NONSURGICAL
ROOT CANAL RETREATMENT
Causes of failures

- Preoperative causes
- Operative causes
- Postoperative causes
Preoperative causes

- **Diagnosis** usually results from misinterpretation or lack of information either clinical or radiographic.
Preoperative causes

- **Case selection:** to determine the feasibility & practicality of Tx including the patient’s co-operation

- **Prognosis**
Operative causes

Major causes of endo failure

(76% of Washington study)
Operative causes

- Failure to obtain:
  - mechanical objectives (cavity preparation)
  - biologic objectives (remove irritants & control infection & inflammation) ex: Untreated canal
Untreated canal space

- **Primary cause of failure**

- Most commonly left untreated canals are: 2\textsuperscript{nd} distal canal in mand molars, 2\textsuperscript{nd} canal in MB root of max molars & Li canal in mand anteriors
Previous access is often underextended & must be corrected to facilitate removal of materials to allow further canal enlargement.
Postoperative causes

- Trauma/fracture
- Poorly designed or lack of final restoration
Long-term leakage

**Temporary restorations** has been identified as a **primary cause** of endo failure following root canal obturation.
It is no longer necessary to wait for extended periods of time after RCT to restore the tooth.
Micro-organisms in 1° Tx

- Dominate with facultative anaerobes (flora in oral cavity)
- Polymicrobial 2-10 species per canal
- Minority of enterococci & yeasts
Micro-organisms in 2° Tx

- Dominate with facultative anaerobes (E. faecalis)
- Yeasts
Indications

- Symptoms / fistula
- Coronal leakage
- Lesion increases in size
Indications

- No healing after 4 yr of Tx
- Poor technical quality of earlier Tx (not always)
No reTx for poor technical quality if...

- No symptoms
- No pathology
- No need for new restorations
- No coronal leakage
Table I. Clinical outcome after nonsurgical retreatment with respect to the initial size of periapical lesions and the type of previous treatments

<table>
<thead>
<tr>
<th>Previous treatment groups</th>
<th>Initial size of lesions (mm)</th>
<th>Complete healing</th>
<th>Incomplete healing</th>
<th>Failure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Root canal therapy (E)</td>
<td>≤5 mm</td>
<td>28</td>
<td>68.3</td>
<td>5</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>0-2 years</td>
<td>3-4 years</td>
<td>5-6 years</td>
<td>7-8 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 years</td>
<td>5 years</td>
<td>14 years</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;5 mm</td>
<td>20</td>
<td>58.8</td>
<td>5</td>
<td>14.7</td>
</tr>
<tr>
<td></td>
<td>0-2 years</td>
<td>3-4 years</td>
<td>5-6 years</td>
<td>7-8 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 years</td>
<td>5 years</td>
<td>6 years</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Surgery (S)</td>
<td>&gt;5 mm</td>
<td>5</td>
<td>45.5</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td>0-2 years</td>
<td>3-4 years</td>
<td>5-6 years</td>
<td>7-8 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 year</td>
<td>2 years</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>53</td>
<td>61.6</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>0-2 years</td>
<td>3-4 years</td>
<td>5-6 years</td>
<td>7-8 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 years</td>
<td>12 years</td>
<td>22 years</td>
<td>12 years</td>
<td></td>
</tr>
</tbody>
</table>
Contra-indications

- Vertical fracture
- No bone support
- Restoration is not possible
Contra-indications

- No function or esthetic value
- Healing with scar tissues
- Lesion under healing
Criteria for case selection in retreatment

ENDODONTICALLY TREATED TOOTH

- ESTABLISHED FAILURE
  - feasibility of coronal access
  - UNFEASIBLE<br>  - FEASIBLE<br>  - CONSIDERATIONS
  - SURGERY<br>  - RETREATMENT

- POTENTIAL FAILURE
  - evaluation of obturation quality
  - evaluation of treatment results
  - UNSATISFACTORY<br>  - SATISFACTORY
  - need of new restoration
  - NEEDED<br>  - NOT NEEDED
  - FOLLOW-UP<br>  - NO TREATMENT
Criteria for case selection in retreatment

