Iatrogenic errors; perforation repair

Pulp floor perforation can occur if the operator becomes disorientated when trying to locate canal orifices and strip perforation on the inner curve of the root canal is commonly the result of over-instrumentation.

The importance of using illumination and magnification during endodontic procedures cannot be over-emphasised. Management of iatrogenic perforation is dependent on several factors, but often non-surgical microscopic techniques can predictably prevent the loss of a natural tooth. Referral to an endodontist may be necessary. A 38-year-old woman was referred for assessment of her mandibular right quadrant, which had been persistently uncomfortable following root canal treatment of 46 and 47. On presentation she reported several bouts of earache, pain and swelling in the area.

Intra- orally, there was slight buccal swelling and a sinus tract adjacent to tooth 47. Periodontal probing revealed a deep, narrow pocket adjacent to the mesial root of 47 and microscopic assessment showed a crack descending subgingivally. Probing depths were normal around tooth 46.

Radiographic assessment showed that three canals had been located and obturated in tooth 47 (Figure 1). There was a fractured instrument lodged in the apical third of one of the mesial canals and a periapical radiolucency that wrapped around this root. Combined with clinical findings, this was pathognomonic of a vertical root fracture.

The operator appeared to have had difficulty locating the mesial canals in tooth 46; one canal was completely unprepared while the other had been perforated and a gutta percha point extruded into the furcation region. There was no significant radiolucency around the roots of 46.

A diagnosis of failed root canal treatment in both 46 and 47 was made. The mesial root of 47 was vertically fractured and there was concomitant periapical peridontitis. The mesial root of 46 had been perforated during root canal treatment.

There are four factors to be considered when dealing with perforations:

- **Level**
  - There is a high risk of microleakage when perforation occurs at crestal bone level as there is direct communication with the oral cavity via the periodontal tissues; repair may have a guarded prognosis. If bone is present on the external aspect of the perforation, repair is normally feasible.

- **Location**
  - Perforations that have damaged the root canal orifice can be more difficult to seal.

- **Size**
  - The larger the perforation, the greater the surface area that will need to be sealed.

- **Time**
  - It is preferable to seal a perforation as soon as possible to prevent microleakage and bacterial contamination. Sensible treatment options in this case therefore include:
    - **Tooth 47**
      - Extraction and do nothing, or replace with an implant-supported crown.
    - **Tooth 46**
      - Non-surgical re-treatment and perforation repair followed by restoration with cusp-coverage or extraction and replacement with an implant.

Extraction and replacement of the molar teeth with implants should be feasible. However, tooth 46 was restorable and a good root filling and restoration could be expected to function well. Maintaining the first molar and accepting a shortened dental arch would reduce the necessity to replace the second molar.

In this case the perforation is below crestal bone level and does not communicate with the oral cavity. Repair should therefore have a good prognosis. The technical challenge is in removing the extruded gutta percha and negotiating the un-instrumented canals.

Tooth 46
- • Surgical re-treatment
- • Non-surgical re-treatment
- • Extraction and replacement with an implant

Tooth 47
- • Non-surgical re-treatment
- • Extraction and replacement with an implant

Non-surgical re-treatment

After discussing all the available options and risk factors, the patient elected to have 47 extracted and 46 re-treated non-surgically. Non-surgical re-treatment of 46 was to be carried out over two visits.

With rubber dam application, straight-line access was made through the composite filling to expose the gutta percha in the root canal orifices (Figure 2).

The bulk of gutta percha was easily removed using Gates Glidden burs sizes 2 and 3. Magnified and well illuminated with an operating microscope, the perforation site could be located. The gutta percha point was carefully engaged with a Hedstroem file and drawn back through the perforation.

It was not possible to achieve a consistent apex locator reading in the mesiobuccal canal due to the perforation and so a diagnostic length estimation radiograph was exposed.

Preparation was completed with WaveOne instruments, always working through a puddle of sodium hypochlorite in the access. The perforation site would also be disinfected, but the operator must be very vigilant to avoid injecting irrigant through it.

Passive ultrasonic irrigation was used with 3% sodium hypochlorite and EDTA for smear removal. Following this the canals were dressed with calcium hydroxide paste.

One week later the patient was symptom-free and the sinus tracts had healed.

At the second visit, the root canals were obturated using vertically compacted gutta percha. In the mesiobuccal root the filling material was condensed below the level of the perforation (Figure 3).

The perforation was then occluded and continued overleaf.
The retention of complete denture baseplates

SIR – I refer to Tony Preston’s article in the July/August edition and his comments about the correct placement of the post dam for upper complete dentures at the vibrating line, and coverage of the tuberosities. I entirely agree.

