Obturation of the Root Canal System: cold and warm techniques

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Based on Cohen's Pathways of the Pulp 10th edition, Chapter 10

CHAPTER OUTLINE

The neccessity of obturation

- Pulpal remnants, necrotic tissue, bacteria, and bacterial by-products remaining - initiate a lesion
- Cannot be completely cleaned and disinfected

- Obturation reduces coronal leakage
- seals the apex
- entombs the remaining irritants

Ideal root canal filling

- Core material + sealer
- obturated root canal should reflect the original canal shape
- Radiographic interpretation

Function of the Sealer

- to seal the space between
  - the dentinal wall and the obturating core
  - gutta-percha points
- To fill voids and irregularities in the root canal, lateral and accessory canals
- lubricants

Ideal sealer (Grossman)
At present no sealer satisfies all the criteria.

Properties of an Ideal Sealer

- Exhibits tackiness when mixed to provide good adhesion between it and the canal wall when set
- Establishes a hermetic seal
- Radiopaque, so that it can be seen on a radiograph
- Very fine powder, so that it can mix easily with liquid
- No shrinkage on setting
- No staining of tooth structure
- Bacteriostatic, or at least does not encourage bacterial growth
- Exhibits a slow set
- Insoluble in tissue fluids
- Tissue tolerant; that is, nonirritating to periradicular tissue
- Soluble in a common solvent if it is necessary to remove the root canal filling

Types of Sealers

- zinc oxide–eugenol
- calcium hydroxide sealers
- glass ionomers
- resins

Zinc Oxide and Eugenol

- Long time usage, still on the market
- slow setting time, shrinkage on setting, solubility, discoloration
- antimicrobial activity

Calcium Hydroxide Sealers

- ? Antimicrobial activity, osteogenic–cementogenic ?
- Solubility

Glass Ionomer Sealers

- dentin-bonding – difficulties to treat apical and middle thirds with preparatory bonding agents
- Retreatment?
- minimal antimicrobial activity

Resin

- AH-26 (Dentsply), epoxy resin with formaldehyde, slow-setting
- AH Plus, no formaldehyde, 4 hours.
- Diaket, a polyvinyl resin (3M ESPE)

AH Plus (gold standard)

- (http://www.dentsply.ch/bausteine.net/f/7299/SCAHPlus050419rMV(Germanmarket).pdf?fd=2: upgrade of the AH26: ~~shrinkage, disoloration, formaldehide, powder-liquid~~
  - Low solubility
  - High stability
  - Slighlty Thixotrop
  - Adhesion to dentin, good penetration
  - Good sealing
  - Slight expansion
- Disadavantage:
  - No bonding to guttapercha

EndoREZ (Ultradent Products, South Jordon, UT), methacrylate resin, hydrophilic properties. EndoREZ resin-coated gutta-percha cones

Epiphany/resilon RealSeal (Kerr?) 2004

"monoblock"

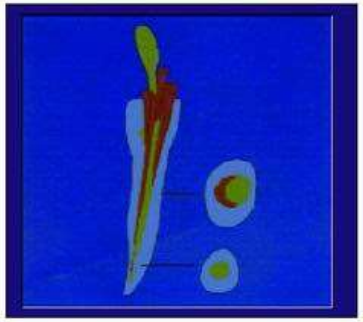


Figura 1

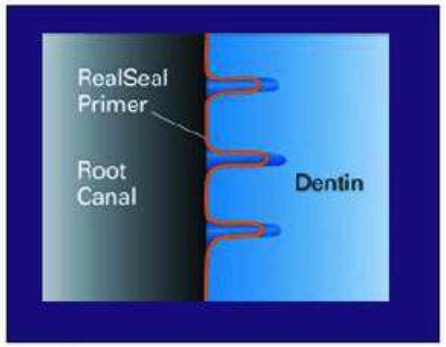


Figura 2

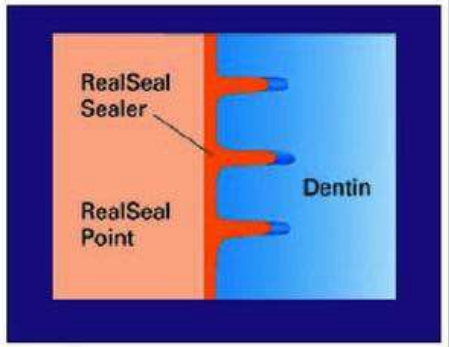


Figura 3

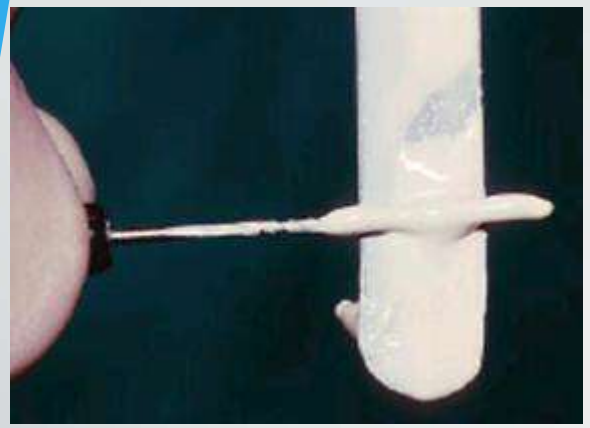
Silicone Sealers

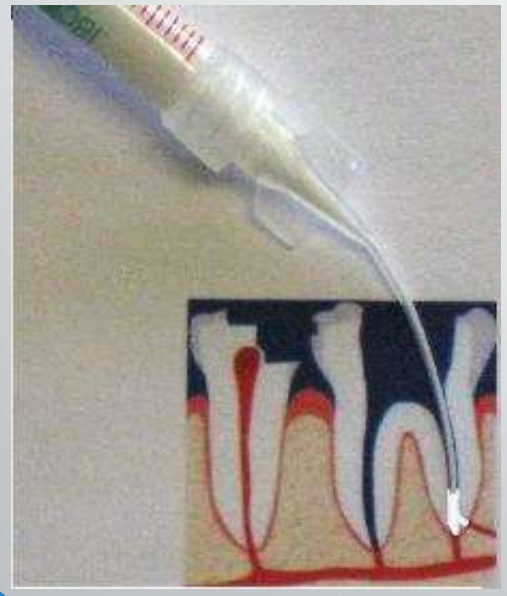
- RoekoSeal (Colténe/Whaledent, Germany) is a polyvinylsiloxane, expand slightly on setting
- GuttaFlow (Colténe/Whaledent) cold flowable gutta-percha added to RoekoSeal, single master cone, 25 to 30 minutes,.

