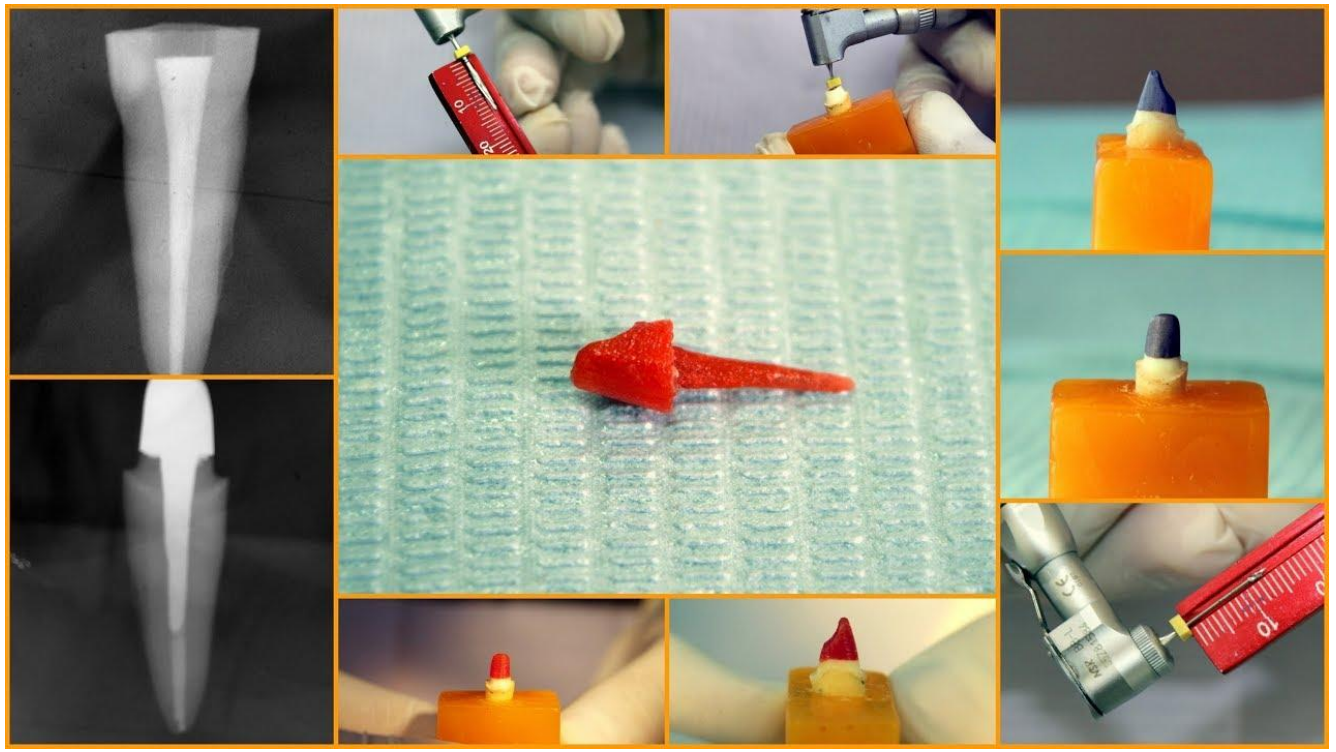
Restoration of Endodontically Treated Teeth

Lecture 3: Post and Core Fabrication Techniques



Learning Outcomes

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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

