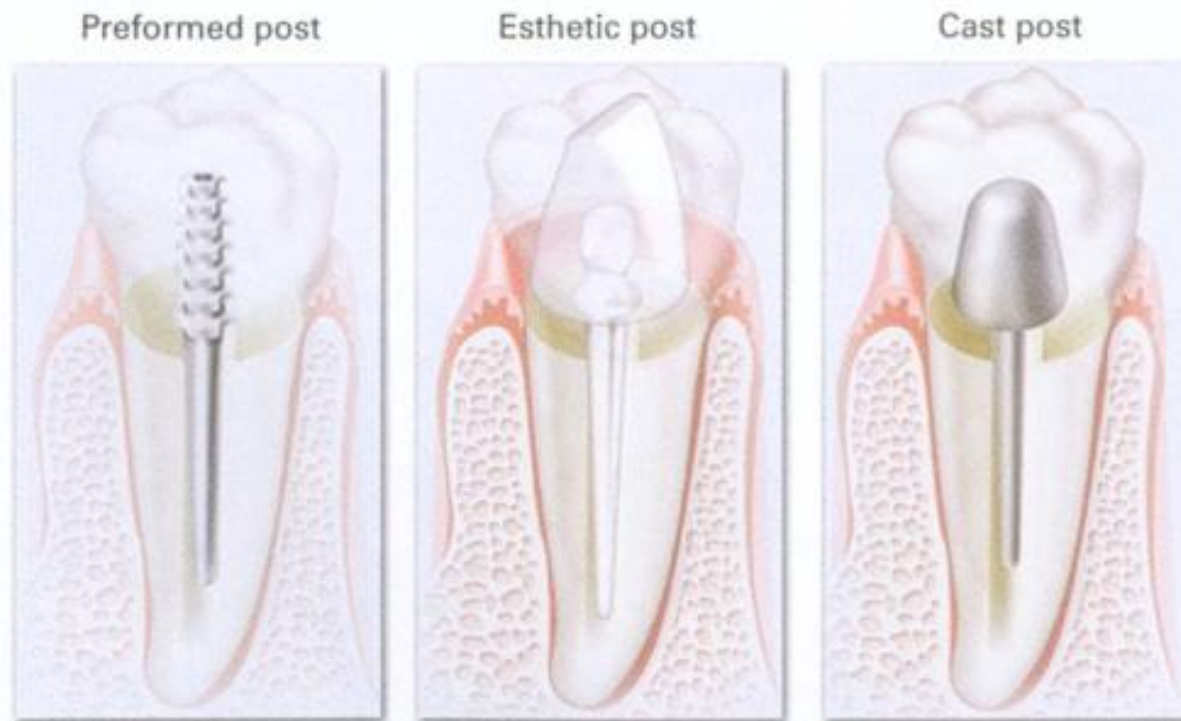
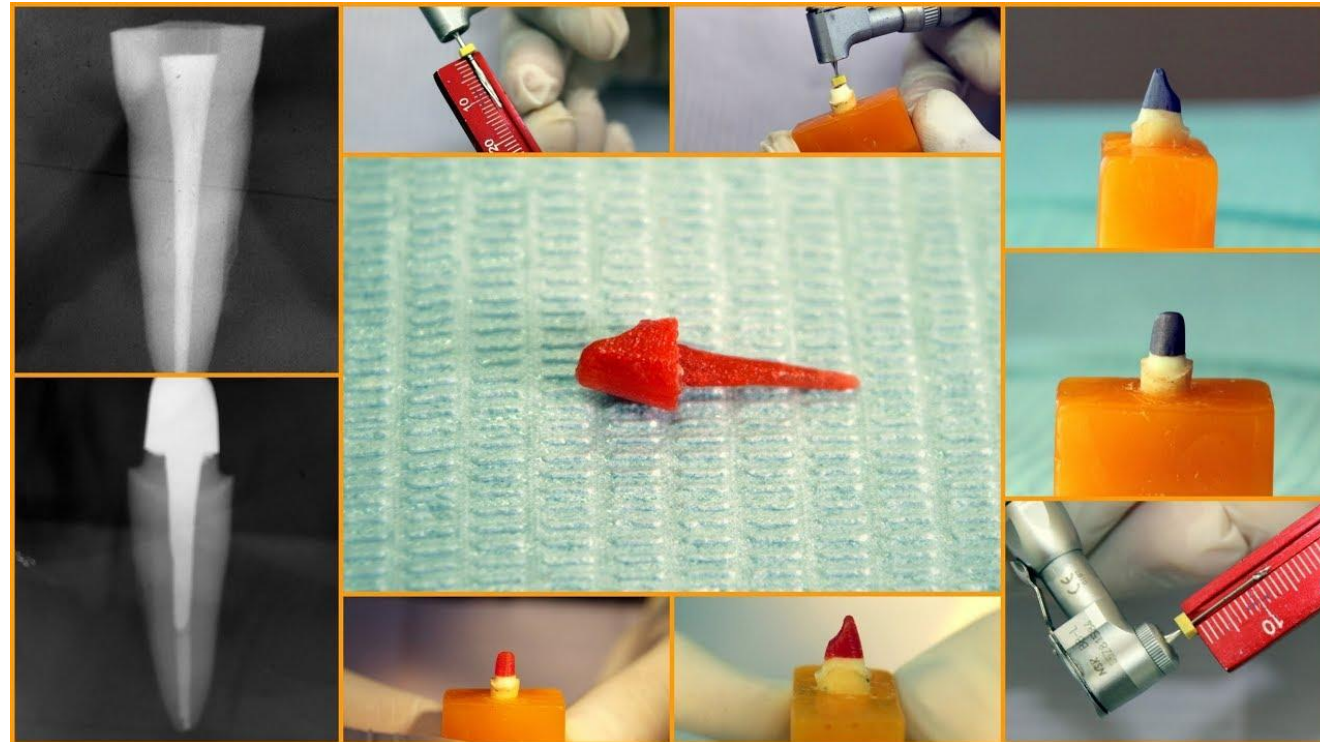


