



Procedural errors in endodontics

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DCP 4 - Semester 2



Procedural accidents are also called
endodontic mishaps

■ Classification

I. Inadequately cleaned RC systems

- loss of WL
- Canal blockage
- Ledging
- missed canal

II. Instrument breakage



III.Deviation from normal canal anatomy

- Zipping
- Lateral wall perforation-stripping
- Canal transportation

IV.Inadequate canal preparation

- overinstrumentation
- overpreparation
- underpreparation

V.Perforations

- coronal



-root:cervical
midroot
apical

VI. Obturation related

-overobtured
-underobtured

VII. Vertical root #

VIII. Instrument aspiration

Loss of WL

Causes: rapid increase in file size, accumulation of debris in apex, lack of attention to detail eg, instrument stop moving, changing the reference points

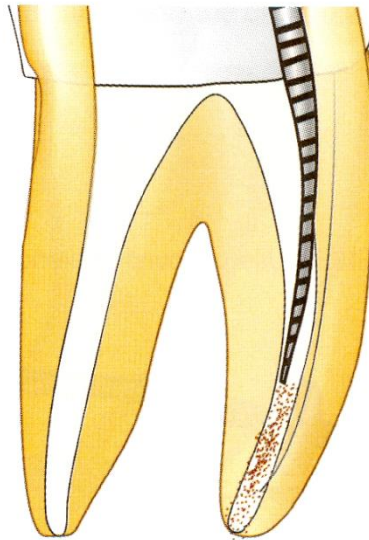



Fig. 16.3: Accumulation of dentinal debris in apical third because of loss of working length

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- Can be corrected by
 1. Frequent recapitulation
 2. Copious irrigation with NaOcl
 3. WL verification
 4. Don't skip sizes
 5. Reliable reference points



Canal Blockage

- Always remove all unsupported tooth structure
- Straight line access
- Use instruments in wet canal
- Good temporary



Use EDTA, with sodium hypochlorite irrigation.

Sometimes ultrasonics can be used to dislodge dentinal debris

If the block cannot be opened, canal can be obturated to that level provided the patient is asymptomatic without any endo/perio problems

Ledges

- Is an internal transportation of the canal which prevents positioning of an instrument to the apex in an otherwise patent canal.
- Treatment: Bypass the ledge with a smaller instrument
- Try to maintain apical foramen patency
- Use NiTi instruments

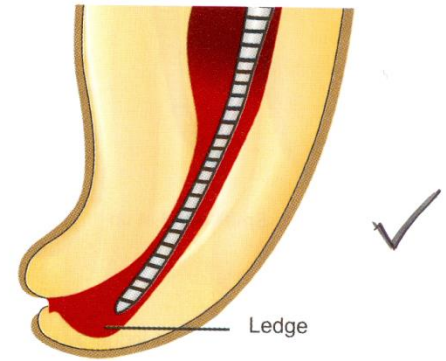
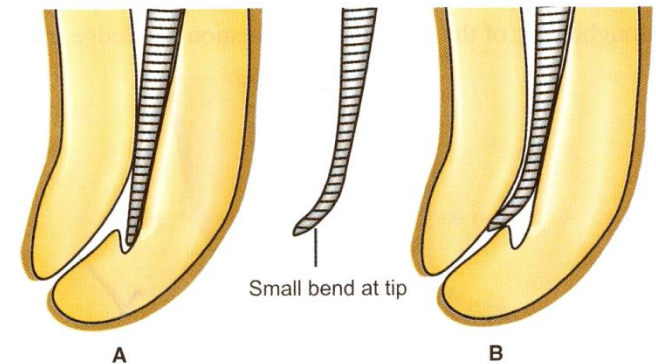


Fig. 16.10: Ledge formation in a curved canal using stiffer files



Figs 16.11A and B: A. Formation of ledge by use of stiff instrument in curved canal. B. Correction of ledge; Ledge is bypassed by making a small bend at tip of instrument. Bent instrument is passed along canal wall to locate original canal

Missed canal

Treatment

- Knowledge of the anatomy

Canal can be located by-
magnification, Surgical microscopes, correct
access, ultrasonics, Dyes, NaOcl-
"Champagne test"

Instrument separation

Studies have shown that broken instrument in a root filled tooth with necrotic pulp has a poor prognosis. But if the instrument can be bypassed, and incorporated in the filling, the prognosis is better.

