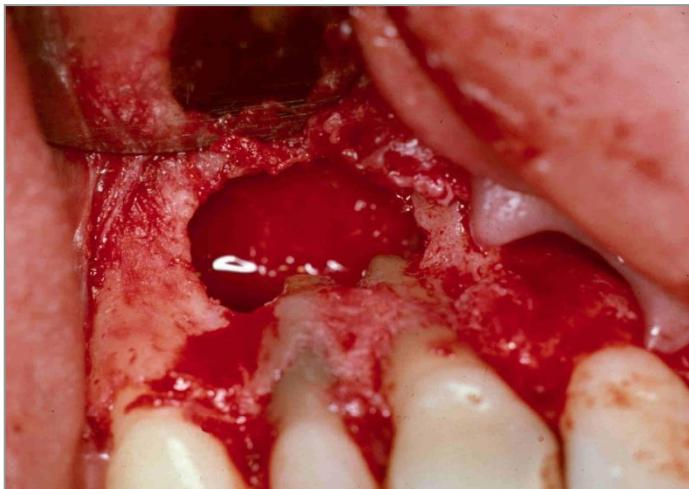


# **Endodontic Surgery**



**Prof.Dr.Mehmet Omer Gorduysus  
DDS,PhD**



# 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**

## **► A. SURGICAL FISTULATION**

1. Incision and drainage
2. Cortical trephination

## **► B. PERIRADICULAR SURGERY**

1. Periradicular curettage
2. Root-end resection (apicoectomy)
3. Root-end preparation (retroprep)and root end filling (retrofilling)

▶ C. CORRECTIVE SURGERY

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 vertical root fracture

3. Intentional replantation (Extraction-Replantation)
4. Surgical repositioning of luxated teeth
5. Surgical uncovering and orthodontic extrusion of endodontically treated teeth
6. Decompression of large periradicular lesions

# Possible Indications for Periapical Surgery

- ▶ When a biopsy of the periapical lesion is required
- ▶ Foreign body reaction with extruded material
- ▶ Perforation repair (that can not be done conservatively)
- ▶ If non-surgical treatment is not feasible – such as:
  - 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, costs, recent crown, etc.

# Periapical Surgery Considerations

- ▶ Psychological aspects
  - Patients are reluctant to have any form of surgery
- ▶ Non-surgical endodontics has a higher success rate
  - Higher success if non-surgical re-treatment was done prior to surgery
- ▶ Surgery is a “one visit” technique
  - Can not disinfect the canal with irrigants and/or medicaments

- \*There is no IDEAL retrograde filling material
- \*Surgery “entombs” bacteria rather than killing or removing them
  - And only “treats” the apical 2 – 4 mm of the canal
- \*Surgery does not remove the pathway of entry along which the bacteria have entered & infected the tooth
  - This is usually caries, a defective restoration, or a crack

- ▶ Over-extended root filling materials
  - Will not always cause a foreign body reaction
  - Hence, always watch and reassess over time
- ▶ Large, well-defined radiolucencies
  - Are not always cysts as often thought by many dentists
  - Can be any form of periapical pathosis
  - Size and borders indicate time & speed of development

- ▶ Potential post-operative sequelae
  - Swelling and bruising (yellowing)
  - Infection
  - Pain / discomfort
  - Anaesthesia / Paraesthesia
  - Tissue discolouration
  - Scarring
  - Gingival recession
  - Loss of interdental papilla
  - Altered aesthetics

# Possible Indications for Periapical Surgery

- ▶ *Few true indications exist for the endodontic surgical approach*

# CONTRAINdications FOR SURGICAL ENDODONTICS

## A. PATIENT'S MEDICAL STATUS

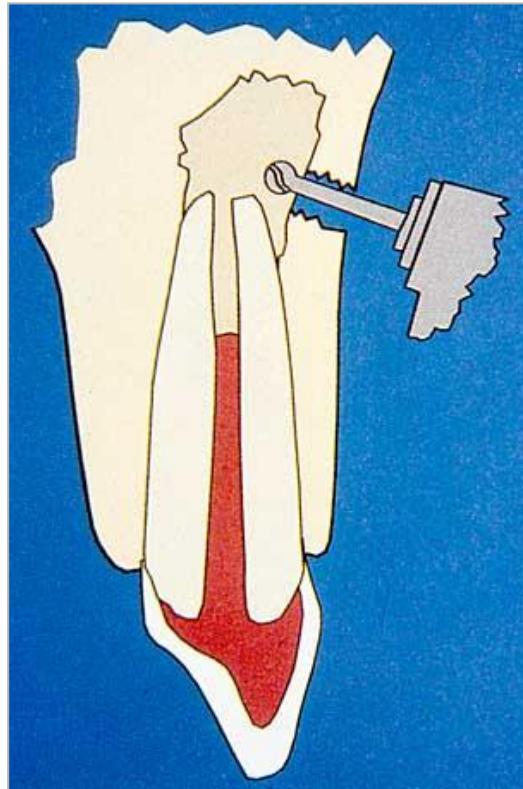
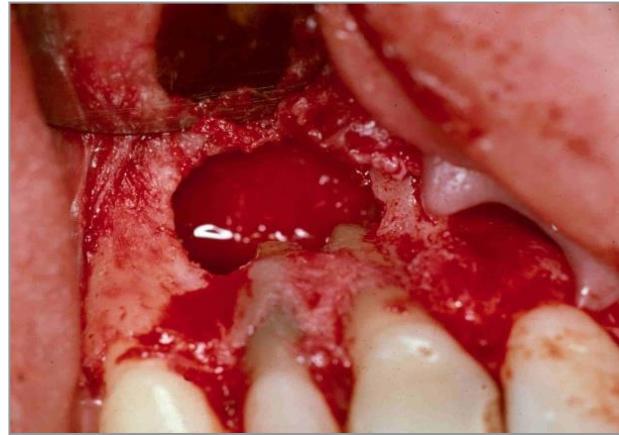
1. Uncontrolled hypertension
2. Recent myocardial infarction
3. Uncontrolled diabetes
4. Dialysis patients
5. Uncontrolled bleeding disorders
6. Immuno-compromised patients

## B. Patient's mental / psychological health:

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

- C. Non restorable tooth
- D. Poor periodontal prognosis
- E. Inadequate access to surgical area
  - 1. Thick buccal cortical plate/external oblique ridge
  - 2. Limited opening
  - 3. Shallow palatal vault
  - 4. Shallow vestibule

# Endodontic Surgery

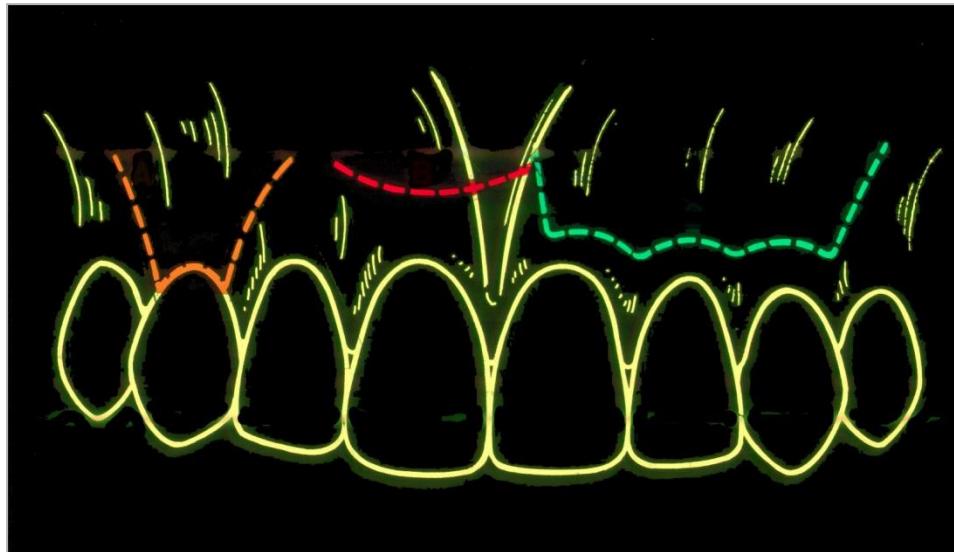


# **Endodontic Surgery – Stages**

- a–Local Anaesthesia**
- b–Consultation, Diagnosis, Treatment Plan**
- c–Periosteal Flap**
- d–Curettage**
- e–Apicoectomy**
- f–Retrograde Endodontic Treatment**
  - \*Apical Bevel, Canal Preparation, Root Filling**
- g–Wound Closure – sutures**
- h–Post-operative Instructions**
- i–Follow-up & Review**

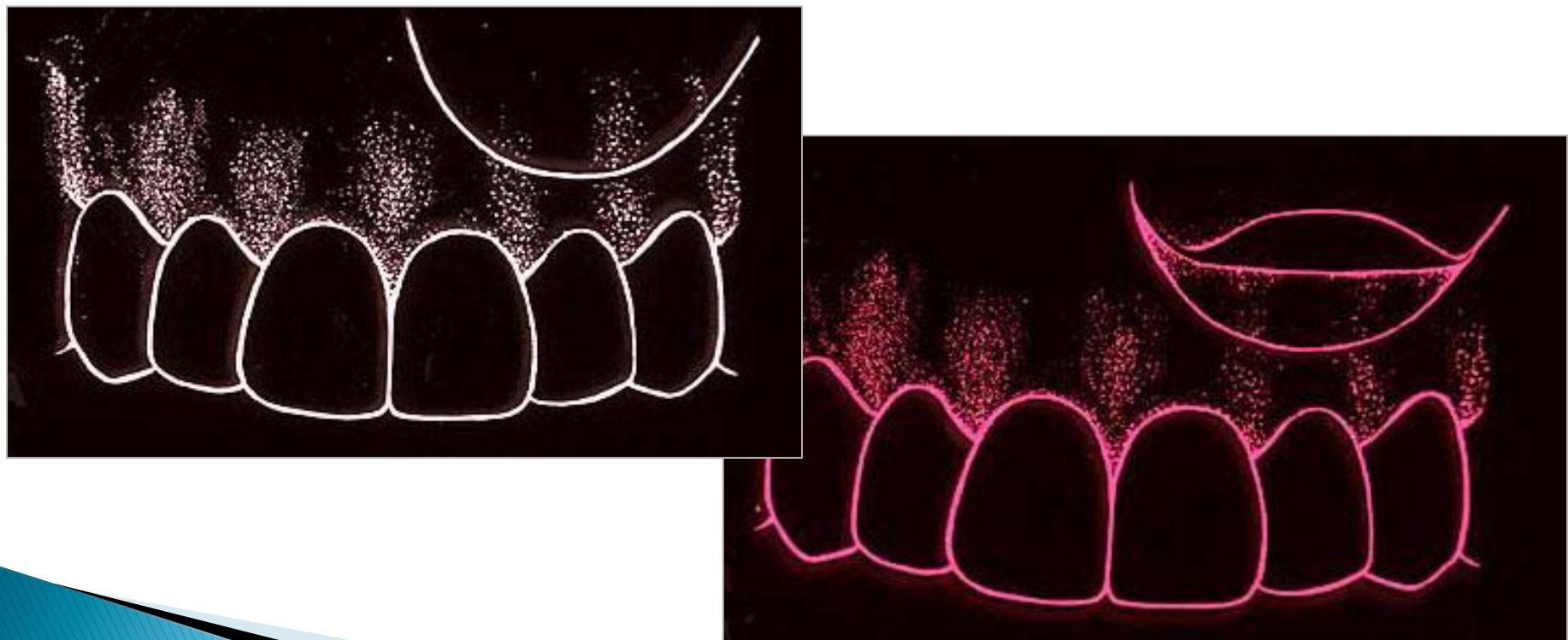
# Flap Designs

- ▶ Semi-Lunar
- ▶ Gingival crest (Intrasulcular)
  - 1-a)Triangular  
b)Trapezoidal
  - 2-Gingival
- ▶ Luebke–Oschenbein



# Semi-Lunar Flap

- ▶ In the mucobuccal fold and attached gingiva



# Disadvantages:

- Poor access
- Incision often over the lesion
- Difficult moisture control (haemorrhage)
- Difficult to reposition
- Uncomfortable during healing
- Leaves scars

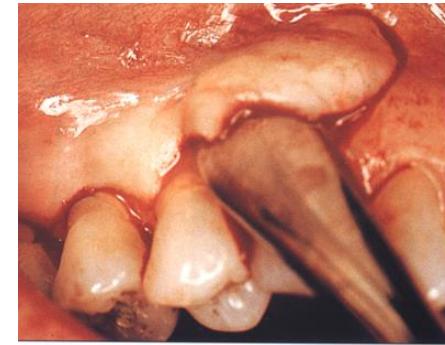
# Semi-Lunar Flap



# Intrasulcular flap:

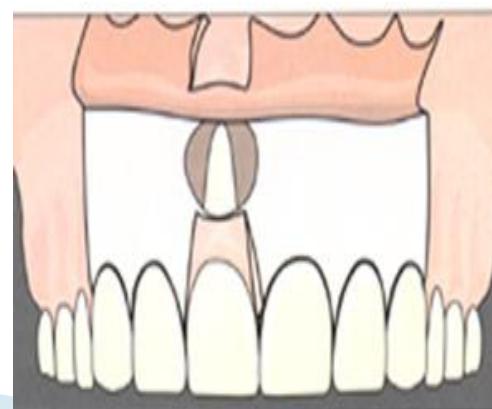
## Advantages:

- ▶ 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



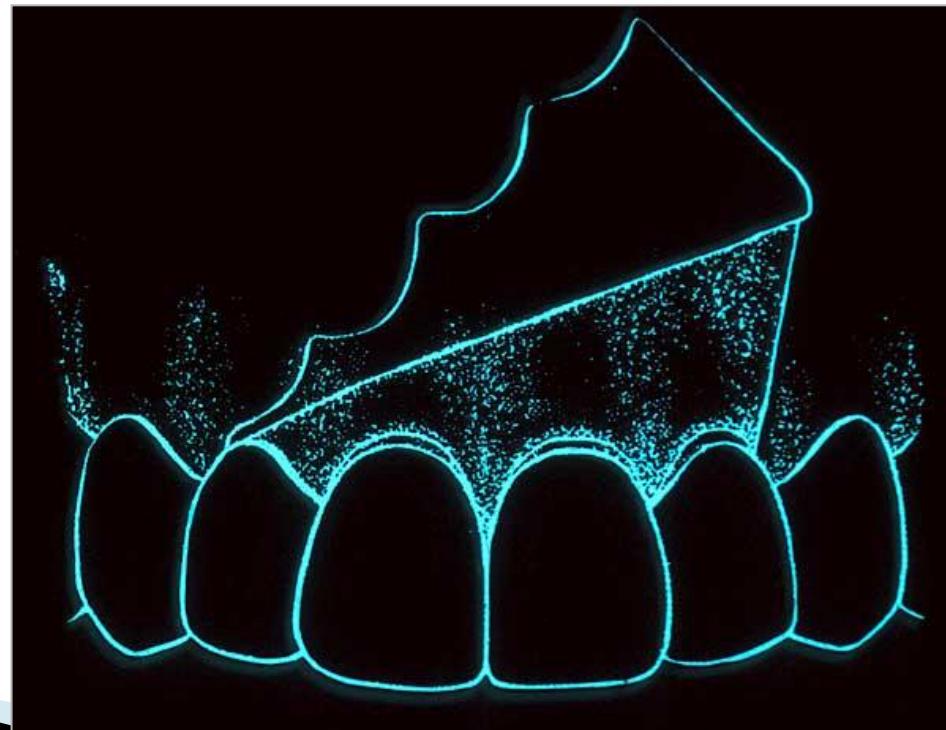
## Disadvantages:

- ▶ Difficult flap elevation
- ▶ Irreversible pocket formation if used in presence of dehiscence
- ▶ Long vertical and horizontal incisions required
- ▶ Changes in the level of the marginal gingiva
- ▶ Difficult suturing
- ▶ Difficult to maintain oral hygiene during healing period