Restoration of Endodontically Treated Teeth





Learning Outcomes

By the end of this lecture, you should be able to:

- Understand the difference between direct, indirect and direct indirect post fabrication techniques
- Describe each technique available to fabricate a post and core
- Understand the advantage and disadvantage of each technique • Describe the post space preparation
- Describe the coronal preparation of a tooth receiving a post

FABRICATION TECHNIQUE

3 Techniques:

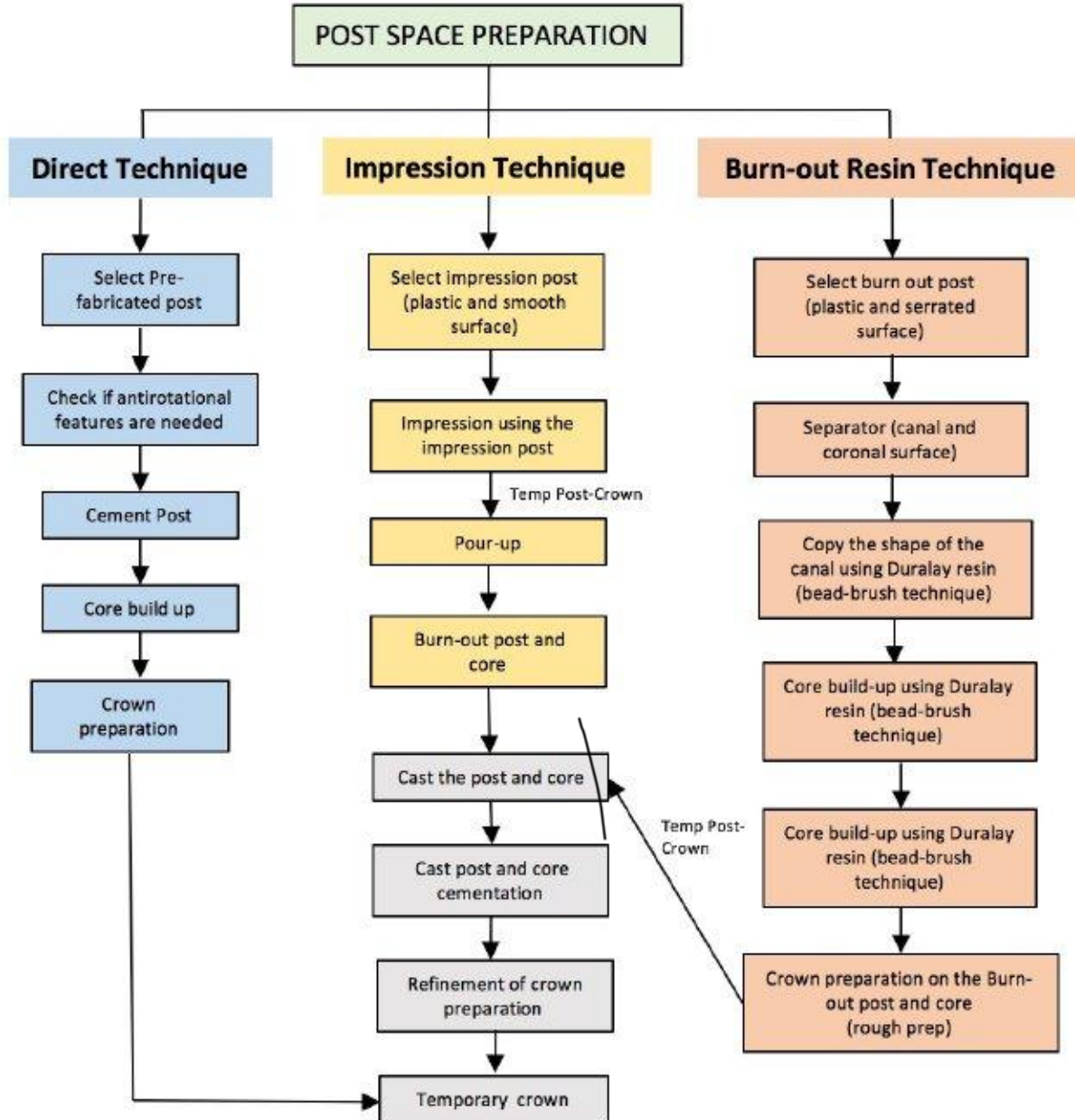
- Direct – **pre-fabricated** post + core (composite or amalgam)
- Indirect – impression technique
- Direct-indirect – burnout resin technique

