PG MANUAL

DEPT. OF CONSERVATIVE DENTISTRY AND ENDODONTICS

TABLE OF CONTENTS

Rubber Dam Isolation - Anterior

Armamentarium

Item	Picture or Procedure	From
1. Stamped rubber dam sheet 2. Floss 1 packet 3. Wedjets 4. Gauze napkin		Operative supplies Stamp is at end of row

Procedure:

Do not use the words “clamp” or “forceps” in front of the patient.

Instead, use “retainer” and “placement instrument”

Never place instruments or materials directly on the patient’s chest!

Placement

1. Determine shade before isolation. Even a few minutes under the rubber dam will alter the shade.

2. Determine isolation area- 1 tooth posterior to tooth being restored if possible, minimum of 6 anterior teeth for easy lingual access.

3. Punch holes in dam, recalling that ‘holes’ on stamp are too far apart. (Proper spacing = 3 mm.) Use the medium hole size. Holes for maxillary central incisors should be 1” from top edge of dam, for mandibular incisors

2inches from bottom edge of dam, to prevent the dam covering the patient’s nose.

If holes punched too far from edge opposing arch may not be covered

ALWAYS FLOSS THE AREA- BEFORE ATTEMPTING TO PLACE RD. Contacts may be too tight to use RD in normal manner- ask faculty for help

4. Get organized: Place punched dam, mirror, and cord instrument on movable tray at front/side of operator for easier access.

5. Retainers: Use a retainer only if most distal contact is too loose for use of a Wedjet. Choose retainer to fit most distal tooth with four points of contact on facial and lingual surfaces, ligating retainer before trying in. Usually a 2A retainer fits premolars. If using, while stabilizing retainer with index finger, visually check for points of contact with mirror, gently lift on bow of retainer with cord instrument to check stability of retainer.

6. Place the rubber dam:

a. Without turning away from the patient, **stretch hole for tooth with retainer** facio-lingually and slide this hole over retainer. (The winged 2A retainer can usually be used this way if a large hole has been punched in the dam. Alternately, remove the 2A, assemble dam and frame, and stretch the hole for the most posterior tooth over the wings. Apply all three together.)

b. Stretch septa of dam facio-lingually, **slide holes over incisors**, beginning at the midline. Place Wedjet to secure end of field if no retainer is used. Do not floss yet.

c. **Place gauze napkin, rubber dam frame**.

d. Beginning with the most anterior contact with rubber septum not already passed, **floss a minimum of twice** for each contact, to pass septa of dam through the proximal contacts.

e. **Invert the edges of each hole** around tooth by

simultaneously drying and turning edges under with a sweeping motion of the cord instrument.

If teeth have small or absent cingulum, wrap floss around the lingual surface and invert entire lingual of the tooth at once by positioning edge of hole below height of contour using cord instrument and floss, then air drying prior to removing floss. If absolutely necessary, anterior tooth may be ligated by tying this loop of floss on the facial, but trauma to the proximal gingival attachments is likely.

7. **Pre-wedge** any proximal contacts receiving a Class II or Class III preparation.

Removal

1. Without removing retainer or frame, **snip** each of the rubber septa.

Although effective, Rubber Dam scissors work better than Crown & Bridge scissors shown.

2. Remove retainer, frame, and dam simultaneously.

3. After removal of Rubber Dam or Isovac, Cotton Roll & Dry Angle isolation is required during occlusal adjustment and restoration polishing to prevent soft tissue trauma

Pitfalls:

1. Selection of **too large a retainer**, which will be unstable and traumatic. Remember that the retainer will engage the tooth at the smaller radius of the CEJ.

2. Can’t invert dam because septum is ‘caught’ in contact, not flossed through.

What to tell the patient after you are done:

1. New restorations will not match for at least 48 hours, until teeth rehydrate.
2. Gums may be a little sore for a few days. Keep it clean, and don’t worry if it bleeds a little.

Rubber Dam Isolation - Posterior

Armamentarium

Item	Picture or Procedure	From
1. Stamped rubber dam sheet		Operative supplies Stamp is at end of row
2. Floss 1 packet		
3. Wedjets		
4. Gauze napkin		

Procedure:

Placement	
1. Determine shade before isolation. Even a few minutes under the rubber dam will alter the shade. **2. Determine isolation area-** 1 tooth posterior to tooth being restored if possible, include anterior midline.	
3. Punch holes in dam, recalling that 'holes' on stamp are too far apart. (Proper spacing = 3 mm.) Use the largest hole size for molars. Holes for maxillary central incisors should be 1" from top edge of dam, for mandibular incisors 2" from bottom edge of dam, to prevent the dam covering the patient's nose. **4. Get organized:** Place punched dam, mirror, and cord instrument on tray in front of operator. Never use patient's chest for instrument storage.	
5. Retainers: Select retainer to fit most distal tooth with four points of contact on facial and lingual surfaces, ligating retainer before trying in. Usually a W8A retainer fits second molars. (If none of the molar retainers in the kit fit, a W3 may be checked out from dispensing.) While stabilizing retainer with index finger, visually check for points of contact with mirror, gently lift on bow of retainer with cord instrument to check stability of retainer. **6. Place the rubber dam:**	

a. Without turning away from the patient, **stretch hole for tooth with retainer** facio-lingually and slide this hole over retainer. (If a winged retainer has been selected, remove it, assemble dam and frame, and stretch the hole for the most posterior tooth over the wings. Apply all three together.)

b. Stretch septa of dam facio-lingually, **slide holes over incisors**. Place Wedjet to secure anterior end of field. Do not floss yet.

c. Place gauze napkin, rubber dam frame.

d. Beginning with the most anterior contact with rubber septum not already passed, **floss a minimum of twice** for each contact, to pass septa of dam through the proximal contacts.	
e. **Invert the edges of each hole** around tooth by simultaneously drying and turning edges under with a sweeping motion of the cord instrument. If anterior teeth have small or absent cingulum, wrap floss around the lingual surtace and invert entire lingual of the tooth at once by positioning edge of hole below height of contour using cord instrument and floss, then air drying prior to removing floss. If absolutely necessary, anterior tooth may be ligated by tying this loop of floss on the facial, but trauma to the proximal gingival attachments is likely.	
7. **Pre-wedge a**ny proximal contacts receiving a Class II or Class III preparation.	
Removal:	

1. Without removing retainer or frame, snip each of the rubber septa.

2. Remove retainer, frame, and dam simultaneously.

3. **After removal of Rubber Dam or Isovac, <u>Cotton Roll & Dry</u> <u>Angle isolation is required</u> during occlusal adjustment and restoration polishing <u>to prevent soft tissue trauma</u>**

Pitfalls:

1. **Selection of too large a retainer**, which will be unstable and traumatic. Remember that the retainer will engage the tooth at the smaller radius of the CEJ.

2. Can’t invert dam because septum is ‘caught’ in contact, not flossed through.

What to tell the patient after you are done:

1. New restorations will not match for at least 48 hours, until teeth rehydrate.
2. Gums may be a little sore for a few days.

ROOT CANAL TREATMENT

Accessing the Root canals

To gain access to the root canals of the tooth, a small opening is made either on the chewing surface oh the tooth (for back teeth) or on the tongue side of the tooth (for front teeth

Accessing the Root Canals:

- In a multi-rooted tooth,gaining access in to the root canal is more challenging
- With the aid of microscope we are able to locate any hidden or calcified canals

Goals of access cavity preparation

According to Vertucci,

- Removal of all carious tooth structure
- Conservation of sound tooth structure
- Complete deroofing of the pulp chamber
- Removal of coronal pulp tissue
- Location of all root canal orifices
- Straight line access

Armamentarium

- Front surface mouth mirror
- Airrotor
- Slow speed rotary handpieces
- Burs- round carbide(no.2,4,6); Diamond burs, fissured carbide burs, Mueller burs, diamond and fissured burs with safety tips, LN burs
- Endodontic spoon excavater
- Endodontic explorer
- Additional aids- magnification and illumination aids, ultrasonic tips, micro openers and micro debriders.