- Clinical considerations
  - Case history
  - Clinical situation
  - Co-operation of patient
  - Capability of clinician
Criteria for case selection in retreatment

- **Radiographic considerations**
  - Intra & extra interference: separated instruments, perforation
Criteria for case selection in retreatment

- Radiographic considerations
  - Root filling
  - Anatomy
<table>
<thead>
<tr>
<th></th>
<th>Relatively Easy</th>
<th>Moderately Difficult</th>
<th>Extremely Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crown</strong></td>
<td>Remove and new replacement</td>
<td>Retreat through and repair</td>
<td>Remove intact and reuse</td>
</tr>
<tr>
<td><strong>Posts</strong></td>
<td>Non-metallic Possible to drill out</td>
<td>Metallic Tapered Smooth-sided</td>
<td>Metallic Parallel-sided</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conventional cement Regular size</td>
<td>Threaded Adhesive cement</td>
</tr>
<tr>
<td><strong>RFM</strong></td>
<td></td>
<td>Well-condensed</td>
<td>Overextended</td>
</tr>
<tr>
<td>Gutta percha</td>
<td>Loose, single cone, or poorly condensed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silver point</td>
<td>Good access Coronal extension</td>
<td>Good access No coronal extension</td>
<td>Restricted access No coronal extension</td>
</tr>
<tr>
<td>Cement or paste</td>
<td>Non-setting, soft</td>
<td>Semi-solid, soluble</td>
<td>Hard and dense, not soluble</td>
</tr>
</tbody>
</table>

* RFM, root filling material
Retreatment planning

Gaining access to root canals

A
- CORONAL RESTORATION A-1
  - quality of restoration
  - prosthetic demand

- POST AND CORE A-2
  - type, size of post
  - crown preservation
  - multirooted teeth

B
- PASTES AND CEMENTS B-1
  - consistency

- SEMISOLIDS B-2
  - condensation
  - shape of root
  - obturation length

- SOLIDS B-3
  - coronal free ends
  - canal cross section
  - location and accessibility

RETAIN (perforate or recement)

REMOVE (to be remade)

REMOVE (post & core)

RETRIEVE (post alone)

PENETRATE (through core)

PENETRATE REMOVE DRILL OUT

DISSOLVE REMOVE PULL OUT

PULL OUT BYPASS DEVICES
Gain access to root canals

- Coronal rest (retain/remove)
  - Tooth morphology
  - Radiographs
  - Fractures
  - Endo cavity
  - Tooth isolation
  - Tooth function
Coronal Restoration

Marginal integrity
Aesthetics
Replacement cost
Ease of removal
New restoration planned

Retain
Remove

Repair
Reuse
Replace
Crowns

 Advantages
  ◆ Aseptic condition & Function

 Disadvantages
  ◆ Visibility (Radiograph & Clinic)
  ◆ Difficulty of access
  ◆ Leakage
Gain access to root canals

Post & core

- Remove
- Retrieve (post alone)
- Penetrate (through core)
Gain access to apical foramen

- Pastes & cements (9.5%): dissolve with solvents/drill out
- Semisolid materials: GP (53.6%): dissolve/pull out
- Solid materials & obstructing objects (20.6%): pull out/by pass
Retreatment of pastes & cements

- **Soft-setting pastes**
  - Instrumentation with copious irrigation

- **Hard-setting cements**
  - Dissolve with solvents
  - Dispersion by ultrasonic
  - Drill with rotary instruments
Retreatment of gutta-percha

- **Coronal portion**
  - Drill out/heat carrier
- **Quality of condensation**
  - Poorly condensed: pull out
  - Overextended: must not be dissolved but by pass & pull out
Dissolving gutta-percha