Bioceramic, calcium silicate-based endodontic sealers

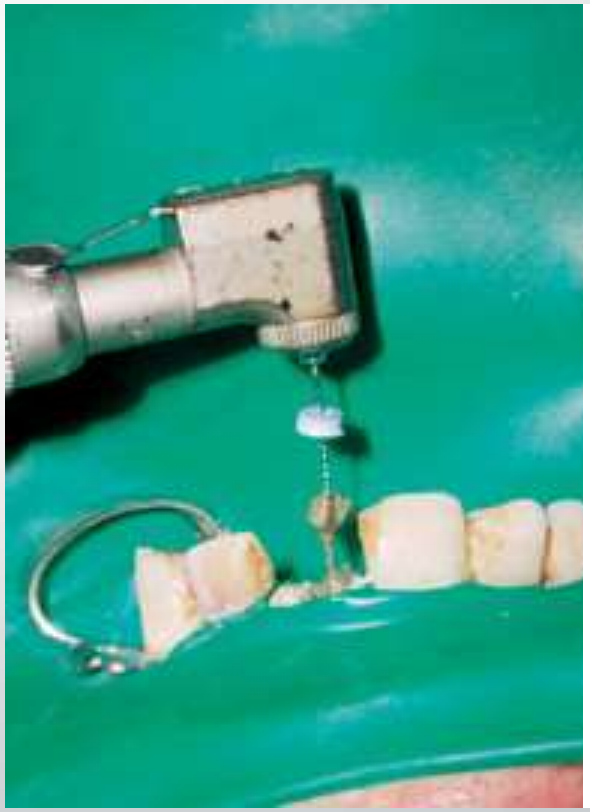
- zirconium oxide, calcium silicates, calcium phosphate monobasic, calcium hydroxide, and various filling and thickening agents.
- hydrophilic sealer it utilizes moisture
- within the canal to complete the setting reaction
- no shrinkage
- biocompatible
- antimicrobial
- master guttapercha cone (piston, synchronized)

Sealer Placement





- master cone, files, reamers
- lentulo spirals
- injection
- ultrasonics.

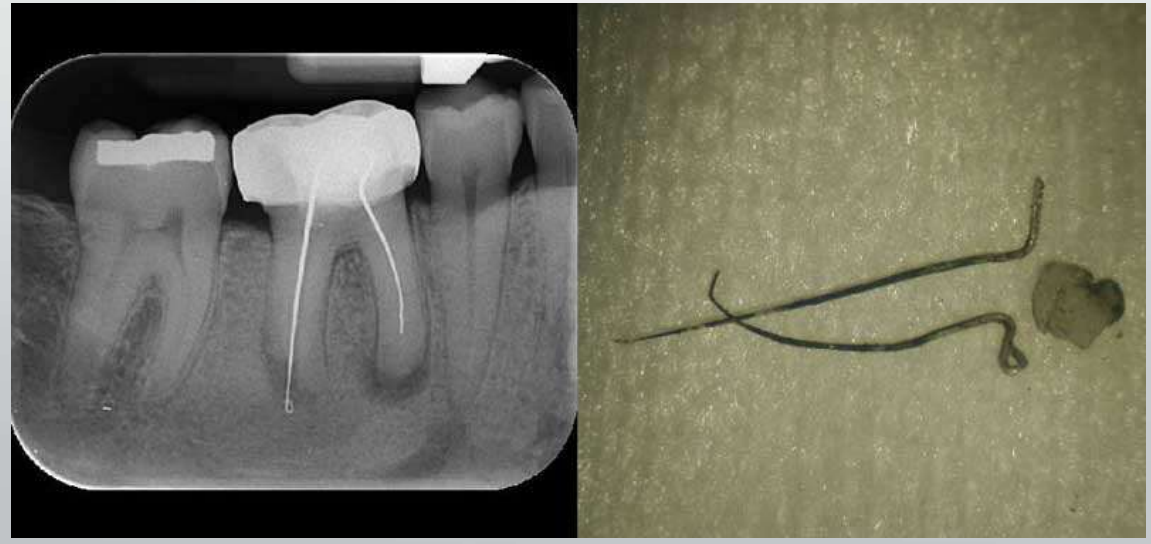


Core Materials

- Silver Cones
- Gutta-Percha
- Activ GP
- Resilon
- Custom Cones

Silver Cones

- Rigidity - easy to place, predictable length control
- Difficult to remove
- inability to fill the irregularly shaped root canal
- Corrosion - cytotoxic
- today is considered to be below the standard of care



ENDODONTOLOGY

2005

GUTTA-PERCHA – AN UNTOLD STORY

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Dr. V. Gopikrishna**
Dr. D. Kandaswamy***

ABSTRACT

"GUTTA-PERCHA" was first introduced as a restorative material and later developed into an indispensable endodontic filling material. It has become the "soul" of endodontics, in its development as a specialty.

Many articles have dealt about the various techniques of usage of Gutta-percha, but the present article deals briefly with its history, sources, chemistry, commercial manufacture, its evolution an aterial, wh