Figure 12.9 Diamond burs with rounded cutting ends. (*Courtesy: Dentsply Maillefer.*)

Figure 12.10 Fissure carbide burs with non-end cutting safety tips. (*Courtesy: Dentsply Maillefer.*)

Figure 12.11 (a) Endodontic excavator. (b) DG–16 endodontic explorer. (*Courtesy: Hu-Friedy Mfg Co., USA.*)

Figure 12.12 Start X ultrasonic tips 1, 2, 3, and 5 for access refinement. (*Courtesy: Dentsply Maillefer.*)

Access cavity shapes

Maxilla

Central incisor	Triangular	
Lateral incisor	Triangular (smaller and more ovoid than central incisor)	
Canine	Ovoid	

I Premolar	Ovoid in buccolingual direction	
II premolar	Ovoid in buccolingual direction	
I molar	Triangular with rounded corners	
II molar	Triangular with rounded corners	
III molar	Triangular with rounded corners (anatomic modifications)	

Mandible

Central incisor	Long and oval oriented gingivally	
Lateral incisor	Long and oval oriented gingivally	

Canine	Similar to maxillary canine	
I Premolar	Ovoid	
II premolar	Ovoid	
I molar	Trapezoidal or rectangular	
II molar	Same as first molar	
III molar	Same as first molar (anatomic variations)	

Rubber dam isolation

- Isolation of the tooth is accomplished with a rubber dam
- Keeps bacteria in the saliva from entering in ti the tooth
- Prevents debris,instruments, etc.from going down the patients throat

Working length Determination

1. Radiographic methods
    - Ingle's
    - Best's
    - Bregman's
    - Bramante's
    - Grossman's
    - Weine's
    - Kuttler's
    - Xeroradiography
    - Digital

2. Electronic apex locaters
3. Non radiographic methods
    - Tactile sense
    - Apical periodontal sensitivity
    - Paper point method

Ingle's method

INGLE'S RADIOGRAPHIC METHOD OF WORKING LENGTH DETERMINATION

Diagnostic radiograph used to estimate the working length of the tooth by measuring the tooth from a stable occlusal reference point till the radiographic apex

↓

Subtract atleast 1mm from this length as

- Minor constriction is always present short of the anatomic apex
- Compensation for radiographic image distortion

↓

This measurement is transferred to a diagnostic instrument with a silicon stop,which is placed in the root canal and working length radiograph taken

↓

On the radiograph, measure the difference between the end of the instrument and the radiographic apex of the root

↓

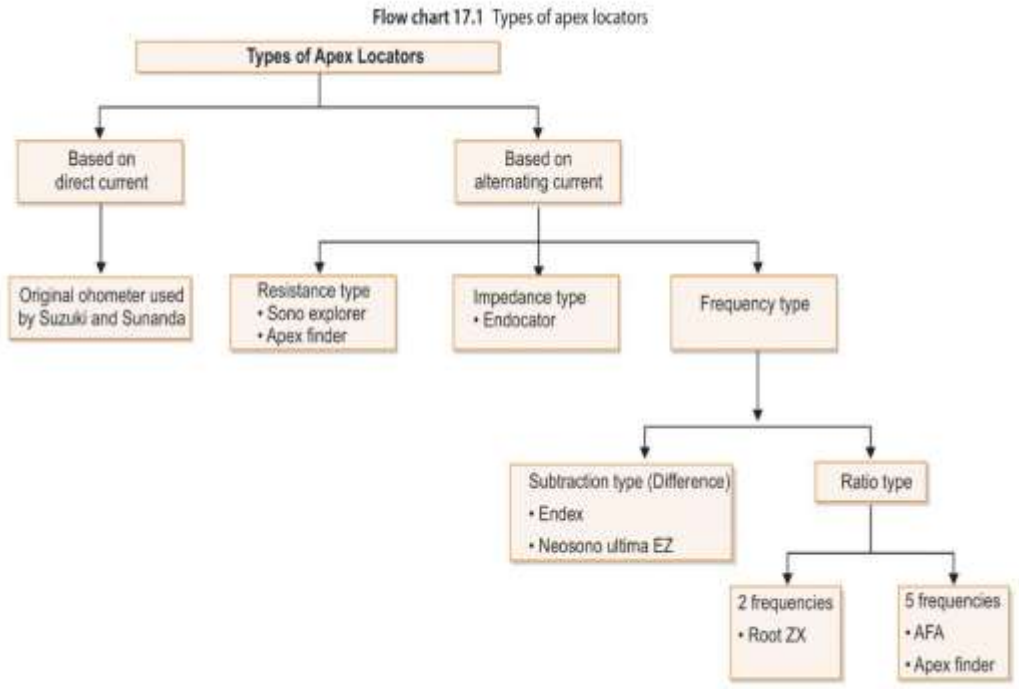
Tip of the instrument ends 0.5mm-1.0mm from the radiographic root apex (working length established)

SHORT OF THE RADIOGRAPHIC APEX BY MORE THAN 1.0MM--→ Add this value to the earlier estimated length and adjust stopper on the diagnostic instrument accordingly
Retake the working length radiograph

BEYOND THE RADIOGRAPHIC APEX→ Reduce this value from the earlier estimated length and adjust stopper on the diagnostic instrument accordingly.

Retake the working length radiograph

Electronic apex locator



Cleaning the Root canal system

We use many instruments of different sizes and shapes to properly clean and shape your specific root canal anatomy

Biomechanical preparation

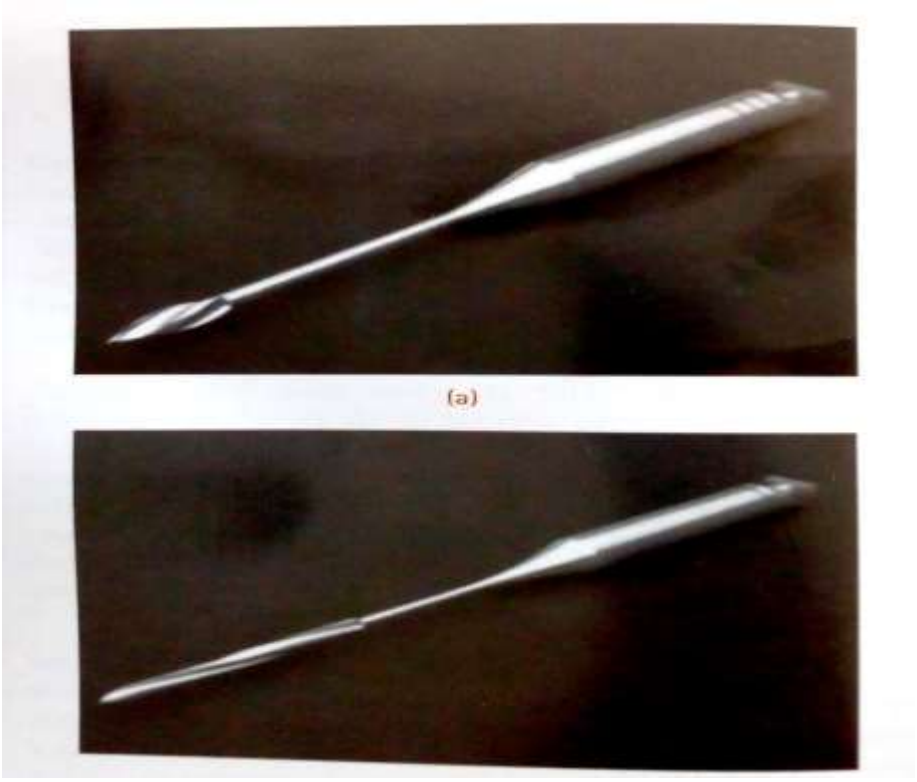
Objectives

- Root canal preparation should be continuous tapering cone
- Canal should be narrow apically and wider coronally
- Keep the apical opening as small as possible
- All infected pulp tissue, bacteria & their by products should be removed
- Necrotic debris should not be forced periapically
- Sufficient space for intracanal medicaments and irrigants should be created

INTRUMENTS USED

BARBED BROACHES

a) K- FILES b) K- REAMERS c) HEDSTROEM FILES



a) GATES GLIDDEN DRILL
b) PEESO REAMER

Table 13.5 Design Features of Current Rotary NiTi File Systems

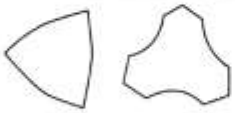
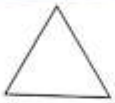
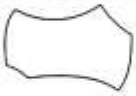
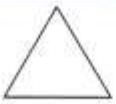
Instrument System	Cross-Sectional Design	Tip Design	Taper	Other Features
ProFile (Dentsply Maillefer)	 Triple-U shape with radial lands. Neutral rake angle planes dentin walls	Noncutting	Fixed taper. 2, 4, and 6%	20-degree helix angle and constant pitch
GT Files (Dentsply Maillefer)	 Triple-U shape with radial lands	Noncutting	Fixed taper. 4, 6, 8, 10, and 12%	Files have a short cutting portion. Variable pitch
GT Series X	Variable-width lands (lands at the tip and shank region of the file are narrower than midfile lands)	Noncutting	No. 10 or 12% taper	Decreased helical angle, increased pitch. Heat treatment aims to improve cyclic fatigue resistance, M wire
LightSpeed Instruments (Lightspeed, San Antonio, TX)	 Triple-U shape with radial lands	Noncutting	Specific instrument sequence produces a tapered shape	Thin, flexible noncutting shaft and short cutting head
ProTaper (Dentsply Maillefer)	 Convex triangular shape, sharp cutting edges, no radial lands. F3, F4, F5 files have U-flutes for increased flexibility	Shaping files—partially active tips Finishing files: Noncutting	Variable taper along the length of each instrument	Pitch and helix angle balanced to prevent instruments screwing into the canal
HERO 642 (MicroMega)	 Triangular shape with positive rake angle for cutting efficiency. No radial lands	Noncutting	Fixed taper. 2, 4, and 6%	Variable pitch. Files have a short cutting portion (12–16 mm)
K3 (SybronEndo)	 Positive rake angle for cutting efficiency, three radial lands, and peripheral blade relief for reduced friction	Noncutting	Fixed taper. 2, 4, and 6%	Variable pitch and variable core diameter

