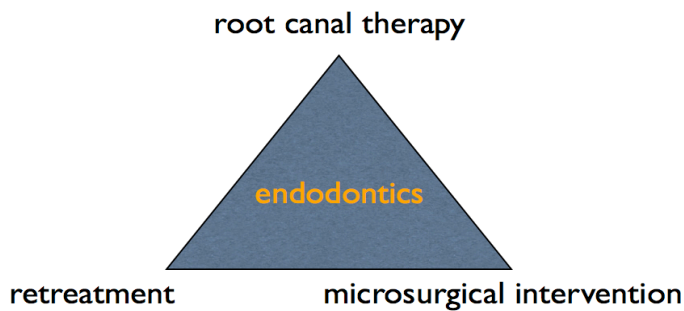


## A Case for Microsurgery Endodontics

Endodontics entails a full and complex knowledge of the root canal system, its embryology, physiology, histology and pathology. The education of endodontics includes recognising signs and symptoms of disease and the correct treatment protocol to restore health.

Endodontic treatment includes the triad of root canal treatment, conservative retreatment and surgical intervention.

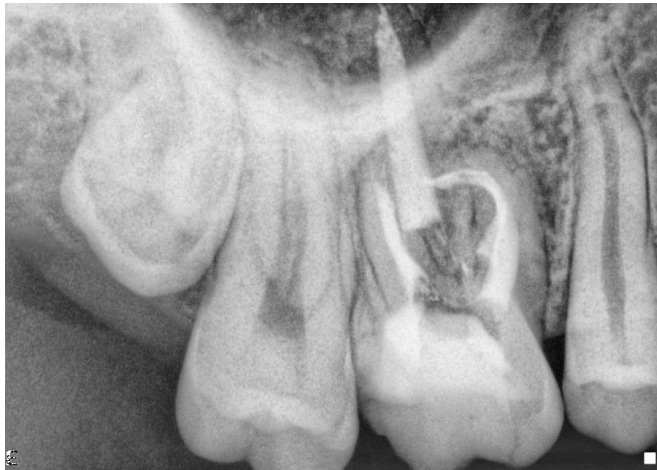


The success rate of initial root canal treatment has been studied and may range from 74% to 96%, depending upon which articles you read. The range varies due to the operators' ability, treatment protocol, instruments used and most importantly the criteria that are used to determine the success. In the past these criteria were strict and objective and were based clinically on symptoms and signs of disease. The radiographic criteria were also exacting and anything falling short of an ideal presentation would incur poor ratings. Nowadays the criteria are more subjective and include functional criteria. Obvious signs and symptoms would prejudice the result, but radiographic presentation that are less than ideal would not preclude a good success rate.

Failed root treatment would necessitate the decision of either trying to retreat, extract or a surgical intervention. The success rate of retreatment depends upon the initial performance of the initial treatment. Root treatment may fail for many reasons, such as, poor obturation, iatrogenic strip perforation, transportation of the canal, missed canal, mis-diagnosis, for example, presence of crack, etc. Retreatment of the tooth would then entail initially removing the present obturating material and sometimes an obstruction, such as, a file that has separated in the canal, and then correcting the canal shape. The canals would then require sterilising and obturation of the full three dimensional root canal system with a hermetically sealing material. The success rate of retreatment has been shown to be statistically inferior to initial root canal treatment due to the increased complexity of treatment. A case that presents with a failed root

treatment and a pre-existing lesion on x-ray will statistically result in a decreased result when retreated.

The use of rotary nickel titanium files has dramatically improved the success rate. The advantages of the instrument with regard to increased fatigue, flexibility and torsional strength have greatly improved root canal preparation in ease, speed and canal shape with less iatrogenic canal transportation and file separation.



Some retreatment cases may fail. This would then necessitate a decision to either retreat again, extract or a surgical intervention. It is clear that if there is still room for improvement with regard to the completed root treatment and specifically the root filling, non-surgical retreatment would be the treatment of choice. With the advent of the microscope and microsurgical tools, nonsurgical retreatment has become more predictable. Notwithstanding that retreatment would be the first choice for treatment for radicular pathosis, the clinician may decide for a number of reasons for referral for radicular surgery.



If the practitioner does not have the knowledge and skill and is unable to provide the necessary advanced treatment, then a referral to a specialist is advised. Past

accepted indications for surgical intervention are no longer valid in light of current concepts of the biological basis for endodontic retreatment.

Therefore, it must be recognized that surgical intervention has become very selective in contemporary endodontic practice.