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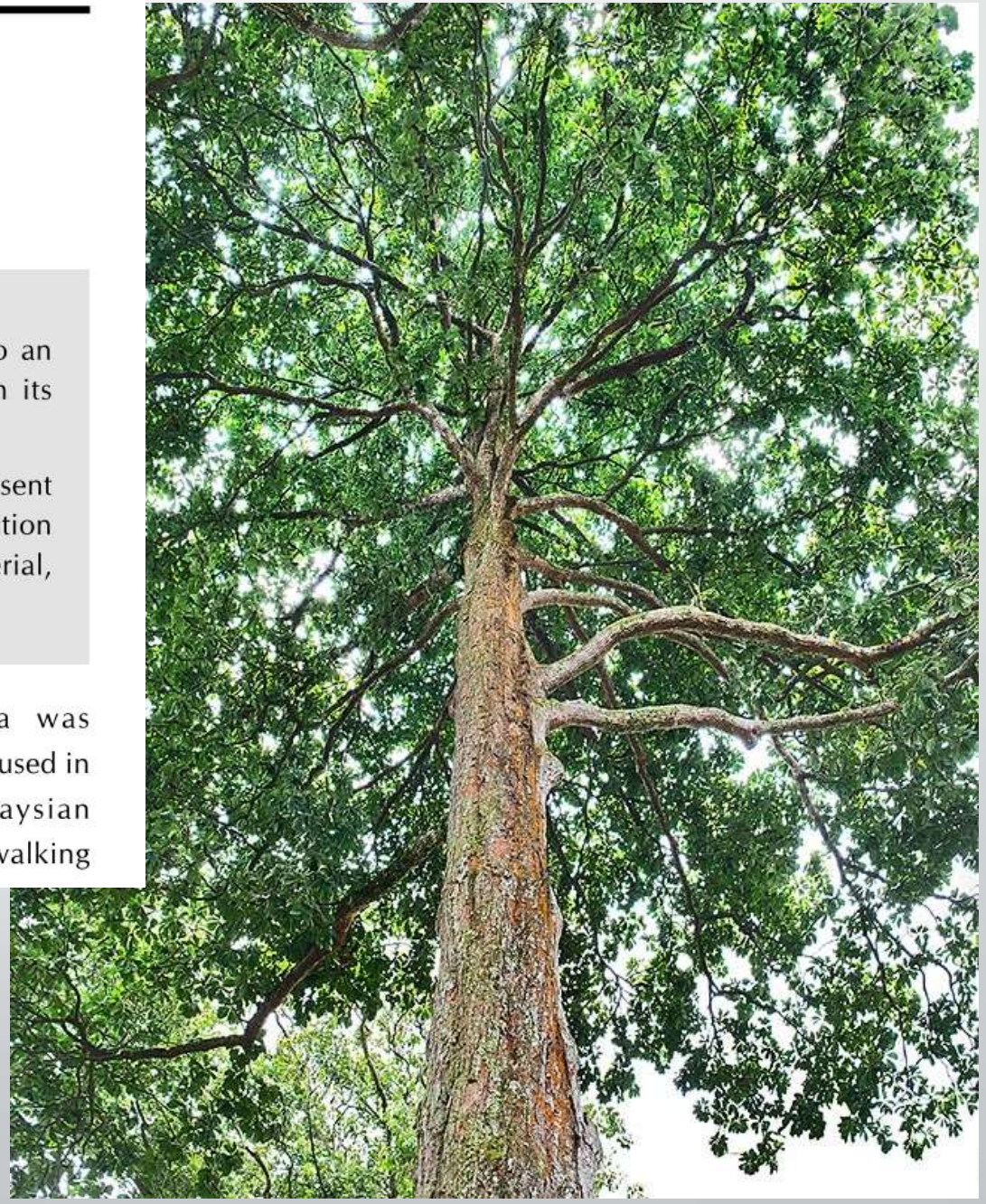
Gutta-percha fa
(Sapotaceae család,
Palaquium gutta, Isonandra gutta, Dichopsis gutta)

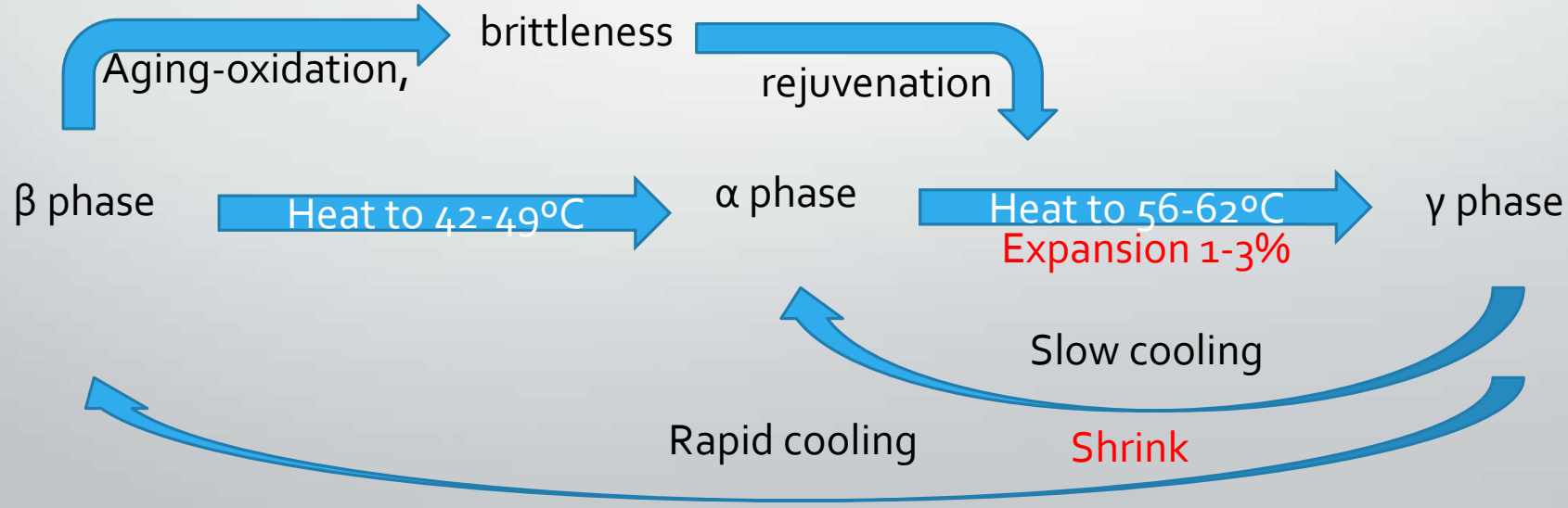
"GETAH"- gumi
"PERTJA"- fa neve (Maláj nyelven)

1656 - John Tradescant hozta először Angliába távol keletről
1867 - Bowman - gyökértömés.
1887 - S.S White cég – első guttapercha poén
1959 – Ingle és Levine - standardizálás



Gutta-percha

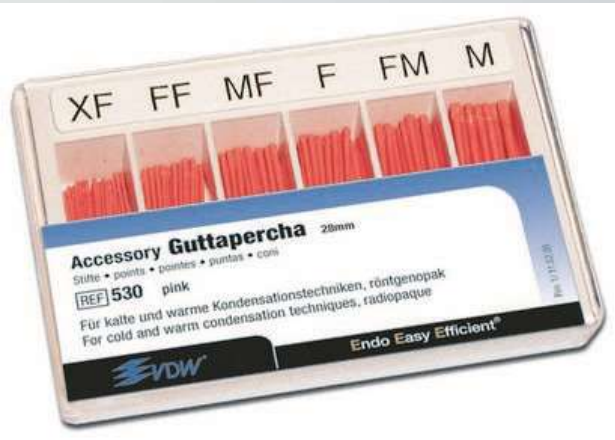
- *trans* isomer of polyisoprene (rubber)
- Gutta-percha cone: 20% guttapercha, 65% zinc oxide, 10% radiopacifiers, 5% plasticizers
- two crystalline forms
  - α.....natural form, runny, tacky and sticky, lower viscosity, THERMOPLASTIC FILLING
  - β.....most common commercial form solid, compactible and elongatible, higher viscosity
  - γ phase - amorphous
  - Slow cooling result in α form rapid cooling result in β form