Table 13.5 *(continued)* Design Features of Current Rotary NiTi File Systems

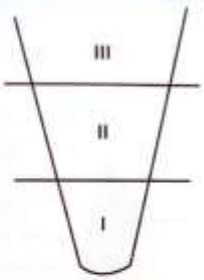
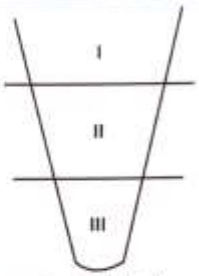
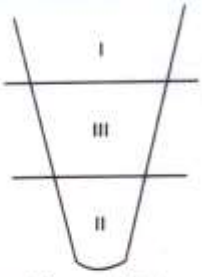
Instrument System	Cross-Sectional Design	Tip Design	Taper	Other Features
FlexMaster (VDW, Munich, Germany)	 Convex triangular shape with sharp cutting edges and no radial lands	Noncutting	Fixed taper. 2, 4, and 6%. Intro file has 11% taper	Individual helical angles for each instrument size to reduce screw-in effect
RaCe (FKG, LaChaux De Fonds, Switzerland) Endowave (J. Morita)	 Triangular shape (except RaCe 15/0.02 and 20/0.02 which have a square shape), two alternating cutting edges, no radial lands	Noncutting	Fixed taper. 2, 4, 6, 8, and 10%	Alternating cutting edges along the file length due to alternating twisted and untwisted segments (RaCe), or a continuous wave design (Endowave). Intended to reduce screw-in effect
Quantec SC, LX (SybronEndo)	 S-shape design with double-helical flute, positive rake angle, and two wide radial lands	Cutting (SC). Noncutting (LX)	Fixed taper. 2, 3, 4, 5, 6, 8, 10, and 12%	Flute space becomes progressively larger distal to the cutting blade
Mtwo (Sweden & Martina, Padova, Italy)	 S-shape design with two cutting edges, no radial lands. Minimum core width to improve flexibility	Noncutting	Fixed taper. 4, 5, 6, and 7%	Variable pitch. Steep helical angle designed to reduce screw-in effect
Twisted File (SybronEndo)	 Triangular shape, no radial lands	Noncutting	Fixed taper. 4, 6, 8, 10, and 12%	Variable pitch. Made by twisting a ground blank in combination with heat treatment; aims to increase superelasticity and cyclic fatigue resistance
Protaper Next (Dentsply Maillefer)	 Off-centered rectangular cross-section, no radial land, sharp cutting edges	Noncutting	4, 6, 7, 8, 9%	M wire technology Asymmetric rotary motion

Different commonly available rotary nickel-titanium endodontic file systems a) Profile

b) Lightspeed c) ProTaper d) Hero e) K3 f) FlexMaster g) M2 h) Protaper next i) Twisted files

a) Gear reduction handpiece
b) Electric/battery powered slow speed endodontic motors with torque control X-SMART
c) Electric/ battery powered high speed endodontic motors with torque control. TCM Endo iii
d) Endotouch TC cordless endodontic motor
e) X-SMART easy cordless endodontic motor

Table 13.8 Summary of Principal Techniques of Root Canal Instrumentation

Features	Step-Back	Step-Down	Hybrid
Author	Clem, Weine	Goerig	Recommended by us for use with stainless steel instruments
Concept	Involves preparation of the apical third initially followed by middle and coronal third of the canal using larger instrument sizes	Involves preparation of the coronal two-thirds of the canal first followed by middle and apical third of the canal	Involves a combination of crown-down and step-back techniques
Sequence of instrumentation	 Phase I: Apical-third instrumentation Phase II: Middle third Phase III: Coronal third	 Phase I: Coronal-third instrumentation Phase II: Middle third Phase III: Apical third	 Phase I: Coronal-third instrumentation Phase II: Apical third Phase III: Middle third
Recommended instruments	Hand instruments	Hand and rotary instruments	Hand and rotary instruments
Principle motion of instrumentation	Coronal instrumentation with reaming motion and apical instrumentation with circumferential filing	Reaming motion	Coronal instrumentation with reaming motion and apical instrumentation with circumferential filing
Advantages	• Popular technique employed with 2% standardized SS files • Ability to prepare a proper apical stop prior to preparation of the middle third and coronal third of the root canal	• Shaping is easier • Elimination of the bulk of the tissue, debris, and microorganisms from coronal and middle third before apical shaping • Minimizes debris extrusion • Better access and control over apical enlarging instruments • Better penetration of irrigants	• Ability to shape the canal predictably with hand instrumentation using stainless steel instruments • Optimizes the advantages of crown-down and step-back techniques
Limitations	• Extrusion of debris into the periapex • Tendency to straighten in the canal • Loss of working length	• Gauging of the apical third is done as the last phase of the procedure	• Middle third preparation has to be done carefully in order to prepare a continuous tapered canal preparation

Disinfection of the root canal system

- Sodium hupochlorite is one of the disinfectants used to reduce the bacteria load within the tooth
- Specialized blunt-ended needles are used to deliver these disinfectants to the end of the root in a safe and effective way

Final preparation

After thoroughly cleaning and shaping the canal, the canals are deied prior to filling the roots

GROSSMAN'S CRITERIA FOR AN IDEAL ROOT CANAL SEALER

- Provide an excellent seal when set
- Produce adequate adhesion between itself, the canal walls, and the filling material
- Be radiopaque
- Be nonstaining
- Be dimensionally stable
- Be easily mixed and introduced into the canals
- Be easily removed if necessary
- Be insoluble in tissue fluids
- Be bactericidal or discourage bacterial growth
- Be nonirritating to periradicular tissues
- Be slow setting to ensure sufficient working

DECISION MAKING CRITERIA FOR SINGLE VISIT ENDODONTICS

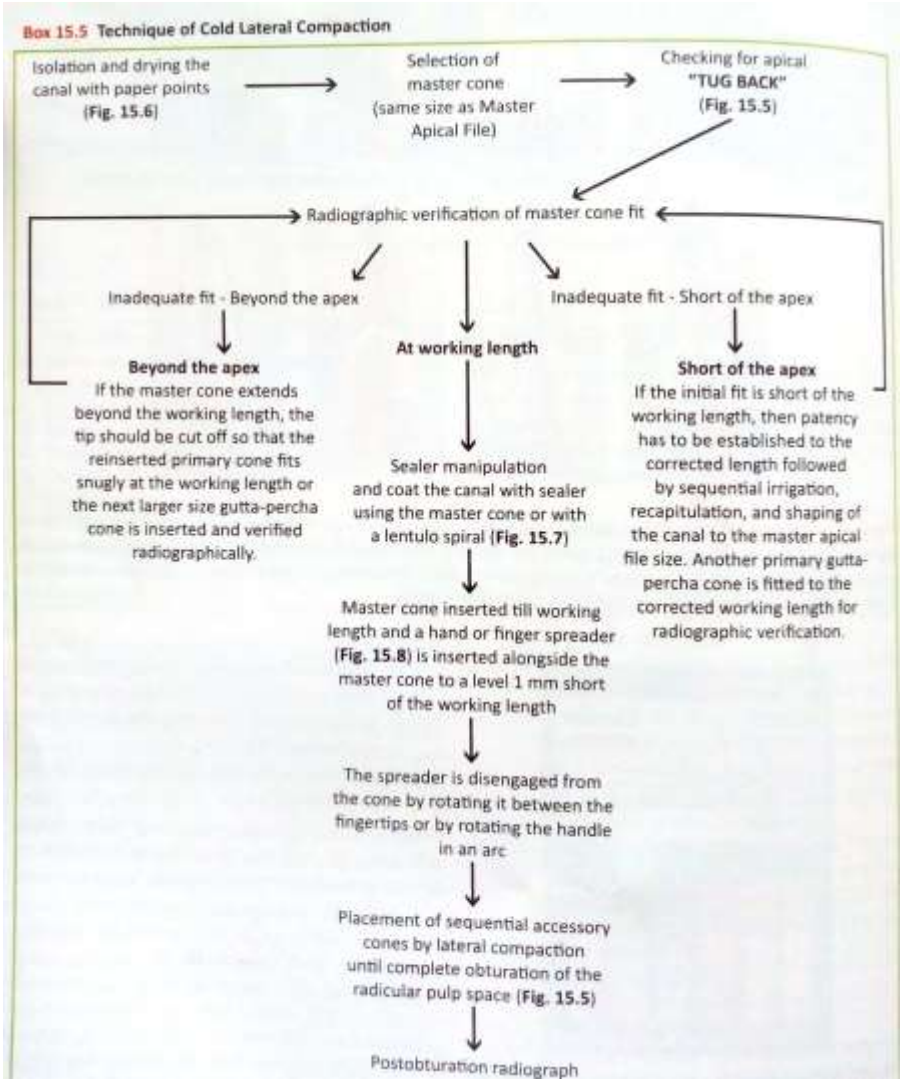
FAVOURABLE CRITERIA	UNFAVOURABLE CRITERIA
• Clinically experienced operator • Patient is cooperative for the longer procedure • Accessibility and mouth opening is good • Normal root canal anatomy • Patent root canals • Easily negotiable curvatures • Absence of periradicular lesion • Complete pulpal anaesthesia easily achieved • Primary endodontic treatment	• Relatively inexperienced operator • Patient is noncooperative • Poor accessibility and mouth opening • Anatomical variations like extra roots/canals • Calcifications/ledges/ canal obstructions • Acute canal curvatures • Presence of a periradicular lesion • Hot tooth • Retreatment cases