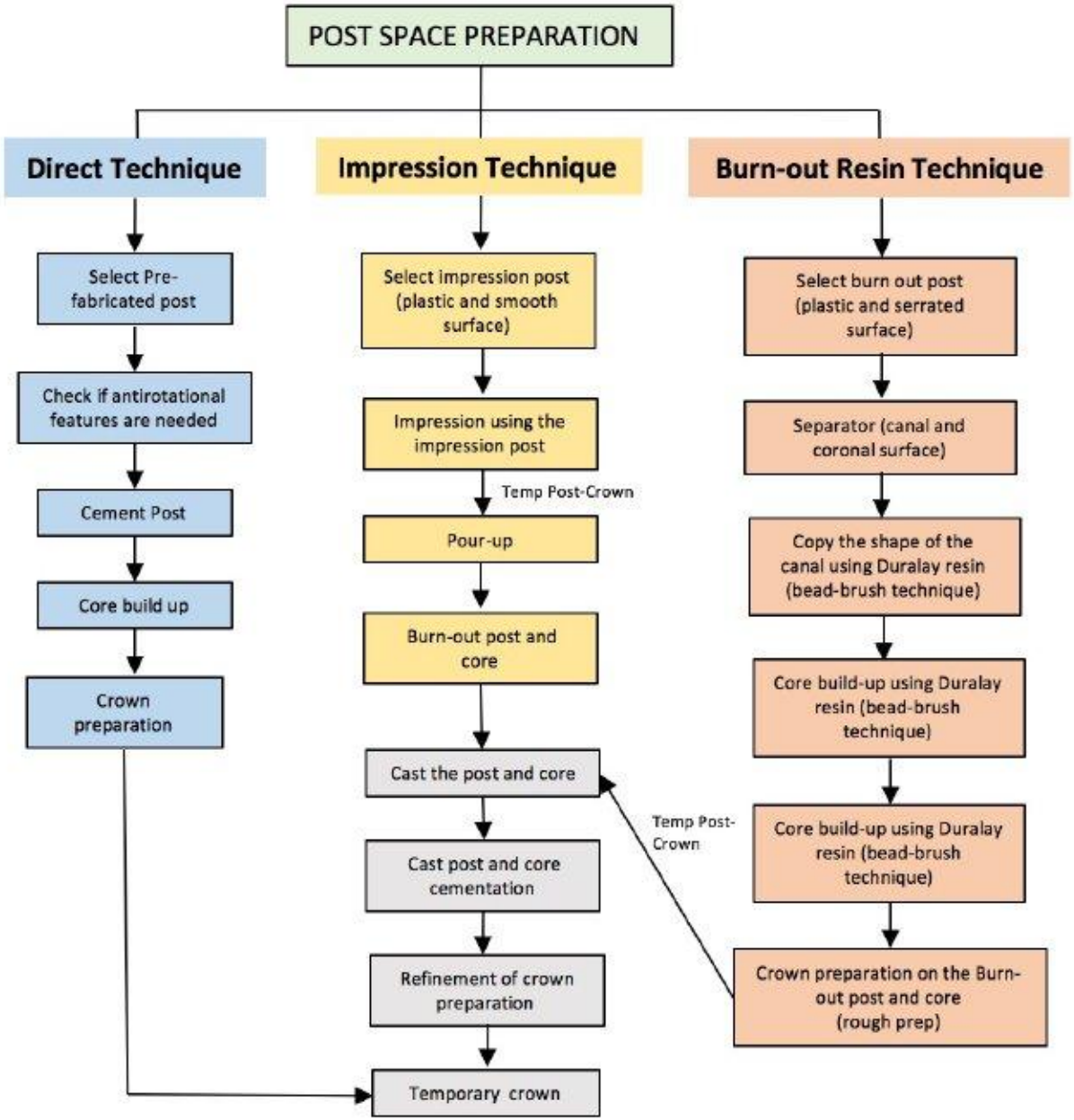
FABRICATION TECHNIQUE

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:

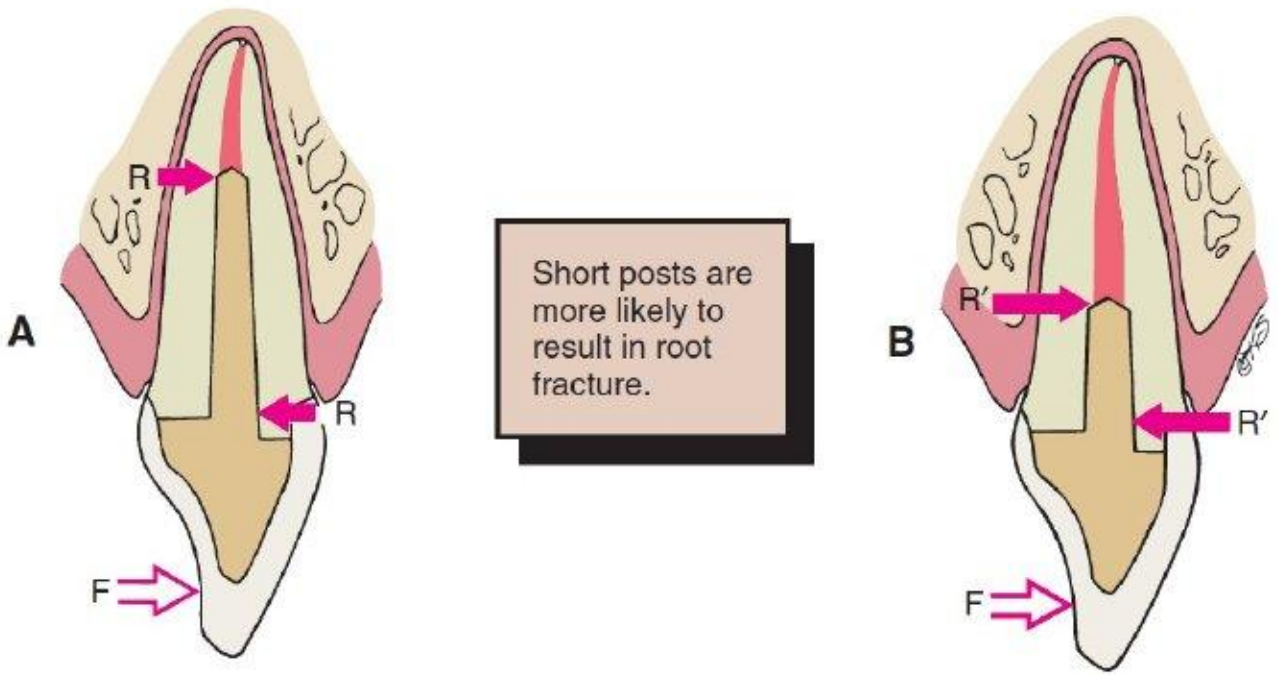
- Removal of existing restorations
- Eliminate undesirable undercuts (cast post and core only)
- Crown preparation to create ferrule

