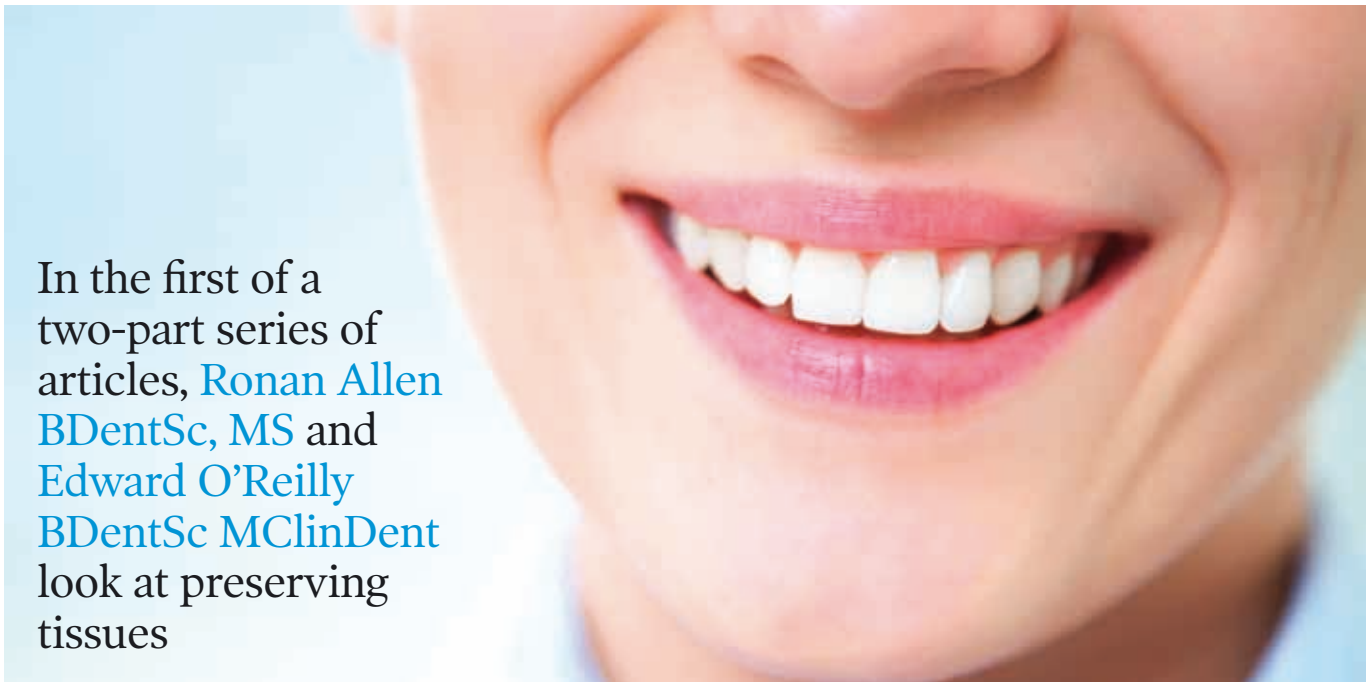
Immediate implants in the aesthetic zone



In the first of a two-part series of articles, Ronan Allen BDentSc, MS and Edward O'Reilly BDentSc MClinDent look at preserving tissues

The aesthetic outcome of any single anterior implant restoration is largely dependent on the contours of the peri-implant hard and soft tissues *(Kois JC et. al. 2001)*. Advances in abutments and ceramic materials mean that, we as clinicians have the ability to mimic life-like restorations on a very consistent and predictable level.

The challenge we face today in implant dentistry is trying to place implants in a minimally traumatic, time-efficient fashion without compromising aesthetics. Therefore, ideally we would like to place implants immediately into extraction sockets with an immediate provisional restoration.

The literature shows us that survival rates for immediate implant placement into extraction sockets are as successful as delayed approaches *(Kan et al 2003)*. However, aesthetic risks do exist with this treatment modality especially with respect to mid facial recession.

It has been well documented that the majority of dimensional changes to bone and soft tissue occur in the first six months after tooth extraction. To overcome this tissue loss, an immediate implant concept was introduced in the late 1990s, in an attempt to preserve the original bucco-lingual contours.