Obturating (filling) the Root canals:

- Finally the canals are sealed with two componants:
  - Sealer-a cement that seals over time
  - Gutta percha- a filler made of a natural form of latex
- This serves as the permanent root canal filling

TECHNIQUES OF OBTURATION

1. Cold Lateral compaction
2. Warm compaction (warm gutta-percha) a) Vertical b) Lateral
3. Continuous wave compaction technique
4. Thermoplasticized gutta-percha injection
5. Carrier based gutta-percha a) Thermafil thermoplasticized b) Simplifill sectional obturation
6. Mcspadden thermomechanical compaction
7. Chemically plasticized gutta-percha
8. Custom Cone



Root canal treatment completed

- Upon completion of the root canal treatment , a temporary filling is placed over the sealed canals that has two parts:
  - Cotton pellet soaked in an antibacterial solution
  - A splid temporary filling on top
- A final restoration (usually a crown) is placed by your dentist
- This will restore functionality to your tooth and protect it from fracturing
- Follow ups
  - We will see you back to evaluate healing.
  - The healing bone takes one year (on average) to completely heal.

Principles of endodontic surgery.

Periapical surgery (apectomy) – indications and contraindications

Apicectomy/ Apicoectomy/ Apectomy - The surgical amputation of the apex of a tooth root.
Periapical curettage - The removal of pathological material present in the periapical region.
Indications for Periapical Surgery:
- Anatomic problems preventing complete debridement/obturation
- Teeth with radicular cysts
- Horizontal apical root fracture
- Irretrievable material preventing canal treatment or retreatment.
- Procedural errors during treatment
- Large periapical lesions that do not resolve with root canal treatment

Contraindications (or Cautions) for Periapical Surgery
When conventional root canal treatment is possible
Periodontal diseases /mobile tooth/
Vertical root fracture or horizontal root fracture around tooth cervix
Anatomic structures (e.g., adjacent nerves and vessels) are in jeopardy
Structures interfere with access and visibility
Compromise of crown/root ratio
Systemic complications (e.g., bleeding disorders)
Primary teeth

Apicoectomy is only regarded as a supplement to normal endodontic therapy and can therefore never
replace it.

1. Apicectomy follows endodontic treatment
2. Endodontic treatment follows apicectomy
The treatment consists of the following phases:
Incision and reflection of a muco-periosteal flap
Exposure of the periapical region of the tooth involved
Curettage of pathologic tissue
Resection of the apical part of the root tip

- Closure of the root canal if necessary!
- Wound debridement, suture and control radiographs
- Follow-up

Root end-filling materials (Super EBA/Super ethoxy benzoic acid cement/, Titianum post, Silver post,
Amalgam, Gutta-percha cone) should:
-seal well,
-be tissue tolerant,
-easily inserted,
-minimally affected by moisture,
-visible radiographically,
-must be stable and nonresorbable indefinitely

In the anterior part of the maxilla where most apicoectomies are performed, a U-shaped incision
is preferred. To ensure proper healing the incision must be placed well outside the expected border
of the bone cavity so that sutures may be placed on solid bone.

In the posterior region of the mandible an angular incision is preferred while in the anterior region
a trapezoid incision is appropriate. Removal of bone is carried out to an extent which gives an easy access to the whole of the pathological process. Granulomatous tissue can now be removed
with a curette. If a cyst is present a periosteal elevator or large curette is placed between the
lining of the cyst and the bone and the whole sac is gently disengaged from the cavity walls and
lifted out. To avoid perforation of the cyst, the curette is placed with the convex side towards the
lining in the initial stages of the enucleation.

Part of the root tip including the apical ramifications of the root canal is cut off with a bur.

It is not necessary to resect all of the root exposed in the pathological cavity. The cut is made with a
labial inclination which gives an adequate view of the apical foramen.

If before surgery endodontic treatment is not performed, after apectomy should be performed.

If the root canal is obliterated for one or another reason, the apical part of the canal is closed with a retrograde silver amalgam root filling or others (gutta-percha, titanium post, Super EBA).

The sutures are placed. Inform the patients about: swelling, discomfort, possible
discoloration, some oozing of blood. Apply ice pack on the operative site, a chlorhexidine
rinse, analgesics, Antibiotics if are necessary.

The pathological tissue should be sent for histologic examination.

The healing of the periapical area is evaluated by yearly radiographic examinations until bone has
filled in satisfactorily.

ESTHETIC INLAY ONLAY OVERLAY

INDIRECT RESTORATION

Cast metal

Gold 22 karat

Gold alloy

gold-platinum

Silver-Palladium

Esthetic

ceramic

composite

metal-ceramic

gold-ceramic

Requirement

Adhesive-technique and Rubber dam isolation

Indication

Esthetics

Size of the defect

Oral hygiene

Root canal obturation

Cusp fracture

Contraindication

Heavy occlusal forces

Deep subgingival preparation

Small tooth crown

big pulp-chamber

Cusp incline is steep

ADVANTAGE

Polymerisation shrinkage

Physical properties

Control of contact point and contour

Biocompatibility

DISADVANTAGE

Number of appointment

Cost, and time

Technique sensitivity

Brittleness of the material

Type of CERAMIC indirect restoration according to the manufacturing process

1.(Feldspatic porcelan) or Fired porcelan: Optec Inlay, fired on refractory die (master die)

2. Glass-ceramic “Lost-wax” casting process Dicor, Ceraperl (casted) Empress (pressed) (not centrifugeted)

3. CAD/CAM System: Computer Aided Design/Computer Aided Manufacturing 1986 Cerec (optical impression)

Type of composite inlay according to the manufacturing process

Direct method: inlay is made into the mouth. Preparation, isolation of tooth, modellation, lightpolymerisation, remove from the tooth, and second polymerisation (light+heat+pressure)

Semi-direct method: (chair-side):not in lab, but next to the chair, but not into the mouth. Preparation, impression, but impression stay in office.

Indirect method: Inlay is made in lab.

Type of composite inlay

1.First generation Laboratory Composite Resin: 1986 Isosit 1986 (inhomogen microcomposite) low flexural strength(60-80 MPa), low resistance to wear, low % of inorganic filler

2. Second generation Laboratory Composite Resin:(microhybrid composite, nanohybrid composite), filled polymers, polymer glasses… ArtGlass,Colombus, Belleglass Filtek Z 500, Gradia: f.s:120-160MPa, Filler:70-80% or more, different in form,size

Indication, Contraindication, Advantage, Disadvantage Cavity preparation

In the rules of preparation are small differences in case of ceramic and composite indirect restoration, therefore we speak about the preparation together.

The techniques follow the general rules of the cast metal restoration. Primer (initial) preparation (occlusal, proximal), secondary (final) preparation

Consideration of making inlay

Metal inlay

Most cases we have to remove more toothstructure.

We can not leave big undercuts into the cavity.

The contact with the neighbouring tooth has to be eliminate. (minimum distance of 0,5mm)

The direction of place in is important.Orientation of the bur! MOD

The contact with the antagonist tooth may not be at the cavosurface margin of the inlay.

Esthetic inlay

Rules of making esthetic inlay

The retention is not the friction .