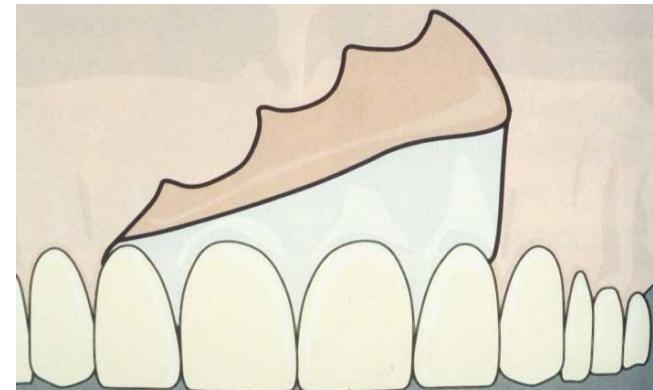
# Triangular Flap

- ◆ **Horizontal incision in the gingival sulcus**
  - + One vertical incision

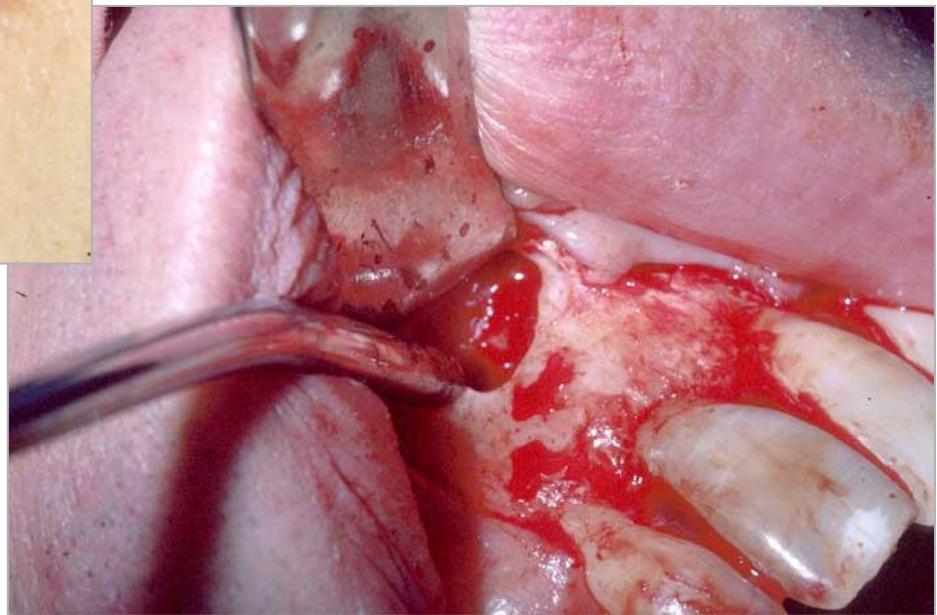


# Triangular Flap

- ✓ “First choice” flap for endodontic surgery
  - Good access
  - Good vision
  - Good moisture control
  - Heals without scars
  - Easy to reposition



# Triangular Flap



# Triangular Flap



# Triangular Flap

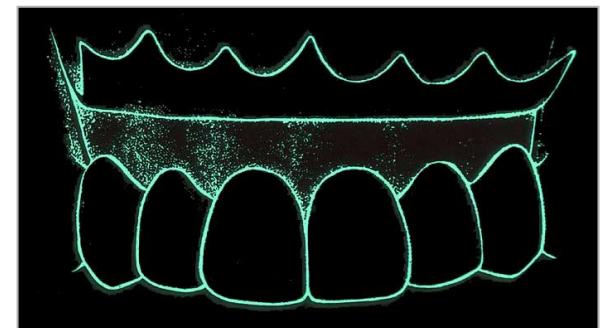


# Triangular Flap

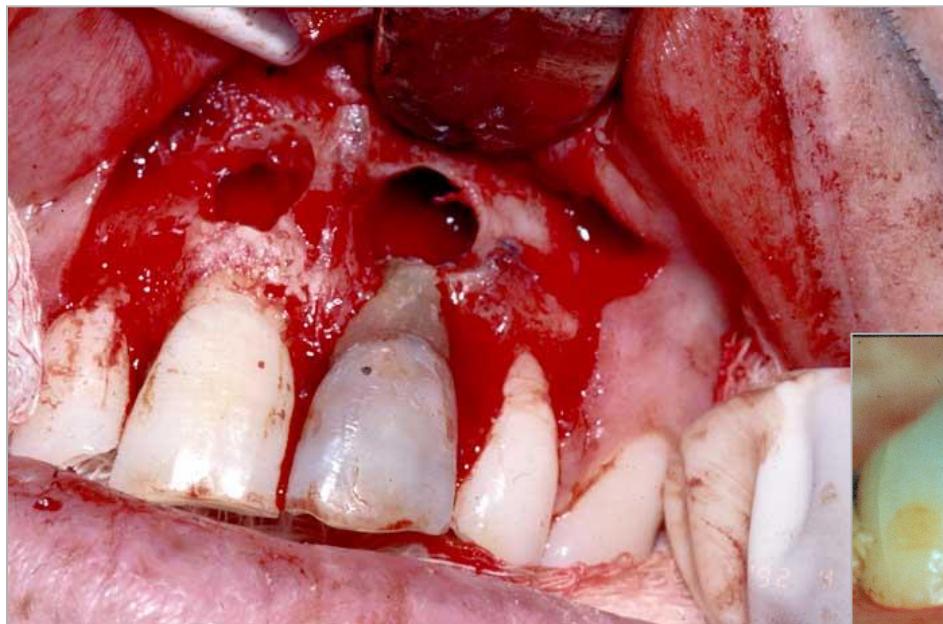


# Trapezoidal Flap

- ◆ **Horizontal incision in the gingival sulcus + Two vertical incisions**
- ✓ **“Second choice” for endodontic surgery**
- ★ **Begin as a triangular flap and then do 2<sup>nd</sup> vertical incision if extra access required**
  - **Good access & vision**
  - **Good moisture control**
  - **Heals without scars**
  - **Easy to reposition**



# Trapezoidal Flap



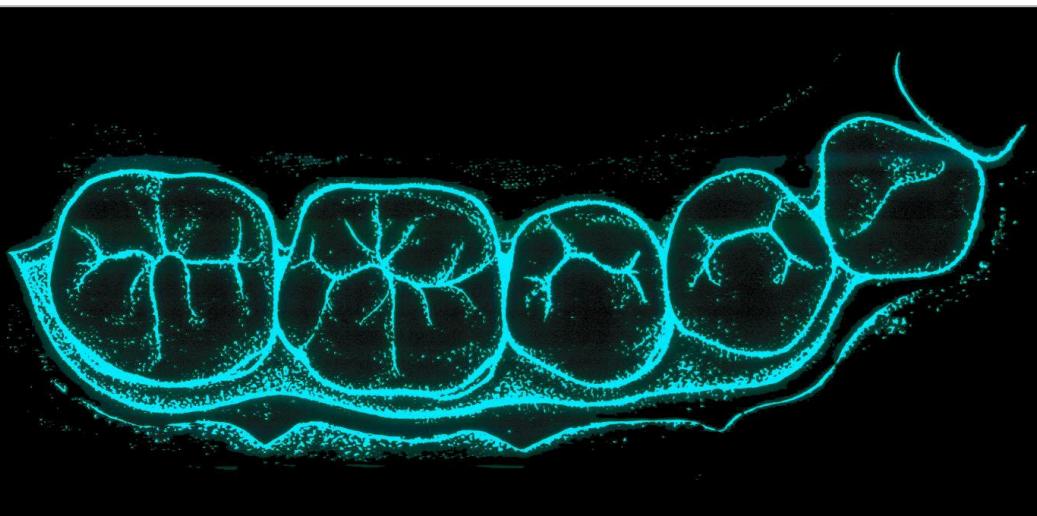
# Trapezoidal Flap



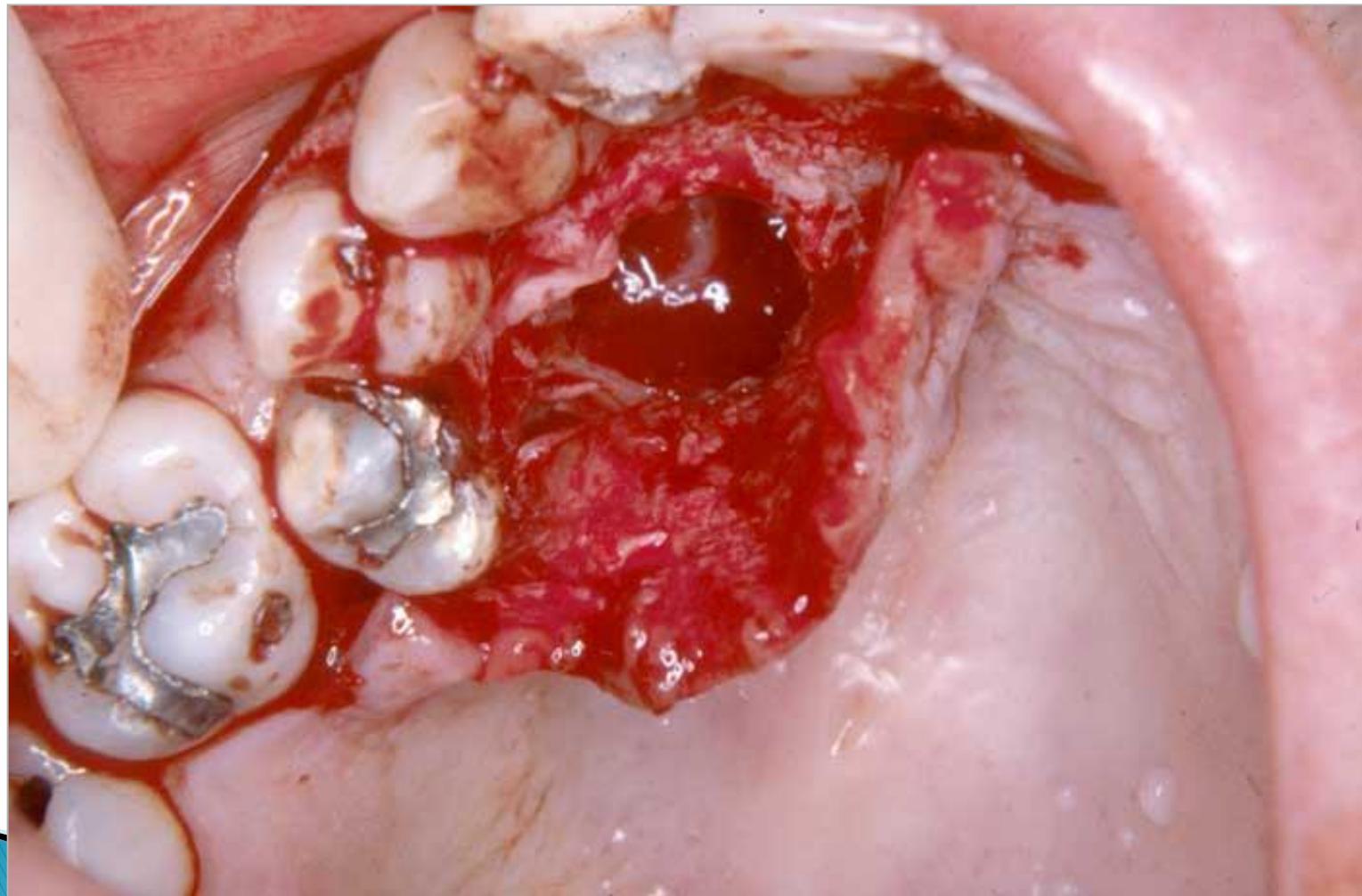
# Gingival Flap

## ◆ Gingival crest incision

- Extended horizontal incision
- No vertical incision
  - ▶ No access to apex
  - ▶ May be useful for coronal third perforations
  - ▶ Used for palatal flaps
    - *But difficult !*

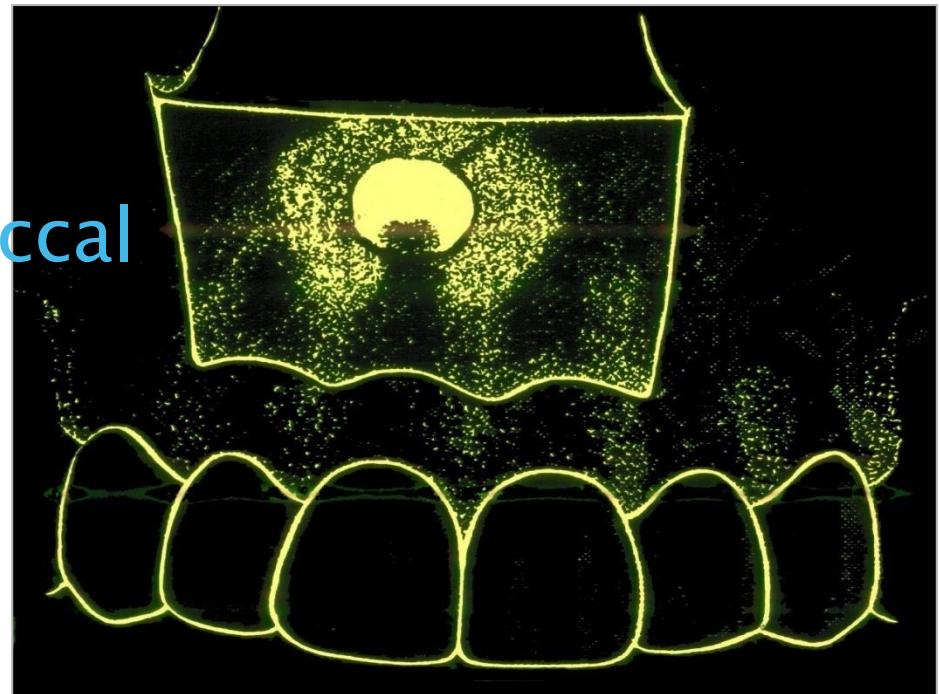


# Gingival Flap

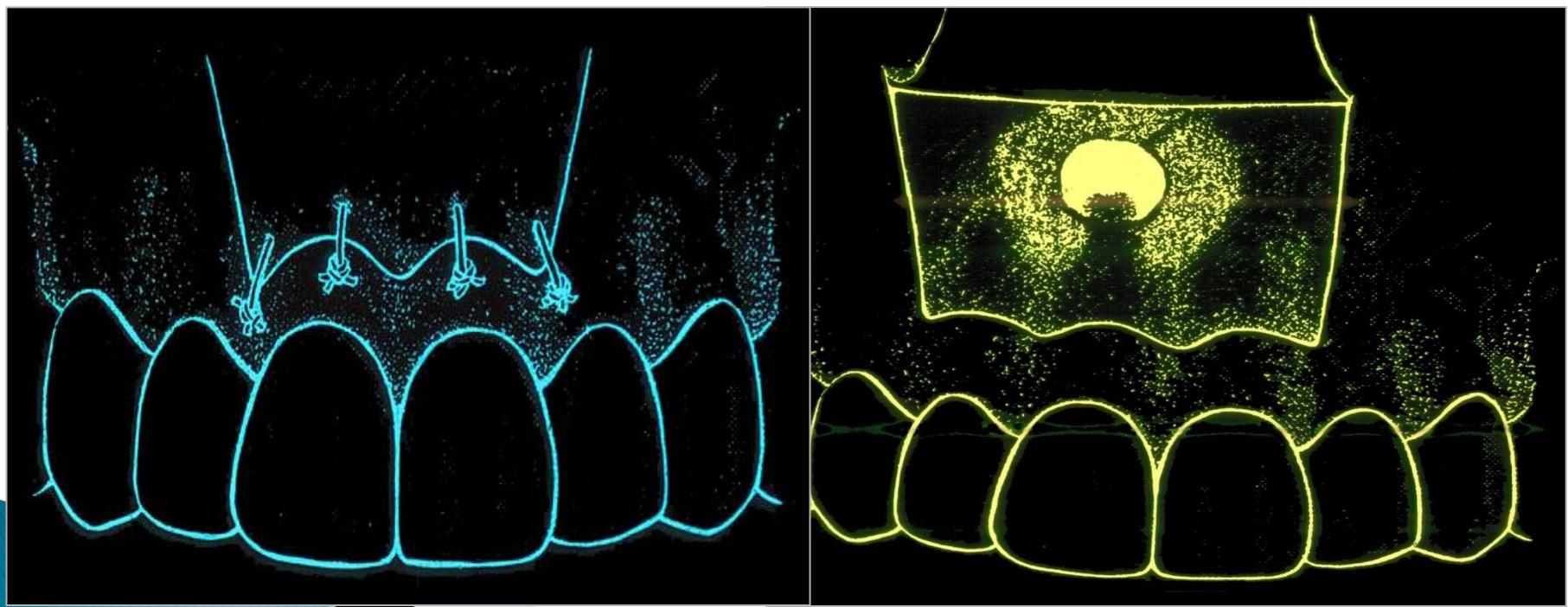


# Luebke–Oschenbein Flap

- ▶ Scalloped horizontal incision in attached gingiva
  - 3 – 5 mm short of the gingival margin
  - Follows contours of the gingival margin
  