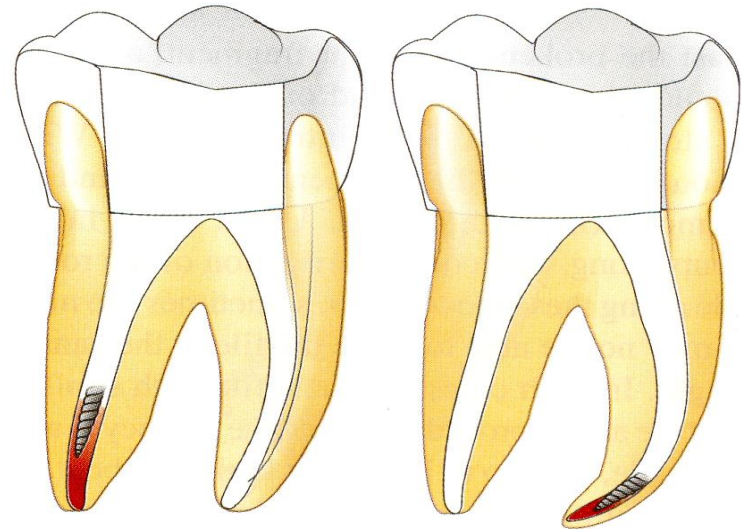



Fig. 16.15: Diameter, curvature of canal and location of instrument affects its removal

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- If the instrument breaks in the later stages of the debridement and closer to the apex, the prognosis is better than if it breaks in an undebrided canal short of the apex or beyond the apex.
 - SEPERATED INSTRUMENT IS NOT THE CAUSE OF FAILURE, but the instrument IMPEDES MECHANICAL DEBRIDEMENT of the canal, which may cause a failure



Treatment

- File Bypass technique
- Use of Gates Glidden bur and the endosonics to dislodge the instrument
- If cannot be removed incorporate the instrument in the final filling

How to prevent instrument separation

- Use stainless steel, NiTi files
- Small sizes should be used 1-2 times
- Examine each file before placing in the canal
- Use in sequence
- Never force
- Work in a wet canal
- Don't give excessive rotation to the file while working with it

Zippering

- Transportation of the apical portion of the canal

Causes

- no pre-curving of files
- forcing of instrument in a curved canal
- large stiff instruments in a curved canal

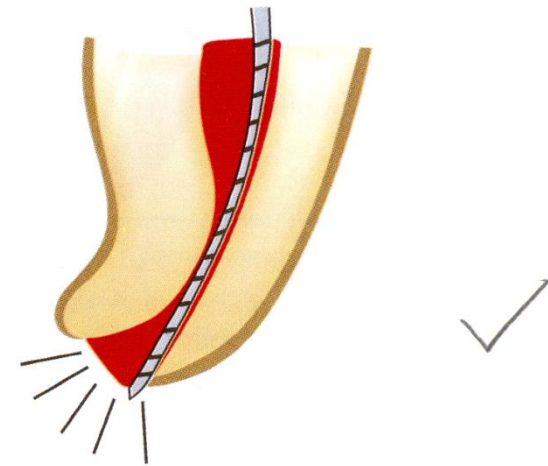


Fig. 16.21: Zippering

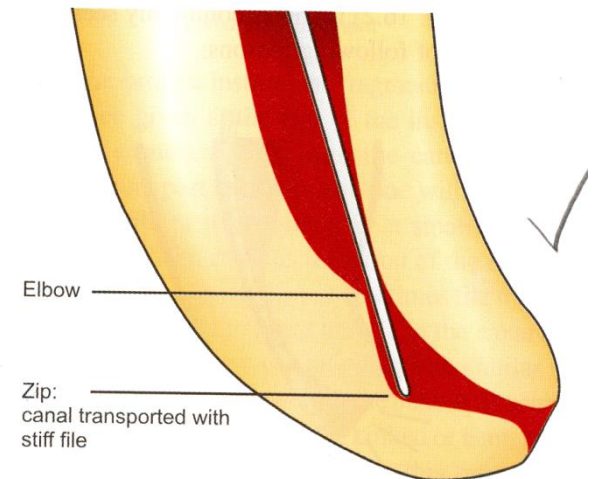


Fig. 16.22: Elbow formed in a curved canal

Stripping

- Lateral perforation caused by overinstrumentation through a thin wall in the root