The retention is microretention! (Difference in luting material!)

The cavosurface margins are not beveled!

Avoid strong line angle and point angle

“Secondary Retentionselement” are not or rarely used.

Primer (initial) preparation

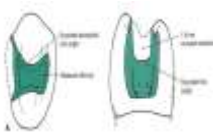
Instrument: Speed, Handpiece, bur

Tapered fissure bur (hard metal or diamond) with slightly rounded angles

Conicity: cast metal inlays 3-5°

esthetic inlay 6-10°

Primer (initial) preparation for esthetic inlay



Depth: of the cavity is 1,5- 2 mm.

Width:The occlusal extention is more.

Isthmus is wider

Walls: have to diverge in occlusal direction, more than in case of cast metal inlay 6-10°.

Line and point angles are rounded more. Isthmus is wider

Cast metal Final (secondary) Preparation

Removal of any remaining infected dentin and/or old restoration and Pulp-protection

Preparation of cavosurface margins.

Different - in occlusal cavity (at about 90°)

- in proximal cavity

- on the vestibulo-oral walls (60°)

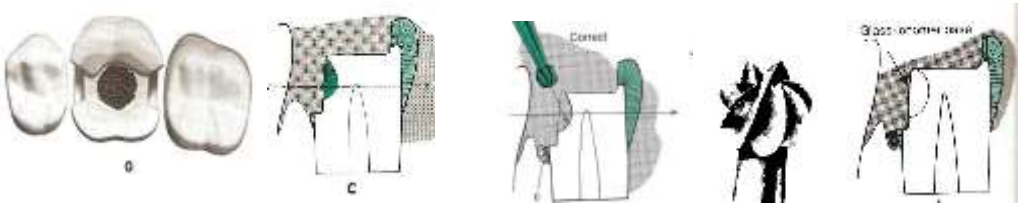
- on the gingival walls (straight)

Finishing the walls

Final (secondary) preparation

Removal of any remaining infected dentin and/or old restoration and Pulp-protection

With round metalbur (hard or steel) (Calcium-hydroxid)+ Glassionomer



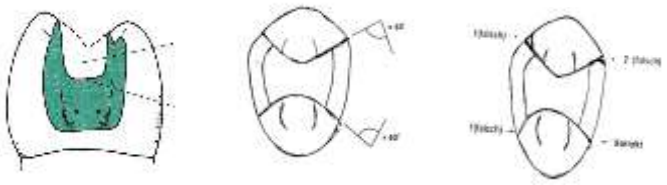
Final (secondary) preparation for esthetic inlay

Preparation of occlusal cavosurface margins.

Preparation of proximal cavosurface margins on the vestibulo-oral walls

-Occlusal cavosurface margins enamel at about 90˚ No bevelling!

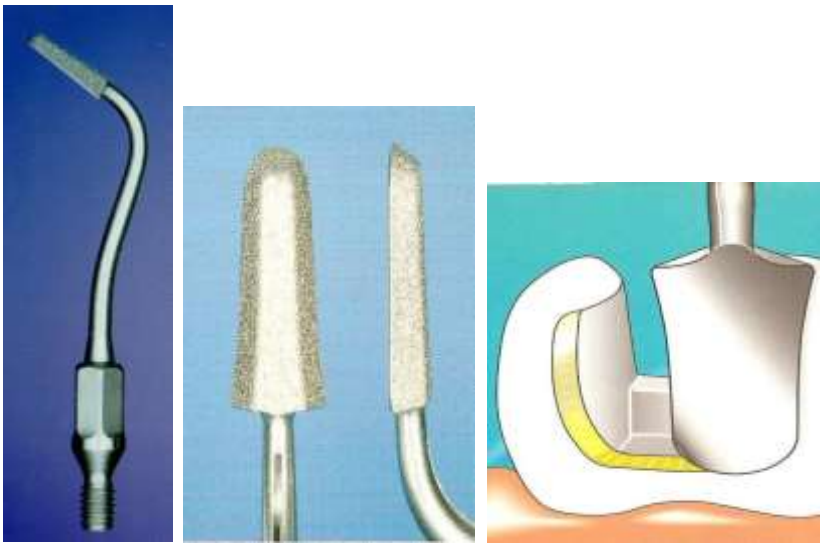
-Proximal cavosurface margins enamel at about 60°



Final (secondary) preparation

Preparation of proximal cavosurface margins on the buccale, linguale walls.

SONICflex 60˚



the proximal cavosurface margins 60° , the gingival cavosurface margin 75° The laterale and gingivale surfaces are rounded.

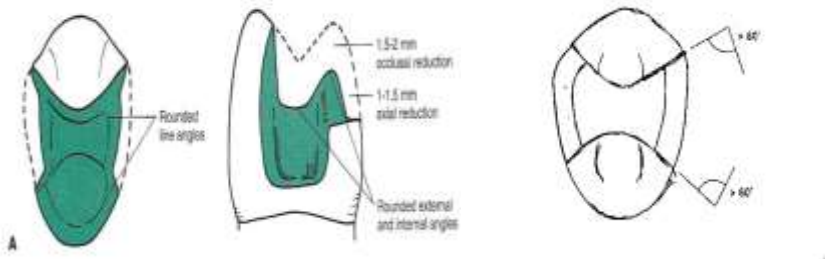
Preparation for esthetic onlay/overlay

-Cusp reduction: 2 mm -No counterbevels or reverse bevel preparation

- Axial reduction : 1-1,5 mm

-Shoulder: without beveled

-Proximal preparation: 60°



The steps of making esthetic inlay

indirect method

1. Shade selection, Preparation

2. Impression, Temporary filling

3. Tray-in

4. Cementation

5. Finishing, polishing

2. Impresson, temporary filling

What kind of impression?

What kind of temporary filling?

3. TRAY-IN WITHOUT PRESSURE

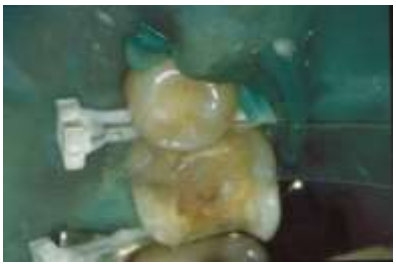
-check the cavosurface margin and

-check the proximal contact

-wax (weaker)

-adhesive (stronger)

4. Fixation of inlay (cementation) /adhesive insertion / Micromecanical retention



-Isolation: rubber dam, plastic matrix strip, wedges, dental floss;

- Preparation of inlay: (inner surface) depends on : ceramic or composie

-Preparation of tooth: depends on the specific luting system (acid etching, priming, bonding) setting!?

-Insertion of inlay:with resin cement LUTING AGENT (in case of esthetic restoration)

Nowdays: always (COMPOSITE) RESIN cement

-ViscositY: - low-viscosity composite with Conventional technique - high-viscosity composite with USI or SI vibration can change the viscosity (ultrasound or sound technique) without water

-Setting: dual curing! Glycerin-gel: for covering the surface of luting composite

Oxygen disturbs the polymerisation of the last layer of composite

Preparation of tooth:

depends on the specific luting system

1. “Etch-and rinse” (total) bond + resin cement (dual-cured bond) (RelyX ARC)

2. “Self-etch” bond + resin cement (Panavia F) (dual cured bond)

3. “Self-adhesive” resin cements (self adhering cements used without application of any adhesive system) (SmartCem, RelyX Unicem G-Cem) Dent.Mat.2010.855-863 J.Prost.Dent. 2009. –

312. Preparation of ceramic inlay

-Sandblasing in the laboratorium

-HF acid

: for fired ceramic 1-2 minutes for the inner surface of inlay remove with water Concentration of HF acid:4-10 %

-Ammoniumbifluoride: 10 % remove with water Glas ceramic Dicor, Empress

-Silan: helps the contact between the ceramic and luting cement (ceramic-silan-resincembond-tooth)

Preparation of composite inlay

This can be different depending on the used composite material

Roughened the surface

Sandblasing in the laboratorium

HF acid:

4. finishing, polishing
5. Checking the occlusion.

When, and how to remove the excess luting material? Finishing: -fine grit diamant instrument (yellow, white) -16-30-40 fluted carbide burs Polishing: -rubber -polishing paste Accuracy of inlay

The weekest point of inlay is the cavosurface margin

Cast metal: 20-50 µm

Ceramic: 40-80 µm

Composite: 40-100 µm


Adhesive technique and Rubber dam application


POST AND CORE PLACEMENT TECHNIQUES:

Pretreatment Data review:

1. Post length
2. Post diameter
3. Anatomic/structural limitations
4. Type of post and core that will be used. (prefabricated post and restorative material core or anatomically customized cast post and core.)
5. Root selection in multirooted teeth
6. Type of definitive restoration being placed and its effect on core form and tooth reduction depths.