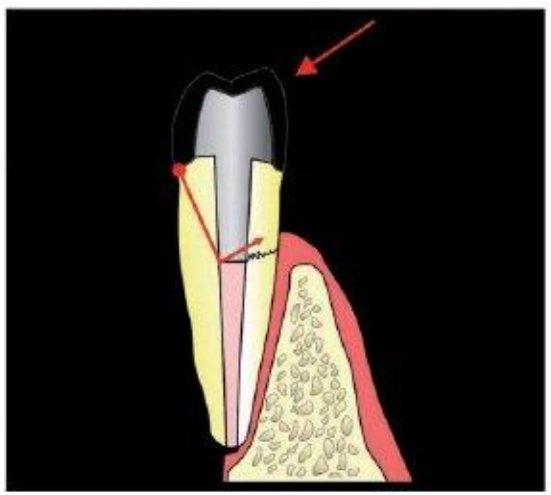
POST SPACE PREPARATION

1. Determine the post length based on PA

Preserve tooth structure

- 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





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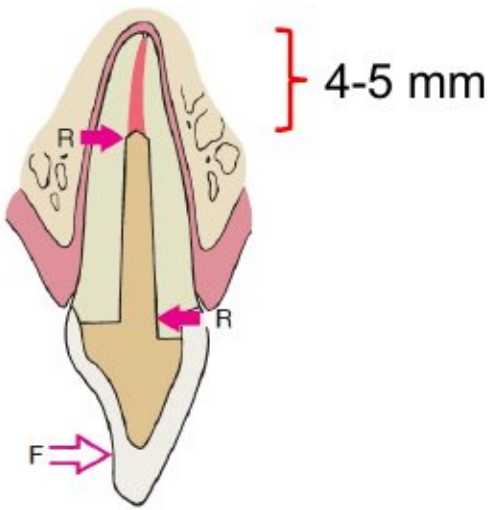
POST SPACE PREPARATION