Management

- very difficult ,success and repair is not predictable
- Calcium hydroxide can be used as a barrier against which to pack the filling material
- Done surgically or non-surgically

■ Prevention

- precurve the files
- modifying the files-removing the flutes
- anti-curvature filing

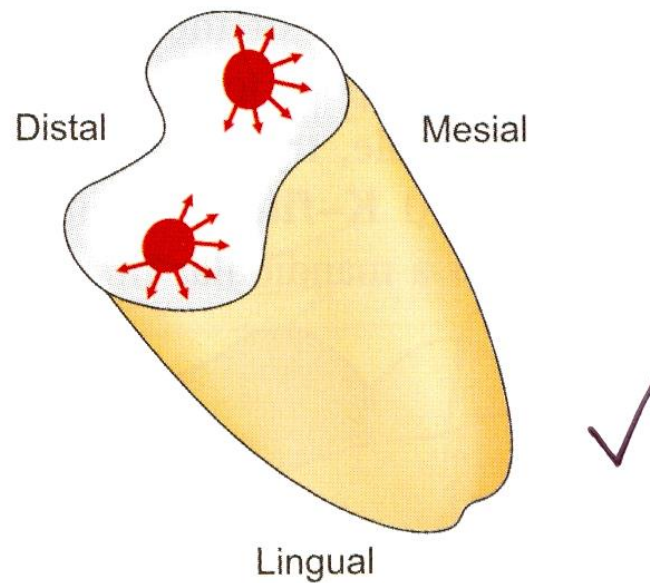


Fig. 16.25: Anticurvature filling



Canal transportation

- Is moving the position of the canals normal anatomic foramen to a new location on the external root surface

- Treatment

Biocompatible material like MTA used as a barrier against which the obturation can be packed

Overpreparation

- Avoid excessive removal of tooth structure as teeth become more weak and are subject to fracture during compaction

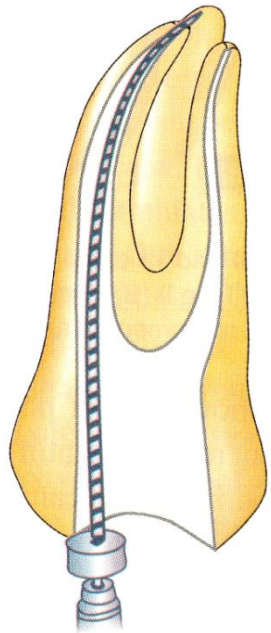


Fig. 16.27: Excessive instrumentation

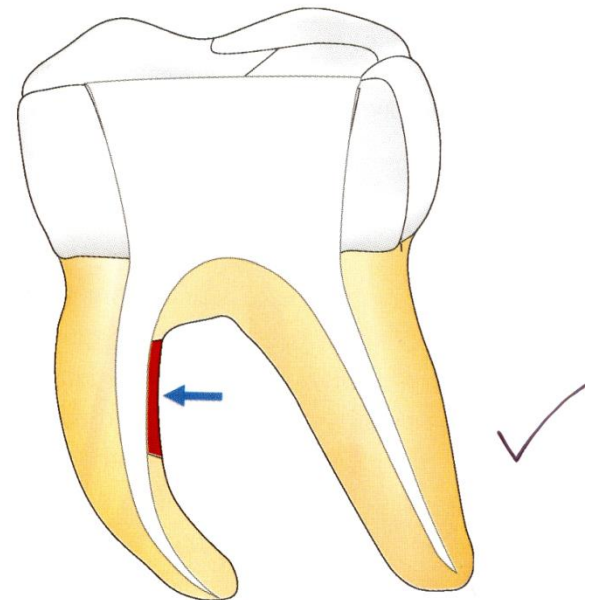


Fig. 16.31: Overpreparation increases the chances of strip perforation (arrow) especially on inner side of a curved canal