TECHNICAL PROCEDURES:

1. Coronal preparation(amount of tooth structure to be reduced is related to the type of crown to be used)
2. Pulp Chamber preparation
3. Root canal preparation(best time-during rct/ later- warm endodontic plugger, gates glidden drills, Peeso Drills)

PREFABRICATED CEMENTED OR BONDED POST/RESTORATIVE MATERIAL CORE

1. The root canal filling material is removed with the warm endodontic plugger or a small diameter rotary instrument until the desired post depth is achieved.
2. The canal is enlarged in size using the rotary instrument that corresponds to the final dimension of the selected post. The post should fit passively into the post space without substantial movement.
3. At least the apical half of the post should fit closely to the preparation. The coronal half of the post may not fit as well because of the root canal flaring.
4. If the root canal cannot be prepared to conform to the round shape of the post and have adequate approximation to the root canal walls, then a custom-cast post may be preferable.
5. Care must be taken not to remove more dentin at the apical extent of the post space than necessary.
6. Radiographic confirmationis important to ensure proper seating and length of the post.
7. The incisal/occlusal end of the post is shortened so that it does not interfere with the opposing occlusion, but it must provide support and retention for the restorative core material (2 to 3mm)
8. When metal posts are used, they can be bent coronally, if necessary, to align them within the core material. Post bending is done outside the mouth with orthodontic pliers.
9. The post is cemented into the root canal using resin bonding procedures.

10. If there is little or no remaining tooth structure to provide resistance to core rotation, an auxillary threaded pin should be placed into the remaining tooth structure.
11. Restorative material is then condensed around the post or bonded to the post and remaining tooth structure. A slight excess of material is placed, and this is removed during the crown preparation.
12. The definitive tooth preparation is then completed and an impression is made for the crown.

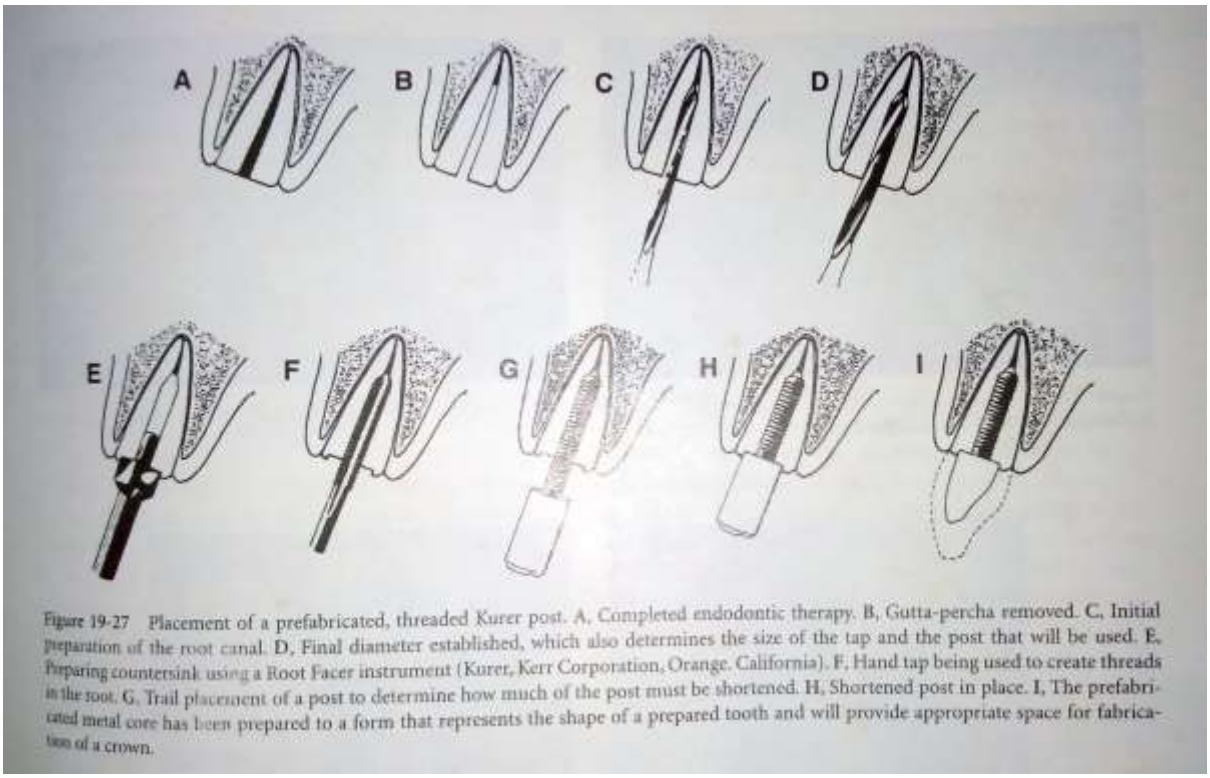


Figure 19-27 Placement of a prefabricated, threaded Kurer post. A, Completed endodontic therapy. B, Gutta-percha removed. C, Initial preparation of the root canal. D, Final diameter established, which also determines the size of the tap and the post that will be used. E, Preparing countersink using a Root Facer instrument (Kurer, Kerr Corporation, Orange, California). F, Hand tap being used to create threads in the root. G, Trail placement of a post to determine how much of the post must be shortened. H, Shortened post in place. I, The prefabricated metal core has been prepared to a form that represents the shape of a prepared tooth and will provide appropriate space for fabrication of a crown.

PREFABRICATED THREADED POST/ RESTORATIVE MATERIAL CORE

1. The root canal filling material is removed as described.
2. The canal is sequentially enlarged using the manufacturer's provided rotary instruments until the desired diameter is achieved.
3. The Kurer post system uses a root facer to prepate a flat area on the coronal surface of the root against which the incorporated metal core can seat. Other threaded posts use a restorative material for the core and therefore donot need such an instrument.
4. Either the root is threaded using a hand tap or the post is threaded into the canal.
5. The core is formed by either reshaping the attached metal core or building a restorative material core to the desired dimensions and then preparing it for the definitive crown.

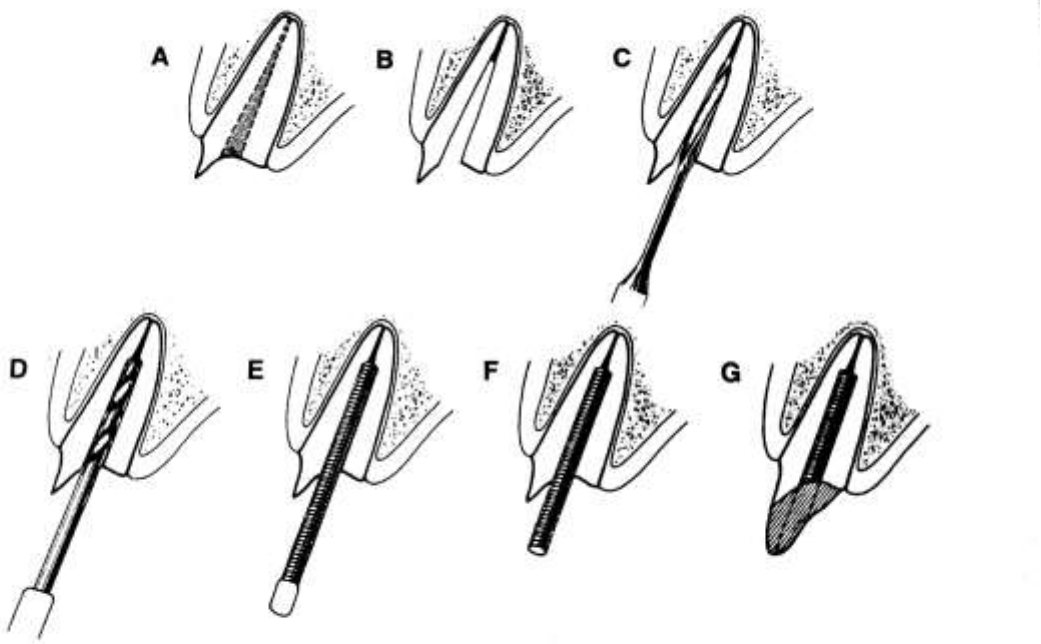


Figure 19-22 Placement of parallel-walled Para-Post and composite resin core in an anterior tooth. A, Endodontic treatment completed and initial crown preparation formed on remaining coronal tooth structure. B, Gutta-percha removed. C, Post space being formed using a Peeso instrument. D, Post space being refined using a Para-Post drill. E, Trial placement of the post to verify adequate approximation to post space without binding. F, The post has been shortened so that it does not interfere with occlusal closure and there will be space for fabrication of the crown. The post was cemented after shortening. G, The tooth has been etched and a bonded composite resin core formed and then shaped using rotary instruments.