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



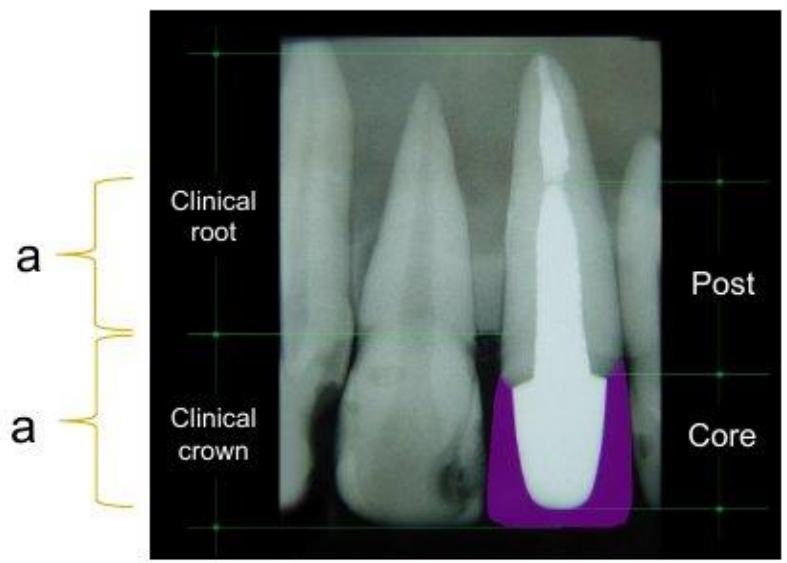
POST SPACE PREPARATION

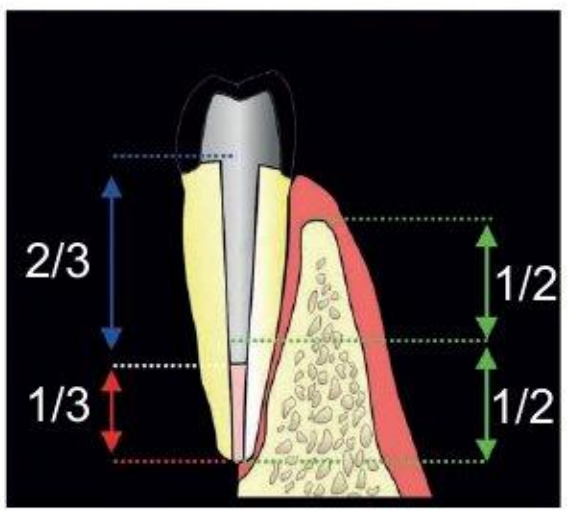
1. Determine the post length based on PA

- There is no absolute guideline for the optimal post length

- **Post length at least equal to the crown length**
- 2/3 of the remaing tooth length
- ½ of the clinical root
- ¾ of the of the root canal length

Always maintain the 4-5 apical seal





Schwarts et al 2004

POST SPACE PREPARATION

1. Determine the post length based on PA

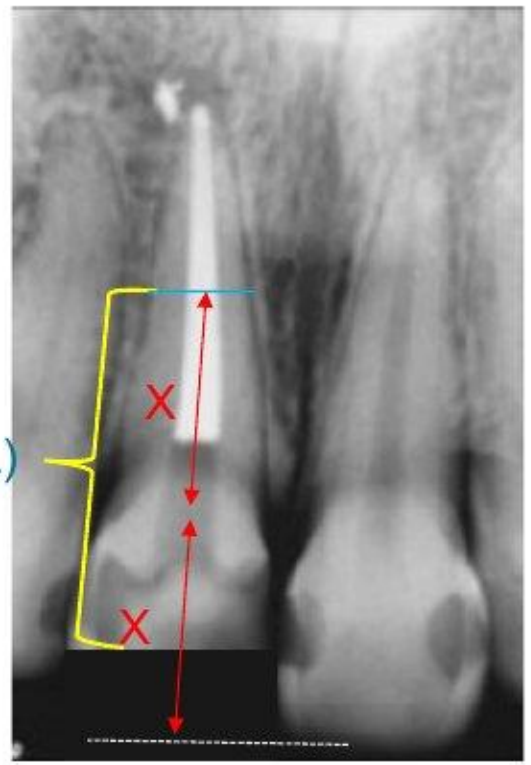
1°) Measure the crown height (use contralateral tooth as a reference)

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

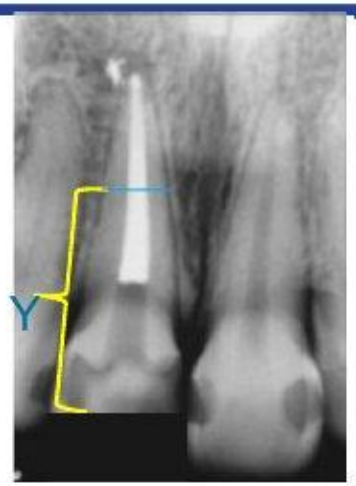


POST SPACE PREPARATION

2. Rubber Dam

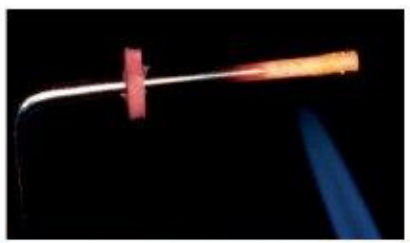
- Avoid bacterial contamination (saliva, blood)
- Avoid inhalation of instruments (endo files, burs)
- Avoid contact of sodium hypochlorite with mucosa (we have to clean the canal at the end of the session)