Underpreparation

- Failure to remove pulp tissue, dentinal debris and Micro-organism
- If we cannot shape adequately, we cannot obturate adequately
- Follow the principles of WL determination and Biomechanical preparation

Perforations

- Defined as a mechanical or pathologic communication between the rootcanal system and the external tooth surface
- Could be coronal, midroot or apical
- Recognized by
 - radiograph
 - paperpoint
 - Appearance of bleeding
 - pt feels instrument touching the periodontal tissue

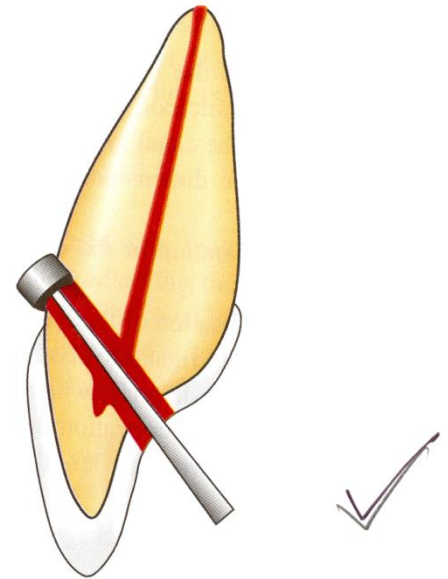


Fig. 16.32: Perforation caused during access cavity preparation

Repair of perforation

Depends on

1. Location of the perforation:

- Perforations at the alveolar crest or coronal to it, prognosis is poor because of epithelial migration and pocket formation
- Perforations in the coronal third surrounded by healthy periodontium has a good prognosis
- Perforations in the furcation has poor prognosis
- Perforations in the middle third and apex which has no communication with the oral cavity has good prognosis.