- ▶ Vertical incisions
  - 1 or 2 mm short of entering the mucobuccal fold
    - Depends on how much access is required



# Luebke-Oschenbein Flap



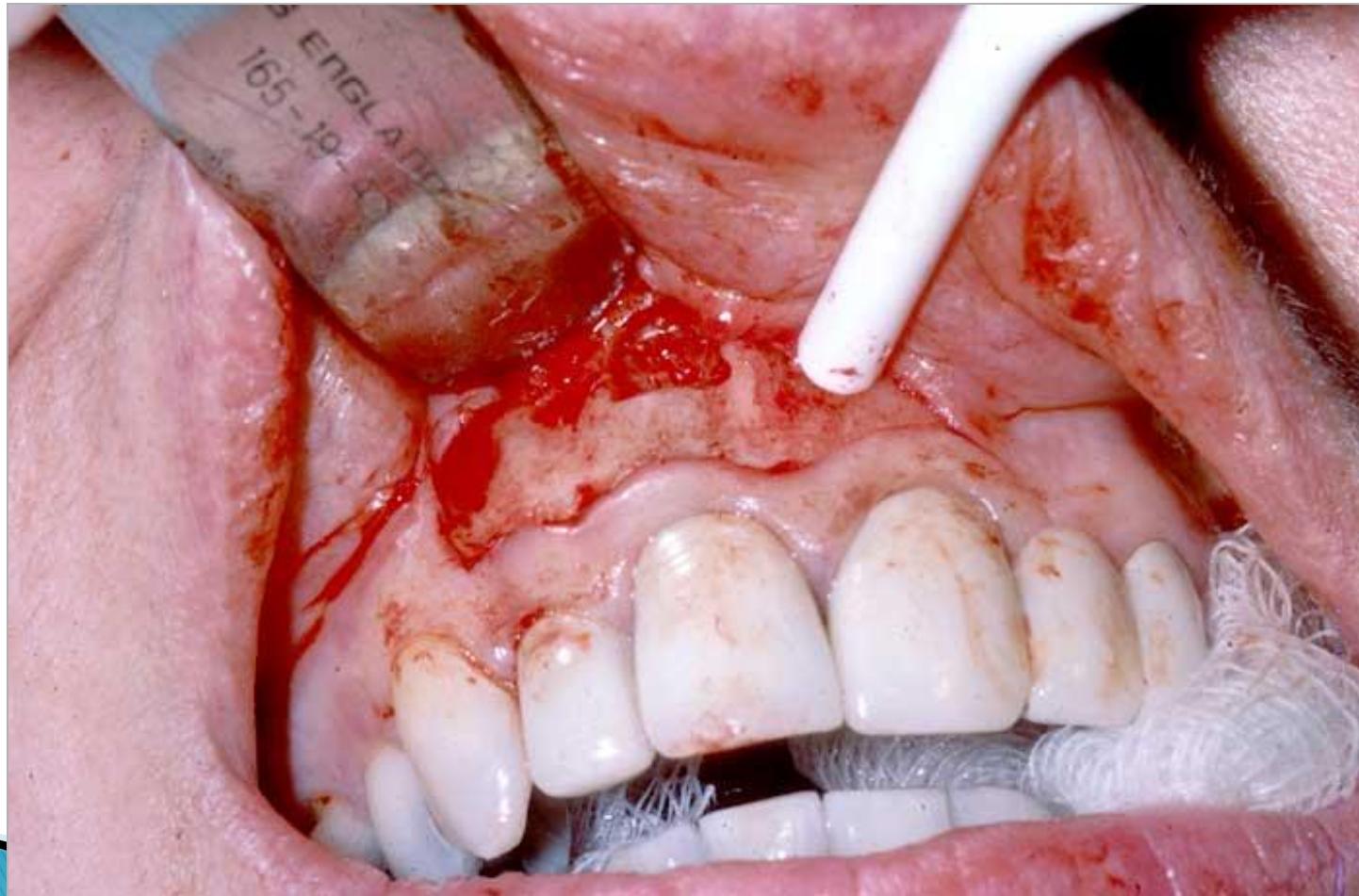
# Advantages:

- ▶ Simple
- ▶ Good access
- ▶ No gingival recession, because the marginal gingiva is not disturbed. (Use for anterior teeth with crowns)
- ▶ Easily repositioned flap
- ▶ The patient is able to maintain good oral hygiene during the healing period

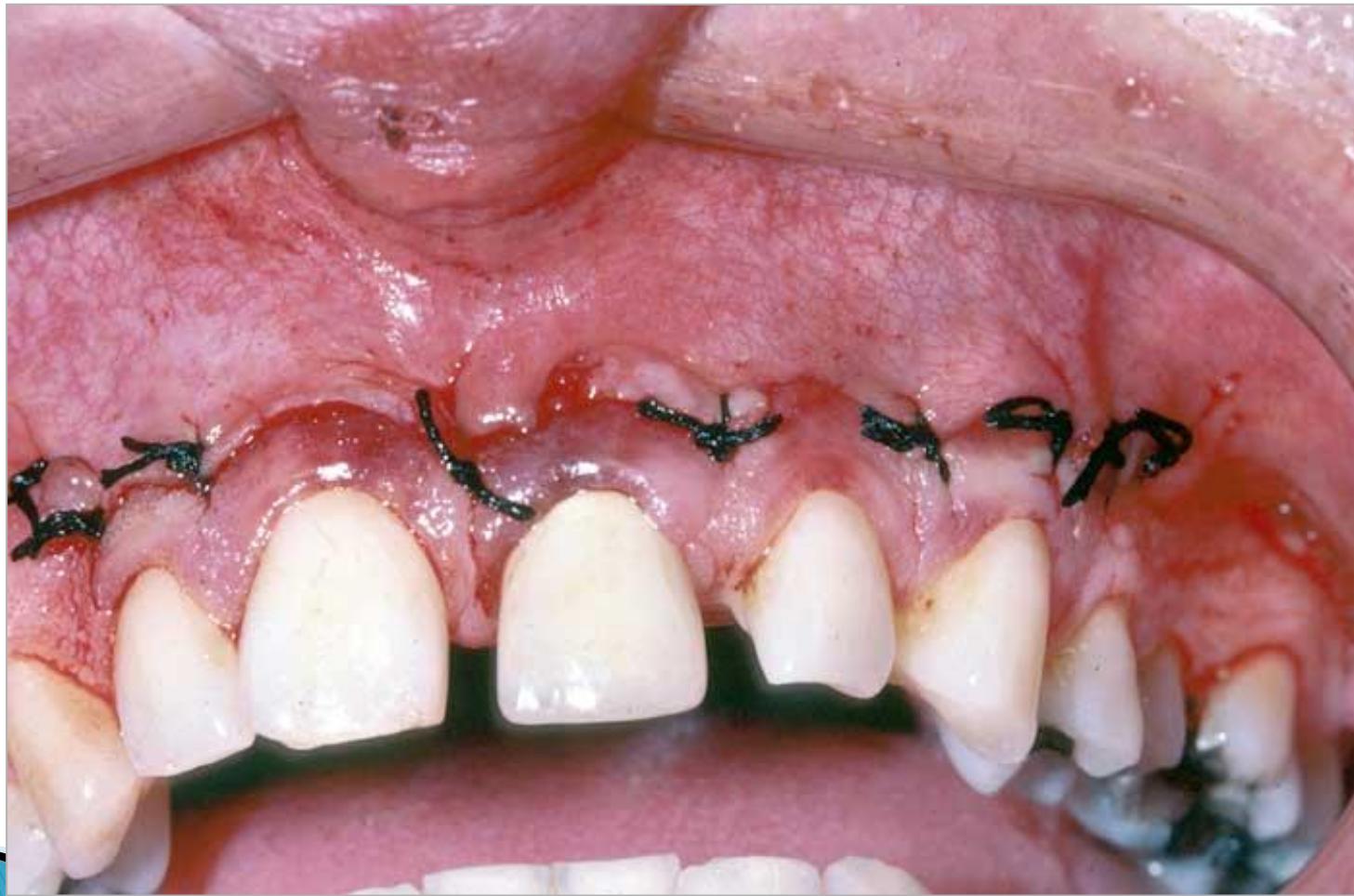
# Disadvantages

- ▶ An unaesthetic scar may form
- ▶ Muscular attachments & frenums may need modification of the horizontal incision
- ▶ Misjudging the size of lesion may result in the incision crossing the osseous defect

# Luebke-Oschenbein Flap



# Luebke-Oschenbein Flap

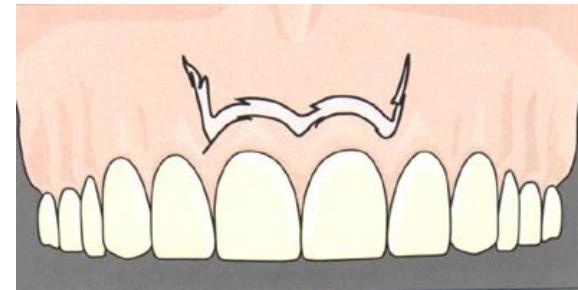
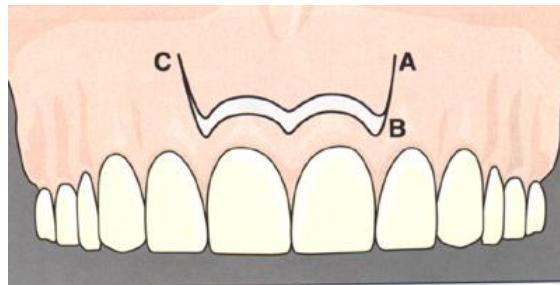


# Luebke-Oschenbein Flap



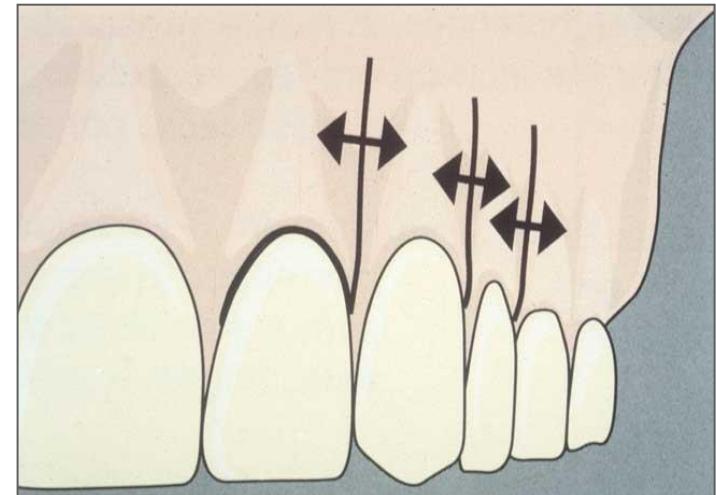
# General Principles for Periosteal Flaps

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



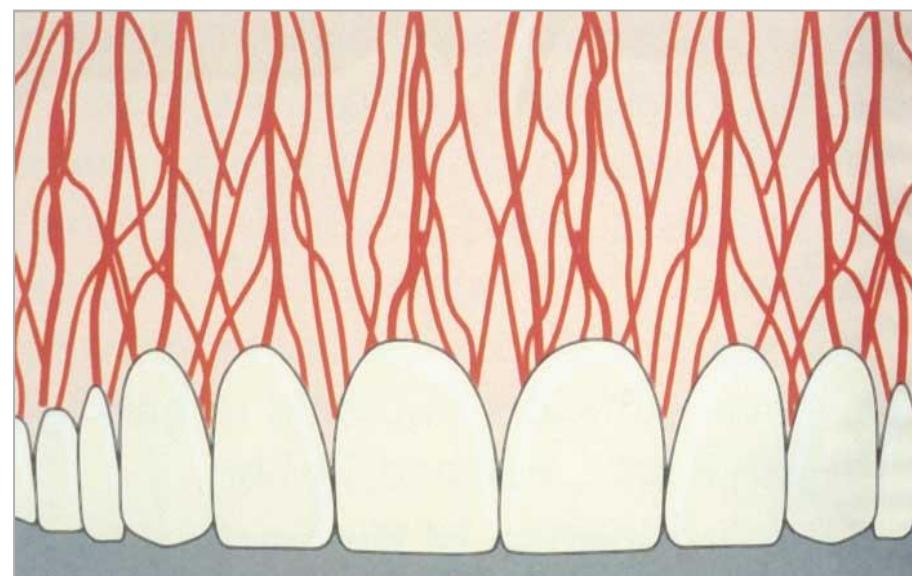
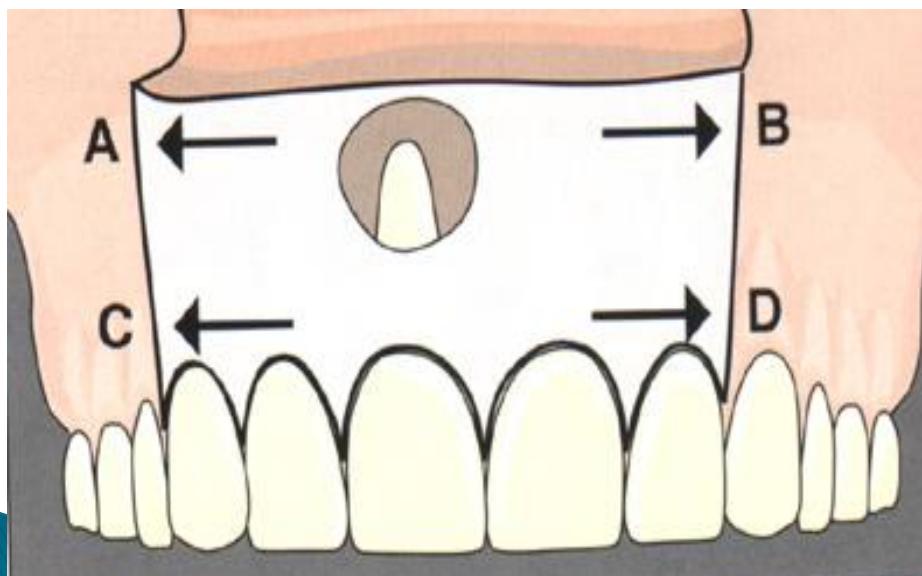
► 2- An incision should not cross an existing underlying bony defect.

► 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 the vertical incision at the gingival crest must be at the mesial or distal line angle of the tooth.

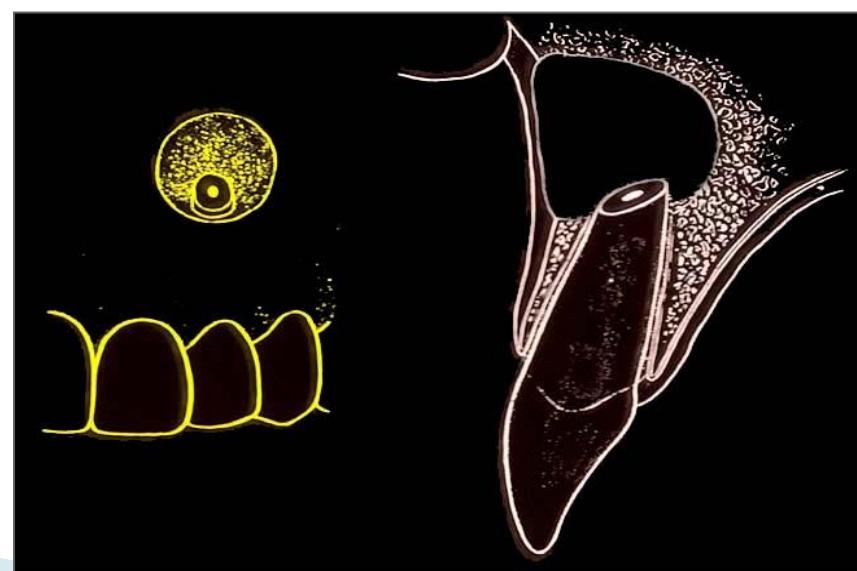
- ▶ 6- The base of the flap must be at least equal to the width of its free end.



