Considerations for optimal restoration of teeth with perforations

By **Georg Benjamin,** Germany

Georg Benjamin *studied at the University of Würzburg (Germany) and the University of Umea (Sweden) from 2005 to 2010. He was assisting dentist in Brieselang in 2011 and 2012. Thereafter, in 2013, he became dentist at 'Endo Berlin Süd'. His work is focused on referral-based endodontic treatments. In 2015, he co-founded the dental blog www.saurezaehne.de, a digital collection of cases and dental topics, to share experiences with like-minded people. At the IDS 2019 he started the international clinical Dental Podcast "Dental Bonding".*

Perforations are an everyday complication that an endodontic practice has to deal with. Thanks to hydraulic silica cements, the prognosis for a perforation closure is good, but the question of how to optimally restore a tooth with perforation remains unanswered.

Case Report

A male patient visited the emergency service during the weekend because of pain in tooth 27. During the pulpectomy, the treating dentist had noticed that there was a particularly strong blood flow from one of the canals and had asked the patient to consult a dentist on Monday for follow-up. The family dentist diagnosed a perforation after X-ray inspection and referred the patient to our office.

Case Report

I made a cone-beam CT (Fig. 1 and Fig. 2) to better assess the extent of the perforation and the tooth was treated the same day. Due to the rotation of the tooth, compensated by the crown, the location of the palatal canal was much more distal than expected. The perforation was closed with a hydraulic silica cement (Fig. 3) and the root canals were prepared until 30.04. The canals were irrigated with NaOCl and provisionally closed (Fig. 4 and Fig. 5).

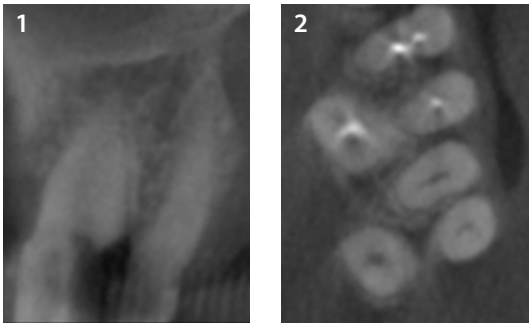

Fig. 1 and 2: CBCT of tooth 27

Fig. 3: The perforation was closed with a hydraulic silica cement

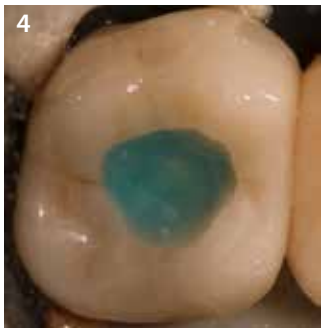

Fig. 4: The orifice was provisionally closed with a hygroscopic temporary obturation material and covered with blue flowable composite

Fig. 5: X-ray of the perforation closure after the first appointment

In the second appointment, as much excess as possible was removed from the fully set hydraulic silica cement (Fig. 6 and Fig. 7) and the dentine was sealed with G-Premio BOND before the NaOCl disinfection according to the "Immediate Endodontic Sealing (IES)" protocol[1], which is similar to the IDS protocol (Fig. 8). This universal adhesive should be dried with strong air pressure. It is ideal for deep endodontic cavities since pooling of the adhesive on the cavity floor is prevented.

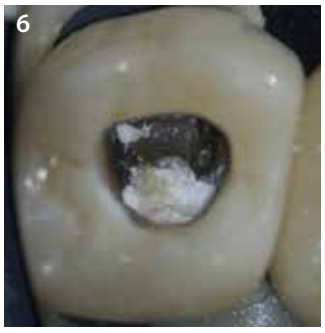

Fig. 6: The hydraulic silica cement after complete setting

Fig. 7: Excess cement was removed as much as possible

Fig. 8: Dentine and cement sealed with G-Premio BOND

The root canal filling (Fig. 9 and Fig. 10) was melted away as deeply as possible in order to gain as much adhesive retention surface as possible in the following post-endodontic closure, followed by sandblasting with Al_2O_3 (Fig. 11). Next, everX Flow (Bulk shade) was used and closes a gap in my treatment protocol. The product flows very well bubble-free into the deep canal spaces and allows small root canals to be filled with a glass fibre reinforced material (FRC). In this case, it was used in the snow plow technique with the more viscous everX Posterior.

Fig. 9: Mastercones placed in the canal

Fig. 10: X-ray with Mastercones to confirm the determined working length

Fig. 11: Sandblasting before closure with everX Flow

Fig. 12: everX Posterior

Fig. 13: everX Flow, Dentin shade

Fig. 14: Essentia Masking Liner

everX Flow (Bulk shade) and everX Posterior allow the area of the perforation to be fully embraced and additionally stabilised in a way that would not be possible with a glass fibre post. Due to their bulk fill properties and the many small glass fibres, the polymerisation light is directed deep into the cavity.

To ensure an invisible closure of the crown, a layer of everX Flow in Dentin shade was placed on top of the layer of everX Posterior (Fig. 12 and 13). Using Essentia Masking Liner (Fig. 14) gives additional security to achieve an optimal value.

Fig. 15: Restoration with Essentia Universal

Fig. 16: Shaping and modeling with GC Gradia Brush

Fig. 17: Occlusion control

The crown was further restored with Essentia Universal (Fig. 15).
I used GC Gradia Brushes in combination with GC Modeling Liquid to shape the anatomical morphology (Fig. 16 and Fig. 17).

The different layers are clearly recognisable in the post-op radiograph (Fig. 18).

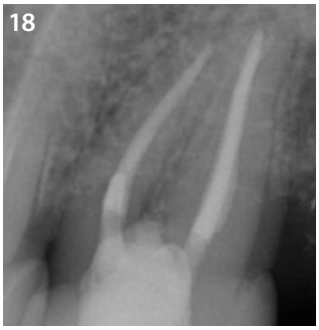

Fig. 18: Final X-ray inspection

Discussion

An FRC composite is more resistant to fracture than a conventional composite, due to simultaneous actions of several toughening mechanisms, such as crack deflection[2]. It stabilises the perforated tooth in a way that would not be possible with a fibre glass post. The entire pulp cavity is reinforced with this crack-inhibiting material. The physical properties of everX Flow are advantageous in a post-endodontic adhesive perforation closure.

References

1. De Rose L, Krejci I, Bortolotto T. Immediate endodontic access cavity sealing: fundamentals of a new restorative technique. Odontology. 2015;103:280-5.
2. Bijelic-Donova J, Garoushi S, Lassila LV, Keulemans F, Vallittu PK. Mechanical and structural characterization of discontinuous fiber-reinforced dental resin composite. J Dent. 2016;52:70-8.