2. Size:

3. Visibility and accessibility

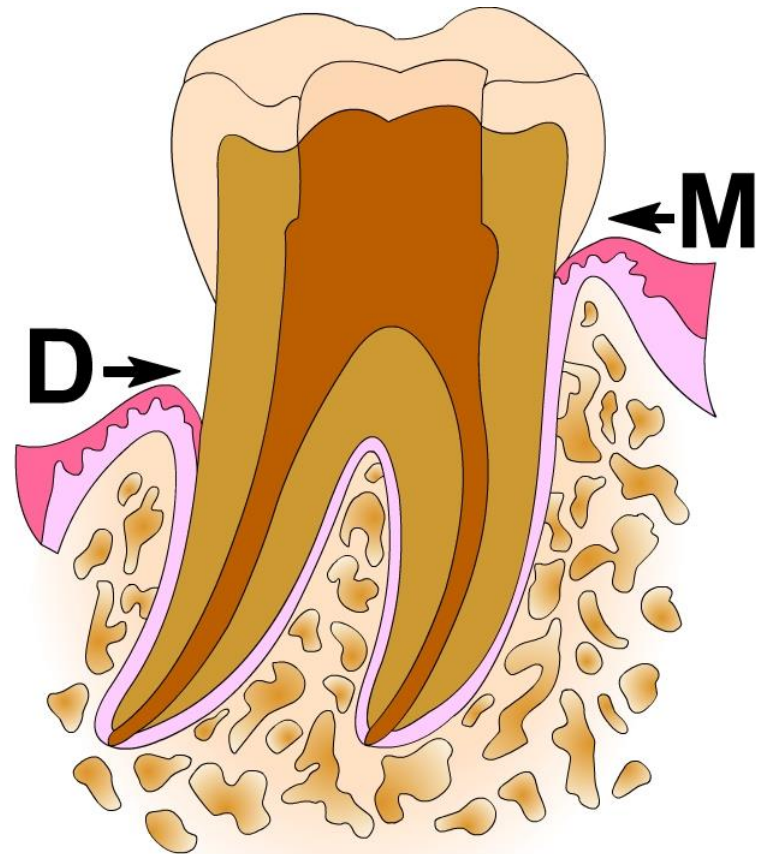
4. Time

5. Associated periodontal status and strategic importance of the teeth

Root perforation – Prognosis

Perforation Location

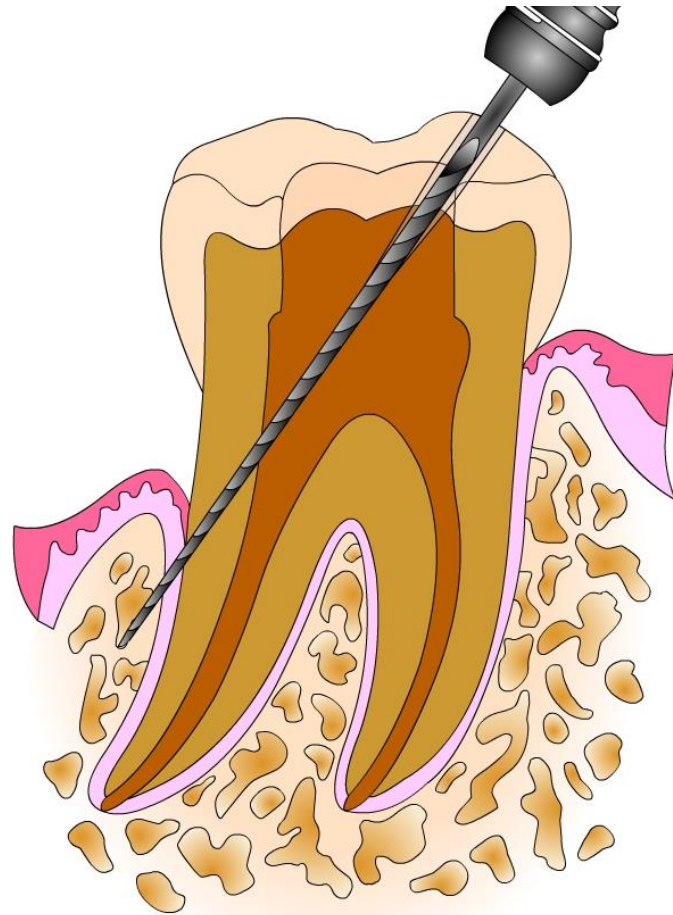
- Critical zone
 - Level of the crestal bone and the epithelial attachment
- Coronal root perforation
 - Coronal to the level of the epithelial attachment and crestal bone
 - Good prognosis



Root perforation – Prognosis

Perforation Location

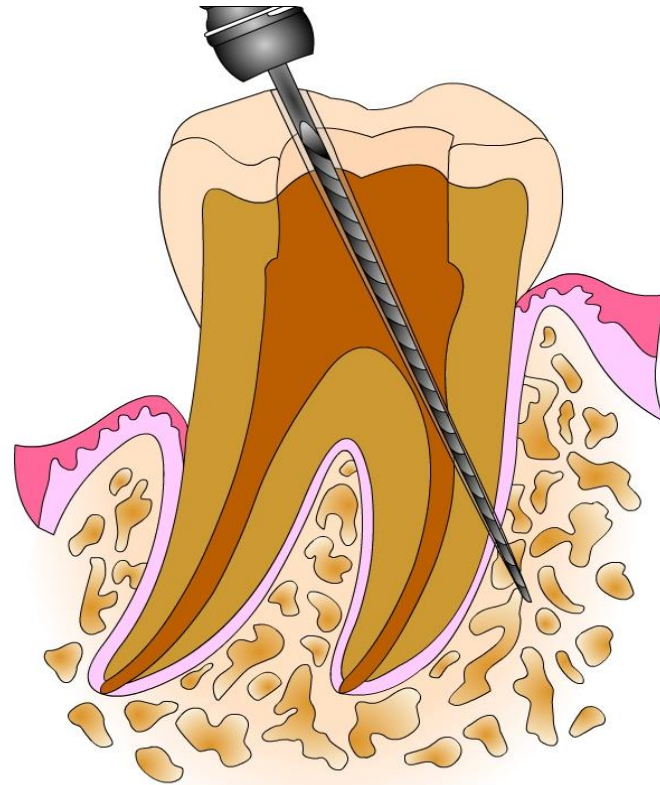
- Crestal root perforation
 - At the level of the epithelial and crestal bone
 - Furcation
 - Poorest prognosis
 - Epithelial migration and pocket formation



Root perforation – Prognosis

Perforation Location

- Apical root perforation
 - Apical to the crestal bone and epithelial attachment
 - Good prognosis
 - Provided effective chemomechanical preparation is possible



Materials used

Amalgam, Calciumhydroxide, IRM, SuperEBA,
MTA, GIC, Hydroxy apatite

Haemostatics used to control the bleeding.

