

The 'ink' tooth: an MTA case

JASNEET GULATI was a runner up in the Young Dentist Endodontic Award 2016, organised by the Harley Street Centre for Endodontics, with the following presentation...

AN 18-year-old male patient attended with his mother for a consultation complaining of discolouration from his front tooth, which people had described as looking like 'ink in his tooth'. The front tooth was also occasionally tender to bite on, with pain lasting a few seconds. He also described spontaneous episodes of a dull aching pain from the gum above his tooth.



The patient sustained trauma to UL1 while playing sports when 8 years old, resulting in a mesio-incisal fracture. Since then, he has had two courses of non-surgical root canal treatment for UL1 and one course of internal bleaching with his general dental practitioner (GDP). However, his UL1 was still discoloured. The patient has been bullied about the 'ink stained' colour of UL1.

Having turned 18, the patient was referred to the Restorative Dentistry department for treatment of his discoloured central incisor.

Clinical Examination:

Extra Oral - TMJ nad, Muscles of mastication: nad, Lymph nodes nad
High smile line in 'E' smile, for which he compensates by relaxing his upper lip
Intra Oral - Soft tissues (Tongue, FOM, BM, Palate, RM) nad
No sinus tracts or swellings present
Good oral hygiene with minimal, localised calculus deposits
Minimally restored dentition
BPE:

1	0	1
2	2	1

Occlusion – Class I incisor relationship, midline diastema present. UL1 has a distal crown angulation with slightly immature dento-alveolar development. The gingival zeniths of the central incisors are not even, with UL1 being 0.5mm higher. Lack of symmetry of central incisors in terms of form, colour and texture.

Restorative findings – Minimally restored dentition. Caries-free young adult.

UL1 specific findings – Discoloured UL1 with translucent composite veneer and underlying mesio-incisal pin-retained composite restoration. Negative ledge present labially.

Mesially-positioned composite palatal access cavity restoration with no evidence of breakdown.

No pocketing present around UL1
UL1 TTP +, UR1 and UL2 not TTP
No mobility present
No tenderness on labial and palatal palpation

Radiographic Examination

Type: Long cone peri-apical radiograph
Tooth: UL1

Justification: Up-to-date baseline pre-operative radiograph to assess quality of previous root filling, presence of apical pathology, working length and apical anatomy.

Radiographic report: UL1 gutta-percha obturation appears slightly over-extended (although less so than in the previous radiograph). There are vertical voids within the obturation in the coronal and middle thirds of the canal. There is continuation of the periodontal ligament (PDL) space distally to the apex. Mesially, there is loss of definition of the PDL space. It is difficult to visualise the apical anatomy and see the true extent of the apical lesion when limited to two-dimensional intra-oral radiographs.

Diagnosis:

Discoloured UL1 with a failing composite veneer

Pulpal Diagnosis: Previously Treated
Peri-radicular Diagnosis: Symptomatic Apical Periodontitis, (?)Incomplete apical formation

The patient opted for the following
Non-surgical root canal re-treatment, followed by internal/external bleaching and definitive restoration as per aesthetic requirements

Clinical procedures:

An operating microscope was used during all phases of endodontic treatment.

Visit 1 – Root canal retreatment – The UL1 was isolated using rubber dam. The existing access cavity restoration was removed and then the access refined to provide better straight-line access as well as to remove the roof associated with pulp horns. The internal coronal anatomy was deeply discoloured, as expected. Sizes 3 and 4 Gates Glidden burs and sizes ISO 35+ Hedstrom files were used to remove the Gutta Percha. I chose this size as smaller diameter files have a potentially higher risk of separation during GP removal. There was evidence of a creamy exudate and a moist intra-canal environment. The Gutta Percha was completely removed and the canal was irrigated copiously with 5.25 per cent sodium hypochlorite. I used a side-venting endodontic syringe, 2mm short of the working length, with gentle pressure and continuous agitation. A size 60 ISO K file was gently used to provide mechanical debridement of the dentine walls. Due to the presence of a weeping canal in the apical third region, a reliable apex locator reading was not possible. The canal was dressed with non-setting calcium hydroxide (Ultracal, Ultradent) using a spiral filler.

Visit 2 – Root canal retreatment continued – The UL1 was re-accessed and irrigated with 5.25% sodium hypochlorite. A micro-suction unit was used in the canal to ensure a dry field. An apex locator reading of 24.0 mm was obtained. A paper point blotting technique was also used to confirm the

working length, as well as obtaining more 3-dimensional information about the apical anatomy. A working-length peri-apical radiograph was taken with the master apical file size 80 at the working-length. The canal was again dried using sterile paper points and dressed with non-setting calcium hydroxide.