Unfortunately, it has been recently reported that the thin facial plate of the anterior maxilla still undergoes some vertical resorption *(Cosyn J et al 2012, Araujo MG et al 2005, Furhauser R et al 2005, Botticelli*

Fig 1

Fig 2

Fig 3

D, et al 2004). This can be exaggerated by facial placement of the implant in the socket. The overall result can then be compromised with respect to the mid-facial soft tissue height due to bone resorption at the coronal aspect of the thin facial plate.

But, even when the implant is placed in a palatal position, it is now apparent that maintaining the tissue volume is unpredictable especially with highly scalloped, thin gingival biotypes *(Figures 1 and 2)*. More recently it has become established practice to place the implant palatally in the socket and place a bone substitute into the gap between the implant and the facial plate. But this approach does not always prevent mid-facial recession *(Chen et al 2007)*.

Another aspect to this loss of tissue contour is the dimensional changes of the connective tissue and epithelium at the facial aspect of the implant site after tooth extraction. A number of clinicians are also using connective tissue grafts to augment the facial soft tissues *(Kan et al 2009, Grunder et al 2011, Cornelini et al 2008)*. This first paper, will describe the step-by-step clinical procedures used to minimize tissue loss in immediate implant cases by combining the use of both a bone substitute and a connective tissue graft protocol.

The second paper will discuss impression making, abutment selection and placement of the final properly contoured restoration in the anterior aesthetic zone.

Table 1 – Treatment sequence for immediate implant placement and provisional restoration

Treatment	Surgical details
1. Atraumatic extraction	Severe supracrestal fibres and periodontal ligament using scalpel and periotomes. Using forceps, remove the tooth with minimal trauma to the gingival tissues or facial plate of bone.
2. Debride the socket	Use a curette or spoon excavator to remove any debris or granulation tissue from bony walls and inspect socket for dehiscence/ fenestration defects.
3. Correct 3D implant placement	Aim to engage the palatal and apical bone to ensure primary stability, and place the neck of the implant 2mm lingual to the facial plate and 3mm apical to the free gingival margin.
4. Placement of bone graft	Use a slow resorbing bovine hydroxyapatite and pack between the implant and facial plate of bone.
5. Placement connective tissue graft	Harvest tissue from palate or tuberosity and place in the partial thickness pouch created on the facial aspect
6. Fit of well-contoured provisional restoration	Use an immediate implant crown, a resin bonded fixed restoration or a removable 'essix' type retainer used to support the interproximal and facial tissues

Procedure for immediate implant placement

This protocol calls for a number of basic principles to be adhered to so that the most ideal treatment outcome can be achieved each and every time it is performed. The initial principle involved is the case selection. It is important to closely examine the patient, smile line, gingival biotype and the extent of any socket defect after tooth removal as these parameters all have a significant bearing on the aesthetic success of any immediate implant.

As a general rule, if there is a bony dehiscence with vertical component greater than 4mm or any pre existing soft tissue recession that needs to be corrected, then extraction and site preservation is indicated rather than immediate implant placement. The surgical protocol will be outlined using the following three cases as examples.

"This approach does not always prevent mid-facial recession"

Case one

A 27-year-old female patient presented with trauma to the UL2 *(Fig 3)*. On examination, a 4mm subgingival oblique lingual fracture was noted and the decision was made to extract and place an immediate dental implant. This patient presents quite a challenge surgically due to the thin gingival biotype and relatively high smile line.

Following the protocol as outlined in *Table 1*, a 15C scalpel blade was used to excise supracrestal fibres, then a periotome is introduced along the length of the root to separate the periodontal ligament fibres *(Fig 5)* before extraction with a forceps *(Fig 6)*. The tooth can be sectioned buccolingally and the fragments elevated out if the tooth has fractured apical to the osseous crest.

After debridement with surgical curette *(Fig 7)* the osteotomy is initiated with the use of a Lindemann side-cutting bur (Brasseler USA) *(Fig 8)* which creates a groove on the palatal wall helping to guide the remaining twist drills to the correct palatal position of the implant – ideally 2mm from the facial plate of the extraction socket at its most coronal aspect.

Once the desired osteotomy size has been created in the socket, a 4.3 x 13mm tapered moderately rough surface implant (Nobel Replace Tapered, Nobel Biocare) *(Fig 9)* is placed in the socket 2mm from the facial plate and 3mm apical to the free gingival margin. A primary stability of greater than 35Ncm and a resonance frequency analysis reading over 65 (Ostell ISQ) is used to dictate whether an immediate restoration is feasible.

