Immediate single-tooth replacement and provisionalisation in the aesthetic zone

As immediate implant placement gains momentum, Dr Graham Magee gives an example of how this high-risk treatment leads to success.

With more than 40 years of clinical evidence, Titanium Endosseous implants have become an acceptable (evidence based) form of treatment to replace natural teeth and should be considered as an alternative to either a partial denture or bridge.

Immediate implant placement with simultaneous intermediate function or immediate loading has been gaining momentum over recent years and can be a very predictable method in providing implant treatment for our patients. There have been various timeframes used for the definition of immediate implant placement. Hammerle et al (2004) suggested that immediate implant placement was when an implant was placed following tooth extraction and as part of the same surgical procedure.

In the same paper, the consensus statements say “implants should not be placed at the time of tooth extraction if the residual tooth morphology precludes attainment of primary stability.” It also states that, “If buccal plate integrity is lost, implant placement is not recommended at the time of tooth removal. Rather augmentation therapy is performed.” The implant is then placed after healing, that being 12-16 weeks or even longer than 16 weeks. It has also been reported that infection adversely affects immediate implant placement (Rosenquist & Grenthe 1996; Grunder et al. 1999). and is a contraindication for immediate placement of an implant into an extraction socket.

Predicatable treatment concept

Immediate implant placement and provisionalisation is a predictable treatment concept (De Rouck et al 2008). The success rate is at least comparable to data published for single-tooth implant placement using standard protocols in healed sites. This happens providing careful appropriate patient selection is used and the surgeon is familiar with the techniques that differ from the standard two-stage protocol for implant placement.

For the patient, the main advantage for immediate replacement and provisionalisation is fewer surgical visits as well as providing immediate aesthetics that are virtually indistinguishable from the original tooth. Sometimes if the tooth being replaced is discoloured due to non-vitality, the aesthetics will provide an immediate improvement.

For the clinician, immediate replacement allows for minimal disruption of the soft tissue providing immediate peri-implant support through careful manufacture and design of the provisional restoration. This helps to maintain the stability of the gin-
gival marginal tissues, which is necessary for a successful aesthetic outcome.

Root-filling failure

The following is a case study of a 50-year-old female with a history of a failing root-filled, upper-left central incisor. The root filling had been present for approximately 25 years and this had been apicected approximately 15 months before the tooth became problematic (Figure 1). The patient did not want another apicectomy and requested that the tooth should be extracted. The various options for restorations were discussed and as the neighbouring central incisor was root filled and restored with a post crown, the lateral incisor was restored with a veneer due to microdontia, a bridge was not a viable option. The patient was adamant that she did not want a partial denture.

As the tooth was not infected and investigation had shown that the buccal plate was still intact, it was decided that the tooth could be extracted and immediately replaced with an implant fixture. This was to be utilised to support a Nobel Biocare immediate temporary abutment and a provisional crown.

What the treatment involved

Under local anaesthesia, a crescent incision was used and no flap reflection. The upper left central incisor was extracted using a very careful (atraumatic) technique with a periosteum to preserve the buccal plate of bone and careful manipulation of the gingival tissues.

Once the tooth was removed, the socket walls were curetted to remove any remnants of periodontal fibres or granulation tissue. The socket was inspected to ensure that the buccal plate was still intact (Figure 5). Using the standard protocol, the hole was first prepared by penetrating the palatal wall at the apical third. Great care needs to be taken in the ostotomy preparation as the palatal wall of the extraction socket is commonly very dense and difficult to prepare which can cause ‘run-off’ of the drill tip.

To achieve the initial perforation, the drill is held at an angle of approximately 45° to the palatal wall. Once the drill has penetrated the palatal wall, the angle is changed to then run more-or-less parallel to the anterior maxilla, implant placement is typically toward the palatal aspect of the socket. Ideally there should be a space of 0.5mm-1mm between the buccal plate and the anterior surface of the fixture.

The site was further prepared using the standard drill sequence. A Nobel Speedy Replace regular platform fixture (ø4mm x 15mm) was then placed which stopped at a torque value of 55Ncm. It is recommended that if a torque value of 55Ncm cannot be achieved the implant should not be brought into immediate function. A cover screw should be used and the implant submerged; therefore some other temporary measure such as a Maryland Bridge should be used. In these conditions the root could even be sectioned from the extracted tooth and the crown bonded to the adjacent tooth.

Primary stability is very important in this procedure as the bone support needs to be strong enough to support the fixture and prevent micromotion from exceeding the threshold above which fibrous encapsulation prevails over osseointegration (Szmukler-Moncler et al. 1998).

An Immediate Provisional Abutment (IPA) (Figure 4) was fitted to the implant and fastened down to 20Ncm. The abutment is non-engaging, screw-retained and inserted using a multi-unit abutment driver. The abutment has a 1.5mm depth of shoulder and comes with a plastic coating, which can be used with acrylic provisional materials. I find however, that when using composite materials it is better to discard the coping and cement the composite to the IPA.

A provisional composite crown was pre-manufactured by the laboratory. A small amount of Tetric Flow composite (any flowable composite would also work) was placed in the provisional crown. A sufficient amount was used to engage with the metal of the IPA but not spill out and touch the tissues. This was then light cured whilst the provisional was supported in the correct position. The provisional was then removed and placed on another IPA connected to a protection analogue. The voids were then filled with more Tetric Flow. The margins were then shaped...
and polished to ensure a smooth shoulder with no ledges or deficiencies against the IPA. (Figures 5 and 6). The provisional crown was then cemented to the IPA with a very small amount of Tempbond, ensuring that no cement extrudes into the tissues.

Adjusting the provisional crown

It is important at this stage to ensure that the provisional crown is adjusted to ensure that there is no contact with the lower teeth in centric occlusion (Figure 7) and no contact in any protrusive or excursive movements (for example, not immediate loading). The patient was advised to try and avoid the provisional crown and not to apply any forces with eating for the first four weeks.

The provisional crown was left in situ for six months (it is recommended that an absolute minimum of three months should be allowed for osseointegration before disturbing the immediately placed implant). The provisional crown was removed and a fixturehead impression taken of the implant. The adjacent post crown (upper right central incisor) was also prepared for a new crown to ensure a good match for both central incisors. A Procera Zirconium abutment was connected to the fixture (Figure 8). The abutment screw was fastened down at the recommended torque of 35Ncm. Procera porcelain crowns were fitted to both central incisors (Figure 9). The implant-retained crown was cemented with Tempbond. It is recommended that the definitive restorations on implants should be cemented with temporary cement as this allows access to the implant if necessary.

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References


Figure 10: Final restorations 18 months after fitting.

Figure 8: Tempbond application to provisional crown.