However, from my experience, the principal reason the posterior border is short of the vibrating line is that there is a very strong tendency among both dentists and their technicians to copy the existing border extensions without considering what might give a better patient outcome.

When preparing special trays from the primary impression, it is usually possible to identify the two foveae palatini, and these depressions mark the correct posterior border. Final adjustments for position should be made after an intra-oral check on the extension with the special tray seated and asking the patient to say “ah”.

Under-extensions can be corrected using moulding compounds or over-extensions by reducing the excess with an acrylic bur. I have also found that a better result ensues if moulding compound is applied to the fit surface of the special tray in the region on the post dam, then seated in the mouth and left to cool.

This corrects for the more displaceable tissues forming the side walls of the palate, and ultimately improves the posterior seal. A mucocompressive (i.e. not alginate) impression material for second impressions is mandatory.

The second factor, which was not discussed, is the shape of the post dam. The vast majority of post dams consist of a single groove cut into the model before final processing of the denture in acrylic resin.

Is this shape correct? I strongly believe this is not correct because it does not take into consideration the anatomy of the tissues in the area of the post dam.

In the mid line there is the well marked raphé from the mid palatal bony suture line, and a similar mucoperiosteum tightly bound down to the underlying bone in the region of the hamular notches and the tuberosities. The walls between these two structures contain the greater palatine neurovascular bundle, mucous glands and displaceable connective tissues.

It follows that, while the post dam of necessity from the underlying anatomy has to be linear at the mid line and tuberosities, this is not the case for the side walls where it can be both deeper and wider to take account of tissue displacability there.

I advocate that the ideal shape of the post dam is that of a “Cupid’s bow” with the arches of the bow pointing anteriorly.

This better shape of post dam is made by marking out the Cupid’s bow shape on the working model; then, using the discoid end of a lea Cron carver, the area is scraped out.

The area is marked out in pencil and scraped again. This is usually enough to form a sufficiently deep post dam at the mid line raphé and the tuberosities, but not the side walls. These are pencilled in and scraped a further twice.

Even then, when the denture is fitted, the post dam may be insufficient. This can be added to at the chairside by the addition of a tissue-friendly self-polymerising acrylic resin, for example Kerr’s Kooliner.

The problem of an insufficient post dam is even worse when a cobalt chromium-based upper complete denture is prescribed.

The linear post dam is usually incorrectly placed, and if this has to be removed, in whole or in part, for any reason, then denture base retention is seriously compromised. The solution is to add tagging to the posterior border, onto which adjustable acrylic resin can be processed (Tomlinson and Turner, 1984).

Further problems occur when an upper complete denture is opposed by natural mandibular teeth. That is another story and one solution has already been published in Dental Practice (Turner, 1985).

Christopher Turner MSc, BDS, MDS, FDSRCS

A drug problem solved

SIR – The cartoon in the September issue is nearer the truth than you may imagine. When in practice, a patient asked me if I would see his wife, who was terrified of dentists.

Our first meeting was in reception, and gradually moved to the surgery where I did an examination, and some work was needed. Her first experience of dentistry was a careful scale and polish, and then came the break-through.

I managed a very small occlusal filling, but knew other cavities required a local anaesthetic. We discussed this, and seeing the doubt in her face, had a “brilliant” idea: “What if I give myself a local to show it is not painful?” I still remember the expressions on the faces of her and her husband as I carefully infiltrated round an upper canine: job done. She settled down and there were no problems as I gave the injection.

My problems came afterwards with slurred speech during the day until the effects wore off. I wonder how many of my patients wondered if I had a drink problem?

Brian Lux

Rhodes’ Referrals

with a small piece of collagen matrix and Biodentine packed into the coronal portion of the canal (Figure 4). A small squirt of thermoplasticised gutta percha was then plugged over the orifice so that a composite core could be built up immediately (Figure 5).

A final radiograph showed the completed re-treatment (Figure 6).

References


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Figure 6. Post-operative radiograph

The drugs kit debate continues

SIR – I received a copy of your journal at the BDTA Dental Showcase and read the article about whether DCs require a drugs kit – “Are drug kits a requirement for remote DCs?”, October 2013.

Another hygienist and I are trying to set up a mobile hygienist service treating people at home who have problems accessing care at a traditional practice.

We contacted the Resuscitation Council about what we should carry and they have e-mailed back stating that they do not expect us to carry a defibrillator or a drugs kit and that all we need is the ability to call an ambulance and perform basic first aid.

We would be interested to know if you have made any progress about this with the General Dental Council.

Karen Sigsworth

We are still waiting for a ruling on this from the GDC. Due to its complexity, the question has gone to the GDC’s legal department for clarification. We will publish the answer as soon as we receive it. Ed