Visit 3 – Review and Restorative phase preparations – JB had described that he was no longer getting any symptoms. This was a shorter appointment arranged around his schedule as part of the restorative phase of treatment. His existing composite veneer on UL1 was removed under microscope using orthodontic composite removal burs, trying to stay as conservative as possible. The true underlying discolouration was assessed. Upper and lower alginate impressions for study models, wax up and whitening trays were taken. A temporary spot-etch composite veneer was made.

Visit 4 – Obturation appointment – Due to there being a large apical diameter, I decided to use MTA (Pro Root MTA, Dentsply) as the apical obturation material to achieve an apical seal.

Prior to obturation, I irrigated the canal with 17 per cent EDTA solution for two minutes, followed by a final flush of 5.25 per cent sodium hypochlorite with ultrasonic activation. I used a size 20 Irrisafe tip (Satalec) to provide 'passive ultrasonic irrigation' with sodium hypochlorite.

The canal was dried using sterile paper points to full working length.

The endodontic plugger (Maillefer, Dentsply) was set 4mm short of the working length and MTA was packed apically. A mid-fill peri-apical radiograph was taken to check the MTA plug, which was found to have an adequate apical contour, but was slightly deficient mesially. Once recognised, more MTA was placed in the apical region. AH Plus (Dentsply) sealer was used and thermoplasticised Gutta Percha was used to backfill the canal (Obtura). The level of the GP was set to 1mm below crestal level. A sterile sponge was placed over the GP to keep the space open for eventual internal bleaching, and the coronal seal was provided by Fuji IX (GC). A post-operative peri-apical radiograph was taken.

Visit 5 – Walking bleach technique initiation – The composite veneer was atraumatically removed using a flat plastic instrument. The UL1 was isolated with rubber dam and access was again gained. I decided to remove 3mm more GP due to the cervical location of the discolouration, and also to allow 2mm space for a RMGIC (Fuji II LC, GC) seal which was placed over the GP. The patient was instructed (via chairside demonstration supported with written instructions) to use 6% Hydrogen Peroxide placed inside the access cavity at regular intervals. A blunt irrigation needle was provided to allow JB to wash out the cavity and also to dry the access. An interdental brush (Tepe) of an appropriate size was provided to allow thorough cleaning of the access.

Visit 6 – Walking bleach technique review – After 1 week, the progress of the internal/external bleaching was

reviewed. The coronal 2/3 had whitened well, but the cervical 1/3 was still deeply discoloured.

After ensuring that JB was compliant, I used a gooseneck bur under microscope and rubber dam isolation to further remove 2mm more of GP, and carefully replaced a RMGIC seal. Another cycle of internal/external bleaching was initiated.

Visit 7 – Bleaching review. After 1 week, there was a significant improvement noted, with now just an orange hue in the cervical third. JB described that the shade had not improved for the last few days. This result was accepted. The patient was booked in for final restorative treatment to allow the whitening result to settle. The access cavity was packed with disinfected PTFE tape to act as a spacer for potential future internal bleaching. The coronal seal was provided by an opaque shade of composite resin to assist the future practitioner to prevent iatrogenic removal of tooth tissue, should further intervention become necessary.

Visit 8 – Restorative phase – Layered Esthet-X (Dentsply) composite resin restorations were placed for UR1 and UL1 to reduce the diastema (as per patient request) and to mask the underlying orange hue at the cervical third of UL1 using an opaque shade.

The entire treatment took many visits due to the nature of appointments in a secondary care teaching hospital, including significant periods of time taken to send the patient to the dental radiographers. On reflection upon the final result, I felt that the cervical third of UL1 was too opaque as I used too much opaque shade resin to mask the underlying discolouration, but the patient was happy to accept this. Overall, it was a huge improvement from the pre-operative situation achieved in a minimally invasive way. The patient was thrilled with the result.

This was my first case of an open apex obturated with an MTA apical plug, at a time where I had 6 months experience of using an operative microscope and was relatively new to thermal obturation techniques.

To read Jasneet's article in full, with figs. and references, see www.dentalpublic.co.uk

About the author

Jasneet Singh Gulati qualified from Sheffield Dental School in 2013 with honours and distinction. As a student he was awarded the Tom Pitt-Ford Prize in Endodontics by the BES. After completing DCT1 and DCT2 posts in Oral Surgery and Restorative Dentistry, he moved to Singapore where he is currently working in private practice.

