofilament sutures (Figures 9 and 10). The patient was provided with a denture tooth in situ to be used as a provisional restoration, making sure that there was no pressure on the implant site during the healing.



FIGURE 10: Temporary crown UR 1



FIGURE 11: Final crown fit UR1 and papilla healing at review



FIGURE 12: After smile view

### Stage two surgery

After a healing period of four months, the healing abutment was exposed, and a partial thickness flap was raised. Fibro-Gide was used to increase the thickness of soft tissue around the implant. The temporary denture was relieved to make space for placement of a 4mm healing abutment. At this stage an Ostell ISQ reading was recorded to ensure successful osseointegration of the implant. After two weeks, sutures were removed, and a Trios scanner was used to record a digital impression.

### Fitting of temporary crown

The patient returned two weeks later for placement of a custom-made composite crown with a specific cervical shape to help to shape the soft tissue emergence profile (Figure 10). PTFE tape was placed at the screw access and restored with composite.

## Fitting of final restoration

Following four months of soft tissue profiling with the temporary restoration, the patient returned for another digital impression to capture the newly formed emergence. The shade recording was aided using clinical photography as per the Matisse protocol. When the patient returned for fitting of the final crown, a slight correction was required and so the final restoration was fitted at a second visit. At the review, papillary infill was evident between the central incisors (Figure 11). As per the review visit, a satisfactory outcome was achieved from the clinicians' and technicians' point of view and the patient was delighted with the final outcome (Figure 12).

## Conclusion

This case is a clear example of how thorough treatment planning and communication between the patient, dentist and technician can lead to an excellent clinical outcome. The advances in digital dentistry and restoratively driven treatment planning have really aided in ensuring the ideal implant placement, even in situations where there is a severe defect. The use of contemporary bone grafting techniques still allows us to respect the patient's biology and ensure successful osseointegration. From a restorative point of view, the additional attention to detail at the second stage surgery involving soft tissue augmentation can ensure better profile and aesthetics of the gingiva around the implant as well as protecting the bone grafting site to ensure longevity of the end result. Moreover, a well-designed temporary restoration using digital scanning methods can significantly improve the soft tissue emergence prior to placement of the final restoration. ■

### Products used

- Septanest 1:100,000 Septodont
- BLX Roxolid implant Straumann
- Bio-Oss, Bio-Gide, Fibro-Gide Geistlich
- Ostell ISQ Ostell
- Trios intraoral scanner 3shape