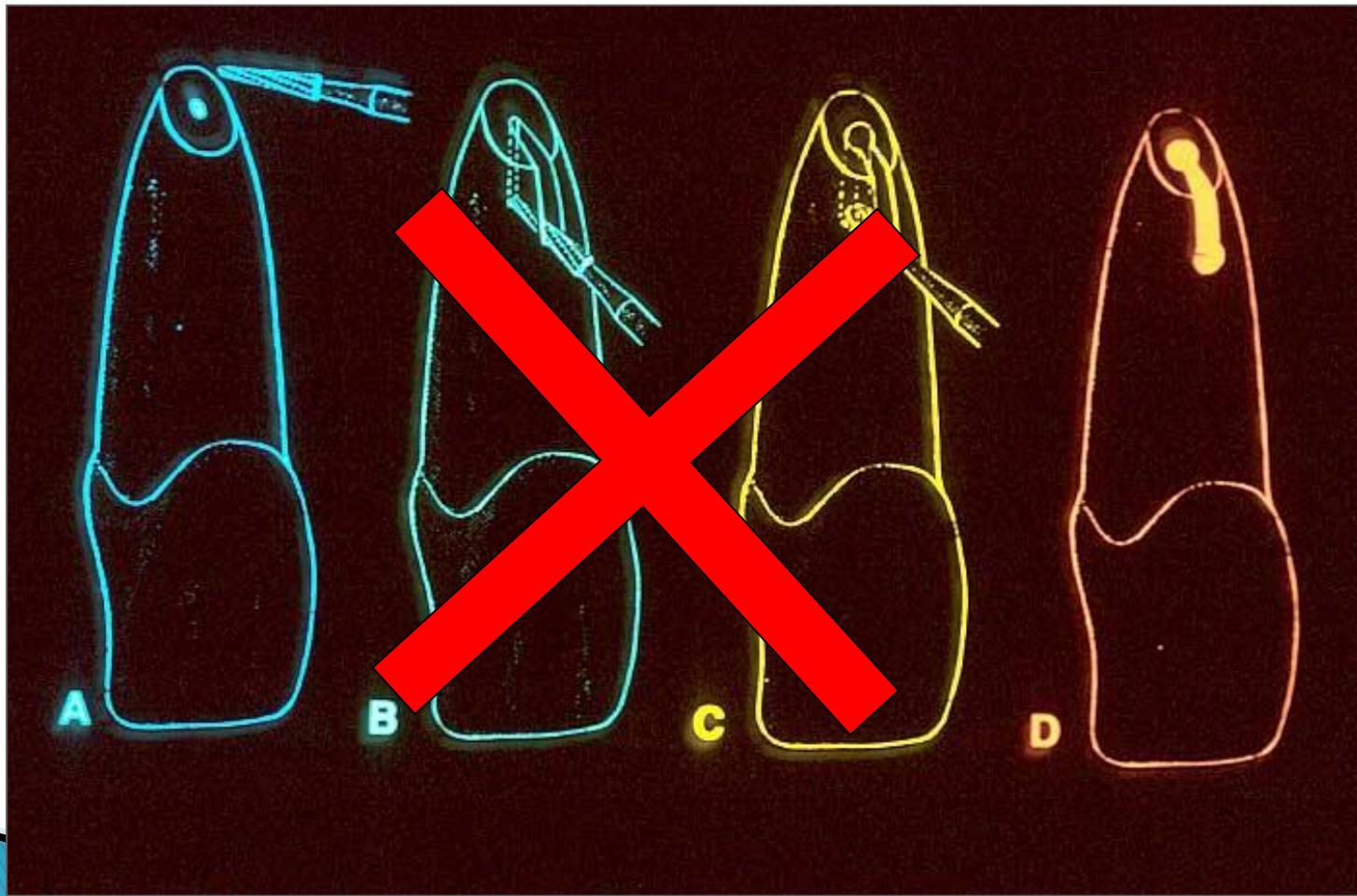
# Apical Bevel

Done by:

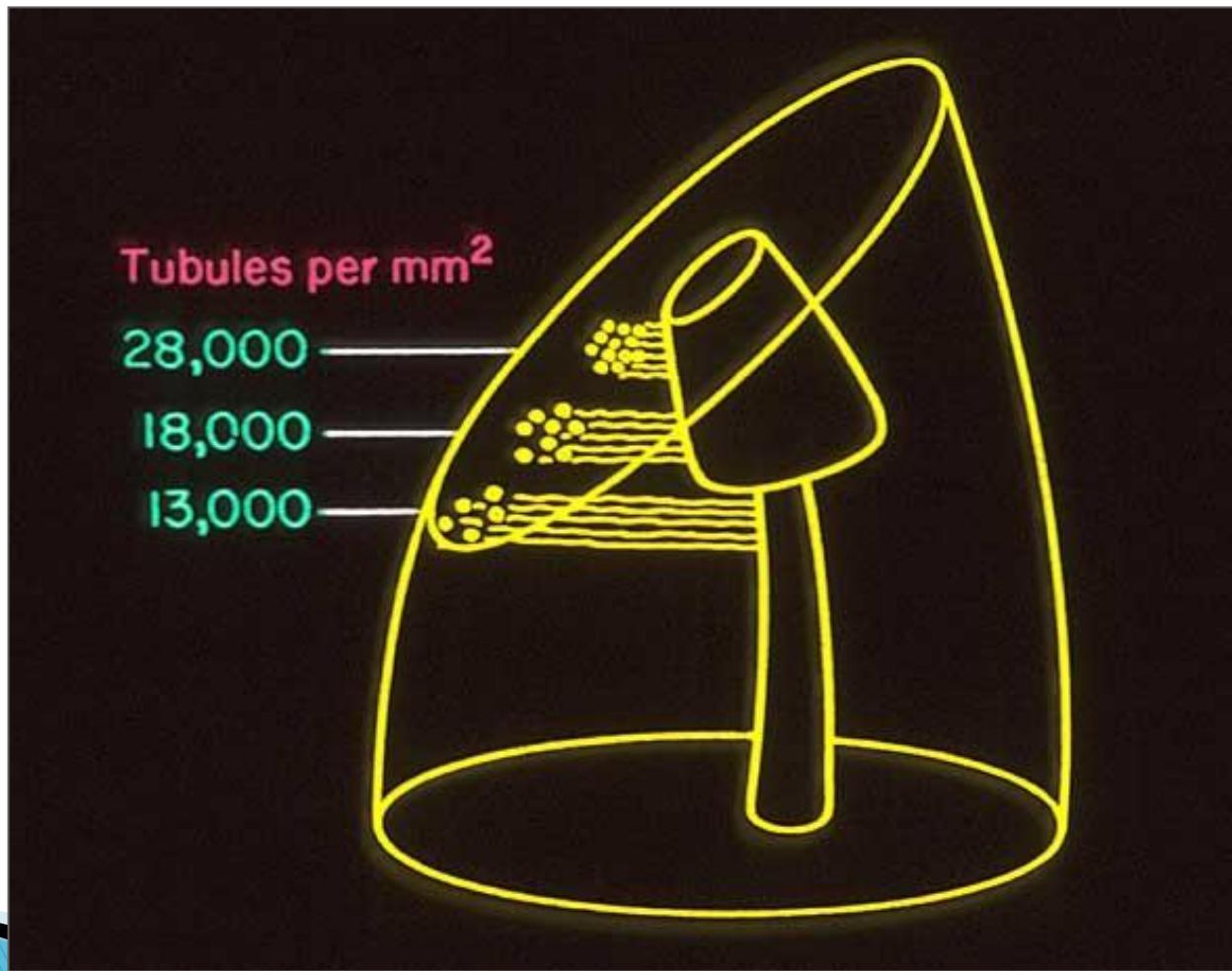
- ▶ 1-Round bur or 2-noncutting-tip fissure bur  
Amount of root removed depend on:
- ▶ 1-Degree needed to examine root exits, zips, perforation
- ▶ 2-Wide surface to prepare Class I cavity



# Apical Bevel



# Apical Bevel

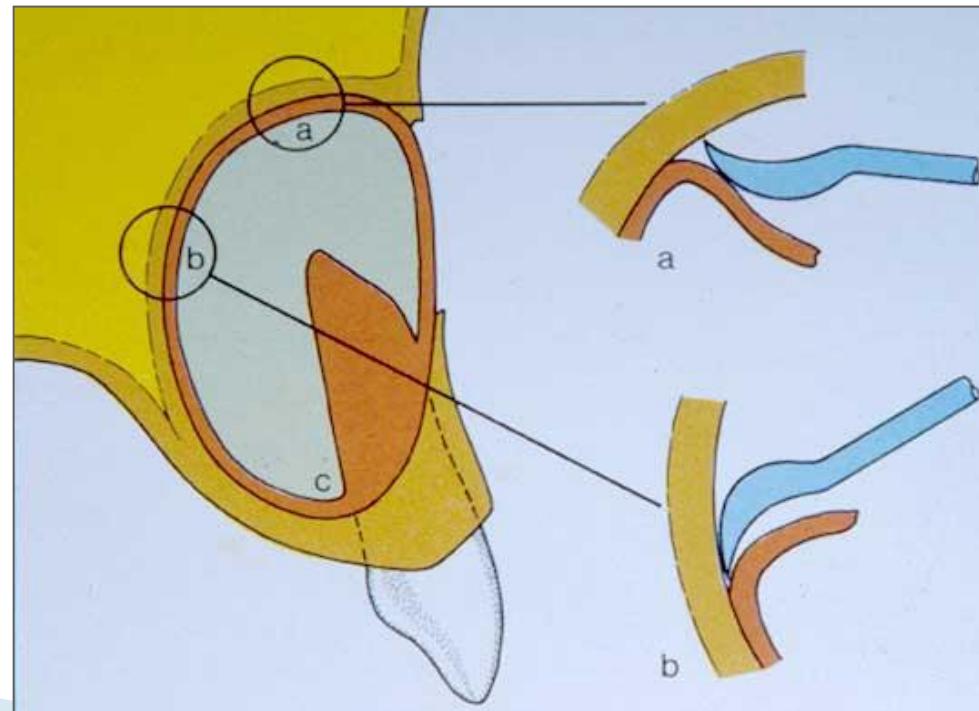


# **Apical Bevel**

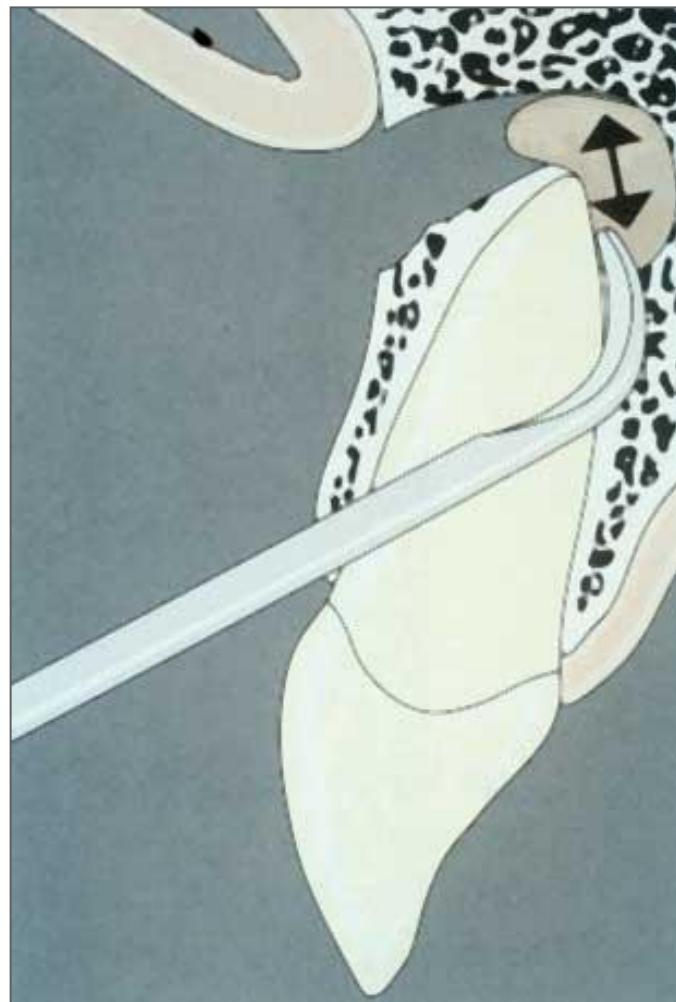


# Curettage Techniques

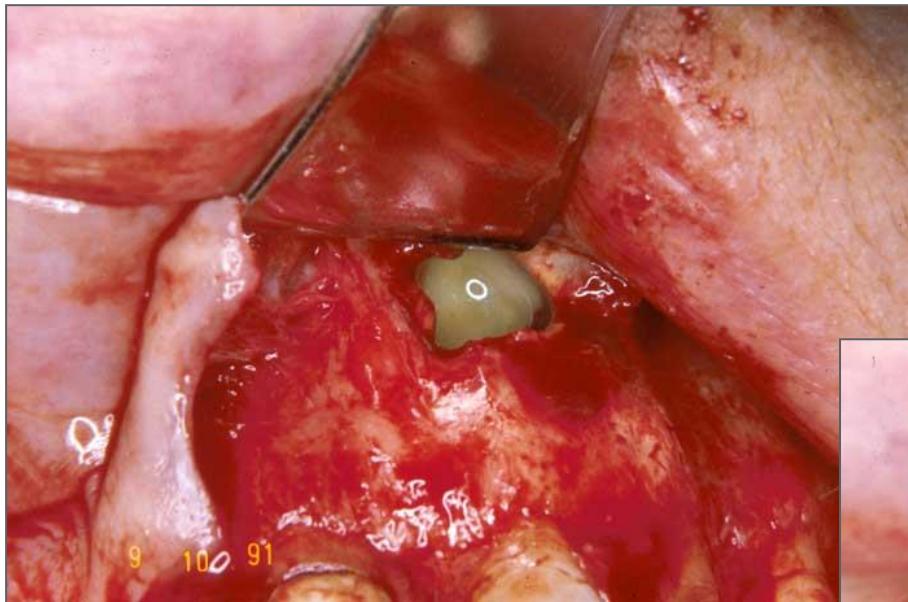
- ▶ To remove all pathologic tissue, foreign bodies, and root and bone particles from the periradicular area.