$\text{Ca}(\text{OH})_2$, CaSO_4 , Freezedriedbone and MTA
all have haemostatics

Internal matrix concept-Lemon 1992

- Used for the repair of strip perforations using microsurgical techniques
- Rationale-a matrix was used to control the material and prevent overfilling into periradicular tissues
- Hydroxyapatite was used for accessible perforations

1. Attain haemostasis,
Place GP in the canal
to maintain patency
2. HA is deposited and
condensed with
pluggers to fill the
defect completely
3. Perforation site is
prepared to receive
material-
GIC, amalgam

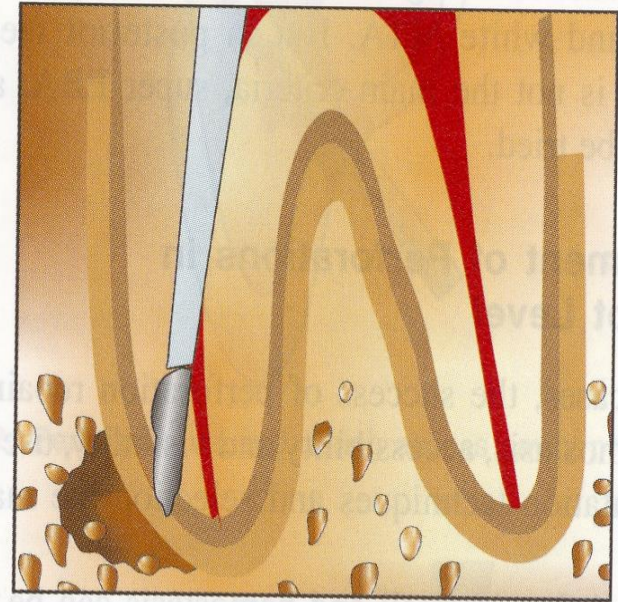


Fig. 16.36: Hydroxyapatite crystals are packed and condensed in perforation using pluggers

MTA(Mineral Trioxide Aggregate)

- Comprised of –Tricalcium silicate
 - Dicalcium silicate
 - Tricalcium aluminate
 - Tetracalcium aluminaferite
 - calcium sulfate
 - bismuth oxide

It is a hydrophilic and requires moisture to set. It is brickhard in consistency, known to induce cementogenesis and bone deposition with almost no inflammatory response.

THE MATERIAL OF CHOICE IN PERFORATIONS

Procedure

- Rubberdam placed,dry the area
- Isolate perforation site
- Mix and prepare the MTA
- Use a carrier to deposit the MTA into the site
- Condense
- While placing the MTA, keep a file in the canal to maintain the patency,move the file up and down to prevent the file from getting frozen in the MTA
- Seal the pulp chamber
- Next appt,recall and obturate the canal

