ENDODONTIC SURGERY

Endodontic surgery should be the choice only when non-surgical treatment has failed, or the problem cannot be treated non-surgically.

Endodontic Surgical Techniques		
Surgical Fistulation	**Periradicular Surgery**	**Corrective Surgery**
1. Incision and drainage 2. Cortical trephination	1. Periradicular curettage 2. Root-end resection (apicoectomy) 3. Root-end preparation (retroprep) and root-end filling (retrofilling)	1. Perforation Repair a. Resorptive and carious b. Mechanical 2. Periodontal Management a. Root amputation b. Hemisection c. Regenerative techniques d. Exploration to confirm suspected root fracture 3. Intentional replantation 4. Surgical repositioning of luxated teeth 5. Surgical uncovering and orthodontic extrusion of endodontically treated teeth 6. Decompression of large periradicular lesions

PERIAPICAL SURGERY

INDICATIONS – FEW TRUE INDICATIONS EXIST FOR ENDODONTIC SURGICAL APPROACH

- When a biopsy of the periapical lesion is required
- Foreign body reaction with extruded material
- Perforation repair (that cannot be done conservatively)
- If non-surgical treatment is not feasible:
  - Very long or wide post; post not in line with canal
  - Canal blocked by broken file, calcifications, etc
  - Tooth is not likely to be suitable for further restoration
- Patient factors
  - Medical & dental condition
  - Time & cost

CONTRAINDICATIONS

Patient's Medical Status

1. Uncontrolled hypertension
2. Recent MCI
3. Uncontrolled diabetes
4. Dialysis Patients
5. Immuno-compromised patients

Patient's Mental Status

1. Patient does not desire surgery
2. Patient unable to handle stress of long complicated procedure
3. Patient extremely apprehensive (fearful)

Non restorable tooth

Poor periodontal prognosis

Inadequate access to surgical area

1. Thick buccal cortical plate / external oblique ridge
2. Limited opening
3. Shallow palatal vault
4. Shallow vestibule

CONSIDERATIONS

- **Psychological Aspects**: patients are reluctant to have any form of surgery
- Non-surgical endodontics have a higher success rate.
  - Higher success if non-surgical re-treatment was done prior to surgery (????)
- Surgery is a "one visit" technique ➔ Cannot disinfect the canal with irrigants and/or medicaments.
- Surgery entombs bacteria rather than killing them. Surgery only "treats" the apical 2—4mm of the canal.
- Surgery does not remove the entry pathway that the bacteria have used to infect the tooth.
- There is **no** ideal retrograde filling material
- Over-extended root filling materials will not always cause a foreign body reaction ➔ watch and reassess over time.
- Large, well-defined radiolucencies are not always cysts as often thought. Size and borders indicate time& speed of development, so It can be any form of periapical pathosis.

COMPLICATIONS (POTENTIAL POST-OPERATIVE SEQUELAE)

Swelling and bruising (yellowing)	Anesthesia / Paresthesia	Gingival Recession
Infection	Tissue discoloration	Loss of interdental papilla
Pain &/ discomfort	Scarring	Altered aesthetics

INSTRUMENTS (ENDODONTIC SURGERY KIT)

1. **Explorer, mirror, and tweezer.**
    a. Micro-mirrors
2. **Scalpel**
    a. No.15 – periosteal flaps
    b. No. 11 – incision and drainage (stabbing action)
3. **Periosteal elevator**
4. **Hand Piece– For apical bevel**
    a. High speed
    b. Low speed
5. **Root End Instruments**
    a. Rotary (micro-head handpiece + round & inverted cone burs)
    b. Piezoelectric Ultrasonic
        i. Advantages of ultrasonic Instrumentation
            1. Cleaner, smaller, and deeper preparation
            2. More parallel
            3. Accurately follow root canal space
            4. Decreased bevel (less microleakage)
            5. High success rate
        ii. Disadvantages of ultrasonic instrumentation
            1. Potential for cracks and chipping
    c. Mini carriers, pluggers, and mirrors
6. **Magnification Instruments**
    a. Loupes (x2.25 – x6)
    b. Glasses (x2.5 – x6)
    c. Microscopes (x3 – x30)
7. **Curette**
8. **Tissue Retractors**
9. **Tissue & suture scissors**
10. **Needle holder**
11. **Tissue forceps**

ENDODONTIC SURGERY – STEPS

1. LOCAL ANAESTHESIA

2. CONSULTATION, DIAGNOSIS & TREATMENT PLAN

3. PERIOSTEAL FLAP

General Principles for Periosteal Flaps:

1- The incision for a full mucoperiosteal flap (mucosa, connective tissue, periosteum) must be made with a firm continuous stroke

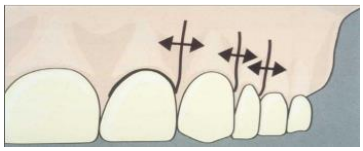
2- An incision should not cross an existing underlying bony defect

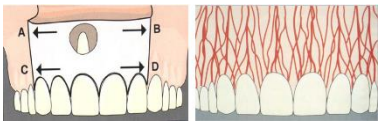
3- The vertical incision(s) should be made in the concavities between bone eminences