Gutta-percha

- plasticity,
- Ease of manipulation
- minimal toxicity
- Radiopacity
- ease of removal with heat or solvents.
- Disadvantages: lack of adhesion to dentin
- shrinkage on cooling

Gutta-percha



alpha Guttapercha .04 und .06

» Learn more

Mtwo® Guttapercha

» Learn more

RECIPROC® Guttapercha

» Learn more

Standardised Gutta-Percha Cones

» Learn more

Conventional Gutta-Percha

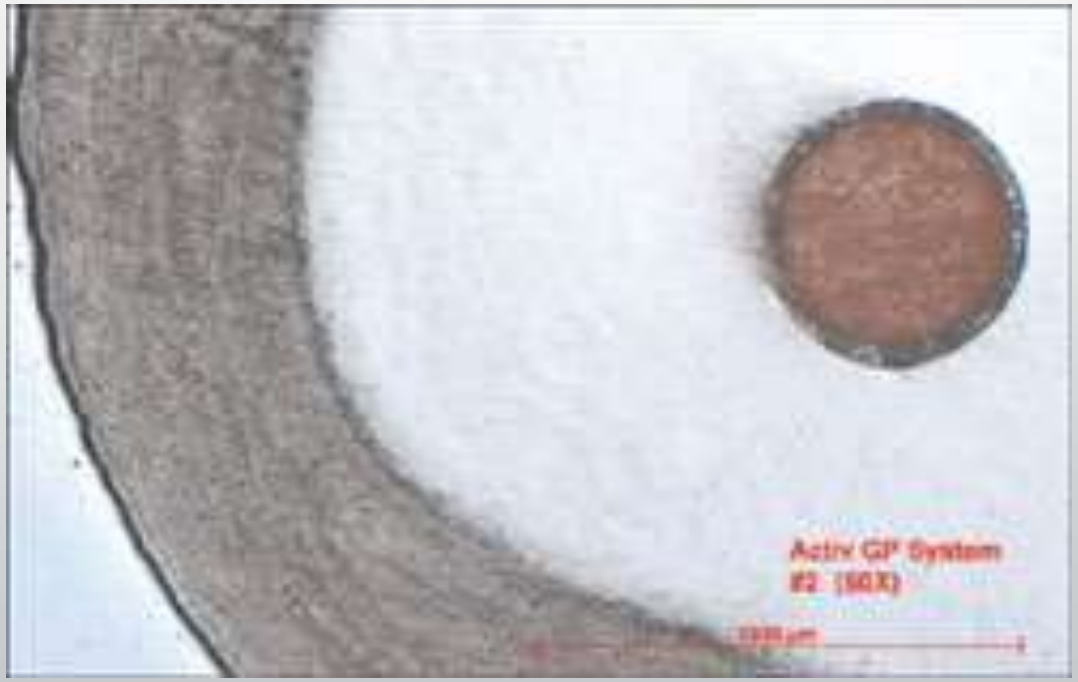
» Learn more

Gutta-percha

- Sterilization before use: placing the cones in 5.25% NaOCl for 1 minute

Activ GP

Activ GP (Brasseler USA, Savannah, GA)
glass ionomer–impregnated gutta-percha cone + glass ionomer external coating + a glass ionomer sealer