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

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POST SPACE PREPARATION

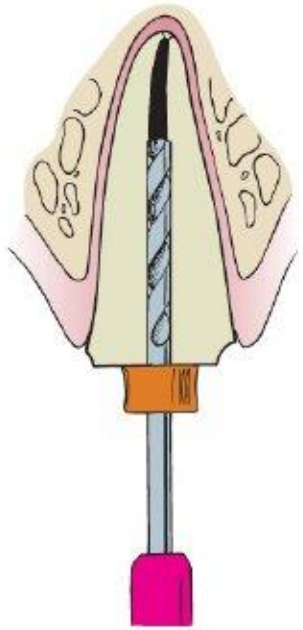
3. Removal of GP

- **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

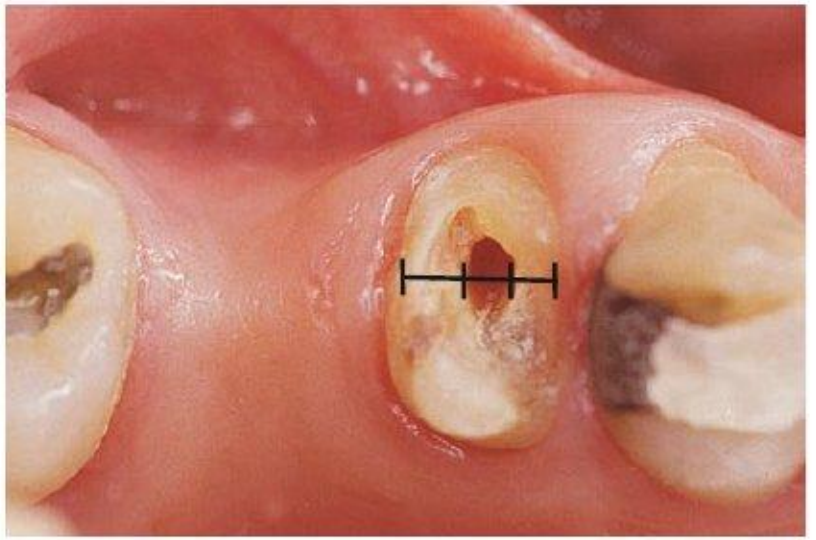
- Drill following the root canal direction
- Light vertical forces
- Start with smaller drills and increase the size if necessary
- Take PA if you are not sure if the bur is following the root canal

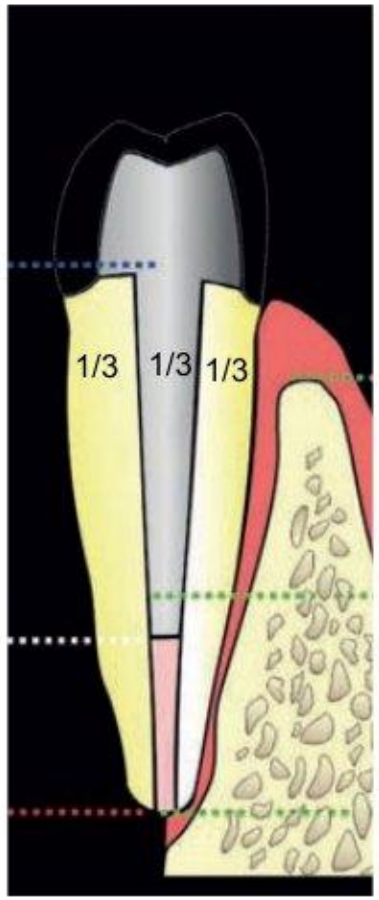
POST SPACE PREPARATION

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 1/3 of the width of the root
- Preserve buccal wall in upper incisors



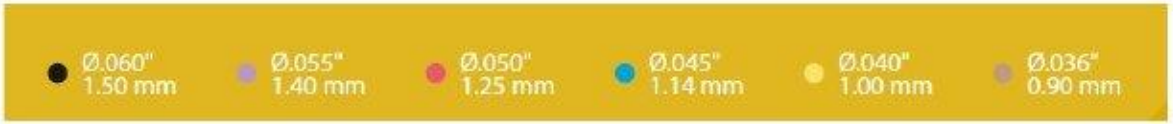


POST SPACE PREPARATION

4. Post space preparation

- Establish the Width of the post

Select the size of ParaPost drill



Minimum size for Cast post is Yellow (1 mm diameter)
Minimum size for Pre-fabricates is Brown (0.9 mm)