Given the retreatment success rates and improved technology these days, there are specific indications for periradicular surgery today. These are (1) failure of nonsurgical retreatment, (2) failure of nonsurgical (initial) treatment and retreatment is not possible or practical or would not achieve a better result, or (3) when a biopsy is necessary. It is paramount that these indications must be in the best interests of the patient, within the skills of the clinician, and reflective of biological principles of endodontic therapy.

Few absolute contraindications to endodontic surgery exist. Most contraindications are relative and they are usually limited to three areas: (1) the patient's medical status, (2) anatomical considerations, and (3) the practitioner's skills and experience. When considering performing any surgical procedure on a patient who reports a major system disorder (cardiovascular, respiratory, digestive, hepatic, renal, immune, or skeleton-muscular), a thorough medical history is mandatory. Following the identification of all potential medical complications and a review of the patient's current drug regimen, a consultation with the primary care physician or specialist may be in order. The dentist should explain to the physician the needed endodontic surgical treatment, including a brief description of the procedure, anesthetic agents and other drugs to be used, the approximate length of time required for the procedure, and the expected length of recovery. In this way, the physician can more adequately assess the medical risks involved and can assist the endodontist in determining the appropriate treatment modifications. These modifications may be preoperative (alteration of drug therapy, sedative or hypnotic, and systemic antibiotics), intra-operative (N<sub>2</sub>O<sub>2</sub> and intravenous sedation), or postoperative (re-establishment of drug therapy, sedatives, and analgesics).

The major anatomical considerations of importance to endodontic surgery involve (1) the nasal floor, (2) the maxillary sinus, (3) the mandibular canal and its neurovascular bundle, (4) the mental foramen and its neurovascular bundle, and (5) anatomical limitations to adequate visual and mechanical access to the surgical site. A skilled surgeon with the needed microsurgical armamentarium is usually able to circumvent these anatomical limitations and accomplish successful endodontic surgery.

It is imperative that dental professionals keep in mind that all treatment rendered by them to their patients must be in the patients' best interests and at the highest quality of care. As a professional, one has an obligation to know one's limitations of clinical skills and to perform treatment procedures consistent with those limitations. The majority of endodontic surgical procedures should be performed by trained endodontic specialists. When receiving care of a specialized nature, patients need and deserve treatment that meets the standard of care delivered by competent practitioners trained as specialists.

A contemporary classification of endodontic surgery is as follows:

1. Periradicular surgery

- a. Curettage
- b. Root-end resection
- c. Root-end preparation
- d. Root-end filling

3. Corrective surgery

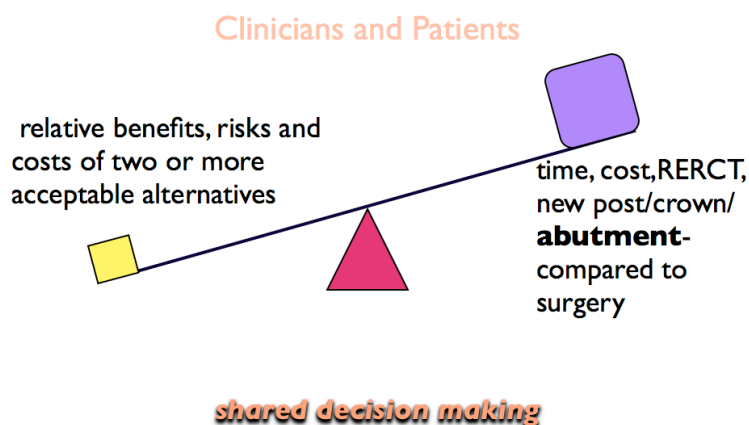
- a. Perforation repair
  - i. Mechanical (iatrogenic)
  - ii. Resorptive
- b. Periodontal management
  - i. Root resection
  - ii. Tooth resection
- c. Intentional replantation



The most important principle of endodontic diagnosis and treatment planning is that the primary modality for endodontic treatment failure should be nonsurgical endodontic retreatment whenever possible. The importance of thorough and meticulous presurgical planning cannot be over-emphasized. The use of the cone beam computer tomography (CBCT) is recommended and is an adjunct and important tool to guide the clinician in diagnosis and presurgical planning. Not only must the practitioner and staff be thoroughly trained, but also all necessary instruments, equipment, and supplies must be readily available in the treatment room. This requires that every step of the procedure be carefully planned and analyzed. The potential for possible complications must be anticipated and incorporated into the presurgical planning.