CUSTOM-CAST POST AND CORE

1. The root canal filling material is removed as described. It is not necessary or desirable to make the post space round.
2. Since most custom-cast post and cores will possess a slightly tapered form, a flat area should be prepared in the remaining coronal tooth structure if there is not one already present in existing morphology. This will serve as positive stop during cementation of the post and during subsequent application of occlusal forces, thereby helping to minimize any tendency for the post to wedge against the tooth.
3. The custom cast post and core can either be made indirectly on a cast obtained from the impression or fabricated from a pattern made directly on the tooth.

Figure 19-29 Custom-cast post and core. **A**, Traumatically fractured central incisor after endodontic treatment and post space preparation. **B**, Cast post and core seated in the tooth.

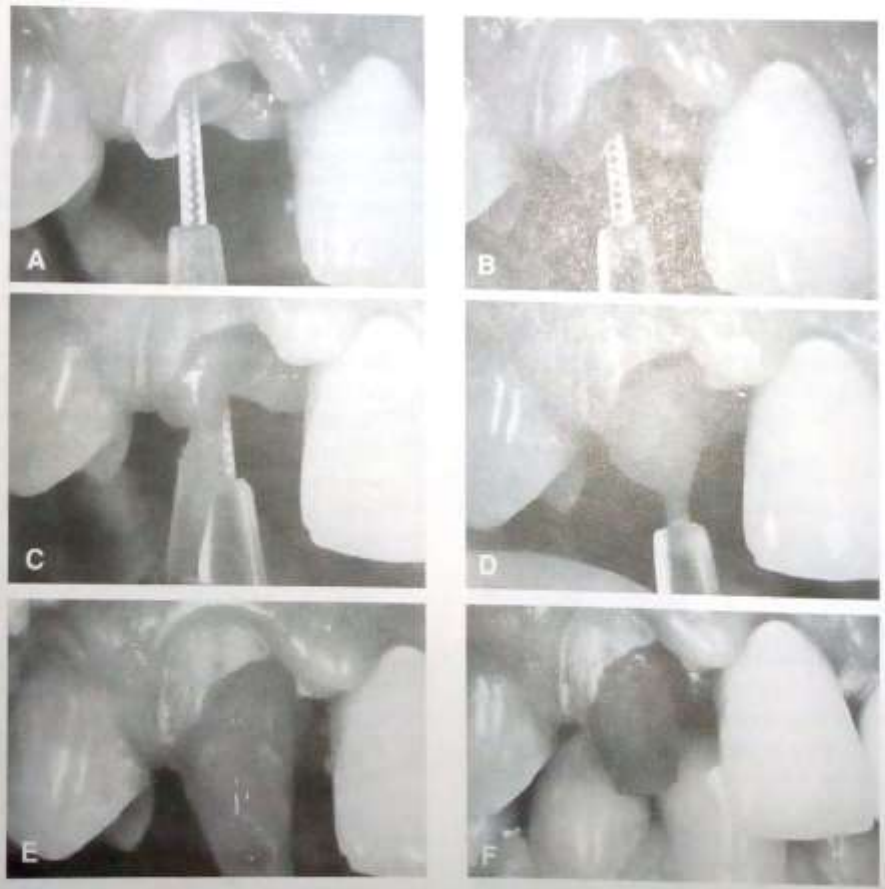


Figure 19-30 Fabrication of a direct pattern for a custom-cast post and core. **A**, Plastic post selected that fits passively into the prepared post space. **B**, Resin has been placed into the prepared root canal and the plastic post seated to the depth of the canal. Note that the plastic post is being removed before the resin completely hardens to ensure that the resin post does not become locked into the prepared post space. **C**, Additional unfilled resin is being applied using a bead-brush technique to build a core. **D**, The core buildup is being removed before it completely hardens to again prevent the resin from becoming locked into position. **E**, Excess core material has been applied. **F**, Initial preparation of the resin core has been completed. The pattern can now be removed and cast and the final tooth preparation completed after the post and core are cemented.

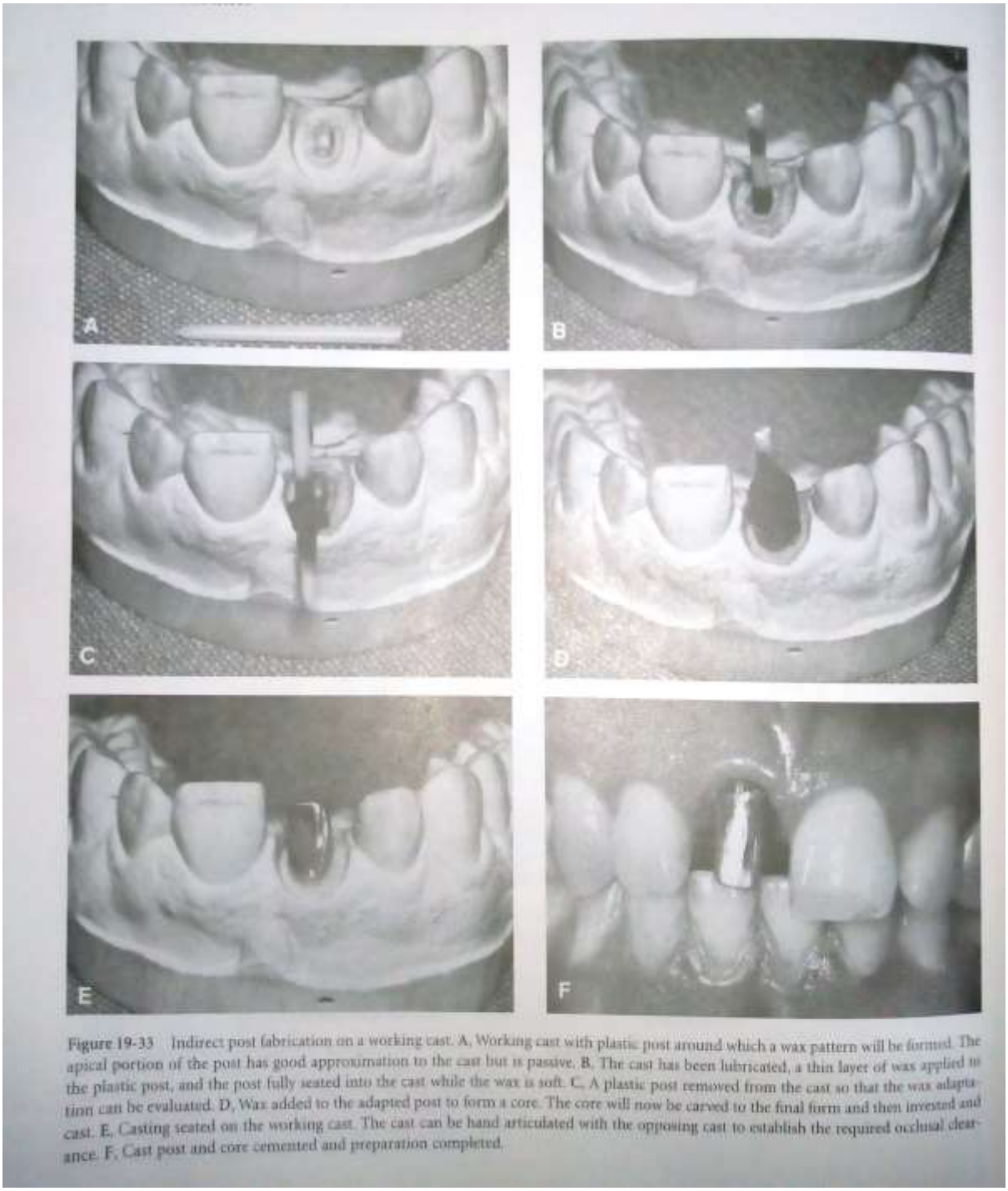


Figure 19-33 Indirect post fabrication on a working cast. A, Working cast with plastic post around which a wax pattern will be formed. The apical portion of the post has good approximation to the cast but is passive. B, The cast has been lubricated, a thin layer of wax applied to the plastic post, and the post fully seated into the cast while the wax is soft. C, A plastic post removed from the cast so that the wax adaptation can be evaluated. D, Wax added to the adapted post to form a core. The core will now be carved to the final form and then invested and cast. E, Casting seated on the working cast. The cast can be hand articulated with the opposing cast to establish the required occlusal clearance. F, Cast post and core cemented and preparation completed.