Placement of the 0.25-1.0mm bovine cancellous bone particles (Nuoss, Ace) should be preformed using small increments of material and using a small instrument (periodontal probe and amalgam plugger) so as not to block initial 2-3mm of the facial socket, preventing further placement of graft particles *(Fig 10)*. Do not overfill the gap vertically as this will prevent introduction

Continued »


Fig 4


Fig 5


Fig 6

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Fig 7


Fig 8


Fig 9


Fig 10


Fig 11


Fig 12

Continued »

of the connective tissue graft into the area.

The connective tissue can be harvested from either the palate or the maxillary tuberosity area depending on the patient's anatomy *(Fig 11)*. A partial thickness envelope incision is created in the facial aspect of the implant site to allow the introduction of the subepithelial connective tissue graft (=10mm x 7mm).

The soft tissue graft is sutured with a fine diameter suture material (5/0 vicryl or 6/0 prolene) using horizontal and vertical mattress sutures to hold the tissue and the papillae together. If the implant is not restored immediately then ideally a fixed 'rochette' bonded retainer or a more cost effective alternative like an 'essix type' removable retainer can be used without pressure on the facial soft tissues.

Care should be taken to carefully contour the provisional pontic so that it does not impinge on the facial soft tissues but does maintain and support the interproximal papillae. The patient was instructed not to brush the area for two weeks and rinse twice daily with a chlorhexidine mouthwash. Sutures were removed at two weeks, at which point tissues should be pink and healthy with limited inflammation due to minimal trauma used in the surgical protocol *(Fig 12)*.

The patient is then reviewed at one and then three months post-operatively. After three months of healing, a small incision is made to expose the healing abutment as the tissue had grown over it *(Fig 13)*. Figure 14 shows the implant six months after delivery of final restoration.

"After three months of healing, a small incision is made to expose the healing abutment"

Note the complete fill of interproximal papilla, maintenance of the facial contours of the extraction site ridge and the increased thickness of the peri-implant soft tissues coronal to the implant-abutment interface *(Fig 15)*.

Case two

A 29-year-old female patient was referred for immediate implant placement in UL1 *(Figs 16 and 17)*. The tooth, which already had undergone endodontic therapy some years ago, had suffered a fracture well below the gingival margin

Continued »


Fig 13


Fig 14


Fig 15


Fig 16


Fig 17


Fig 18

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Fig 19


Fig 20


Fig 21


Fig 22


Fig 23

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one week previous. The fractured portion had been bonded into place and a subsequent sinus tract had developed over the mesial aspect of the mid-root.

An identical protocol to the one previously described was used to extract and immediately implant the socket of UL1 *(Fig 18)*. The implant was restored after three months of healing time. Again, this was a high-risk case due to thin gingival tissues and the infection of the facial soft tissues. However, using the protocol described a predictable outcome is achieved *(Fig 19)*.

Case three

A 45-year-old female patient presented complaining of pain from her lower anterior teeth *(Fig 21)*. On examination, her lower central incisors, that had been endodontically treated many years previously, both had peri-apical radiolucency's and were deemed hopeless for re-treatment due to very short roots *(Fig 20)*.

Once again the immediate implant protocol as previously described was used to extract both teeth and place an implant in the LR1 site. The LL1 site was grafted with xenograft and epithelial plug harvested from the palate with the connective tissue graft *(Fig 21)*. After three months of healing, the implant was restored using an implant-supported cantilevered fixed partial denture *(Fig 23)*.

Conclusions

Our patients expect their implant restorations to last many years, performing well both functionally and aesthetically. If we know that some degree of vertical and horizontal resorption is likely when placing anterior immediate implants, especially in patients with a thin biotype, then every effort should be made to maintain and augment these delicate tissues at the time of initial surgery.

Use of this clinical surgical protocol may be an effective treatment option to compensate for the expected loss of tissue, helping to maintain a good aesthetic result over time.

The next article will discuss the impression techniques, abutment contours and material choices necessary for achieving ideal immediate implant aesthetic results ■

ABOUT THE AUTHORS

Dr Ronan Allen completed his undergraduate training at Trinity College Dublin in 2002 and then in 2009 completed his three-year clinical certificate and masters degree in periodontology and implant dentistry from the University of North Carolina at Chapel Hill. He now works in private practice limited to periodontology and implant dentistry and is a clinical supervisor in the graduate program of periodontology in the Dublin Dental University Hospital.

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