The excellence in endodontics: Endodontic microsurgery

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Gone are the days of the clumsy apicectomy and amalgam retrograde fillings. Endodontic surgery has evolved to become a technically accurate, highly predictable procedure with remarkable success rates.

Implant technology has meant many teeth of questionable prognosis are extracted in the name of future predictability. While implants have been a wonderful adjunct in the dental armature, our primary role as dentists is to try and conserve the existing dentition that have good long term prognosis.

Classically an apicectomy was a treatment of last resort, using large bulky instruments, rough approximations and excess amounts of amalgam. The biological ramifications of additional canals, cracks, apical deltas and poor initial root canal treatments may have been overlooked resulting in poor success rates. This has understandably resulted in a negative perception of apical surgery amongst the dental profession who erroneously believe success rates to be around 60 per cent when the actual figure for endodontic microsurgery is over 91 per cent after five to seven years.

Modern techniques and equipment have transformed the procedure. Using CBCT scans from the outset we can plan surgery exactly; three dimensional picture of bone loss is clear as is the position of anatomically sensitive structures; lengths can be accurately measured and existing treatment such as posts and MB2s assessed.

The following case is an example of the techniques which we now use. The patient presented following multiple episodes of pain and swelling from the UL5. There was an initial root canal treatment and subsequent retreatment provided by a competent GDP using rubber dam and sodium hypochlorite irrigation. There was a well fitting new crown placed and no associated periodontal pocketing greater than 3mm.

Radiographic examination (Fig.1) revealed a large radiolucency associated with the UL5. There was an overextended root canal filling. On CBCT (Fig.2) a clearer picture of the size of the apical radiolucency emerged and its relationship to adjacent anatomical structures was visualised. There was one canal present with an overfill of gutta percha and sealer. The CBCT scan provided very useful information at this point. Although the treated canal appeared centered in the root there was a question whether there was a second canal present in the tooth. Also there appeared to be an apical bulbosity present which could mean multiple paths of exit present.

A provisional diagnosis of acute exacerbation of chronic apical periodontitis was made and treatment options discussed with the patient (who had just paid for and was satisfied with a...
new crown): 1. Root canal retreatment through the crown.
2. Endodontic microsurgery.
3. Extraction +/- prosthetic replacement.

A mucoperiosteal flap was raised with micro-blades that produce neat, precise incisions as they cut in multiple directions. Once the flap was raised, the perforation in the buccal plate was identified and root tip located. The granulation tissue was curettaged and haemostasis achieved. Following resection of 3mm of the root tip perpendicular to the long axis of the tooth a retro-preparation was completed with ultrasonics, then sealed with MTA. The tissues were compressed and the flap closed with 5/0 monofilament sutures that were removed painlessly after 72 hours as reattachment had taken place.

At the four-month review the buccal swelling had completely resolved and radiographically there was significant healing present.

The patient was delighted with the outcome of treatment.

There are significant differences between the above microsurgical techniques and traditional surgery approaches.

1. Osteotomy size

The use of smaller instruments, magnification and illumination allows access to the root tip, often without removing any additional buccal bone should the plate be already perforated. Staining the PDL makes it easier to differentiate between bone and root tip. The smaller the size of the osteotomy, the quicker the healing.

2. Bevel angle

Traditionally the root was resected at 45 degrees for access, visualisation and sealing purposes. But, this method results in the exposure of a greater amount of dentinal tubules and may not remove enough of the apical anatomy lingually. Modern techniques using a cut perpendicular to the long axis of the tooth result in exposure of far fewer tubules, enables a smaller osteotomy, retention of more buccal bone and no periodontal communication. There is less chance of a lingual perforation in the retro-preparation and it is easier to identify the apices of the roots.

3. Root end resection

It is recommended to remove 3mm of the root tip. At this level 98 per cent of apical ramification and 93 per cent of lateral canals are removed. Following resection it is critical that the root end is inspected under high power visualisation, stained and viewed with micro-mirrors. Identification of isthmuses, cracks and lateral canals
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may be treated at this stage.

4 Retro-preparation

Micro-hand pieces and burs are no longer the ideal treatment for retro-preparation. Instead, diamond coated ultra-sonic tips are excellent for allowing the operator to clean along the original canal, the isthmus and minimise microcrack formation.

The use of MTA as a root end filling material is another improvement. Superior to amalgam in terms of sealability and biocompatibility, it is more difficult to place and doesn’t give as aesthetically pleasing results when viewed on a radiograph post-operatively. Critically MTA results in regeneration of periodontal ligament and cementum cells and appears to have inductive effects on bone and tissue cells. Super-EBA has also shown favourable results using microsurgical techniques.

Endodontic microsurgery is a great option to keep in mind when planning treatment and has an added bonus for patients being the least expensive intervention when compared to endodontic re-treatment and crown, extraction and fixed partial denture, or extraction. 

Fig. 7 Examining a resected root tip with a micro-mirror
Fig. 8 Post-operative radiograph
Fig. 9 Four-month review Almost complete healing and asymptomatic

Contact info

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