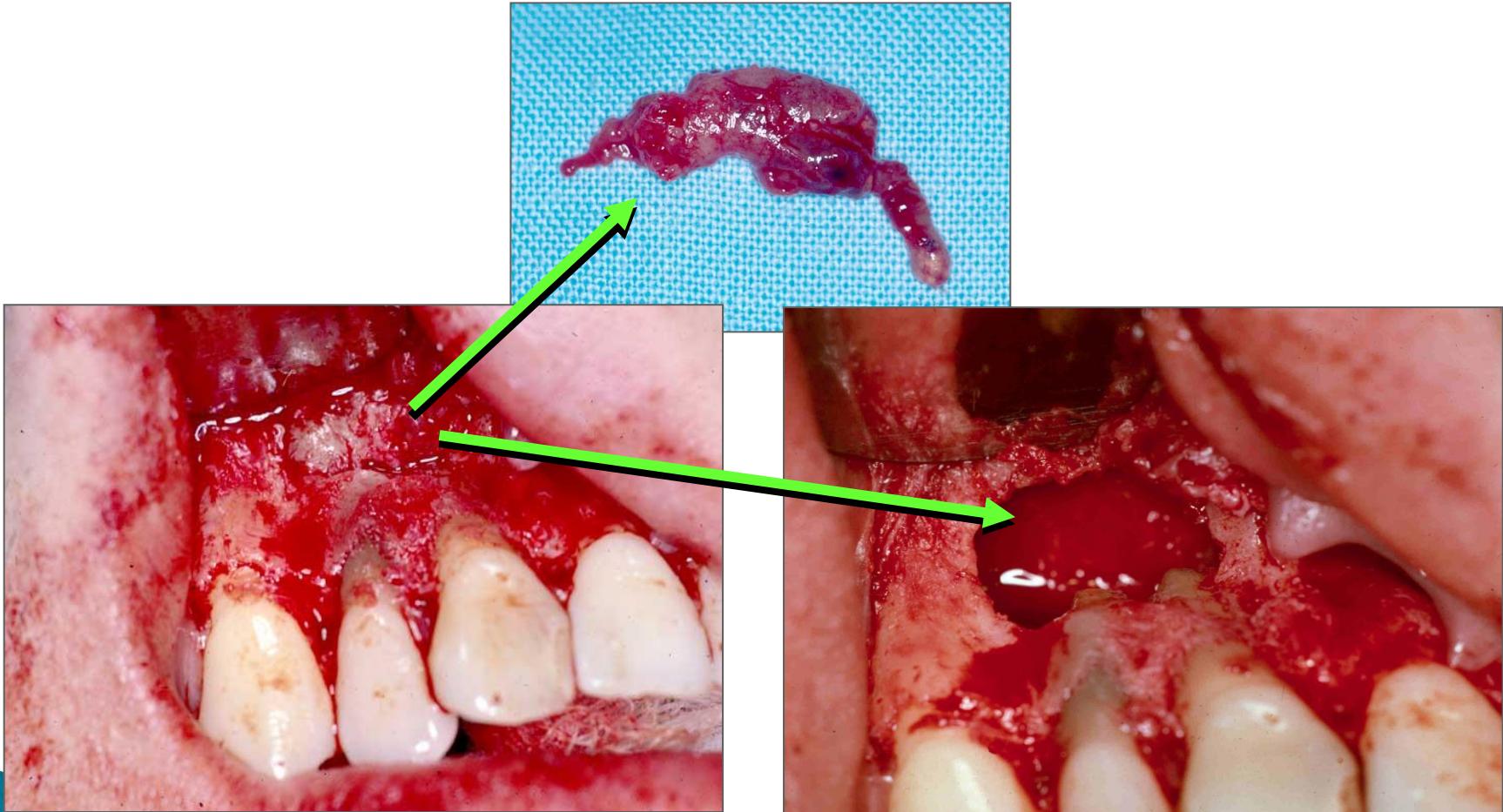
# Curettage Techniques



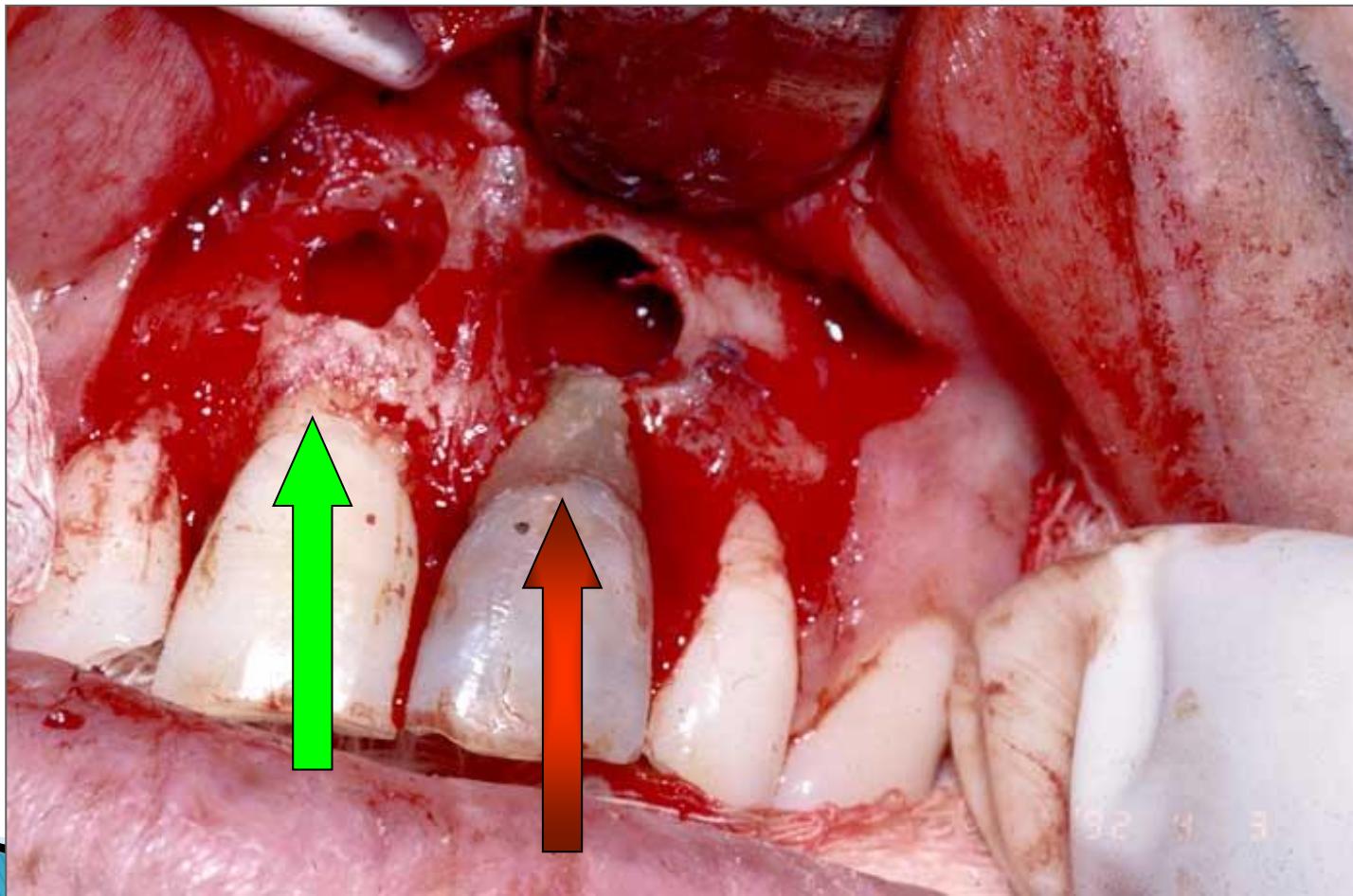
# Curettage Techniques



# Curettage Techniques



# Curettage Techniques



# **Retrograde Filling Materials**

# Materials- Past and Present

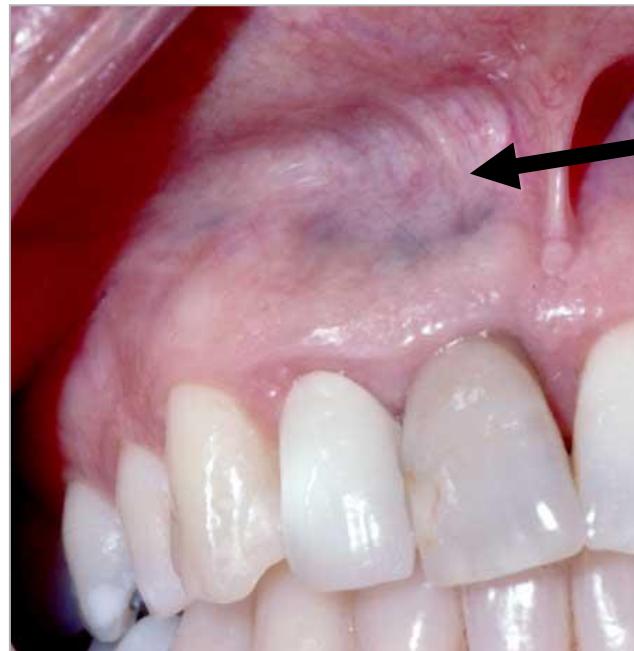
- ▶ Amalgam
- ▶ Cavit
- ▶ IRM
- ▶ Super-EBA
- ▶ Composite resins
- ▶ Gutta percha
- ▶ Glass ionomers
- ▶ MTA

# Amalgam

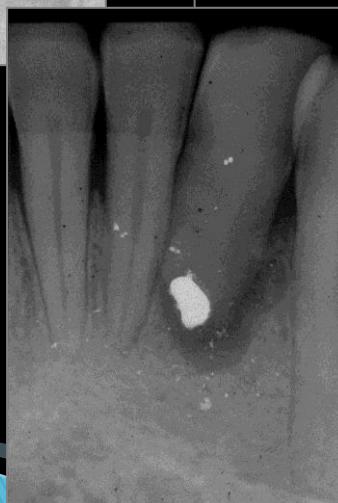
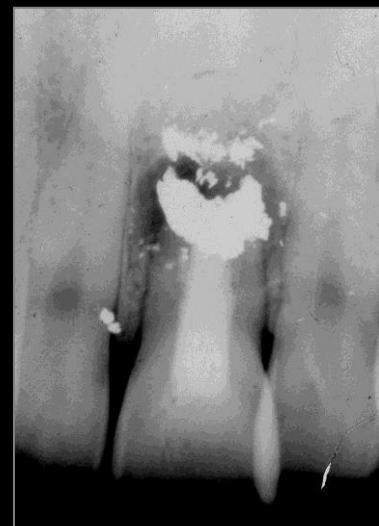
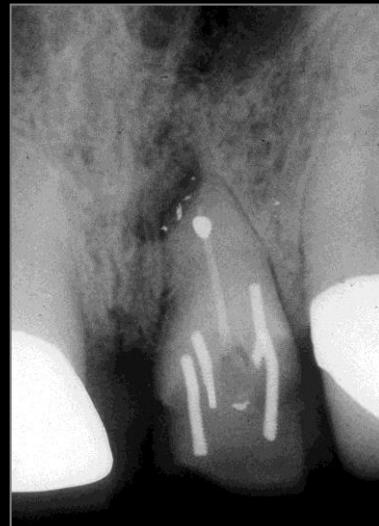
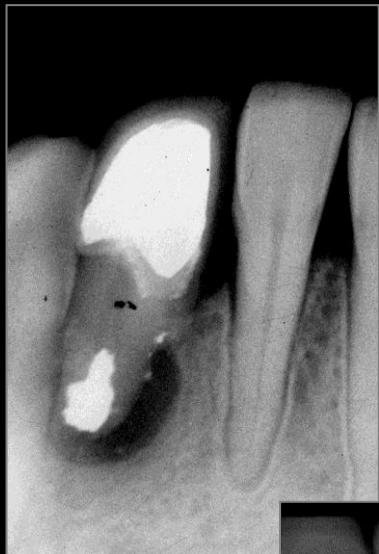
## Disadvantages & Problems

- ▶ Corrosion
- ▶ Galvanism (with posts)
- ▶ Tattoo on mucosa
- ▶ Expansion
- ▶ Dimensional changes
- ▶ Marginal breakdown
- ▶ Excess not absorbable
- ▶ Mercury release
- ▶ Difficult to condense
- ▶ Condensation scatter
- ▶ Cavity large
- ▶ Undercuts needed
- ▶ Poor adaptation to walls
- ▶ No anti-bacterial action
- ▶ Difficult to remove for re-treatment

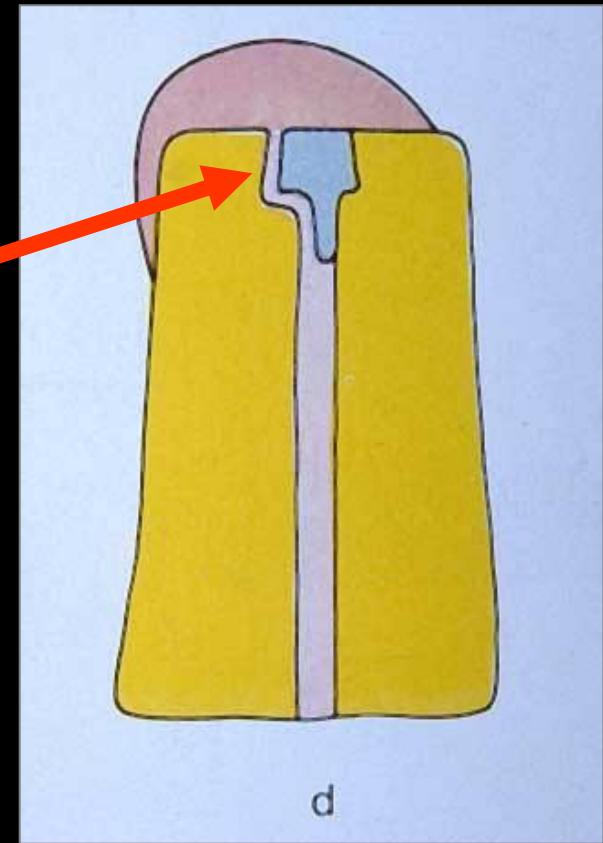
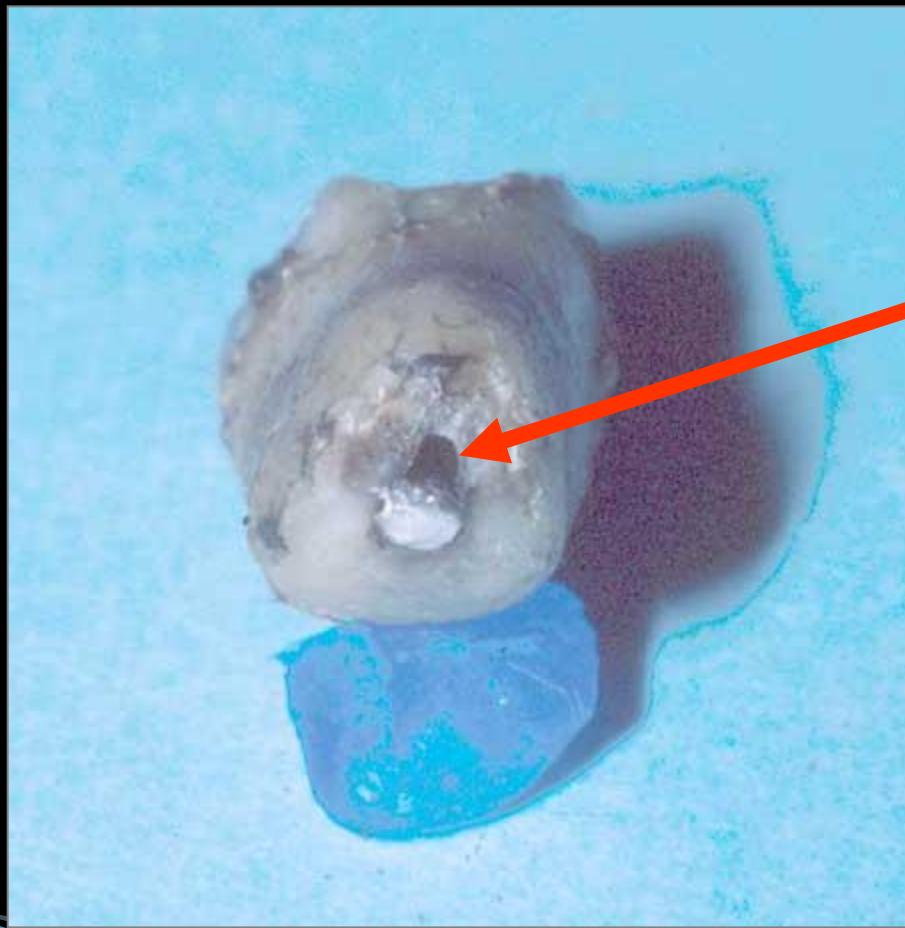
# Amalgam



# Amalgam



# Amalgam



# **IRM + Super-EBA**

## **Disadvantages & Problems**

- ▶ Poor tissue compatibility
  - Due to continuous release of eugenol
  - Fibrosis of adjacent tissue
- ▶ Soluble
- ▶ Large cavity required
- ▶ Difficult to handle material
  - Esp. Super-EBA