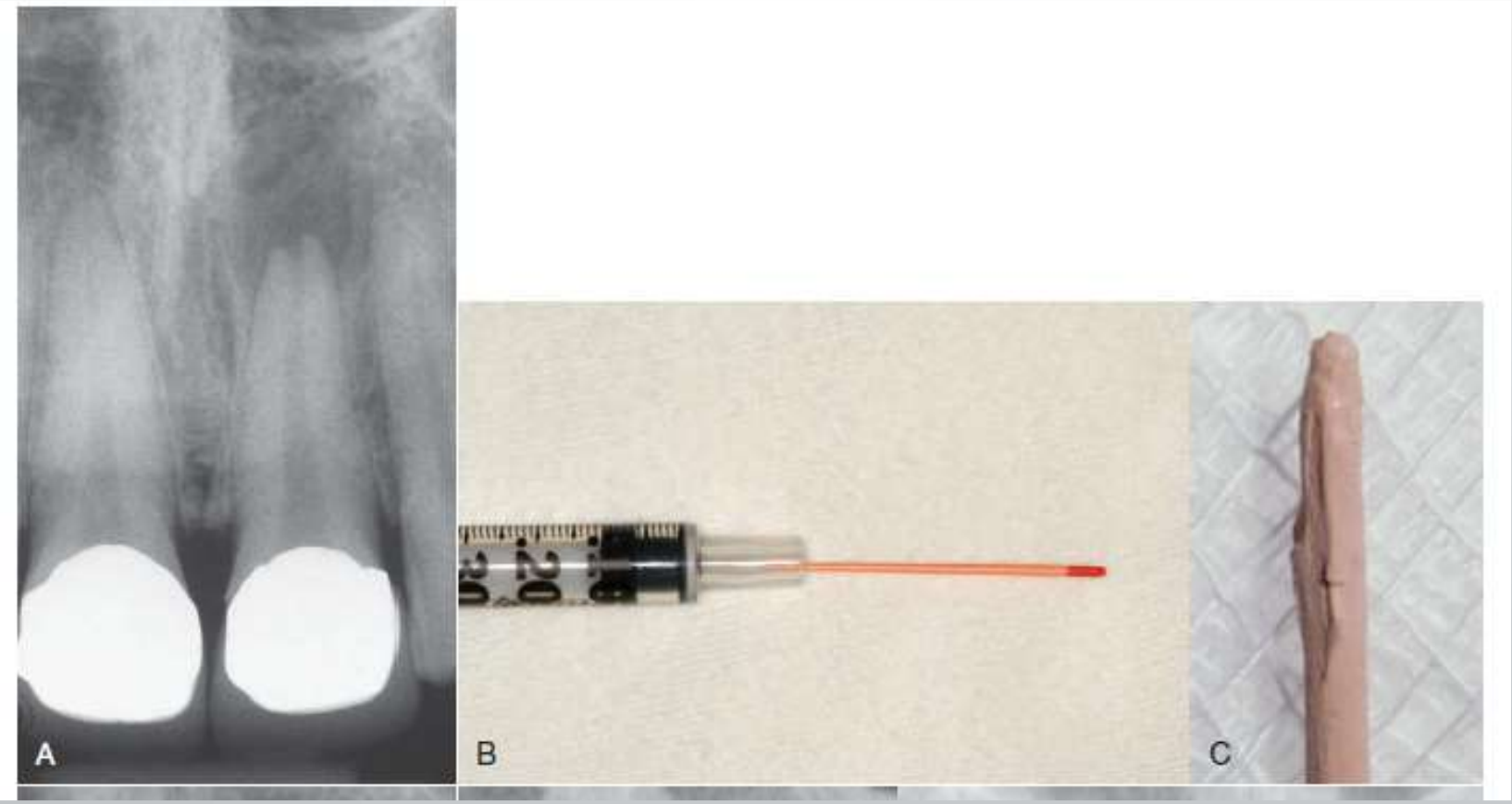
Resilon

resin matrix of bisphenol A-glycidyl methacrylate [**Bis-GMA**], ethoxylated Bis-GMA, urethane dimethacrylate [UDMA], and hydrophilic difunctional methacrylates and fillers [70%] of calcium hydroxide, barium sulfate, barium glass, bismuth oxychloride, and silica).

- Self-ecth primer
- Resin sealer (25 minutes, +light cured)
- Lateral compaction or warm vertical compaction, or thermoplastic injection
- Excellent sealing, resistant to fracture, „prevent" periodontitis versus GP+Ahplus
- biocompatible

Custom Cones

- open apical foramen or large canal



Obturation technique

- To date little evidence exists to support one method of obturation **as being superior to another** and the influence of treatment technique on success/failure has yet to be determined.
- *Aqrabawi JA: Outcome of endodontic treatment of teeth filled using lateral condensation versus vertical compaction (Schilder's technique). J Contemp Dent Pract 7:17,2006*
- *Ng YL, Mann V, Rahbaran S, Lewsey J, Gulabivala K: Outcome of primary root canal treatment: systematic review of the literature. 1. Effects of study characteristics on probability of success. Int Endod J 40:921, 2007.*

Lateral Compaction

- most clinical situations
- length control during compaction
- with any of the acceptable sealers
- Only a few instrumentum (cheap spreaders)

- may not fill canal irregularities

Lateral compaction
Step by step

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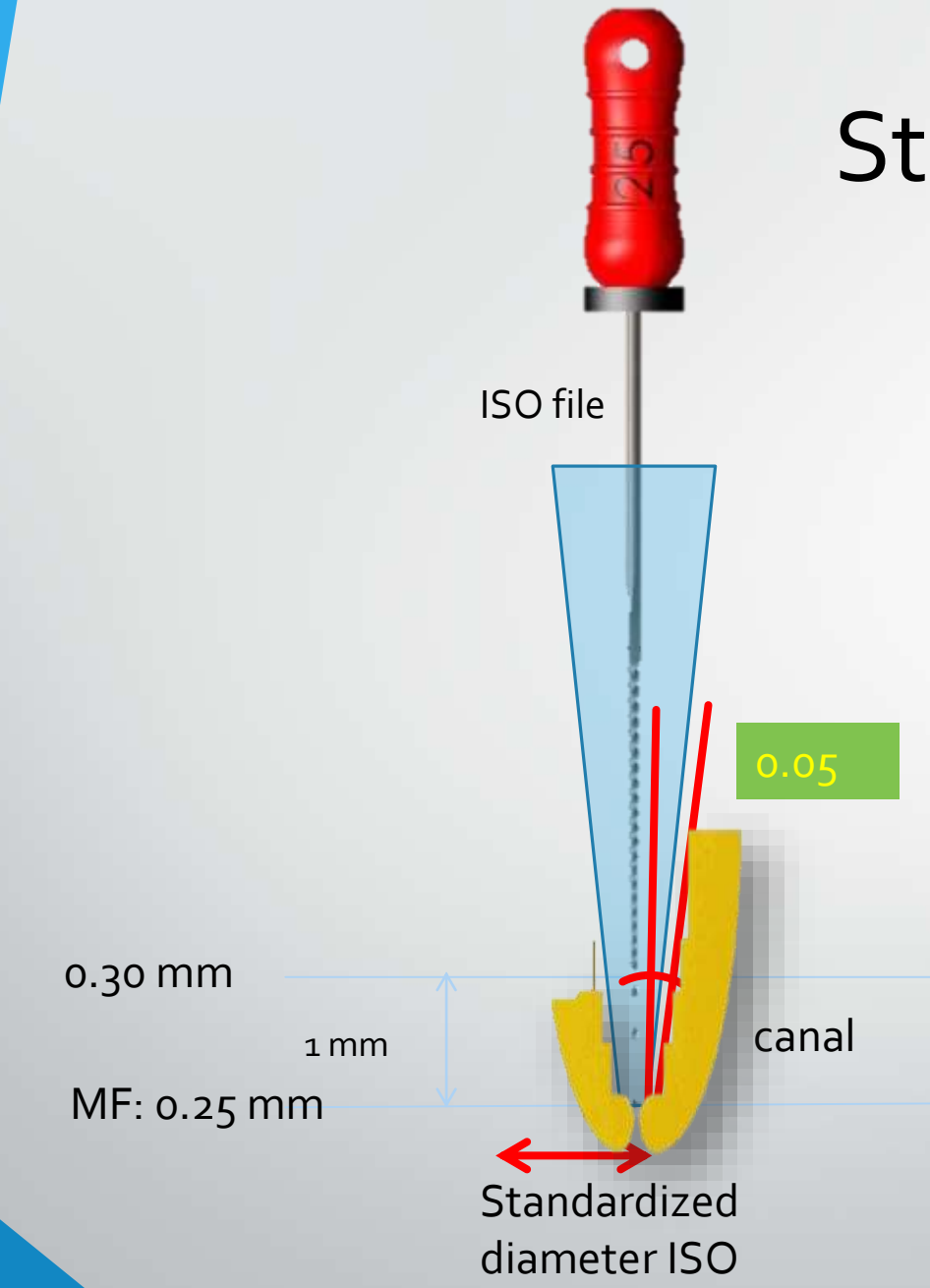
Step-back technique

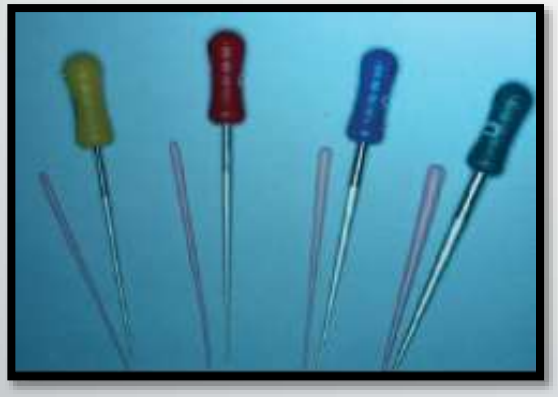


1. LATERAL COMPACTION OF GUTTA-PERCHA

Objective: fill the canal with gutta-percha points (cones) by compacting them laterally against the sides of the canal walls.