Cast post and core



TEMPORARY POST-CROWN





Preparation of coronal structure:

- Removal of existing restorations
- Eliminate undesirable undercuts (cast post and core only)
- Crown preparation to create ferrule

* Burnout = plastic & serrated

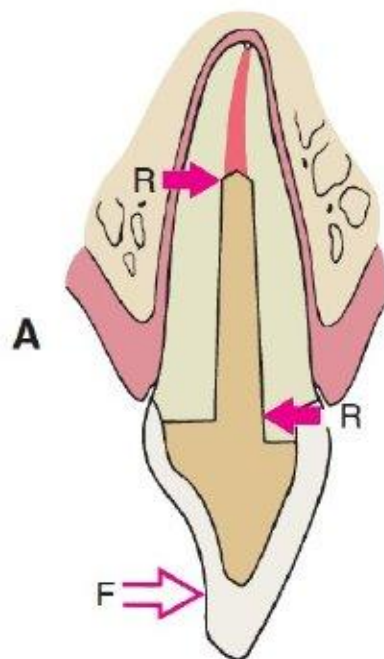
* Impression = plastic & smooth

POST SPACE PREPARATION

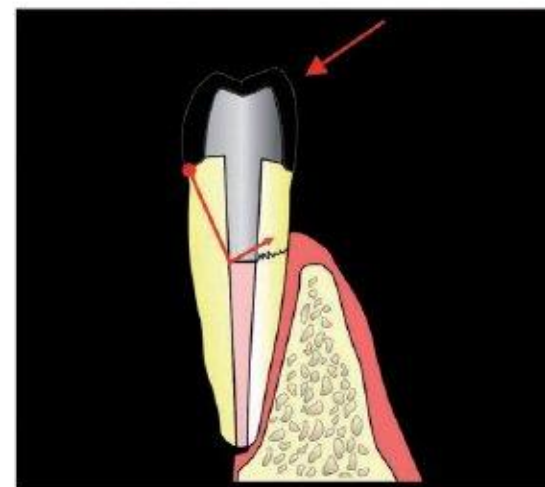
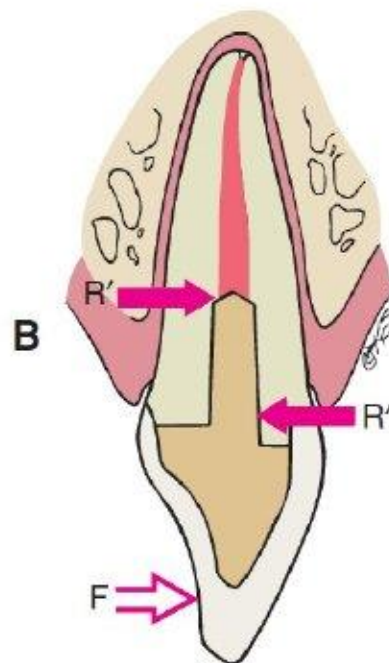
1. Determine the post length based on PA

- Increase of post length = increase of retention
- Careful: Very long may damage the seal of the root canal fill or cause root perforation if the apical third is curved or tapered

Preserve tooth structure



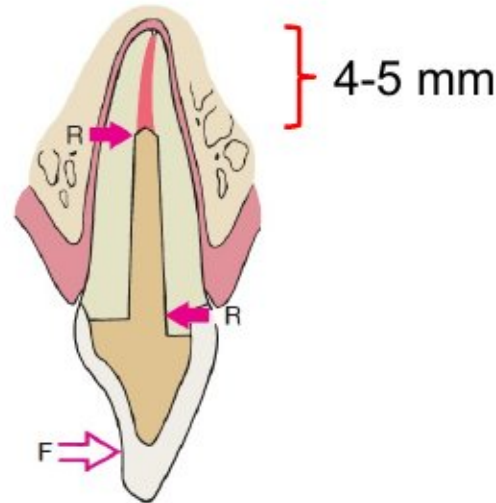
Short posts are more likely to result in root fracture.