# Glass Ionomer

## Advantages

- ▶ Low tissue toxicity
  - Bone apposition
- ▶ Good sealing ability
- ▶ Chemical bond to dentine
- ▶ Radiopaque
- ▶ Easy to mix & place
- ▶ Colour contrast to tooth
- ▶ Short setting time

## Disadvantages

- ▶ Moisture control
  - Haemorrhage
- ▶ Relatively large cavity required

# Gutta Percha + Sealer

## Advantages

- ▶ Low tissue toxicity
  - ▶ Good sealing ability
  - ▶ Radiopaque
  - ▶ Colour contrast to tooth
  - ▶ Conservative cavity only
  - ▶ Anti-bacterial (sealer)
- ◆ Easy to mix & place
  - ◆ Good physical properties
  - ◆ Satisfies requirements of root filling materials
  - ◆ Proven and acceptable material for RCF's for over 120 years

# **MTA (Mineral trioxide aggregate)**

## **Advantages**

- ▶ Superior seal compared with Super EBA
- ▶ Low toxicity
- ▶ Healing of the p.a. tissues with cementum forming over the material
- ▶ Need moisture to set

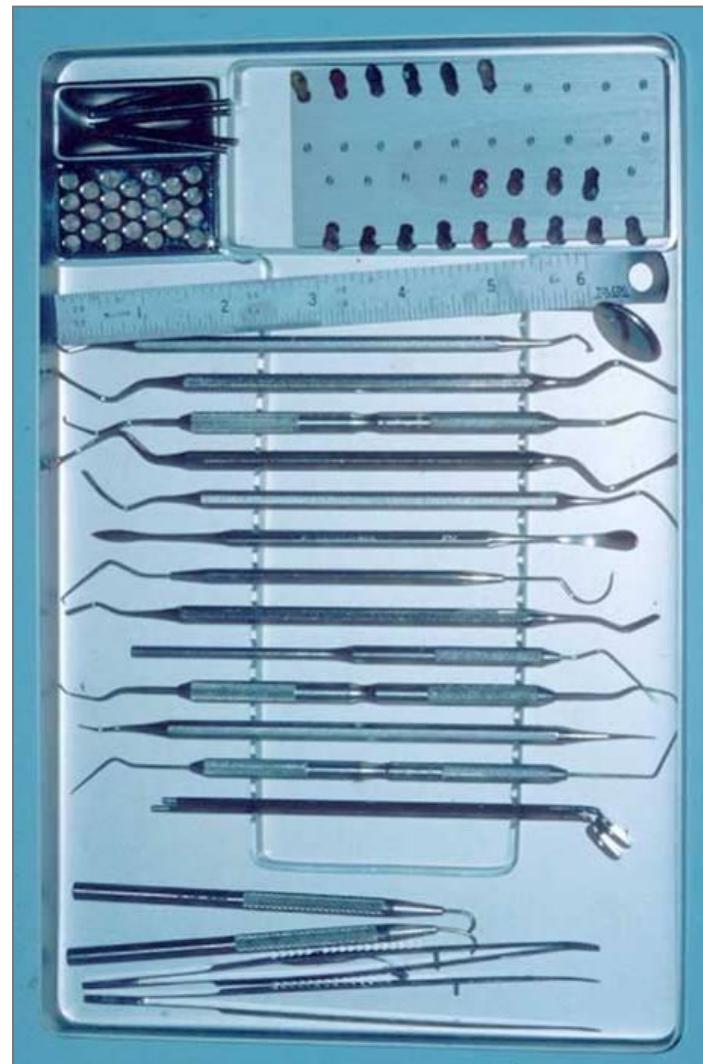
## **Disadvantages**

- ▶ Relatively large cavity required
- ▶ No resistance to dense compaction
- ▶ Washing out the material during flush the bony crypt
- ▶ Setting time 2–4 hours

# Endodontic Surgery – Stages

- a) Consultation, Diagnosis, Treatment Plan
- b) Local Anaesthesia
- c) Periosteal Flap
- d) Curettage
- e) Apicoectomy
- f) Retrograde Endodontic Treatment
  - Apical Bevel, Canal Preparation, Root Filling
- g) Wound Closure – sutures
- h) Post-operative Instructions
- i) Follow-up & Review

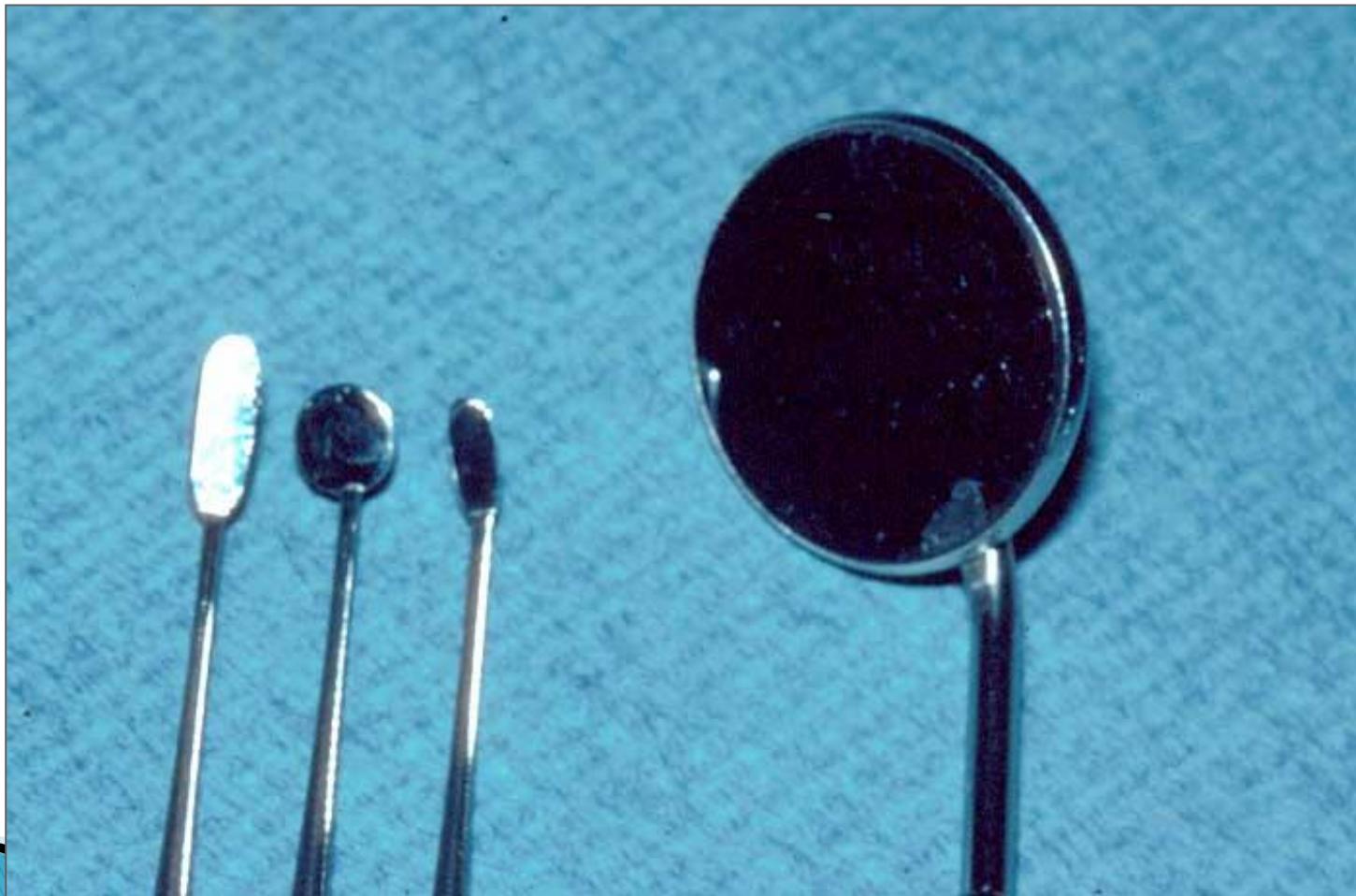
# Instruments



# Endodontic Surgery Kit

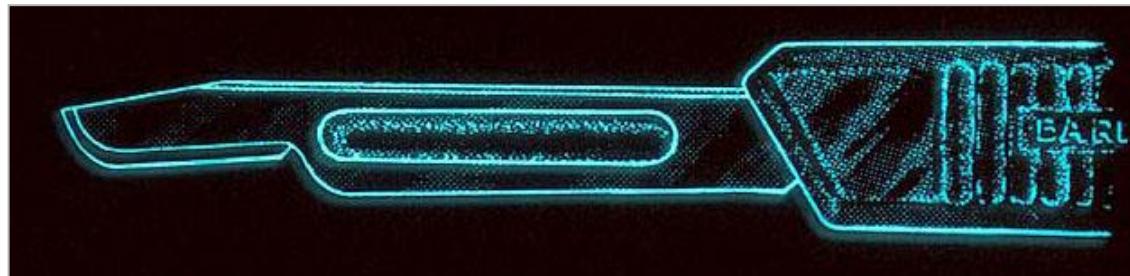
- ▶ Explorer + mirror + Twizer
- ▶ Scalpel
- ▶ Periosteal elevator
- ▶ Curette
- ▶ Tissue Retractors
- ▶ Tissue & suture scissors
- ▶ Needle holder
- ▶ Tissue forceps