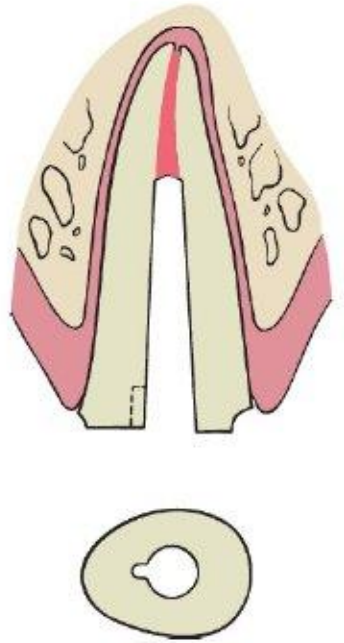
POST SPACE PREPARATION

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



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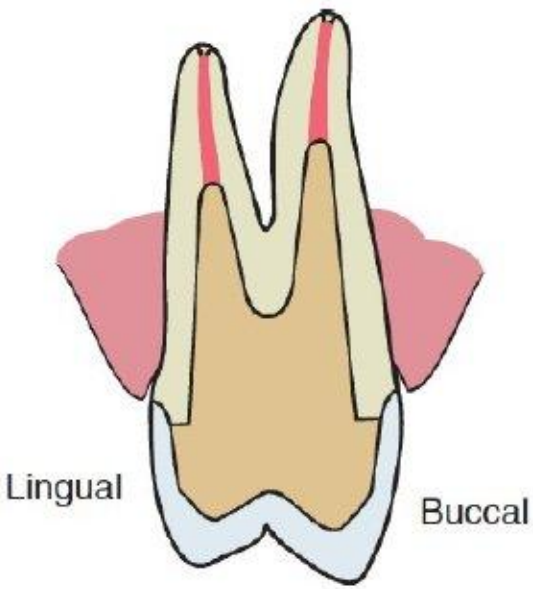
POST SPACE PREPARATION

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



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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)

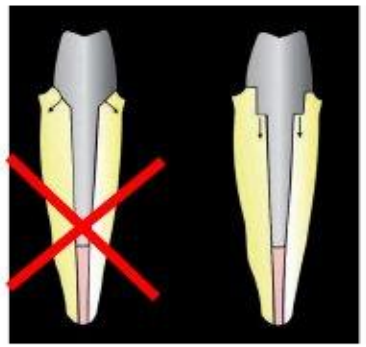
AFTER:

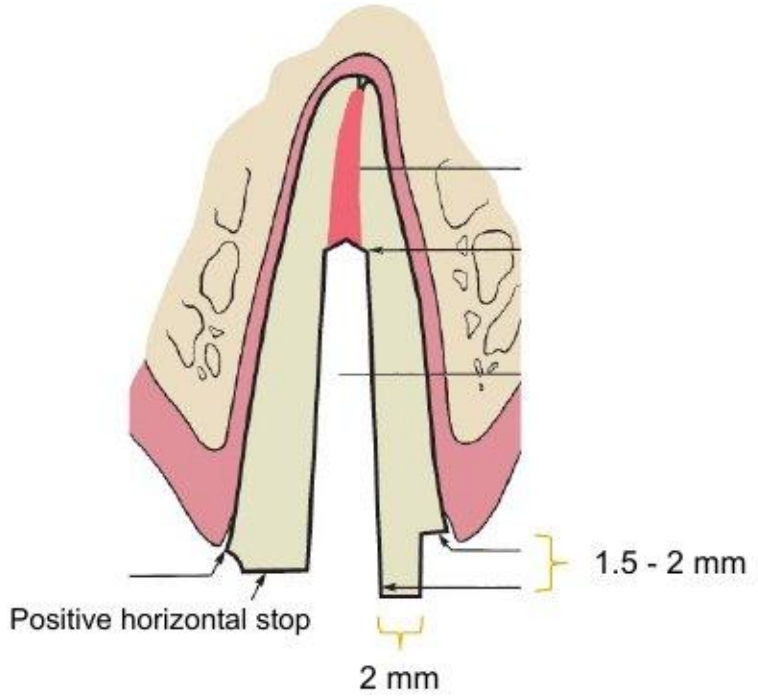
- Maintain the reference point establish using the PA taken after the RCT
- Easier to temporize during multi-appointment post space preparation

