Surgical Endodontics

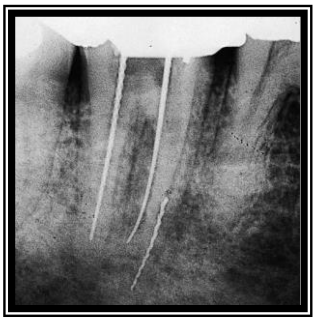
Whilst a high degree of success is achievable with root canal treatment, surgery may be necessary to remove aetiological factors that may impair tooth retention. These include the inability to **clean**, **shape** and **obturate** the root canal system satisfactorily, the **removal of aberrant root anatomy**, the elimination or repair of **clinician errors**, the joint management of **periodontal or restorative problems**, and the potential need for a **biopsy** should periradicular disease fail to heal following good-quality non-surgical treatment.

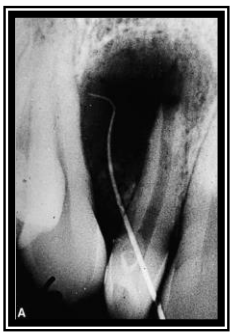
Indications for periradicular surgery:

Most texts on endodontic surgery list multiple, 'cook-book'-type indications for surgical intervention. These often include:-

1- Instrument separation.
2- Apical fracture.
3- Inadequate root canal filling.
4- Presence of a cyst.

Clinical experience in the delivery of good-quality non-surgical root canal treatment and the ability to retreat root canal systems non-surgically have eliminated the routine need for surgery.





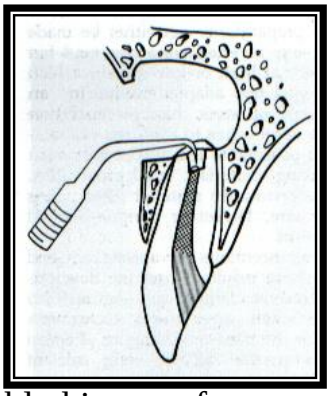
Preoperative assessment:

The following pretreatment regimens should be considered:

1- A periodontal examination should be performed prior to surgery and, if necessary, scaling and/or root planning performed. The patient's oral hygiene practices should be assessed and reinforced.
2- Patients can be placed on chlorhexidine rinses 1 day before surgery, to continue for 2-3 days afterwards.
3- Patients can begin taking a non-steroidal ani-inflammatory medication 1 day before surgery or at the latest one dose 1 h beforehand.
4- Patients should be advised to refrain from smoking.
5- If sedative premedication is to be used, the patient must bring an accompanying person, who will be responsible for escorting home and compliance with postoperative instructions.

Root-end filling materials:

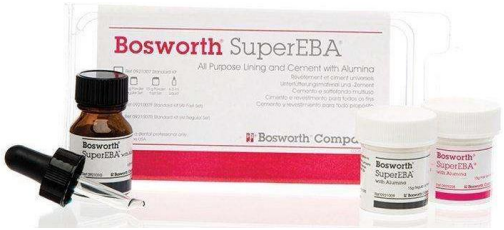
The purpose of the root-end filing is to seal the canal system apically. The materials are the same as those used in restorative dentistry and non-surgical endodontics. A complete list of these materials is available along with a detailed historical, biological and clinical perspective on each material.



When using modern materials as root-end fillings, adherence to manufacturer's recommendations in preparation, manipulation and placement is important. Although there is a reasonable history of success with amalgam root-end fillings, problems have always existed with its long term success, such as corrosion, persistence of apical inflammation and tissue argyria. Coupled with concerns over the mercury component, it is recommended that more bioinductive materials be used; therefore clinical studies support other materials.

Super EBA

This material is alumina-fortified zinc oxide-eugenol cement that has high compressive and tensile strengths, neutral pH and low solubility. It adheres to the walls of the root-end preparation even in the presence of moisture.