POST SPACE PREPARATION

1. Determine the post length based on PA

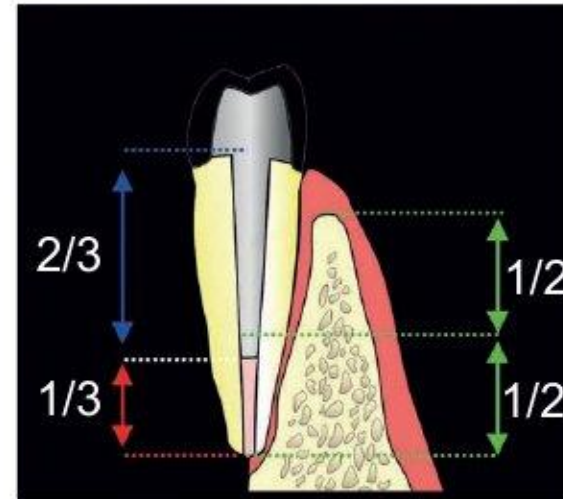
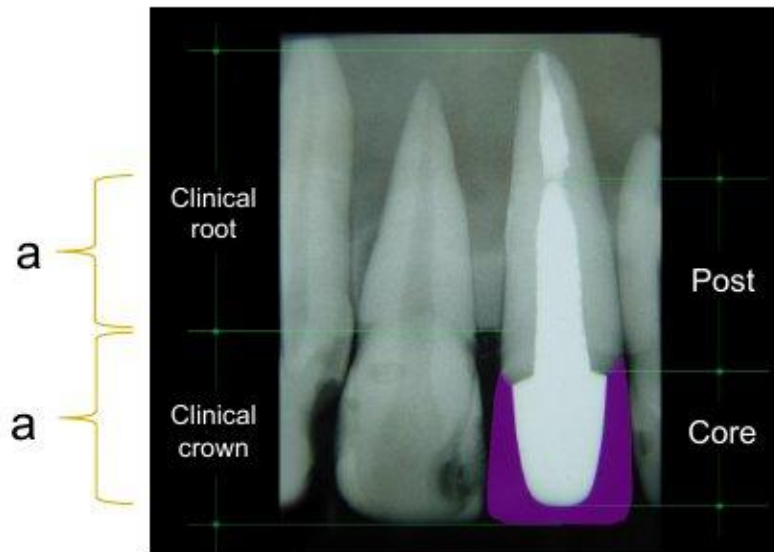
- Increase of post length = increase of retention
- Careful: Very long may damage the seal of the root canal fill or risk root perforation if the
 - ▽ apical third is curved or tapered
- ○ Ideal: at least 5-mm apical seal
- ▽ Very short roots and high crowns: 4-mm apical seal



POST SPACE PREPARATION

1. Determine the post length based on PA

- There is no absolute guideline for the optimal post length
 - **Post length at least equal to the crown length**
 - 2/3 of the remaining tooth length
 - 1/2 of the clinical root
 - 3/4 of the of the root canal length
- Always maintain the 4-5 apical seal



POST SPACE PREPARATION

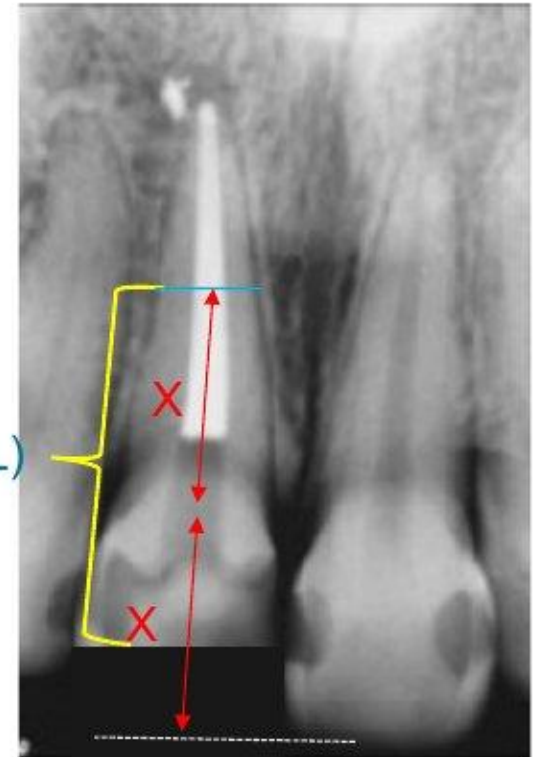
1. Determine the post length based on PA

- 1°) Measure the crown height (use contralateral tooth as a reference)
- 2°) Mark where the post should end (apical end)
- 3°) Pick one point on the tooth that is visible in the X-ray (e.g. incisal edge, marginal ridge, cusp tip)
- 4°) Measure the distance between the reference point and the apical limit = working length



Removal of GP

Working length (WL)





POST SPACE PREPARATION

2. Rubber Dam

- Avoid bacterial contamination (saliva, blood)
- Avoid inhalation of instruments (endo files, burs)
- Avoid contact of sodium hypochlorite with mucosa (we have to clean the canal at the end of the session)

POST SPACE PREPARATION

3. Removal of GP

- Start with a heated endodontic plugger
- Use a rubber stop to mark the WL
- Use Gate Glidden bur to reach the WL



AVOID PERFORATION

- Use the bur parallel to the path of insertion
- Light vertical forces
- Start with smaller bur and increase the size if necessary
- Should see red GP coming out (not white dentin)
- Take PA if you are not sure if the bur is following the root canal



