A 39-year-old male patient was referred to our practice by his general dentist for the management of fractured tooth #21. The tooth had been root filled 25 years ago and the crown had fractured two weeks prior at the gingival margin (Figure 1).

After a thorough clinical evaluation, all options were considered and the patient decided that an implant-supported crown was the most suitable treatment path.

The patient has a high smile, thin scalloped gingiva and high aesthetic expectations. Therefore, careful extraction, implant placement and soft tissue management became even more important to ensure tissue stability and a predictable treatment outcome.

Diagnostic procedures included a diagnostic wax up and construction of a surgical guide. The tooth was extracted and an implant was immediately placed. The missing tooth was provisionally restored with a pull-down denture to ensure minimal tissue contact.

The implant was left to settle for 3 months to ensure bone and tissue integration. Note that the mid buccal gingival height has been maintained but some loss or collapse of the papilla has occurred. The healing abutment is greying the buccal tissue (Figure 2).

Figure 1. Initial situation: Tooth 21 fractured at the gingival margin.

Figure 2. 3-months post implant placement. The healing abutment is greying the buccal tissue.
The fixture and abutment placement allowed for thickness of tissue buccally and interproximally so the tissue could later be manipulated with minimal risk of recession. It was therefore decided to proceed straight to the definitive restoration.

As there would be no provisional implant loading, the abutment design became absolutely critical. The aim was to replicate the emergence of the natural tooth root, support the soft tissue and give adequate thickness for stability and cleaning (Figures 3 and 4).

The abutment was designed with a tulip subgingival form using Nobel Procera software (Figure 3). The restorative margin was placed just subgingivally on the buccal but equigingivally on the palatal (Figure 4). There should be no apical displacement of the mid buccal gingival margin. On the buccal, the margin is short of the previous root form by 0.5mm to allow for tissue thickness.

The mesial and distal papilla are displaced to the same position as the tooth root.

The abutment was carefully placed to ensure there was only minor tissue displacement without too much blanching (Figure 5). Correct abutment design allowed immediate and appropriate support to the papilla (Figure 6). Careful management of the contact point following Tarnow’s guidelines will allow for predictable papilla reformation.

To ensure the mesial gingival embrasure was not open and to make the central incisors completely symmetric, the mesial surface of tooth 11 was adjusted. The contact point was therefore brought closer to the bone level, within 5mm and therefore complete papilla infill could be predicted. Symmetry was confirmed digitally prior to finalising the restoration (Figure 7). After a few weeks ideal soft tissue form was achieved (Figure 8).
A cross section of the tooth on the mesial half and the abutment on the distal half (Figure 9) shows how the ideal form was followed in the abutment design. This allowed for the ideal proportion and emergence profile of the crown, as well as ideal soft tissue form (Figure 10).

A zirconia crown was screwed in place, after cementation to the abutment outside the mouth. An occlusal splint was issued to control parafunctional forces. At one month follow up, the restoration is virtually undetectable (Figure 11).

The final restoration shows beautiful soft tissue form and ceramic aesthetics. This is the result of atraumatic extraction, good soft tissue management, ideal fixture positioning, careful abutment design, ceramic excellence and restorative management. These procedures are predictable even when there is thinner more scalloped gingival form. The use of CAD/CAM is an important part of this process.

This restoration highlights the team approach - surgeon, prosthodontist, ceramist and technology. The end result - a very happy patient!

**About the authors**

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