Managing coronal destruction

A clinical case demonstrating the pre-endodontic reconstruction of a tooth

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For many years, post systems have been an important component of post-endodontic core build-ups. Post crowns or posts and cores used to be manufactured in a dental laboratory with the primary goals of repairing the restoration on significantly destroyed teeth and stabilising the tooth structure. With the development of adhesive systems, mechanical anchoring of the denture to the remaining tooth structure became increasingly less important, to such an extent that clinicians now debate whether a post is even needed.

Whether a tooth requires stabilisation must be critically questioned as well, particularly in view of the risk of fracture and its causes. In this regard, root fractures, vertical root fractures and crown fractures have to be assessed differently. The risk of a fracture of the crown increases with the size and depth of the cavity being prepared in the tooth (Fig. 1).

A tooth with a mesial-occlusal-distal cavity (MOD) and an endodontic trepanation has a much higher risk of fracture than an undamaged tooth does. The
risk of a cusp fracture can be significantly reduced through a preparation covering the cusps for endodontically treated teeth with an MOD cavity (Fig. 2).2,3

Vertical root fractures differ from fractures in the area of the crown. Lost endodontically treated teeth owing to a vertical fracture are often treated with a post. The difference in the elastic modulus between the hard tooth structure and post material has been suggested as a cause of a vertical fracture. It can thus be concluded that post treatment and root canal treatment are the primary reasons for a vertical fracture.4

Preparation that preserves hard tooth substance is considered to be a superior solution for preventing fractures. In addition, the fracture resistance in the coronal area is stabilised through adhesive build-up materials and restorations that cover the cusps. The post and the dentine should have a similar elastic modulus in order to reduce the risk of a vertical root fracture. The decision whether to use a post in the case of an endodontic build-up critically depends on the degree of destruction of the tooth: the more hard tooth tissue present, the less the need for a post.

The diagram in Figure 3 shows three different degrees of destruction of an anterior tooth. In the case of a coronally intact but root-filled anterior root, an adhesive restoration is sufficient. When treating teeth with damage to the hard tissue and for which a crown is planned, the remaining core height and width to be enclosed by the crown play a decisive role (ferrule effect). If the ferrule is more than 2 mm wide, a build-up secured with an adhesive is sufficient. If it is narrower than 2 mm, the use of a glass fibre post is indicated.

_Clinical case_

A busy sales representative came to our practice with tooth 12 broken. Owing to time constraints, we only had one hour available for the reconstruction of the crown. The fracture line ran circumferentially at the level of the gingiva (Fig. 4). A root canal treatment had been performed on this tooth by another dentist three months before.

Initially, the patient requested preservation of the tooth but, after discussion, he said that he was not able to invest time in undergoing systematic tooth treatment. The clinical findings showed a retained root. The degree of tooth mobility was Grade 0–I and the probing depth was 1–2 mm around the tooth. X-ray images showed a root filling up to approximately...
3 mm before the radiological apex, as well as apical radiolucency (Fig. 5).

We diagnosed chronic apical periodontitis in tooth 12. The apical radiolucency should be subsequently observed and, if necessary, root canal treatment should be revised prior to placing a crown.

Being able to position a rubber dam clamp is a basic prerequisite for endodontic treatment and for pre-endodontic reconstruction. If a clamp cannot be positioned, surgical crown lengthening is indicated, if applicable (Fig. 6). Then they were blown to a thin layer and light cured for 10 seconds. The tooth was built up with the dual-curing core build-up material LuxaCore Z-Dual (DMG Dental; Fig. 9) and the post cavity was filled with LuxaCore Z-Dual. The LuxaPost post (DMG Dental) was positioned and the material was light activated (Fig. 10).

Since there was only a small amount of remaining tooth substance, the post cavity was prepared to a depth of 6 mm and thoroughly rinsed. The canal and remaining exposed dentine were conditioned with 35% phosphoric acid for 15 seconds and then rinsed with a multifunctional syringe for 15 seconds (Fig. 7).

Excess fluid was suctioned off with a micro-suction device. The pre-bond was applied using an application tip and worked into the surface for 15 seconds. The micro-suction device was again utilised to remove any excess.

In order to prepare the bonding material, Bond A and B were mixed in equal portions for 5 seconds and massaged into the dentine surface for 20 seconds (Fig. 8). Then they were blown to a thin layer and light cured for 10 seconds. The tooth was built up with the dual-curing core build-up material LuxaCore Z-Dual (DMG Dental; Fig. 9) and the post cavity was filled with LuxaCore Z-Dual. The LuxaPost post (DMG Dental) was positioned and the material was light activated (Fig. 10).

The crown was built up in small increments, activated, and contoured and polished with diamond grinding tools (Figs. 11 & 12).