- **Chloroform**: most effective, widely used, evaporates rapidly, carcinogen, toxic
- **Xylene**: highly toxic, evaporates too slowly
- **Eucalyptol**: less toxic & less effective solvent
Dissolving gutta-percha

- Best used in **small & curved canals**
- “**Wicking**” dry solvent-filled canals with **paper point**, always the **final step** because it will remove residual GP & sealer out of fins, cul-de-sacs
Pulling out gutta-percha

- Technique of choice when the GP is poorly condensed
- K-files are used to bypass the obturation
- Hedstrom files are engaged into loosely condensed GP
Pulling out gp
Rotary removal of gutta-percha

- Safe in straight canals
- Slowly without force
- NiTi 04 & 06 tapers are the most effective
Retreatment of solid objects

- Bypass with hand instruments
  - Multiple files
  - Lengthy procedure
  - Intermittent irrigation with lubricant
Retreatment of solid objects

- **Grasp & pull out**
  - Stieglitz or Perry pliers
  - Hemostat
  - *Ultrasonic vibrates the object which is cemented in the canal*
Retreatment of solid objects

- Bypass with ultrasonic inst
- Special grasping devices
  - Masserann kit: straight root, sacrifice radicular dentine
  - Wire loop technique
  - Instrument Removal System
FIG. 25-52 Retreatment of a broken file with the Masserann technique. A, Preoperative radiograph of mandibular molar with a broken instrument in the mesiolingual canal. B, Radiographic controls showing the location of the instrument and the mild root curvature. C, Radiographic control showing the use of the Masserann Kit. D, Removal of all obturation but the obstructing broken file. E, Radiographic control showing the instrument with the Masserann trepan (arrow). F, The obstructing file was successfully removed. G, Postoperative radiograph showing the canal walls were reduced.
**5 Steps to IRS™ Extraction**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prepare Access</td>
</tr>
<tr>
<td>2</td>
<td>Free the Obstruction</td>
</tr>
<tr>
<td>3</td>
<td>Position</td>
</tr>
<tr>
<td>4</td>
<td>Secure</td>
</tr>
<tr>
<td>5</td>
<td>Extraction</td>
</tr>
</tbody>
</table>

- **Prepare Access**
  - Ensure canal access is straight, by using Gates

- **Free the Obstruction**
  - Free the upper part of the obstruction by cutting the dentine, using ProUltra Tips 6-8

- **Position**
  - Place the appropriate microtube on the upper part of the obstruction
    - Narrow canals (Ø int. 0,6 mm)
    - Wide canals (Ø int. 0,8 mm)

- **Secure**
  - Insert the screw wedge into the microtube. Screw progressively in a counter-clockwise direction to secure the obstruction in the side opening of the microtube. Withdraw everything by turning to the left.

**IRS™ Instrument Removal System**

- The multi-purpose extractor for endodontics... which can deal with more than one obstruction
- Side opening to secure the obstruction before extraction
- Microtube shaped to penetrate the canal better
Completion of retreatment

- Canal may be further enlarged
- Intracanal medicament

Table 1. Positive culture results from the root canals during retreatment of failed endodontic cases in forty single-rooted teeth

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Dressing: CHX+Ca(OH)₂</th>
<th>Dressing: Ca(OH)₂</th>
<th>Total positive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All samples</td>
<td>C contained Enterococcus</td>
<td>All samples</td>
</tr>
<tr>
<td>C1</td>
<td>20</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>C2</td>
<td>2</td>
<td>—</td>
<td>7</td>
</tr>
<tr>
<td>C3</td>
<td>7</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>C4</td>
<td>2</td>
<td>—</td>
<td>3</td>
</tr>
<tr>
<td>C5</td>
<td>4</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>
Completion of retreatment

- One appointment may not be advisable
- Long-term success rate is lower than initial treatment
Resources:

- Problem Solvings in Endodontics, 3rd edn
- Pathways of the Pulp, 9th edn
- Principles & Practice of Endodontics, 2nd edn
- Endodontic Therapy, 5th edn