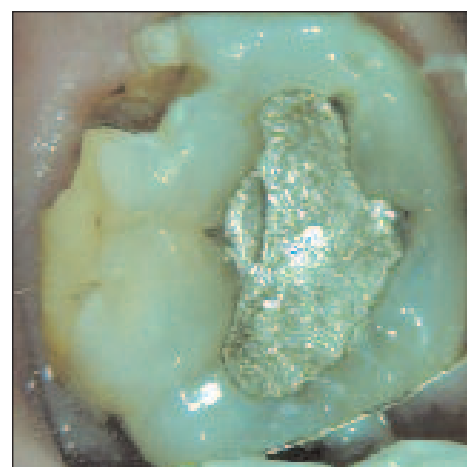


Restoring the cracked tooth

In this article, Dr Raphael Bellamy focuses on the subject of the restoration of the cracked and/or grossly carious tooth



Before treatment



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Following on from the last article I wrote, it seems appropriate that this time I focus on the subject of the restoration of the cracked and/or grossly carious tooth. However, we should not forget that making a diagnosis is treatment, in that it is an action necessary for the management of a specific dental problem. Where appropriate the tooth needs to be brought back to good health and function.

It is all very well me telling you how to diagnose the problem. Now you need to fix the tooth. To this end I am pleased share an example of a typical case with you. This is no different to anything that presents to your office each and every day. What is perhaps different is the attitude toward it and the subsequent treatment of it. This example shows what can be achieved with good co-operation between the dentist and specialist within dentistry and is shown with the kind permission of Dr Paul Murtagh, Bray, Co. Wicklow.

I stated in my previous article that there is solid evidence to suggest that

perfectly salvageable, restorable teeth are being needlessly removed and replaced with implants. I will not move from that position. It is obvious why this happens. If it was clear in the operator's mind as to what could be achieved with a little time, effort and appropriate remuneration, perhaps it would be possible to make a real difference in the provision of care to our patients (i.e. preservation of the natural dentition).

Schilder stated that any tooth can be saved endodontically if it is periodontally sound, or can be made so, and if foramina can be sealed with or without a surgical approach. That has not changed. Unfortunately, other aspects have.

A 30-year-old male was referred to my office for an endodontic assessment on LR6 and an opinion as to whether the grossly carious tooth was restorable.

It is true to say that the question of restorability is not really the remit of an endodontist but with almost 20 years as a dentist before concentrating on endodontics I am happy to make such a judgement, and

do so increasingly on behalf of the dentist.

The tooth was asymptomatic and had become a concern because of a recent fracture of the buccal enamel. OH was fair; MH was unremarkable; Class I occlusion; no paranormal habits.

Oral examination showed gross caries extending 3mm subgingivally on the buccal margin. On the occlusal surface there was an amalgam with cracks in the surrounding enamel extending to the MMR and DMR. Periodontal probings were within normal limits.

Decisions

After collection of all the data, including clinical findings, radiographs and intraoral clinical pictures, I had formulated a broad opinion on what ought to be done. Considerations were:

- The work that needed to be done
- The time to be taken
- The number of visits
- Proposed/prospective outcome
- Prognosis/risks
- Other options and their prognosis

- The cost of all of these.

A conversation with the patient quickly established the direction to follow and then the patient made his decision based on this information and my recommendation.

As an aside, the cost of the treatment may not be what you or the patient want it to be. However, if all the above are considered, then it is what is necessary for you to be able to carry out the procedure correctly and ensure the best outcome. Fortunately in this case the patient elected to keep the tooth.

Anaesthesia

Anaesthesia needs to be profound in order to concentrate on your job.

If the procedure is to be prolonged then consider long-acting anaesthesia rather than having to 'top up'. Consider block rather than infiltration anaesthesia. Continued anaesthesia after the procedure may be welcomed during the patient's postoperative recovery.

In this case two cartridges (2 x 1.8ml) of 2% lignocaine with 1:80,000 adrenaline were administered as an inferior dental nerve block, long buccal and localised gingival infiltration buccally and lingually. The localised infiltration is to aid the haemostasis during the gingivectomy procedure.

Restorability

Extensive caries removal is necessary in order to establish restorability. As caries extended subgingivally, the gingivectomy was carried out first.

A Blake's gingivectomy knife was utilised as I find this a useful and easily adaptable instrument to deal with both the lingual and buccal aspects of the tooth, while retaining the need for a 45 degree bevelled incision. It also uses the easily attainable and cheap



Blake's Gingivectomy knife

Bard Parker No. 15 blade.

Additional haemostasis is attained with the use of an electrosurge or any other cautery device. This allows continuation with the removal of decay to establish the margins for temporary restoration and isolation, a prerequisite for the endodontic procedure.