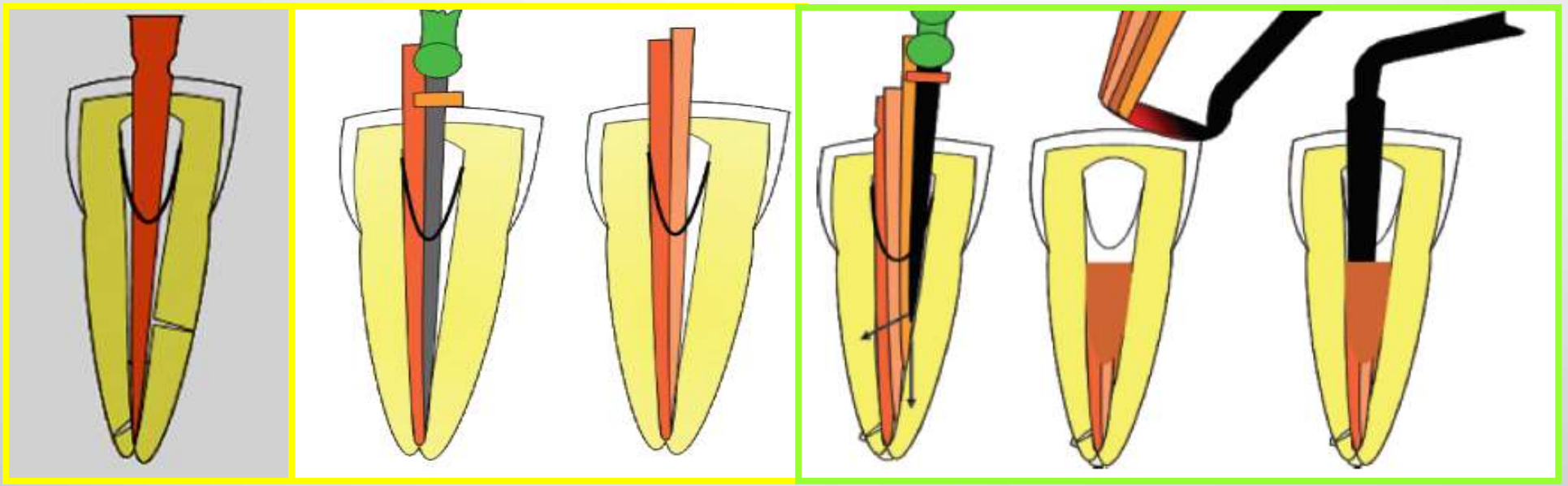
Two main types of spreading instruments

- long handled spreaders
- finger spreaders



•Finger spreaders provide: better tactile sensation & less likely to induce fractures

SUMMARY



Efficacy of Lateral Compaction

•“Gold standard”

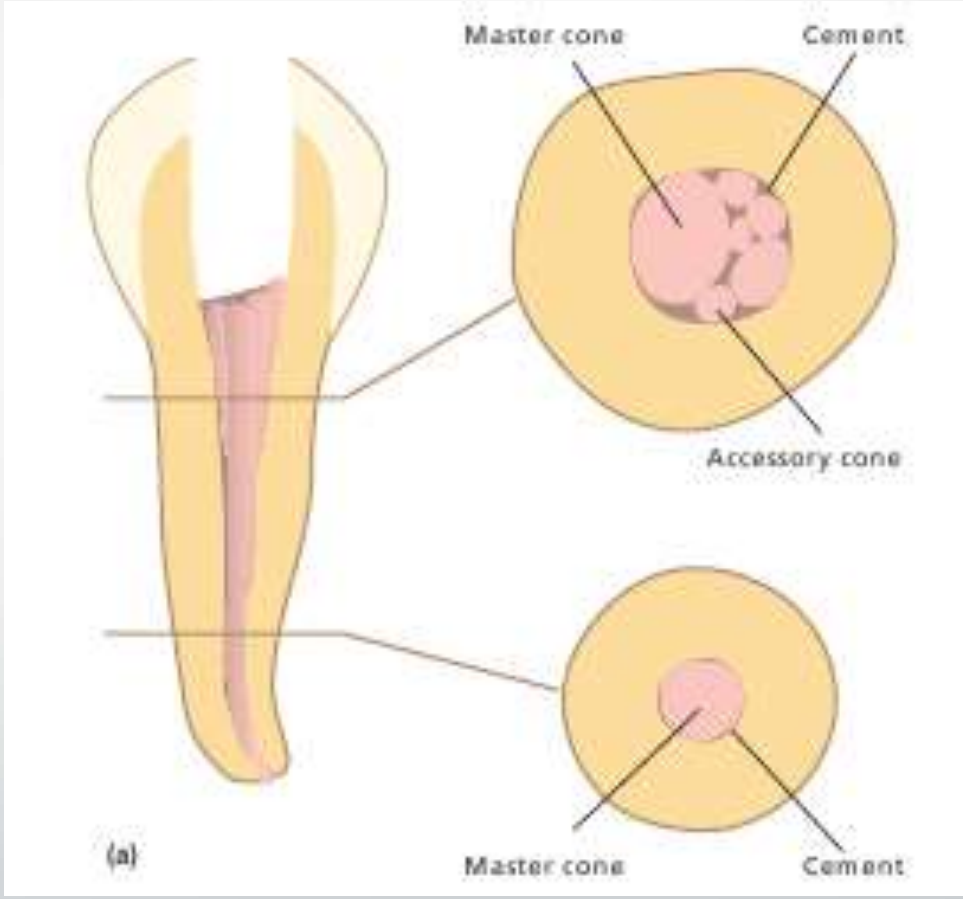
Advantage :

• Excellent length control

Limitations:

➢ However, this technique may not fill canal irregularities

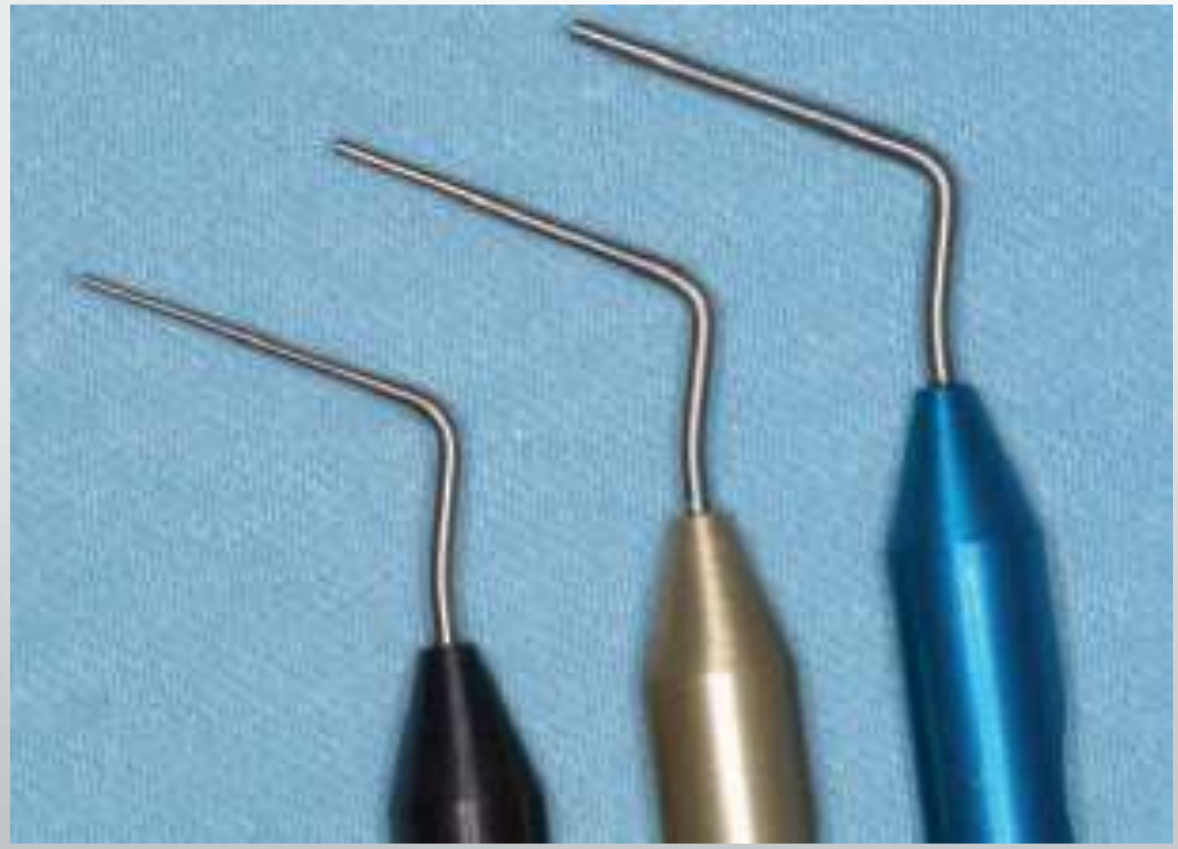
➢Gutta-percha cones never merge into a homogeneous mass, but they slip and glide and are frozen in a sea of cement

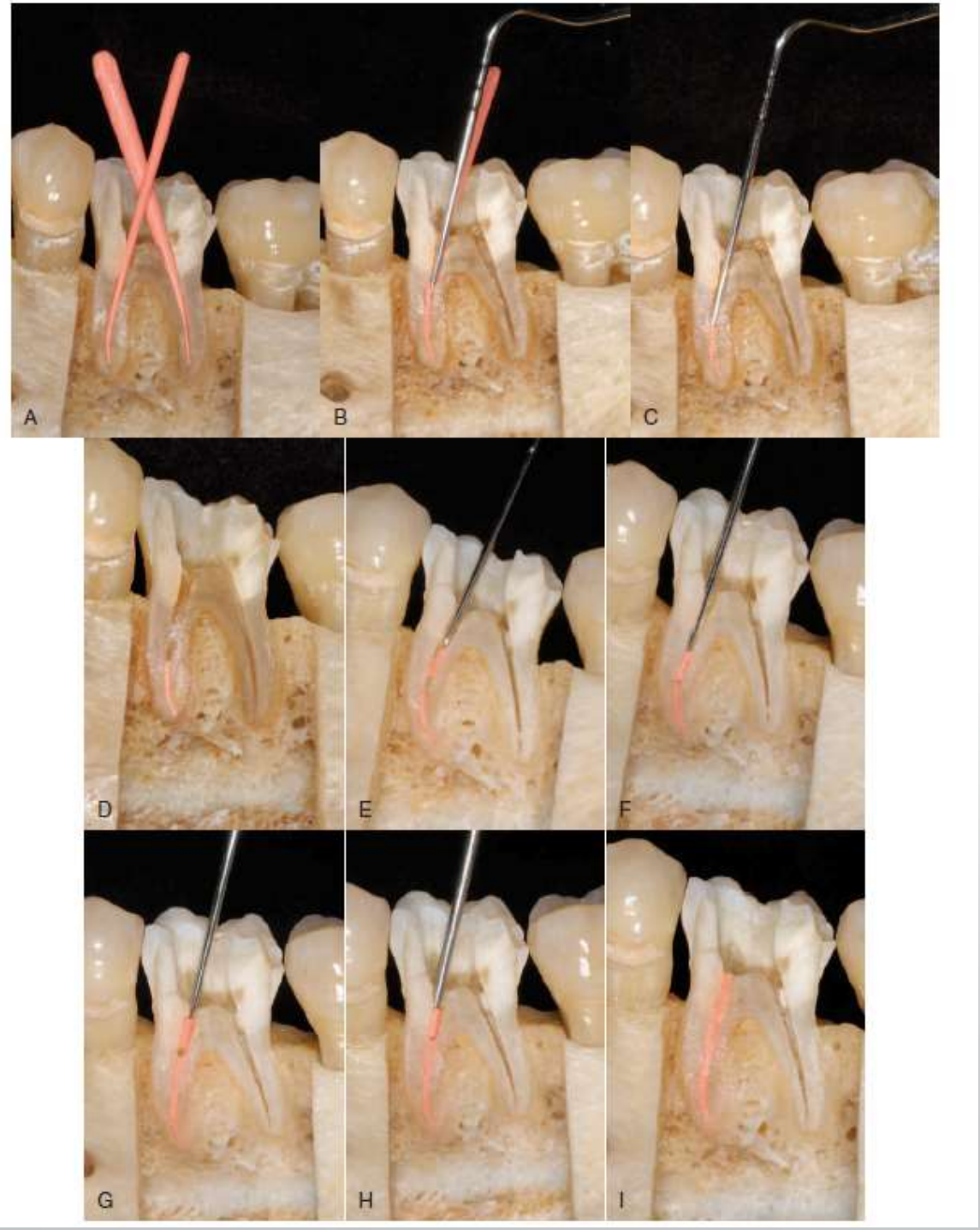


Warm Vertical Compaction

- Schilder introduced warm vertical compaction
- a continuously tapering funnel
- keeping the apical foramen **as small as possible**.