Glass ionomer cement

Glass ionomer cements bond physico-chemically to dentine and enamel. Their biocompatibility enhances with setting, and marginal adaptation and adhesion to dentine have been shown to be improved with the use of acid conditioners and protective varnishes. The sealing ability of glass ionomer cement has been demonstrated in studies of their use for root-end filling. Antibacterial activity is acceptable and sealing ability is better than those of amalgam, heat-sealed gutta-percha and zinc polycarboxylate cements. Bone healing in intimate contact with glass ionomer cements has been shown when used

Dentine-bonded composite resin

There has been limited use but promising results with dentine-bonded composite resin root-end fillings. Key to their success appears to

be a combination of minimal toxicity of the dentine-bonding agent, placement in a moisture-free environment and good adhesion to the underlying dentine with minimal polymerization contraction.

IRM (Intermediate restorative material)

This material is a polymer modified zinc oxide-eugenol which has been shown to seal better than amalgam, especially against microorganisms. Healing of the periradicular tissues in the presence of IRM root-end fillings has been quite favorable. Likewise, clinical studies have shown enhanced success with IRM root-end fillings (91%) compared with amalgam (75%) over long periods. When using this material as a root-end filling, the clinician is cautioned to use a high powder-to-liquid ratio, for ease of placement, decreased setting time, reduced toxicity and reduced solubility. Therefore, the use of IRM as a root-end filling material can be recommended when mixed in a higher powder-to-liquid ratio than that for temporary restorations; a drawback is a significant reduction in clinical working time.

Diaket

Primarily a root canal sealer, this polyvinyl resin has been used as a root-end filling material for a few years with a high level of empirical success. Diaket has excellent sealing ability with a highly favorable tissue response in bone and periradicular tissues.

MTA

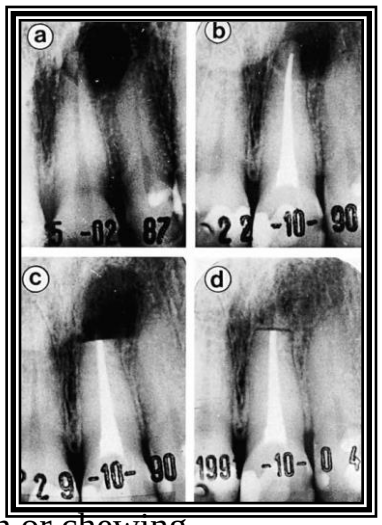
Mineral trioxide aggregate has been shown to have excellent sealing properties, not to be affected by saliva or blood contamination, and to allow for periradicular tissue repair when used as a root-end filling.

Success and failure-aetiology and evaluation

Whilst many studies have attempted to determine success-failure rates for periradicular surgery, none have been able to integrate fully all parameters of evaluation with techniques performed, materials used, patient compliance and clinician expertise, variability and interpretative skills. Attempts at multivariate analysis have provided some trends and correlations, but even these findings may only be applicable to specifically controlled cases.

Success (complete healing) with periradicular surgery has been reported to range from 25% to 90% using mixed populations, less than ideal percentages of review examinations and minimal evaluation periods.

Clinical evaluation of success and failure



Clinical success

No tenderness of percussion or palpation.
Normal mobility and function.
No sinusitis or paraesthesia.
No sinus tract of periodontal pocket.
No infection or swelling.
Adjacent teeth respond normally to stimuli.
Minimal to no scarring or discoloration.
No subjective discomfort.

Clinical uncertainty

Sporadic vague symptoms.
Pressure sensation or feeling of fullness.
Low-grade discomfort on percussion, palpation or chewing.
Discomfort with tongue pressure.
Superimposed sinusitis focused on treated tooth.
Occasional need to use analgesics.

Clinical failure

Persistent subjective symptoms.
Discomfort to percussion and/or palpation.
Recurrent sinus tract or swelling.
Evidence or irreparable tooth fracture.
Excessive mobility or progressive periodontal breakdown.
Inability to chew on the tooth.

The primary reason for failure following periradicular surgery is the presence of necrotic tissue debris in uncleaned and obturated canal space. The primary cause for failure with non-surgical root canal treatment has been identified as coronal leakage due to poor quality of the coronal restoration. Therefore, it is essential to access, clean and obdurate as much of the canal space as possible and to seal thoroughly the coronal aspects of the root canal system before resorting to surgical intervention. If this is not adhered to, failure will inevitably result.

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