Isolation

Fluid control is critical at this stage to ensure sound bonding. The use of Dry Guards or Dry Tips to close down the parotid secretions is essential, and combined with cotton rolls produces the desired field. After appropriate preparation, fibre-reinforced composite was used to restore the buccal defect, then trimmed with composite finishing burs. The appropriate orthodontic band was selected for the tooth. Minimal removal of interdental enamel with the finest finishing bur and a snug fit on the lingual to support this precious tooth structure allowed the band to seat well down onto the tooth. If this is not possible then a hand-crafted copper band can be adapted to fit with the use of wedges, especially in case of deep interproximal decay. The tooth was conditioned, washed and the band cemented with fibre-reinforced composite. This dual-cure fast-setting material allowed immediate clamping (Hu Friedy12a) and rubber dam (medium) isolation of the tooth with adjunct use of Oraseal or



Essential isolation from Ultradent

Opel Dam to prevent seepage of saliva.

Access

After initial disinfection of the isolated tooth site with NaOCl (5.25%), all of the occlusal amalgam filling was removed and the pulp chamber unroofed. A large sterile excavator was used to remove the chamber contents and after irrigation four orifices were identified as individual bleeding points.

NaOCl (5.25%) combined with hydrogen peroxide (4.5%) was used for the cleaning and shaping procedure.

Initial opening of the orifices was made with Profile orifice shapers numbers 1, 2 and 3 (Profile O.S. Dentsply Item # OS0219). Copious irrigation was used while recapitulating several times. These instruments are used passively and no conscious effort is made to move the instruments apically. On the contrary they are used to brush the dentine hood overlaying the orifices buccally, thus straightening the access to the mid body of the canals. It quickly became clear that there was indeed only one distal canal of considerable bucco-lingual diameter.

After further irrigation the canals were filled with Fileze/Glyde (EDTA) and hand instruments used to gain working lengths. The first instrument utilised was a .08 SS precurved file. Instruments of 31mm were used to facilitate length



Dry Tips

measurement as they appeared to be in the region of 24mm. A suitable glide path of .20mm was created in all the canals before resorting to the Protaper rotary files.

Protaper instruments were chosen due to the apparent uncomplicated anatomy in all the canals. As these instruments are so aggressive in their dentine removal, I always prepare each canal individually as they demand the utmost attention. Despite such attention two recapitulations of the shapers S1 and S2 were enough to leave the apical 3mm of the S1 file in the ML canal. This was removed later by by-passing with hand files and the combined use of irrigation and ultrasonics. Lengths were retaken and the S1 and S2 taken to within 1/2mm of the working length.

After copious irrigation, the finishing instruments F1, F2 and F3 were used, just following the line of the canals. Once again, no conscious effort was made to move these instruments apically.

After final irrigation, Fileze was placed in the canals and the F1 negotiated to length by hand, with the apex locator ('0' on the dial) placed on the file in the ML canal. This was repeated in the MB canal. The canals were rechecked for patency. The same procedure was adopted for the distal canal with F2 being snug at the constriction. Canal length was recorded for the last time.

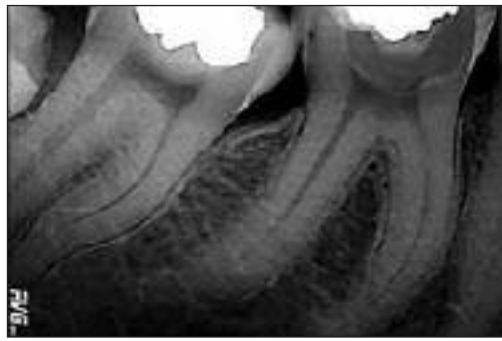
CLINICAL

Cone fit was uneventful and a radiograph showed placement of all three cones to within .5mm of the radiographic terminus. These were retained for the next appointment. The root canals were dressed with calcium hydroxide and the cavity sealed with 5mm of Cavit G.

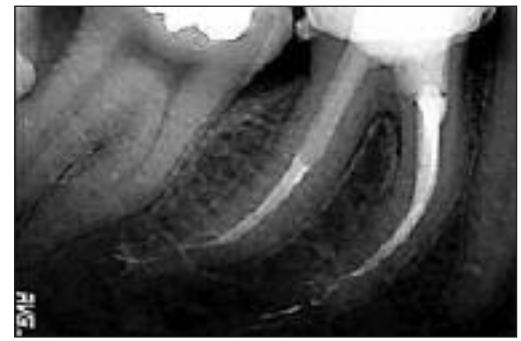
At the second appointment, one week later, the patient acknowledged some soreness for a day from the gum in the buccal area and that the tooth felt stronger. Stabilisation with the band would probably give this impression. After tooth isolation, the temporary filling and calcium hydroxide were removed and the gutta percha cones rechecked to length. The canals were then treated with 17% EDTA, 2% chlorhexidine and isopropyl alcohol. After complete drying with paper points, the canals were sealed with the gutta percha cones and Kerr EWT cement. Obturation was carried out utilising the warm vertical compaction of System B (Sybron Dental) and the mesial canals backpacked with the aid of the Obtura.