4- The vertical incision should not extend into the mucobuccal fold

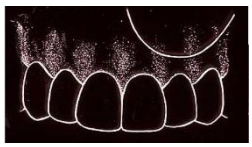
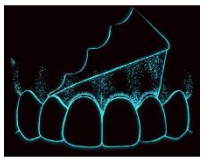
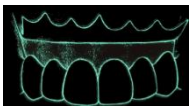
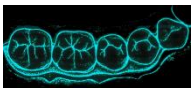
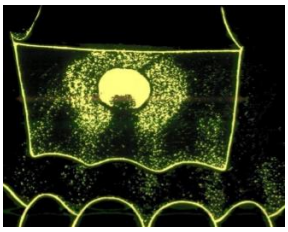
5- The termination of vertical incision at the gingival crest must be at the mesial or distal line angle of the tooth

6- The base of the flap must be at least equal to the width of its free end





Flap Design

Semi-Lunar	Gingival Crest (Intrasulcular)			Leubke-Oschenbein
	Triangular	Trapezoidal	Gingival	
In the mucobuccal fold and attached gingiva 	Horizontal incision in the gingival sulcus + ne vertical incision 	Horizontal incision in the gingival sulcus + two vertical incisions. (Begin as triangular flap then do 2nd vertical incision if extra access is required) 	Extended horizontal incision with no vertical incision 	- Scalloped horizontal incision in attached gingiva ○ 3-5 mm short of gingival margin ○ Follows contours of gingival margin - Vertical Incisions ○ 1–2mm short of entering mucobuccal fold 
	First choice flap for endodontic surgery: - Good access - Good vision - Good moisture control - Heals without scars - Easy to reposition	Second choice for endodontic surgery - Good access - Good vision - Heals without scars - Easy to reposition	- No access to apex - May be useful for coronal third perforations - Used for palatal flaps (but difficult)	
	• Horizontal incision not crossing bone defect • Greater access for lateral root repair • Useful in short roots and coronal third defects • Easy reposition • Maximal Blood Supply			• Simple • Good access • No gingival recession because marginal gingiva is not disturbed (anterior teeth with crowns) • Easily repositioned • Patient can maintain good oral hygiene during healing perion
• Poor access • Incision often over the lesion • Difficult moisture (hemorrhage) control • Difficult to reposition • Uncomfortable during healing • Leaves Scars	• Difficult flap elevation • Irreversible pocket formation if used in presence of dehiscence • Long vertical and horizontal incisions required • Changes in the level of marginal gingiva • Difficult suturing • Difficult to maintain oral hygiene during healing period			• Unaesthetic scar may form • Muscular attachments & frenums may need modification of the horizontal incision • Misjudging the size of lesion may result in the incision crowing the osseous defect,

4. CURETTAGE

- To remove all pathologic tissue, foreign bodies and root and bone particles from the periradicular area.

5. APICOECTOMY

6. RETROGRADE ENDOCONTIC TREATMEANT (APICAL BEVEL, CANAL PREP, ROOT FILLING)

APICAL BEVEL

Apical Bevel is done by Round Bur or non-cutting-tip fissure bur. The amount of root removed depends on:

1. Degree needed to examine root exits, zips, perforations
2. Wide surface to prepare class I cavity

HAEMORRHAGE CONTROL

Adrenaline – with pressure
Bone wax – mechanical
Ferric Sulfate
Microcrystalline collagen substances

RETROGRADE FILLING MATERIALS

Next page ➔

RETROGRADE FILLING MATERIALS

Material	Advantages	Disadvantages
Amalgam		- Corrosion - Galvanism - Tattoo - Condensation Scatter - Dimensional Changes - Marginal Breakdown - Mercury Release - Excess not absorbable - Difficult to condense - Expansion - Large Cavity - Undercuts - Poor adaption - Not antibacterial - Difficult to remove for re-treatment
CAVIT		
IRM		- Poor tissue compatibility (continuous release of eugenol & fibrosis of adjacent tissue) - Soluble - Large cavity required - Difficult to handle
Super-EBA		
Composite		
Gutta Percha	- Low tissue toxicity - Good sealing ability - Radiopaque - Color contrast to tooth - Conservative cavity - Anti-bacterial (sealer) - Easy to handle - Good physical properties - Satisfies requirements for root filling materials	
Glass Ionomer	- Low tissue toxicity (bone apposition) - Good sealing ability - Chemical bond to dentine - Radiopaque - Easy to mix & place - Color contrast to tooth - Short setting time	- Moisture control (haemorrhage) - Relatively large cavity required.
MTA	- Superior seal compared with Super EBA - Low toxicity - Healing of the periapical tissues with cementum forming over the material - Need moisture to set	- Relatively large cavity required - No resistance to dense compaction - Washing out the material during (flush the bony crypt) - Setting time 2—4 hours

- After placement of root-end filling, an **interim radiograph** should be exposed to ensure that:
    - Root tip has been totally removed
    - No excess material is present in the osseous crypt
    - Placement of root end filling is adequate.

7. WOUND CLOSURE – SUTURES (W/ ABSORBABLE OR NON-ABSORBABLE SUTURE)

After suturing: the flap should be compressed with digital pressure and a moist gauze for 5—10 minutes to decrease the size of coagulum and enhance healing.

8. POST OPERATIVE INSTRUCTIONS

1- Icepack (10 minutes on & 10 minutes off)
2- Rest for a day
3- Analgesics & NSAIDs (ibuprofen)
4- Antibiotics **(only in case of signs of system infection or patient history)**
5- Rinse of surgical site with warm salt water 3—4 times a day beginning the day after surgery

9. FOLLOW-UP & REVIEW

- Suture removal (4—5 days)
- Reviews
    - 3—4 months
    - 12 months
    - 3 years