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

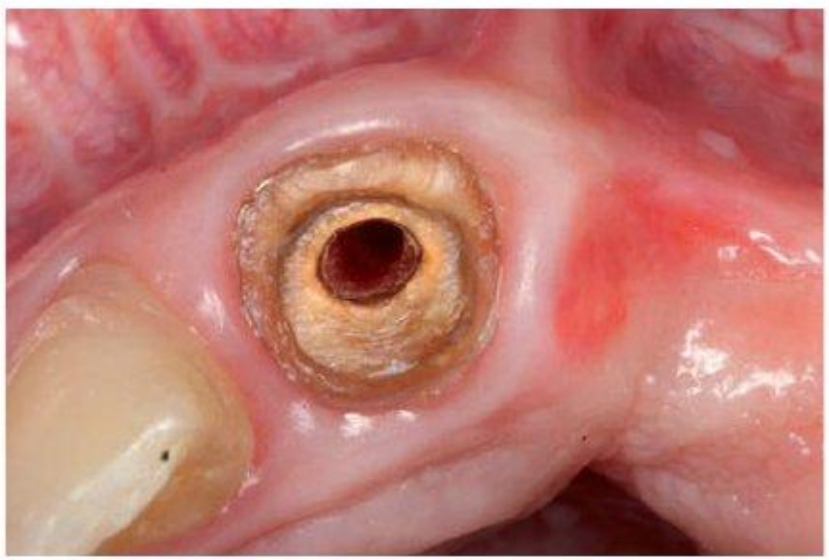


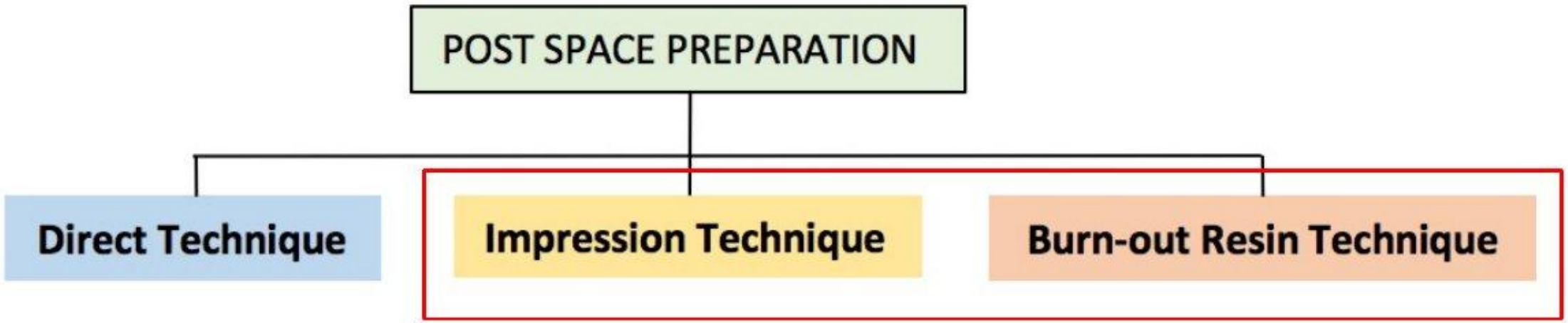


Jotkowitz et al 2010, Contemporary Fixed Prosthodontics 4ed

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



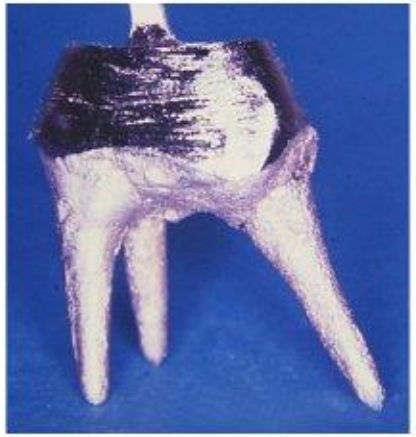


CAST POST AND CORE

IMPRESSION TECHINIQUE

INDICATION:

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



Advantage:

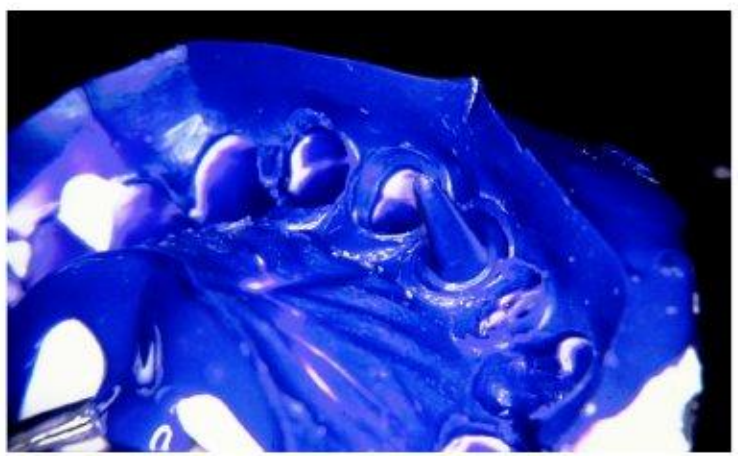
- Faster clinical procedure compared to burn-out resin
- Lab will manufacture the post