POST SPACE PREPARATION

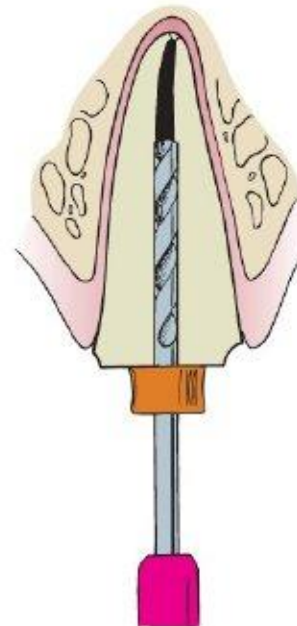
3. Removal of GP

- **Take a PA to verify if you reach the WL – post length that you calculated** (remove GP from the canal walls before taking the PA), and to check the remaining apical GP.

POST SPACE PREPARATION

4. Post space preparation

- Use **ParaPost** drills (ParaPost System)
- Create parallel walls (let the drill make the work, do not tilt the drill)
- Remove undercuts inside the canal
- Establish the Width of the post



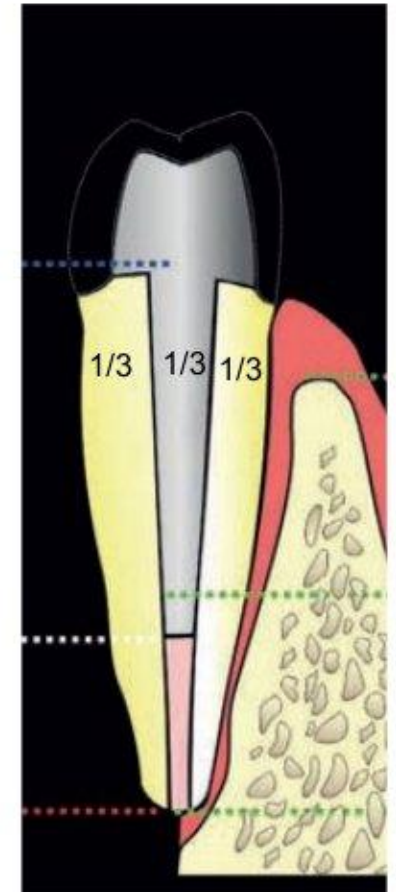
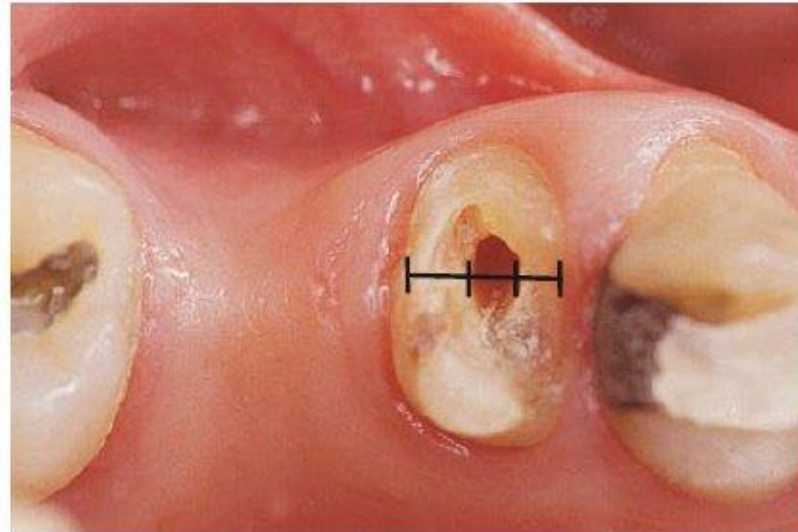
AVOID PERFORATION

- Drill following the root canal direction
- Light vertical forces
- Start with smaller drills and increase the size if necessary
- Take PA if you are not sure if the bur is following the root canal

POST SPACE PREPARATION

4. Post space preparation

- Establish the Width of the post
- Increase post width, increase of retention and resistance
- Wide post weaken the root (removal of tooth structure)
- No more than $\frac{1}{3}$ of the width of the root
- Preserve buccal wall in upper incisors



POST SPACE PREPARATION

4. Post space preparation

- Establish the Width of the post

Select the size of ParaPost drill

● Ø.060" 1.50 mm ● Ø.055" 1.40 mm ● Ø.050" 1.25 mm ● Ø.045" 1.14 mm ● Ø.040" 1.00 mm ● Ø.036" 0.90 mm



Minimum size for Cast post is Yellow
(1 mm diameter)

Minimum size for Pre-fabricates is
Brown (0.9 mm)