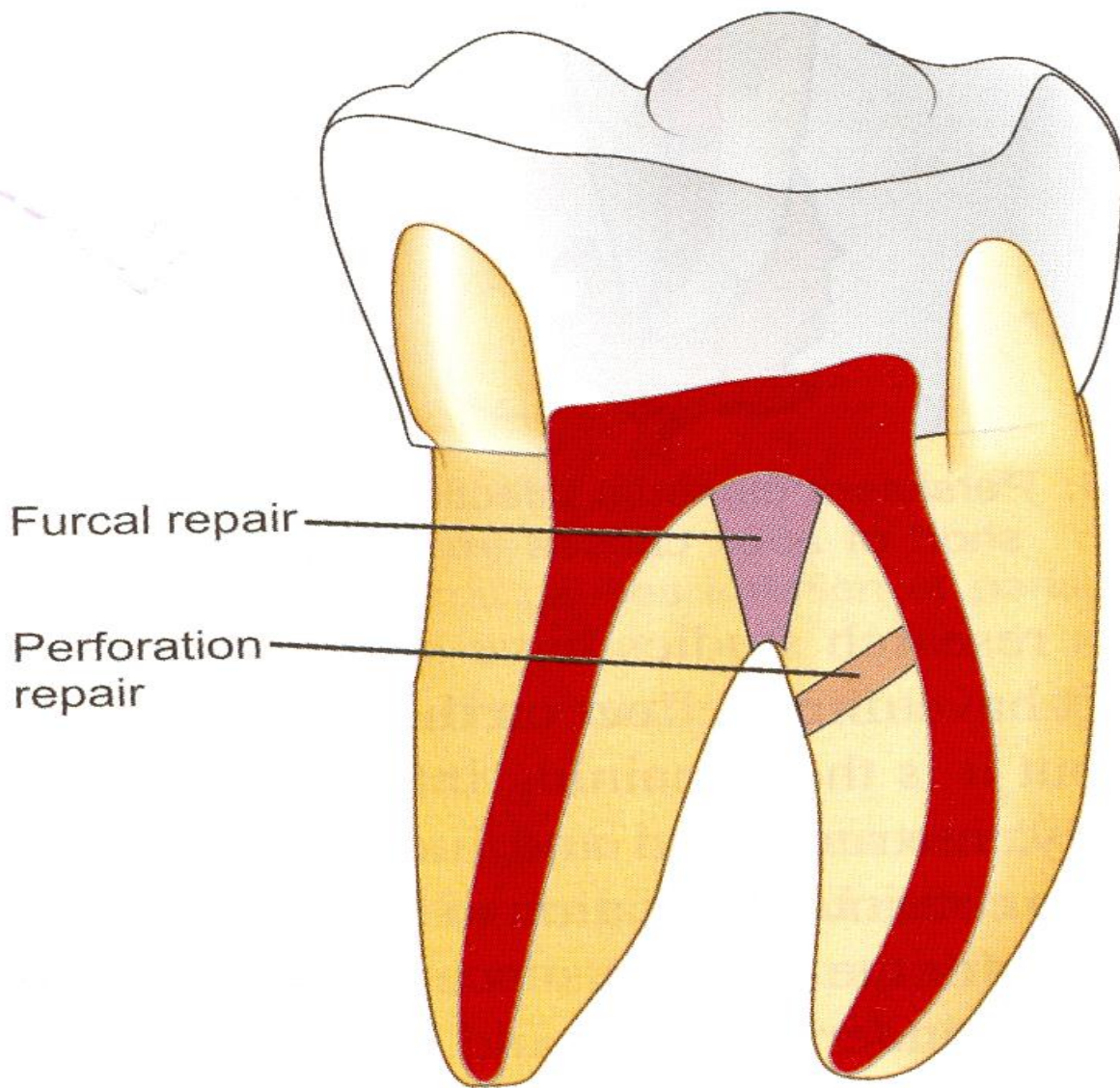


Fig. 16.39: Use of MTA for repair of perforation





Post space perforations

This usually happens due to

- Poor clinical judgement
- Improper orientation of the drill

Underfilling

- Inadequate removal of the infected necrotic tissue remains

In teeth with periapical pathosis, bacteria get colonized around the apex

There is always constant infection in the root canal –shows poor prognosis

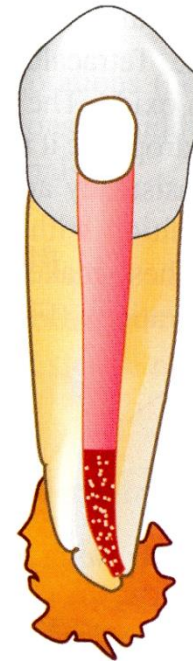


Fig. 16.43: Persistent bacterial infection in root canal with filling short of apex causes treatment failure

Overfilling

This happens due to

- Overinstrumentation
- Wrong WL determination
- Incomplete root apex formation
- Resorption
- Improper reference points