# **Micro-Mirrors**

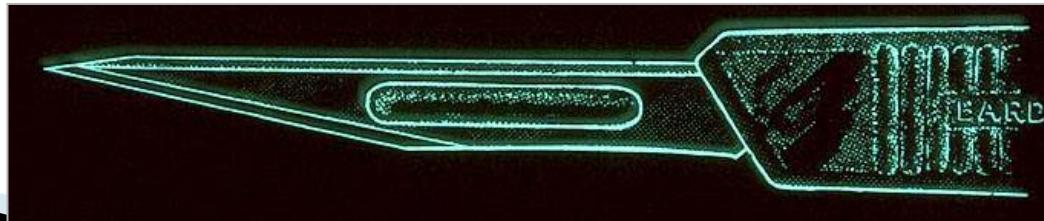


# **Scalpel Blades**

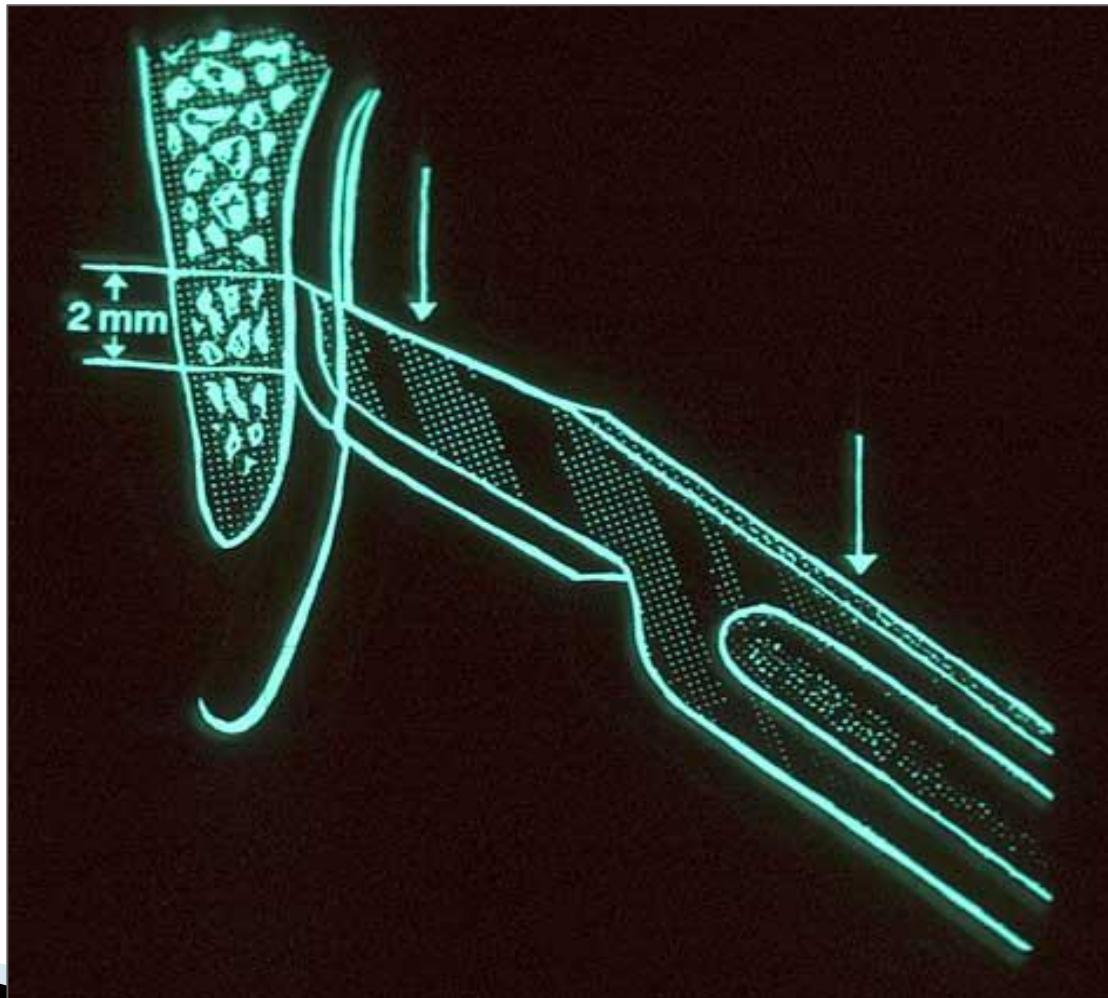
- ▶ No. 15 – for periosteal flaps



- ▶ No. 11 – for incision and drainage
  - Stabbing action



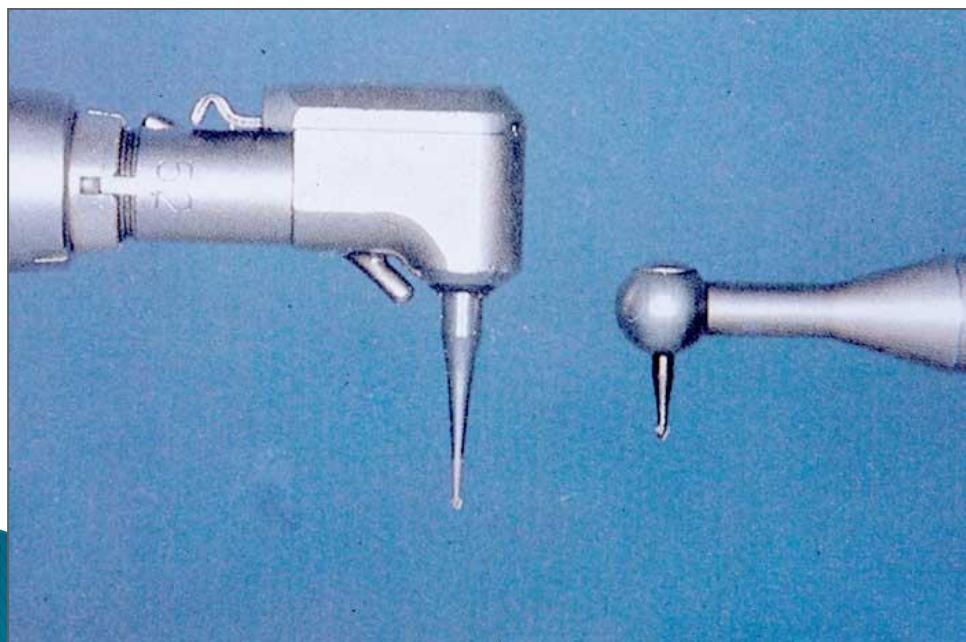
# Scalpel Blades



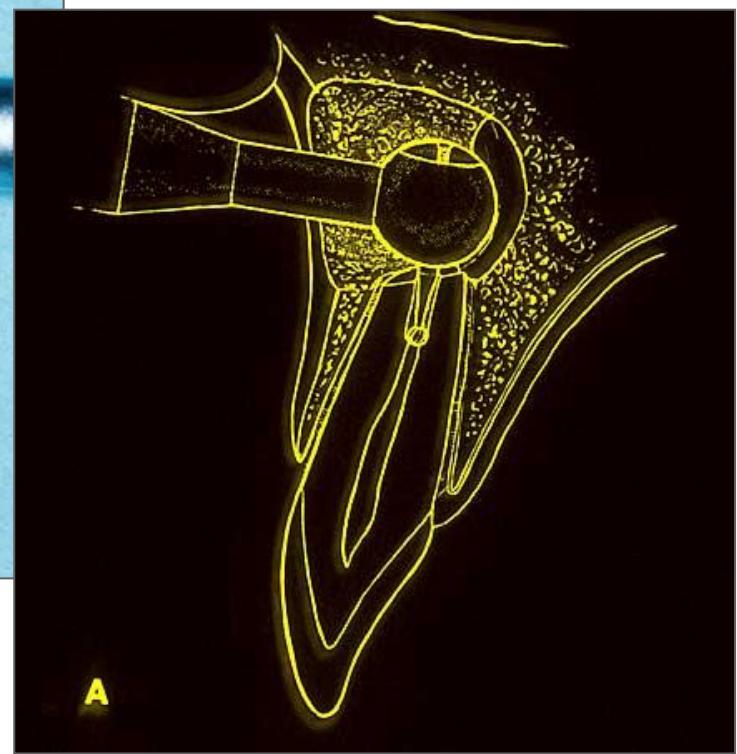
## Hand Pieces

Slow-  
Speed

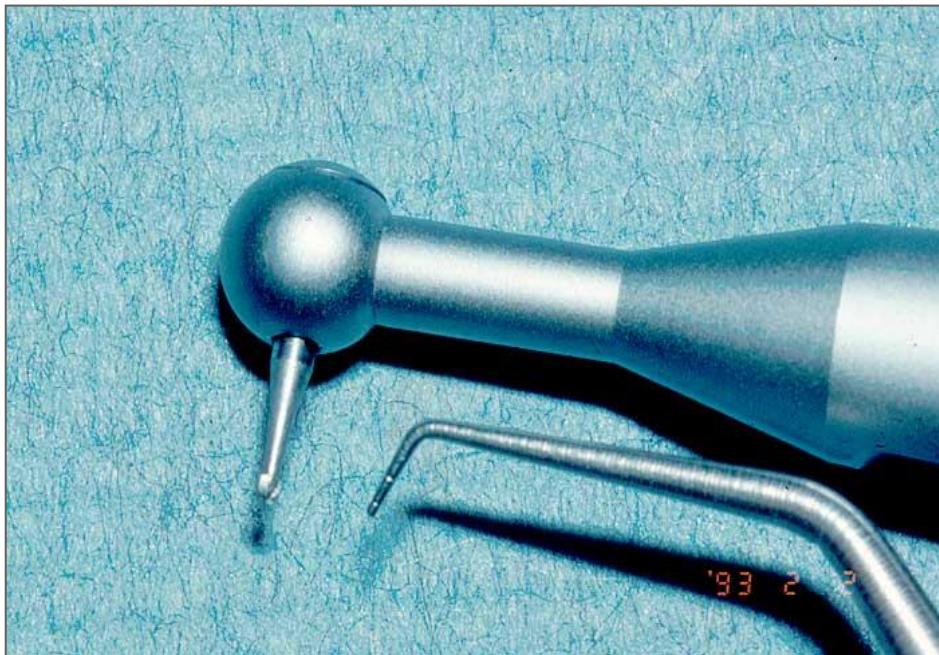
High-  
Speed



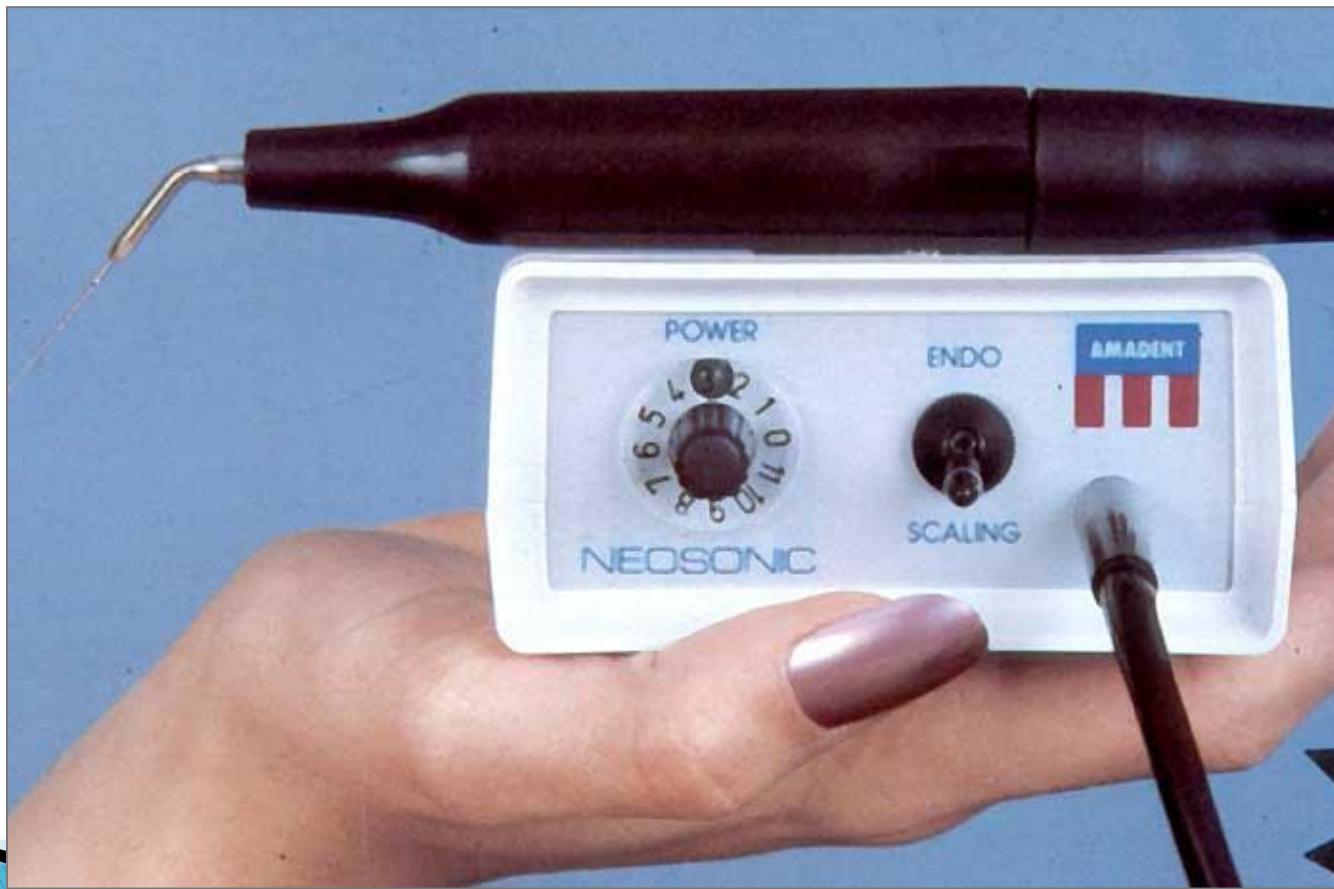
# **Apical Bevel**



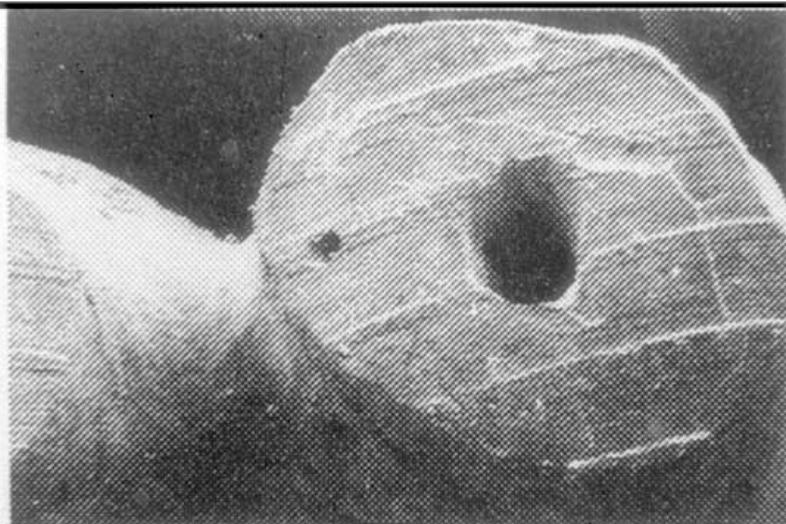
# **Apical Bevel**



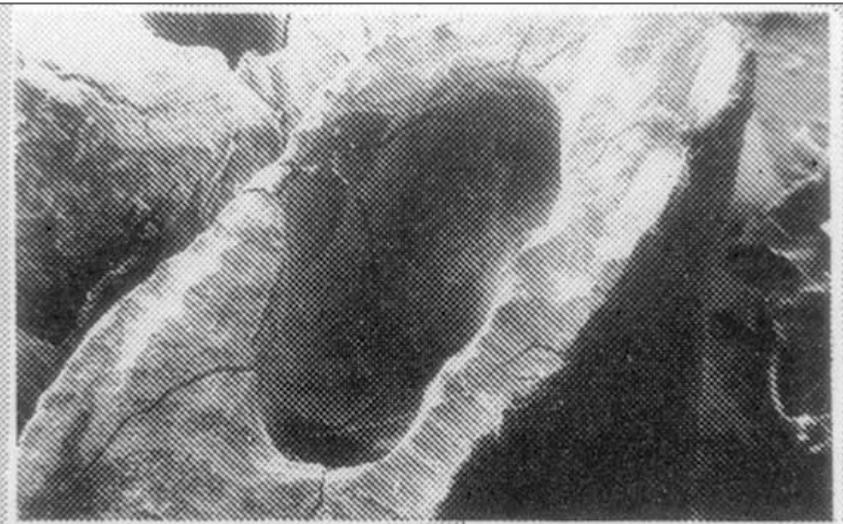
# Apical Bevel



# **Apical Bevel**



**with tips**



**with hand piece**

# Root End Instruments

- ▶ Rotary (microhead handpiece + round & inverted cone burs)
- ▶ Piezoelectric Ultrasonic
- ▶ Minicarriers, Pluggers, & mirrors

# Advantages of ultrasonic instrumentation

- ▶ Cleaner, smaller, deeper preparation
- ▶ More parallel
- ▶ Accurately follow the root canal space
- ▶ Decreased bevel
  - (more bevel=more microleakage)
- ▶ High success rate

# Disadvantages of ultrasonic instrumentation

- ▶ Potential for cracks and chipping

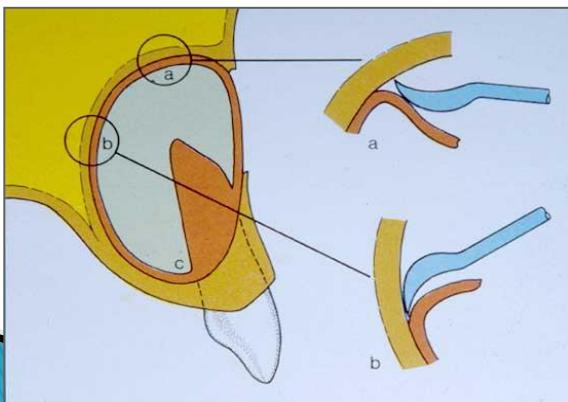
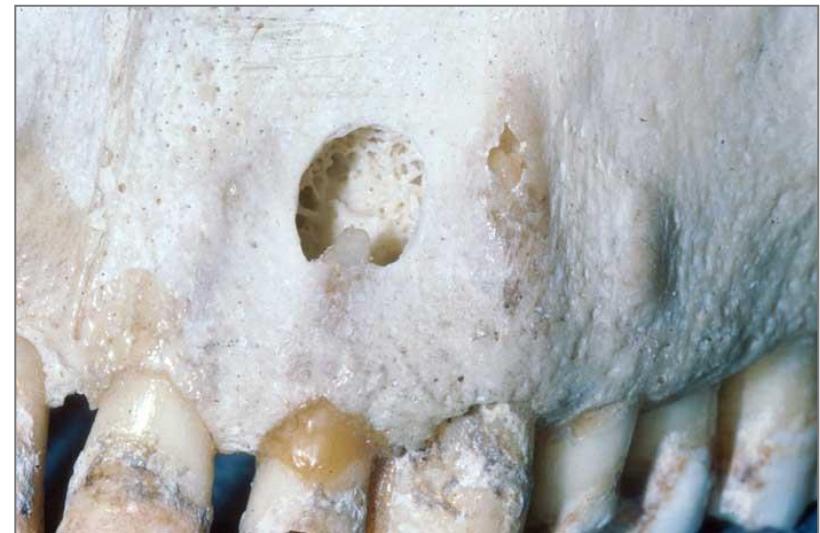
# Microsurgical Instruments

- ▶ Loupes (X2.25 – X6)
- ▶ Glasses (X2.5 – X6)
- ▶ Microscopes (X3 – X30)

# Incision + Periosteal Flap



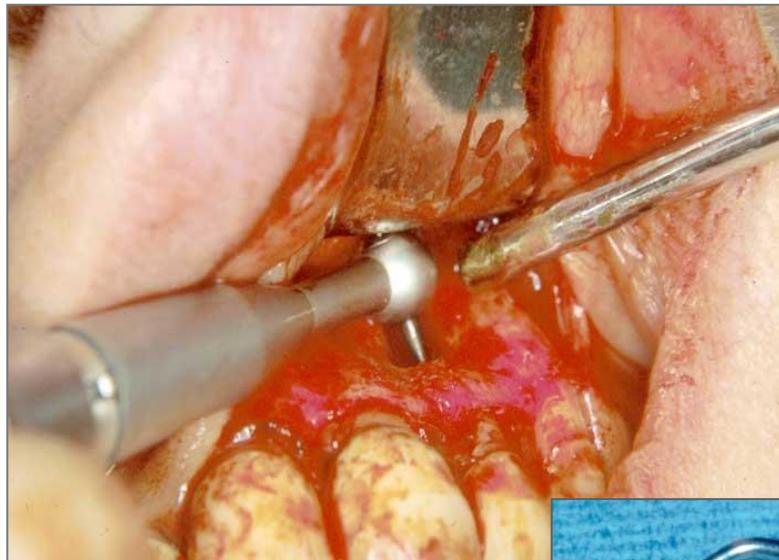
# Bone Removal & Curettage



# Retrograde Canal Preparation



# Retrograde Canal Preparation

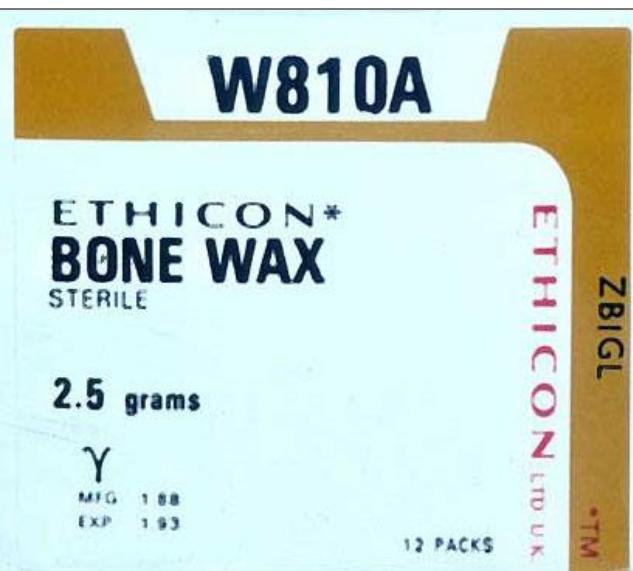


# Retrograde Canal Preparation



## Haemorrhage Control

- 1-Adrenaline → with pressure
- 2-Bone wax (Mechanical)
- 3-Ferric sulfate
- 4-Microcrysatalline collagen substances