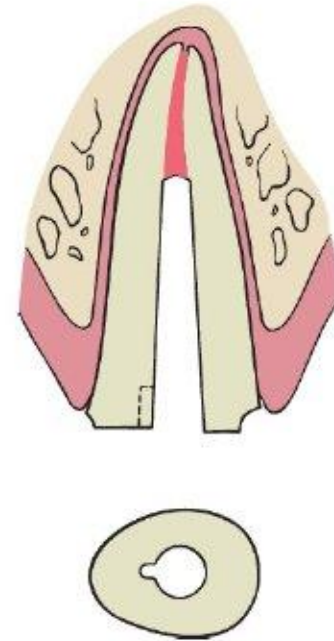
POST SPACE PREPARATION

4. Post space preparation

- Establish the Shape of the post

Uniradicular teeth with minimal coronal structure:

- The post space should have elliptical shape to have an antirotational feature
- If the canal is circular, create a small groove in the root canal following the path of insertion on the thickest wall



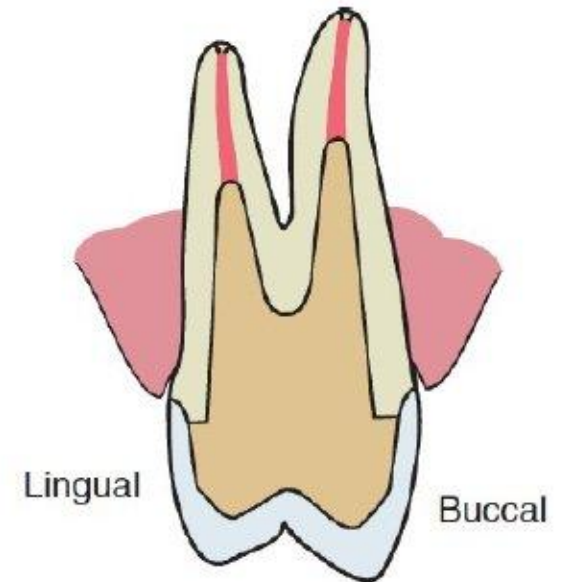
POST SPACE PREPARATION

4. Post space preparation

- Establish the Shape of the post

Multiradicular teeth with minimal coronal structure:

- Use more than one canal to provide antirotational feature and improve retention





POST SPACE PREPARATION

4. Post space preparation

- Take a PA after the post space preparation to verify that there is no GP on the walls and confirm the final shape



*Should I remove existing temporary restoration and make the crown prep **before** or **after** the post space preparation ?*

BEFORE:

- Better visualization of the canal
- Know how much natural tooth structure will be left so you can plan the post space preparation accordingly (length, shape, antirotational)
- Sometimes you lose the reference point for post space preparation (need a new PA and select another RP)



*Should I remove existing temporary restoration and make the crown prep **before** or **after** the post space preparation ?*

BEFORE:

- Better visualization of the canal
- Know how much natural tooth structure will be left so you can plan the post space preparation accordingly (length, shape, antirotational)
- Sometimes you lose the reference point for post space preparation (need a new PA and select another RP)

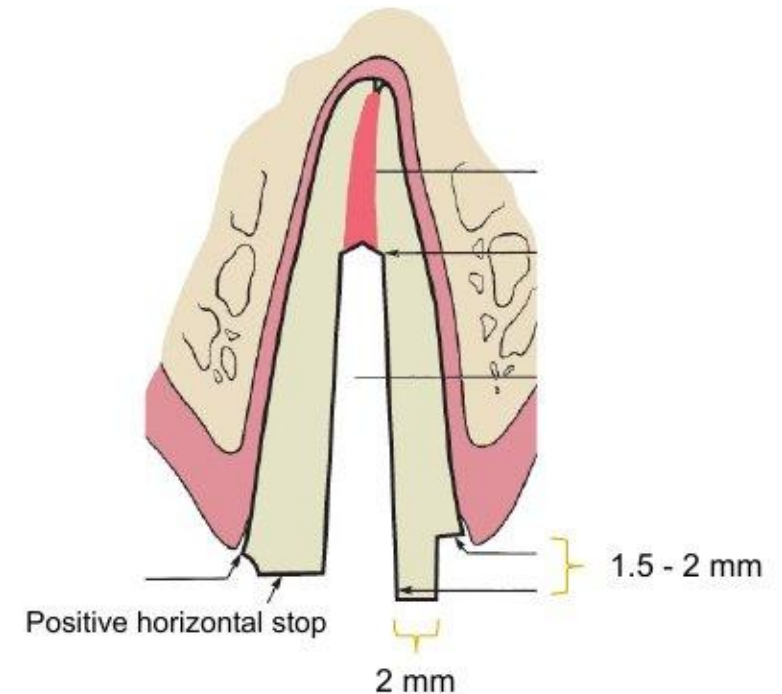
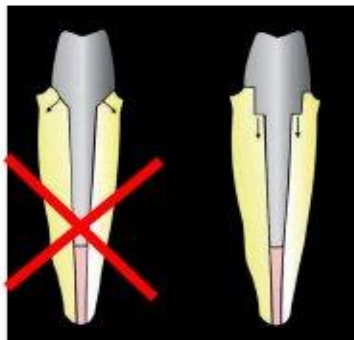
AFTER:

- Maintain the reference point establish using the PA taken after the RCT
- Easier to temporize during multi-appointment post space preparation

Should I remove existing temporary restoration and make the crown prep before or after the post space preparation ?