Good patient communication is essential for thorough surgical preparation. It is important that the patient understands the reason surgery is needed as well as

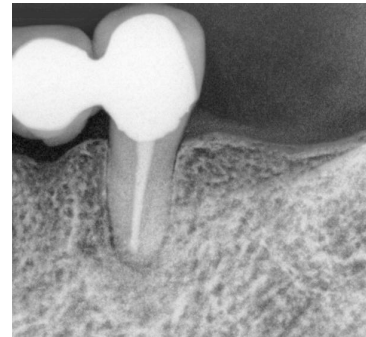
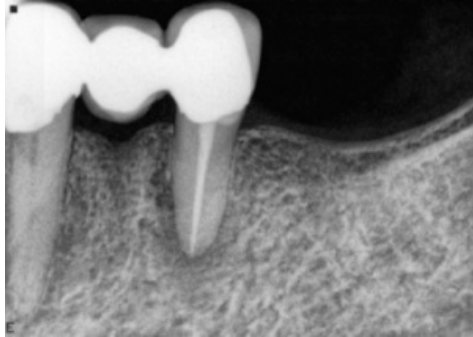
other alternative treatment options available. The patient must be informed of the prognosis for a successful outcome and the risks involved in the surgical procedure in addition to the benefits. Comparative probabilities for successful outcome are difficult to project. Treatment variables are complex and not easily quantified (location, bone quality, influence of systemic disease on healing, periodontal support, remaining tooth structure and resistance to fracture, quality of coronal restoration, patient susceptibility to recurrent caries, materials used, etc). Therefore a shared decision must be made for the course of action. It is also important that the patient is informed of the possible short-term effects of the surgery such as pain, swelling, discoloration, and infection and a signed consent form is essential.



What are the main concerns of a referring dentist for surgery? Does the surgery work? Will the patient be in pain? Is there a risk of sinus perforation or nerve damage? What is the cost? Would implants be a better choice? The reality is that surgery can have a very high success rate (which we will talk about later). Post-op pain is minimal. Sinus perforation is minimal and the healing is still high. Parasthesia is minimal and transient at worst (so long as the nerve is protected during surgery). The debate regarding surgery or extraction and replacement with implants remains an individual and site specific one. Without going into too much detail, the argument for a case with failing root treated abutment tooth involved in an expensive long standing post retained bridge may perhaps be better treated with surgical intervention rather than discarding the bridge for an implant. The debate is not fully addressed in this article and I'm sure will garner support for both sides of the argument.

A fresh look at the microsurgery treatment modality must be considered and advocated and will hopefully gain support due to the advances in surgery with regard to microsurgery knowledge, technique, skill, micro-instruments and materials. Let's look at these changes: with the use of the microscope we have the advantage of illumination and magnification. The size of the osteotomy window can be smaller which impacts beneficially on the healing rate, post-

operative discomfort and outcome. The bevel of the root-end is smaller, if at all, which also accounts for greater number of successful outcomes. With the use of micro-ultrasonic instrument tips, the root end preparation is deeper, parallel with the long axis of the root, with less deviation and there is a decreased chance of perforation. The root-end biocompatible material, MTA, used to seal the apex has supreme sealing ability, dimensional stability and also promotes cementum overgrowth.



Advances in incision technique, such as, the papilla based incision technique have eliminated gingival recession around prosthetic crowns in the smile zone and elsewhere. Surgeons advocate the use of lidocaine 2% with 1:50 000 epinephrine for an almost blood-less surgical field which is important in this type of surgery. The bloodless field enhances the speed to which the surgery can be performed. A dry root end cavity is mandatory in order to place the root end filling and ensure a hermetic seal.

The atraumatic and tension-less retraction of the surgical flap results in less post-operative trauma of swelling, bruising and pain. In fact most patients are pleasantly surprised how post operative pain is almost a non-issue. The use of sutures in the range of 5/0 to 7/0 has produced quicker and less traumatic healing without scarring in the gingival tissue.

Success rates for surgical endodontics have been studied and it has been found that microsurgical techniques clearly show advantages in higher success outcomes as well as they are less traumatic and have faster and complete healing. The outcome results depend upon the material used to seal the apex and it appears that MTA at the moment is the material of choice. The pre-existing lesion size will impact on the healing; lesions of less than 5mm heal the fastest and completely and lesions greater than 10mm having a tendency for incomplete healing. The use of ultrasonic instruments has impacted in a beneficial way and with more successful outcomes.

In conclusion, microsurgical endodontic intervention offers a good alternative treatment option when orthodox root treatment has failed.