# Paper Points



# Sealer - AH 26



# Gutta Percha



# Sealer – Placement



# Retrograde Root Filling



# Retrograde Root Filling



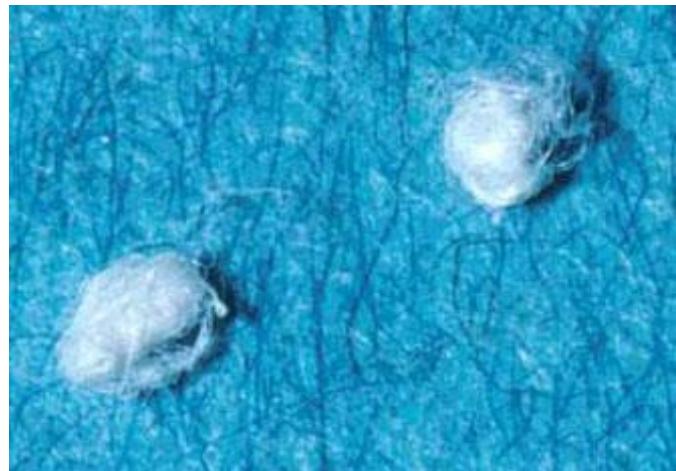
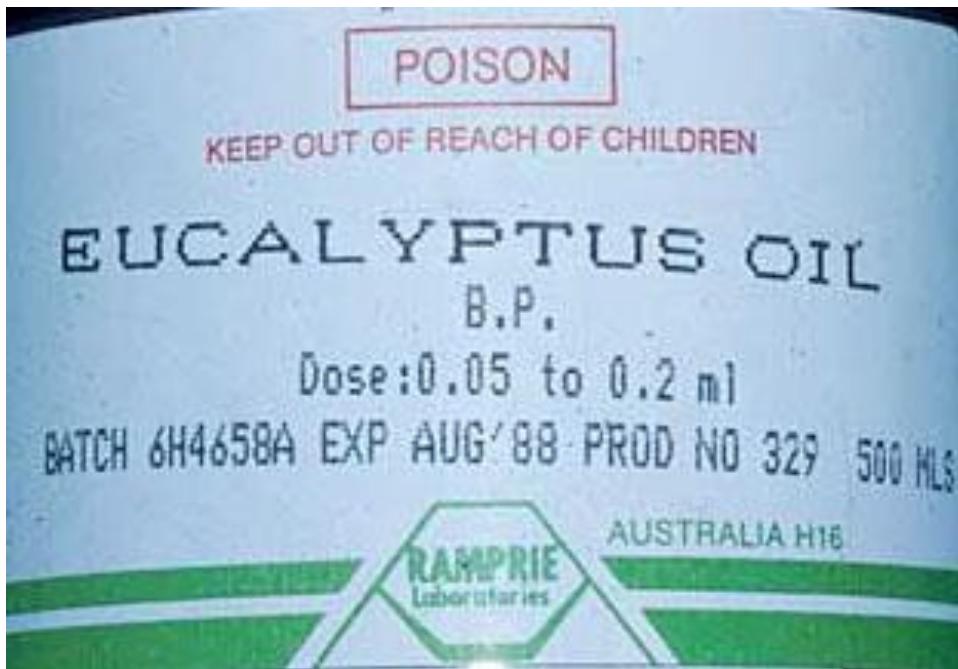
# Retrograde Root Filling



# Retrograde Root Filling



# Retrograde Root Filling



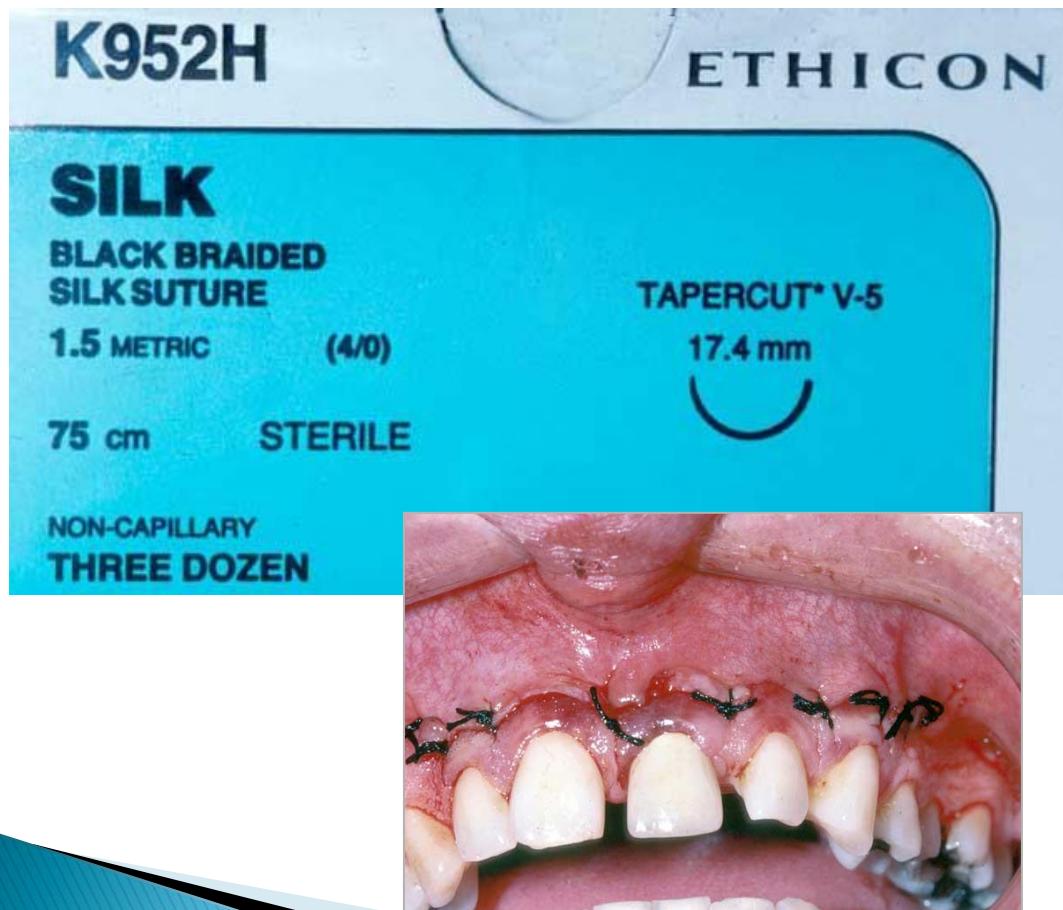
# Retrograde Root Filling



After placement of root end filling, an interim radiograph should be exposed to ensure that:

- 1–Root tip has been totally removed.
- 2–No excess material is present in the ossous crypt.
- 3–Placement of root end filling is adequate.

# Suturing( with absorbable or non absorbable suture)



# After suturing:

- ▶ The flap should be compressed with digital pressure and a moist gauze for 5 - 10 mins. To decrease the size of coagulum and enhances healing.

# **Post-Operative Instructions**

- 1-Ice pack(10 mins. on & 10 mins. off)**
- 2- Rest for a day**
- 3-Analgastics & NSA! drugs (ibuprofen)**
- 4-Antibiotics (**only**) in case of signs and symptoms of systemic infection, or bec. Of patient medical status**

**ALSO:**

**5-Rinsing of surgical site with warm salt water 3-4 times a day, beginning the day after surgery.**

## ALSO:

- ▶ Post-op Radiograph
- ▶ Suture Removal
  - 4–5 days
- ▶ Reviews
  - 3–4 months
  - 12 months
  - 3 years

**Pre-op**



**Mid-surgery**



**Review - 3 months**

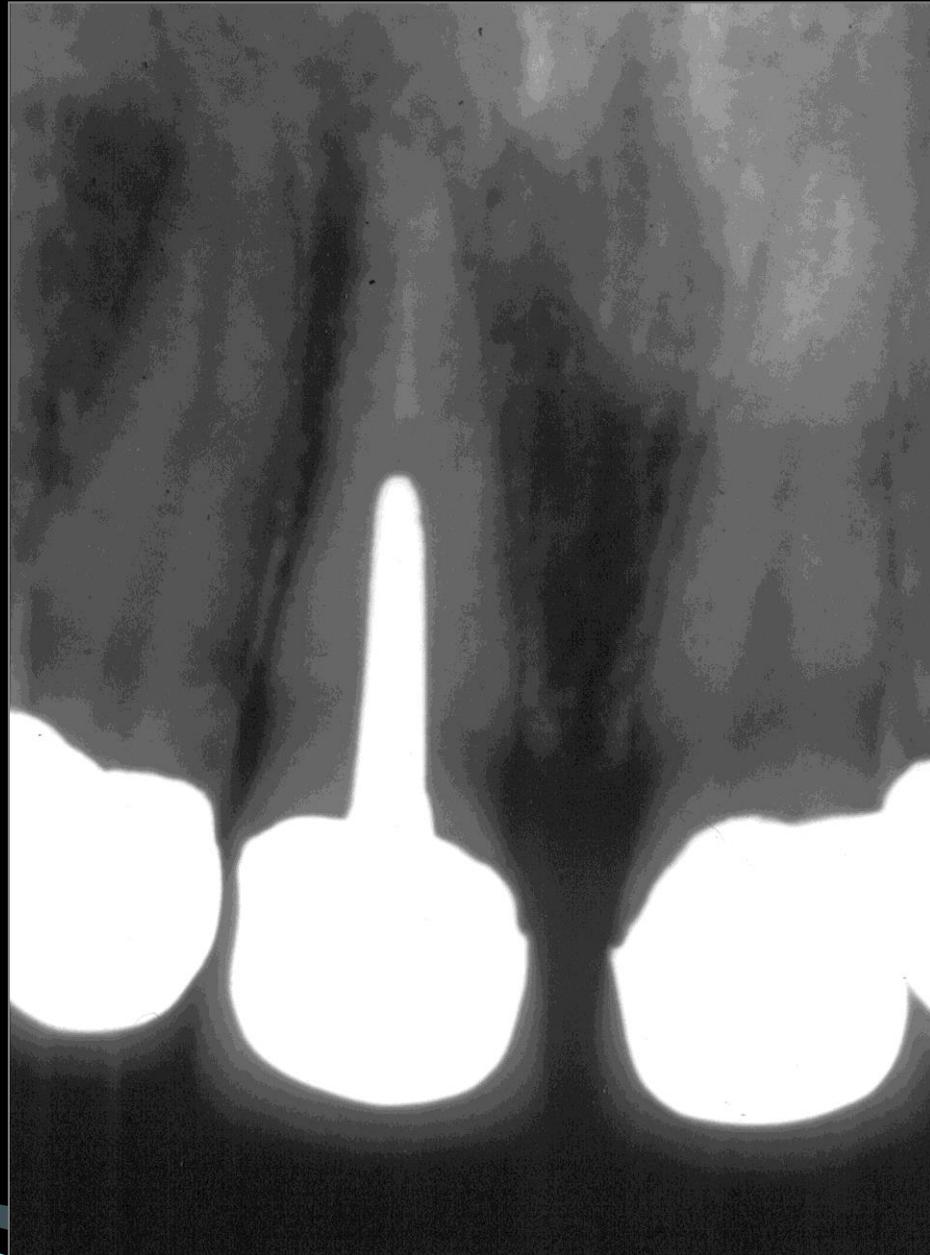


**Review - 12 months**

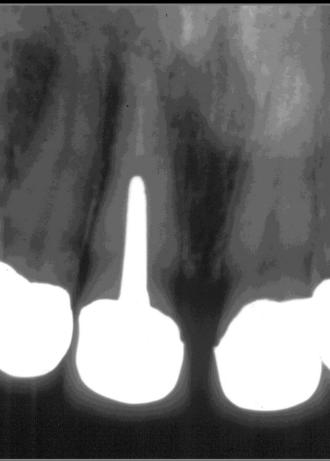


**Review - 3 years**

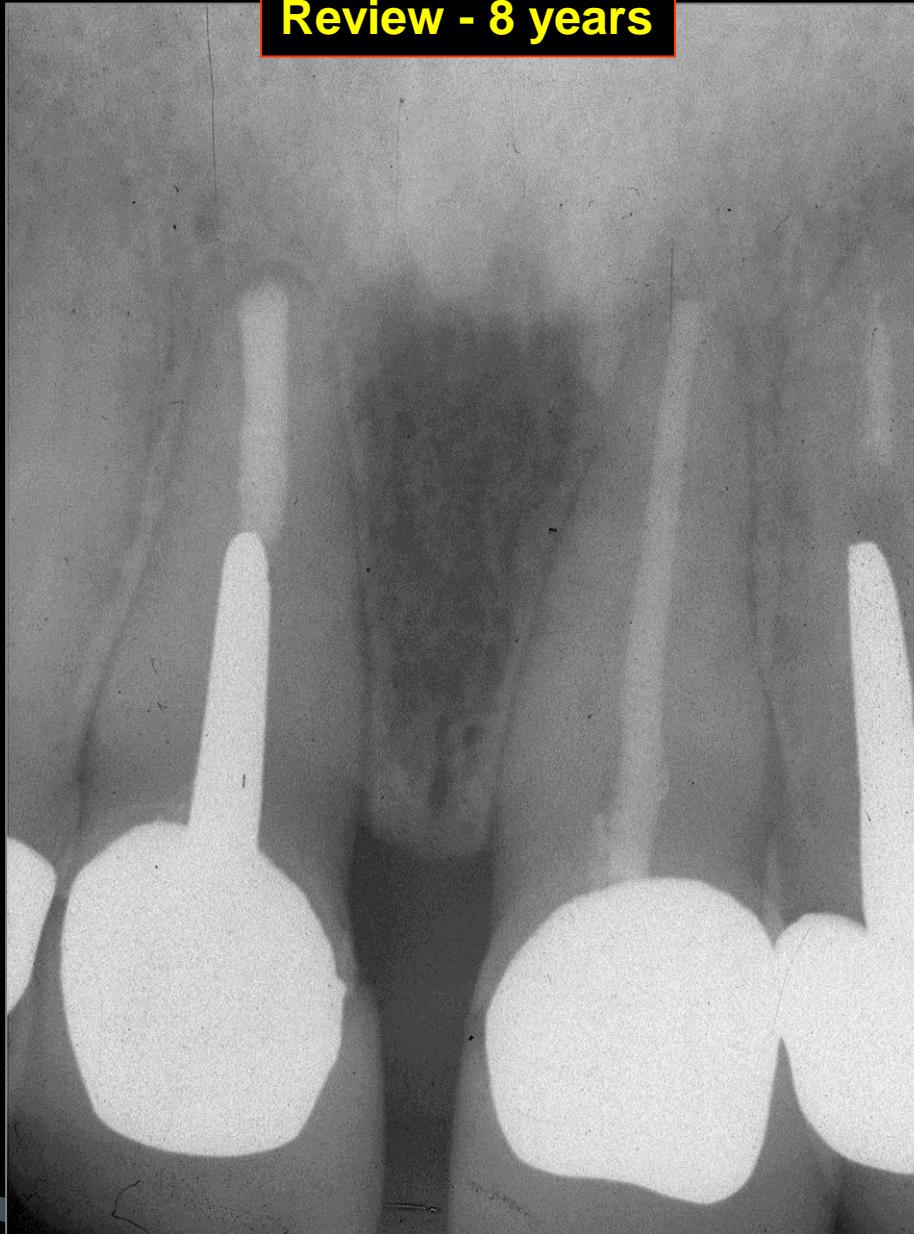
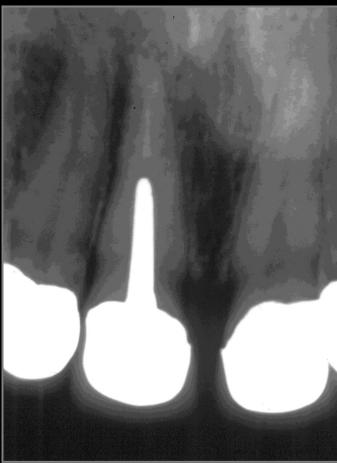




**Post-op**



**Review - 8 years**



***Thank  
You....***