1 or 5) Preparation of the coronal structure

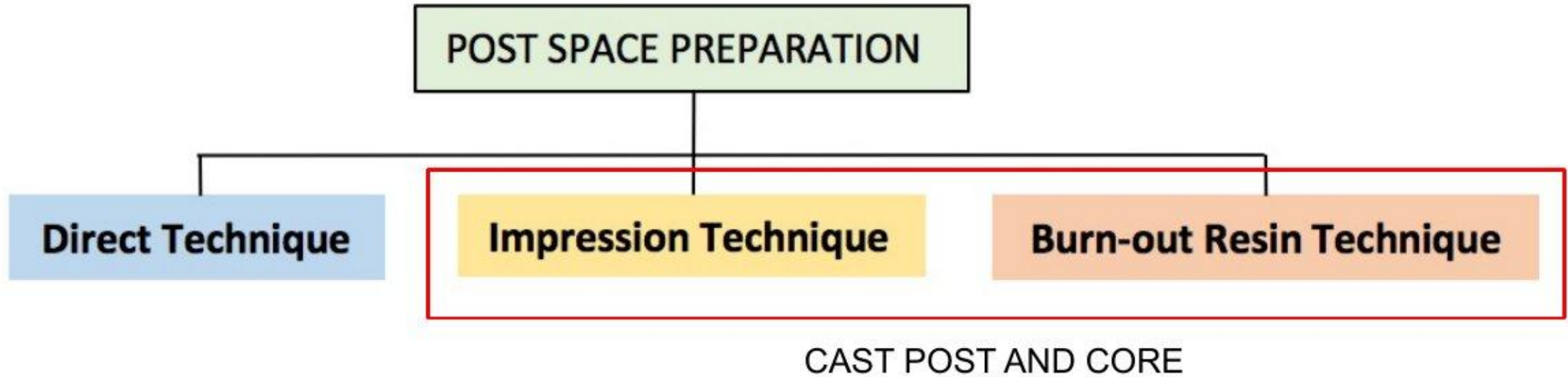
- Remove all existing restorations (temporary or definitive)
- Eliminate undesirable undercuts (only for cast post and core)
- Make the full crown preparation
- Eliminate unsupported tooth structure (<2 mm)
- Preparation of margins (create ferrule)
- Positive horizontal stop



Should I remove existing temporary restoration and make the crown prep before or after the post space preparation ?

1 or 5) Preparation of the coronal structure





IMPRESSION TECHNIQUE

INDICATION:

- Multiple post and cores
- Abutments of bridge (easier to establish parallelism)
- Posterior teeth with divergent canals

Advantage:

- Faster clinical procedure compared to burn-out resin
- Lab will manufacture the post

Disadvantage:

- May introduce errors (distortion during impression and pour-up)
- May need more adjustments during try-in



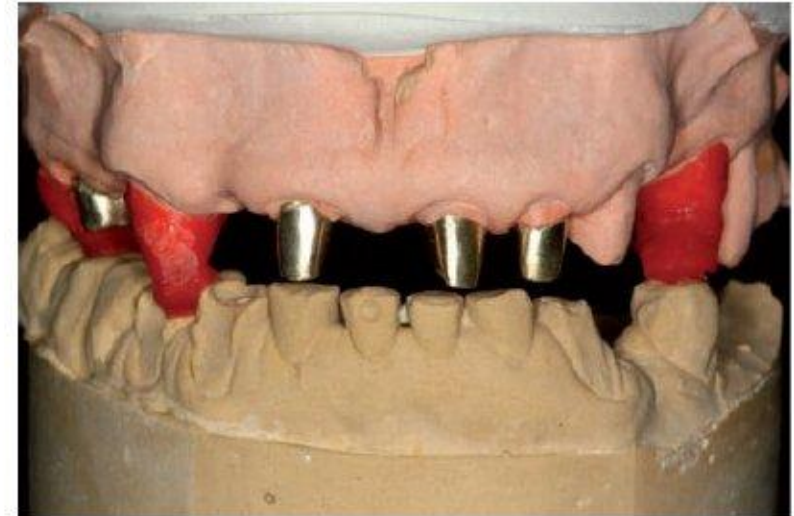
IMPRESSION TECHNIQUE

- Use full arch stock tray or custom tray
- Dry the canal (air and paper points)
- Verify the impression post seating
- Apply the light body PVS
- Seat the impression post
- Apply heavy/medium body on the tray
- Insert the tray
- Remove the tray with 'snap' movement



IMPRESSION TECHNIQUE

- Lab pour up the model and create a burn-out resin post and core
- Cast post and core





BURN-OUT RESIN TECHNIQUE

INDICATION:

- Uniradicular or multiradicular teeth without divergent root canals

CONTRA INDICATION:

- Patients allergic to monomer
- Patients who cannot stay with the mouth open for long period of time
- Divergent roots