Successful obturation with System B demonstrated the filling of accessory lateral anatomy. This is always an indication of a good irrigation technique and the generation of good hydraulics from the correct shaping and good cone fit.

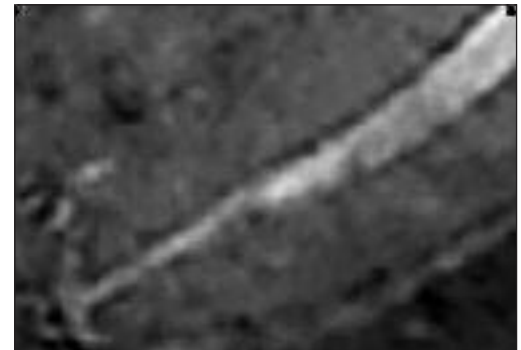
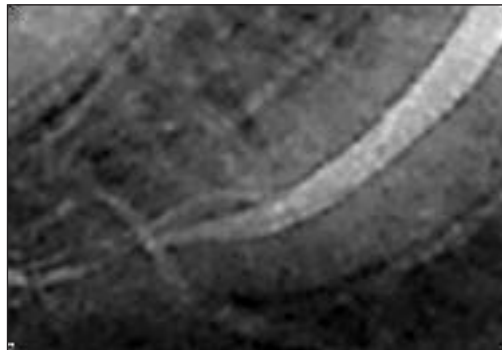
Post seated well to the deepest point of preparation



Preoperative radiograph



Final radiograph



Good cone fit and hydraulics ensure the filling of anatomy

Post preparation and core provision

The distal root canal was prepared to accept an anatomically-formed glass fibre post (Light Post, RTD France) to the 14mm depth, taking care to ensure that the post seated well to the deepest point of preparation and that no large step existed in the diameter of the distal canal.

All remnants of gutta percha were removed from the distal root walls and the walls of the chamber with solvent. The chamber and post space were then scrubbed with a miniature bottle brush (Vista Dental

Miniature bottle brush



USA) and 35% orthophosphoric acid, washed and the corresponding bond (Sealbond, Karma Dental Ltd) applied to the post, post space and chamber, following the manufacturer's instructions.

All surfaces were exposed to 10 seconds of the curing light before addition of the cement/core material. The accurate delivery of the dual-cure fibre-reinforced composite resin core material (Build It, Pentron USA) is critical and is facilitated by the angle adaptable narrow tip placed on the end of the mixing gun. This allows delivery deep into the post space and chamber floor, and avoids the generation of unsightly radiographic voids.

In order to avoid the problems associated with the contraction of these dual cure materials, only the occlusal surface, including over the post area, is cured with a 10 second burst before removal of the rubber dam for occlusal adjustment.

Occlusal adjustment

Considerable attention is always paid to this procedure before the final radiograph and discharge of the patient.

We must acknowledge that the previously functioning surfaces of the tooth had failed and fractured. These have now been replaced and the tooth brought back into function, albeit incomplete at this stage. It is important to allow the tooth to do some work during this period with a temporary crown. How else will we know how the tooth will function when fully restored? Have we fulfilled the requirements to ensure longevity? Perhaps the finished anatomy should be modified to accommodate any deficiencies that may exist.

Finishing

The setting core was trimmed with coarse then fine composite finishing burs. Close attention to centric position, as well as lateral and retrusive excursion, was paid.

The tooth was then polished with coarse then fine



Before

discs (SupaSnaps, Shofu Japan) coated with petroleum jelly.

Finally, the core material was exposed to further curing to ensure a complete set.

A final radiograph showed complete obturation and successful coronal restoration in readiness for full cuspal protection.

The recommendation of a



Ortho band and RCT complete


full gold crown was made to the patient in order to minimise the reduction of the precious lingual tooth structure that existed preoperatively.

In conclusion, it is extraordinary what can be achieved if the operator has the knowledge, skill and desire to achieve a certain goal.



Full gold crown fitted

When combining the efforts of all the dental disciplines I firmly believe that a large majority of grossly decayed teeth are restorable.

If the case that I present to you has any merit whatsoever, let it be that you will think twice before subjecting any tooth to sunshine and cold steel. 

All radiographic images are digital and captured with a Trophy RVG system, Trophy Radiologie SA, France

All colour images are digital and captured with a Nikon 950 camera