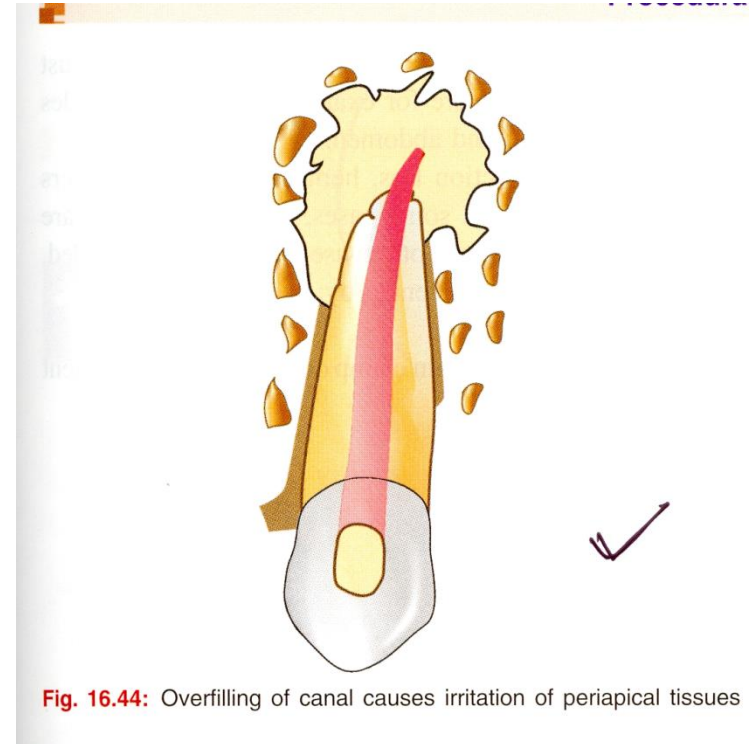



Fig. 16.44: Overfilling of canal causes irritation of periapical tissues



Here the risk of pushing the debris into PA spaces. Studies show that it may cause a foreign giant cell reaction and act as a foreign body which supports the formation of biofilm

BIOFILM is an accumulation of micro-organisms embedded in self produced extracellular polysaccharide matrix adherant to a solid surface



Vertical root fracture

- Avoid weakening the wall
- Minimize the internal wedging forces
- Reduce compaction forces while obturation

Treatment

1.Extraction

2.Hemisectomies or root resections can be tried



Aspiration of instrument

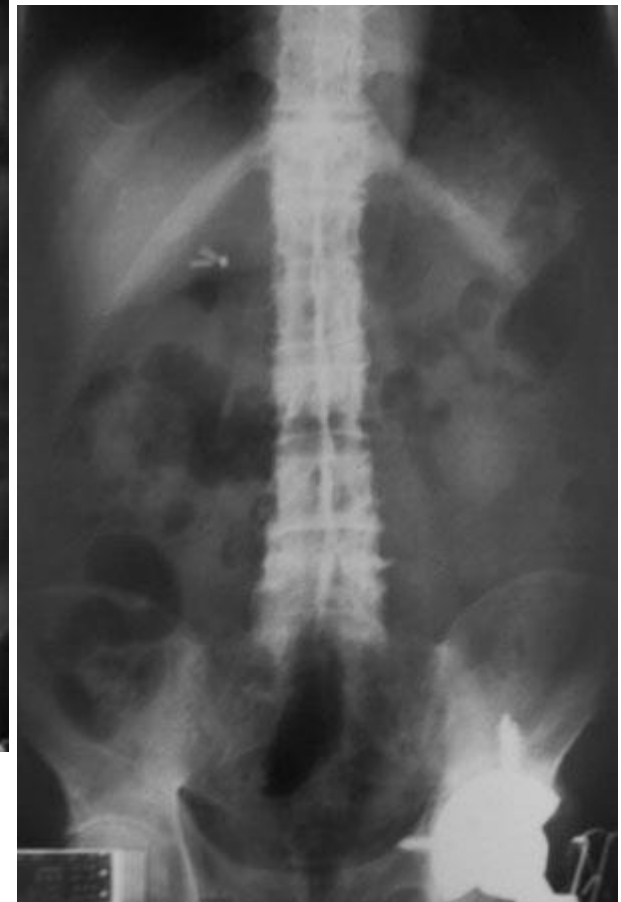
Incase it happens

High evacuation suction tip, haemostats or cotton pliers

Radiograph of the chest and abdomen

Hiemlich manouver

Tie instruments with floss



Let your hands be healing hands!!

Thankyou