Pluggers




A
B
C
D
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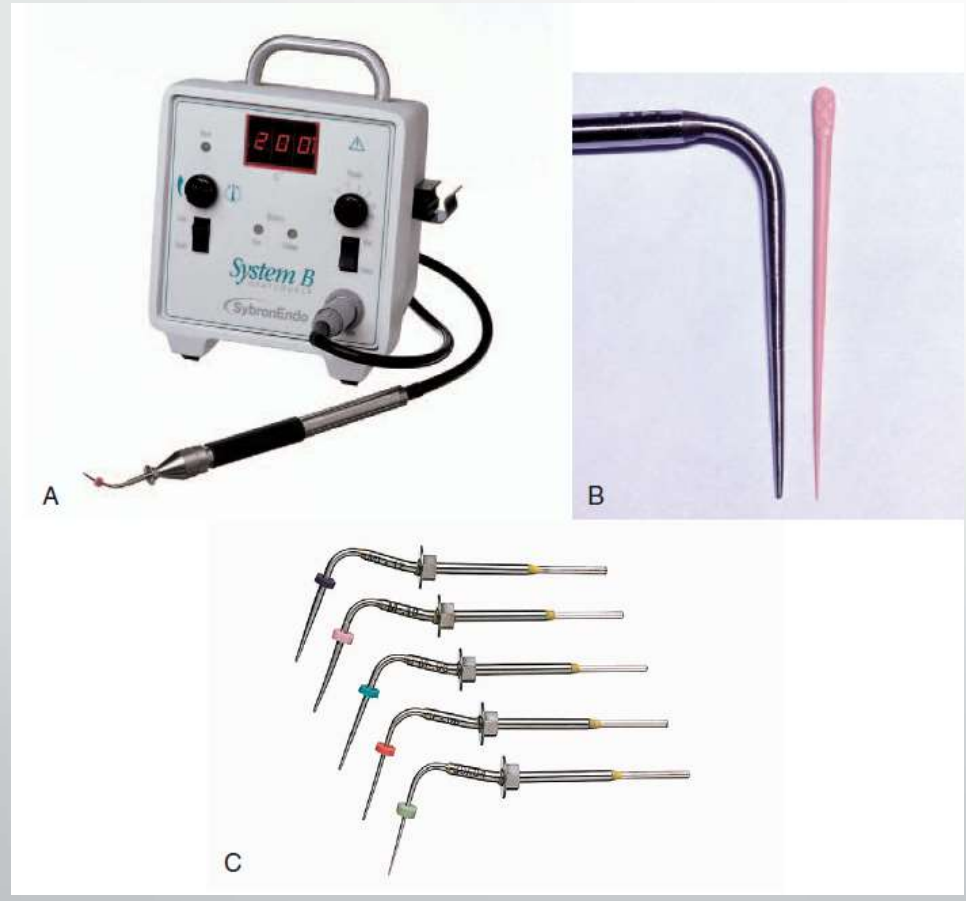
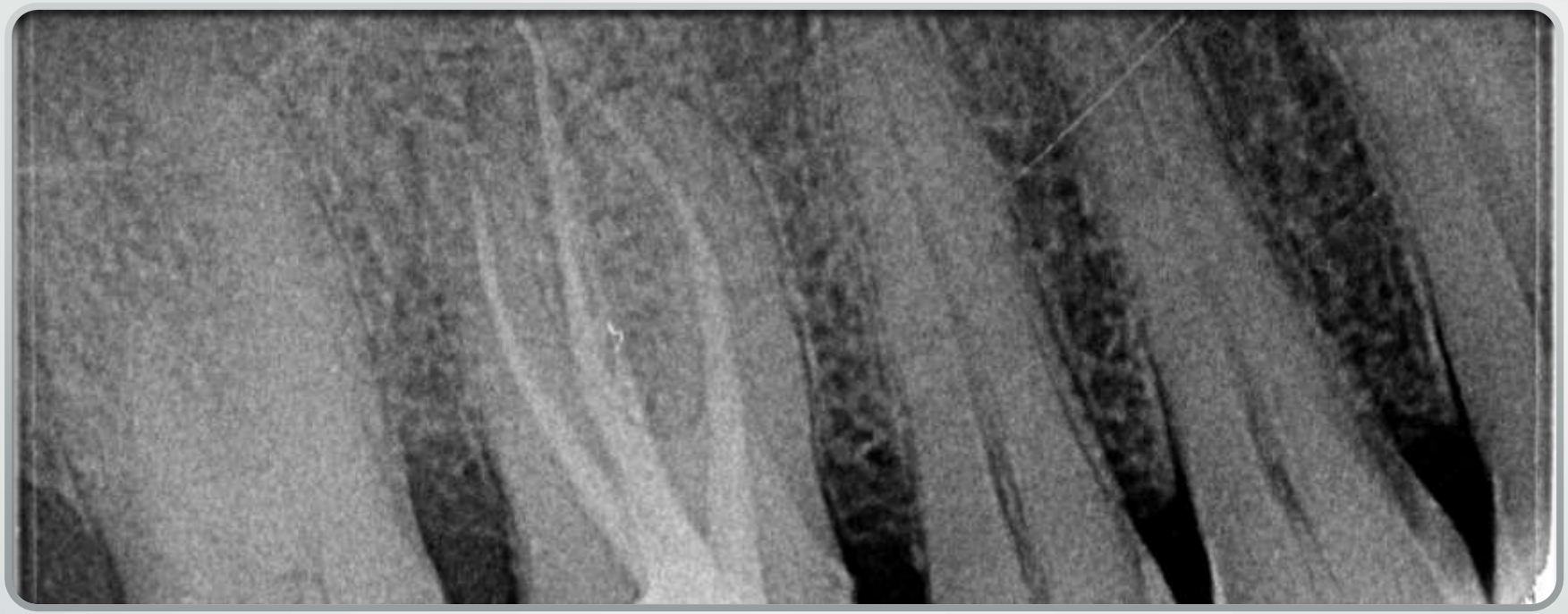
Continuous Wave Compaction Technique: Temperature control instruments



Thermoplastic injection technique: Backfill


B

Carrier-Based Gutta-Percha



Thank you for your attention!