Advantage:

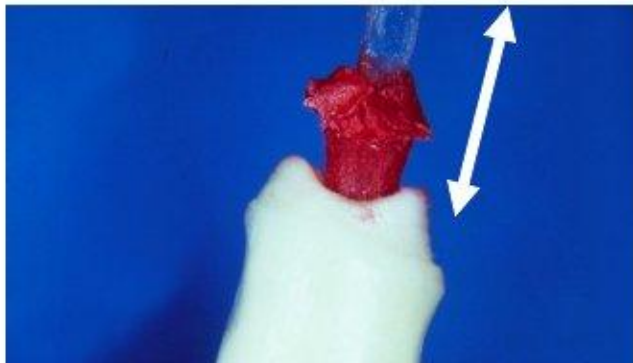
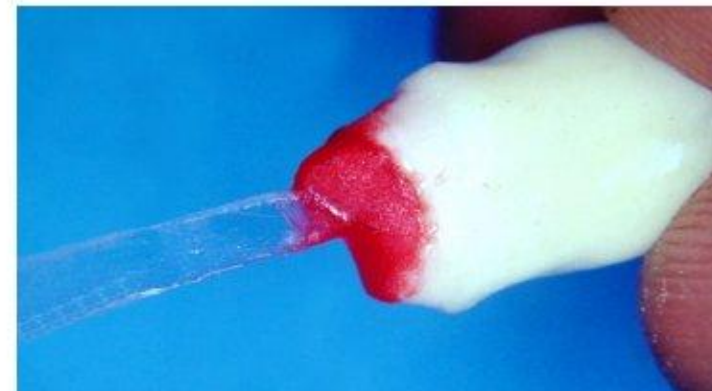
- You have control of the shape of the post and core
- Less adjustments during try-in (not always!)

Disadvantage:

- More difficult method
- More clinical time is necessary

BURN-OUT RESIN TECHNIQUE

- Dry the canal (air and paper points)
- Select the size of the burn-out post
- Apply separator in the canal and coronal structure
- Apply acrylic resin (Duralay or Pattern Resin) inside the canal and around the burn-out post (bead-brush technique) – PASSIVE FIT
- Insert the burn-out post into the canal
- Wait until the acrylic starts to set, and then make in and out movements until the acrylic polymerize



BURN-OUT RESIN TECHNIQUE

- Build up the core **after** the modeling of the post,
- Apply the Duralay to reestablish the missing coronal structure (do not overbuild)
- Make the crown preparation
- Remove the handle and check occlusal clearance (MIP and excursion)
- Send the acrylic post and core to the lab for cast



POSTERIOR TEETH - CAST POST AND CORE

- No coronal structure to support the core material
- Use more than one post

Divergent canals

- Multipiece cast post and core
- More retention
- Impression technique



Parallel canals – Single piece cast post and core



Main Post

Upper molars: Palatal
Lower molars: Distal



POST SPACE PREPARATION

Direct Technique

Impression Technique

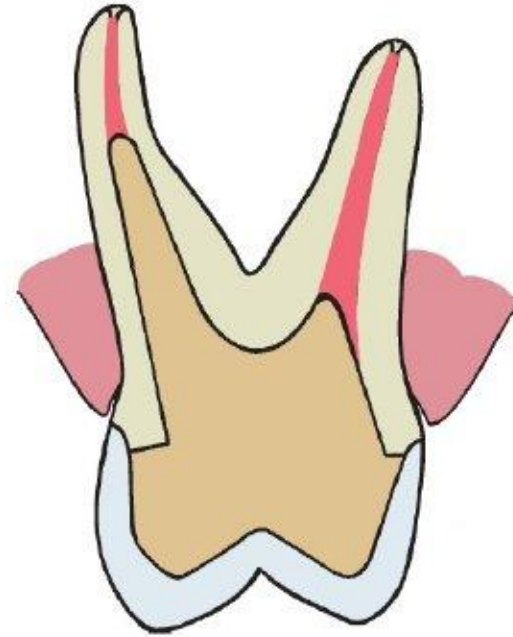
Burn-out Resin Technique

DIRECT TECHNIQUE

(Pre-fabricated post)

Improve core retention

- Leave undercuts (help retention)
- Add pins if necessary (extra retention)
- Use amalgam tags in other canals (amalgam core in posterior teeth)



DIRECT TECHNIQUE

(Pre-fabricated post)

- Dry the canal (air and paper points)
- Select the size (diameter) of the prefabricated post that fits tight in the post space (same as the last Parapost drill used)
- Check the length of the post according to the interarch space
- Adjust the length by cutting the apical end if needed (post completely embedded in the core material)
- Clean the post space (saline) and dry very well (paper points)

Cementation:

Resin cement (e.g. Panavia) – metal and fiber post

GIC and RMGIC (e.g. Permacerem) – metal

After cementation, wait the complete setting (at least 10 min)



DIRECT TECHNIQUE

(Pre-fabricated post)

- Core build-up



Before crown prep



After crown prep



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