PRINCIPLES OF TOOTH PREPARATION

1. Preservation of tooth structure
2. Retention and Resistance – (sleeve retention/wedge retention- taper,length) and (pins, boxes,grooves)
3. Structural durability(functional cusp bevel, occlusal reduction, axial reduction, offset,groove, occlusal shoulder, isthumus, proximal box.
4. Marginal integrity (finish line- equigingival, supragingival, subgingival) (shoulder, chamger)
5. Preservation of periodontium

Anterior tooth preparation

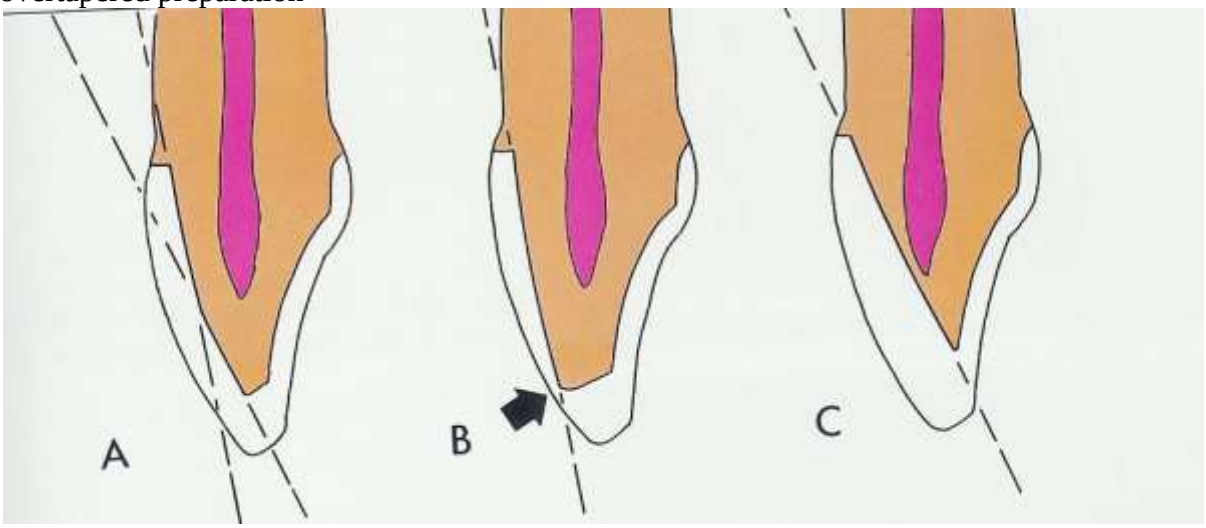
Facial surface reduced in two planes:

1.Parallel with the path of insertion

2.Parallel with incisal two-thirds of the facial surface

Reduction only parallel with the path of insertion: insufficient space for ceramic in the incisal one-third

One-plane reduction that creates adequate space will come close to the pulp and produce overtapered preparation



Porcelain Jacket Crown All-ceramic crown

Depth orientation grooves-parallel with the gingival portion

Two or more vertical cuts in the incisal portion

Grooves disappear near the middle of the facial surface, where the curvature of the surface is greatest

Incisal reduction

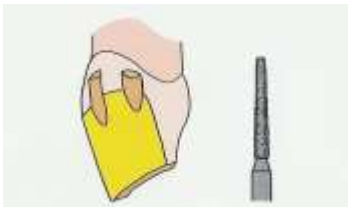
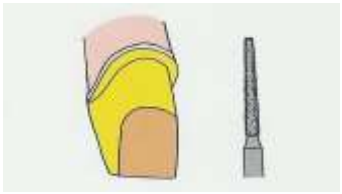


Incisal reduction:flat end tapered diamond

2.00mm deep faciolingual incisal orientation grooves

Plane of the reduced incisal surface parallel with the former incisal edge, perpendicular to the forces of mastication (45 degree incisolingual bevel)

Facial reduction

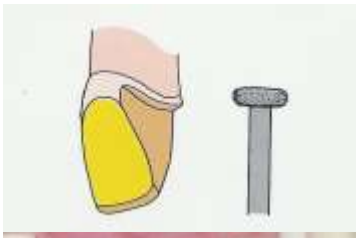
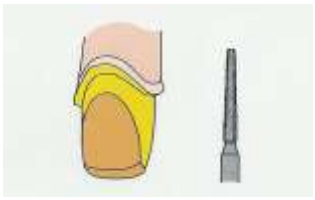

Facial reduction, incisal half: flat-end tapered diamond

Facial reduction, gingival half:flat-end tapered diamond

Remove tooth structure between orientation grooves

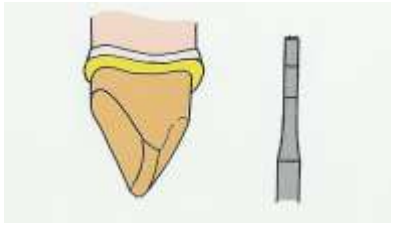
Extend facial reduction through proximal surfaces with flat-end tapered diamond,producing a shoulder in process

Lingual reduction

- Lingual reduction:small wheel diamond
- Producing concave shape
- Curved surface reduce stress
- Lingual axial reduction: flat-end tapered diamond
- 1mm depth, minimum taper in relation to the gingival portion of facial surface
- Blend the reduction of axial surfaces, rounded preparation produces greater strength

PJC-Shoulder

- Smooth axial surfaces with tapered fissure bar
- Round over all positive angles: sharp line angles cause crown to fracture
- 1.0 mm wide shoulder with flat-end diamond, smoothed with end-cutting bur
- Shoulder perpendicular to the line of force or to the long axis of tooth



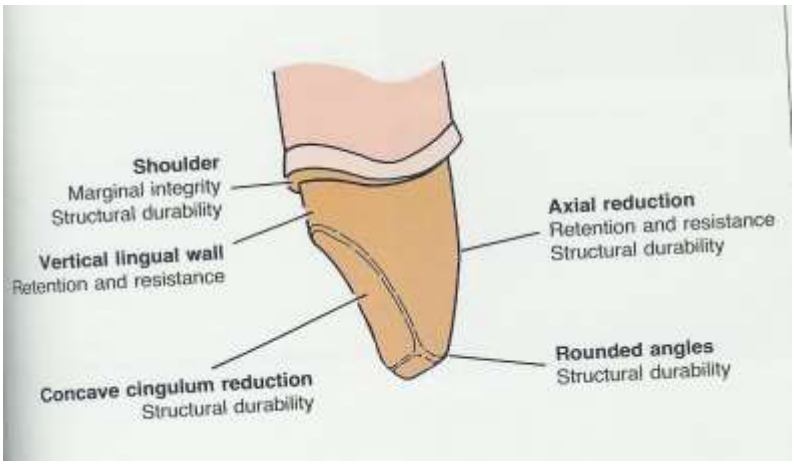
All-ceramic crown Porcelain jacket crown

- Depth reduction index: adapting condensation silicone putty
- Sectioning along the midsagittal line
- Sectioning along the incisal edge and cut into incisal and gingival halves

Overall reduction can be checked with midsagittal index and horizontal facial index

No sharp line angles on the lingual and incisal aspects of tooth

Features of preparation and function



POSTERIOR CROWN PREPARATION

1. Remove old restorative material and decay to verify restorability in its current state and need for possible root canal therapy and/or crown lengthening. IDetermine if a crown restoration is going to be the most conservative and longest lasting or would the tooth and patient be better served doing an inlay or onlay restoration?
2. Isolate the tooth for proper bonding and adhesive protocol to place the build-up material of choice. Don't overbuild the tooth as this waste material but also can affect the simplicity of the next step.

3. Now we are ready for the crown preparation (if a tooth will definitely need a crown, e.g. root canal posterior molar with large filling, then start with this step first). Start with depth cuts on the occlusal table with a known length bur (there are specific depth-cutting burs as well) that for the needed reduction of the restoration of choice. Take this bur down the central groove, across the cusps and out the grooves to depth.
4. Then place a small diameter bur (KS0 is my bur of choice) to remove the pieces of tooth that are sticking up between the depth cuts. Place the bur in the groove and either push or pull, which cuts or "amputates" that segment of the tooth off rather quickly and efficiently.

5. Then take the same bur on the facial and lingual and do depth cuts in two planes: in the incisal 1/3 and then to an approximate area of margin area along the gingival height. This bur is 1mm in diameter, so adjust as needed for material choice. Be sure that your account for facial/lingual area where you need added thickness for the functional cuspal area.
6. Place the bur back in the depth cuts and pull/push again to remove the segments of tooth remaining between the depth cuts quickly. It is more efficient to cut these segments away vs. milling the tooth back and forth at this stage. Once the enamel is reduced, then you can easily smooth and refine the margins.
7. Carry the bur carefully between the interproximal areas to break contact and follow the gingival contours and/or restorative material.

8. Rough finish the margins with this bur and round off any immediate edges or ledges.
9. Switch to a larger, finer diamond bur to refine and smooth margins and preparation overall.