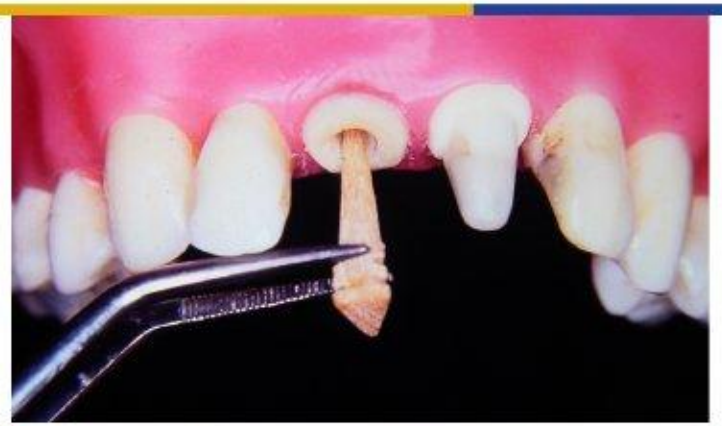
Disadvantage:

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

IMPRESSION TECHINIQUE

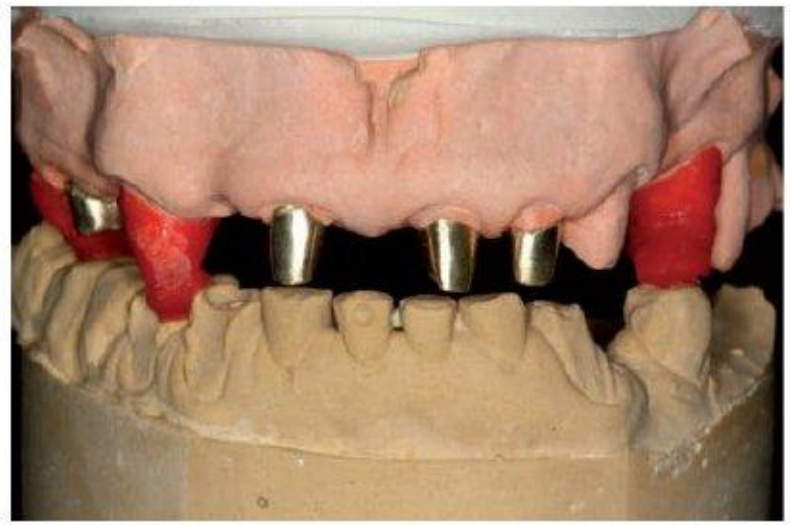
- Use full arch stock tray or custom tray
- Dry the canal (air and paper points)
- Verify the impression post seating
- Apply the light body PVS
- Seat the impression post
- Apply heavy/medium body on the tray
- Insert the tray
- Remove the tray with ’snap’ movement





IMPRESSION TECHINIQUE

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



BURN-OUT RESIN TECHINIQUE

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:

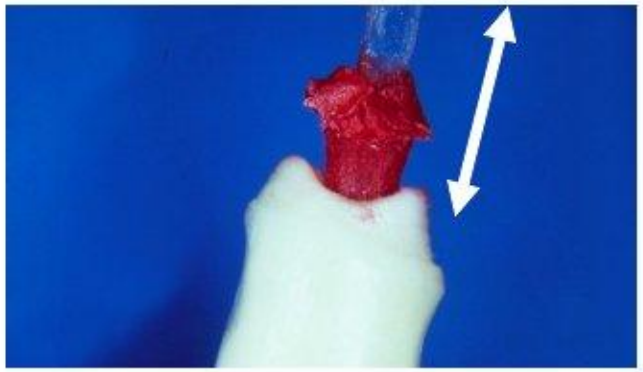
- You have control of the shape of the post and core
- Less adjustments during try-in (not always!)

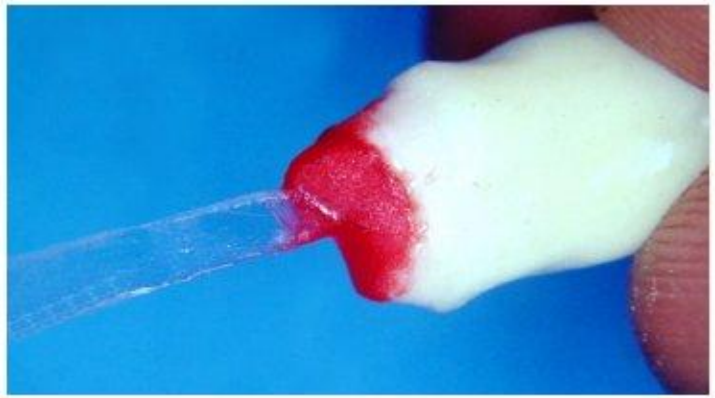
Disadvantage:

- More difficult method
- More clinical time is necessary

BURN-OUT RESIN TECHINIQUE

- 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

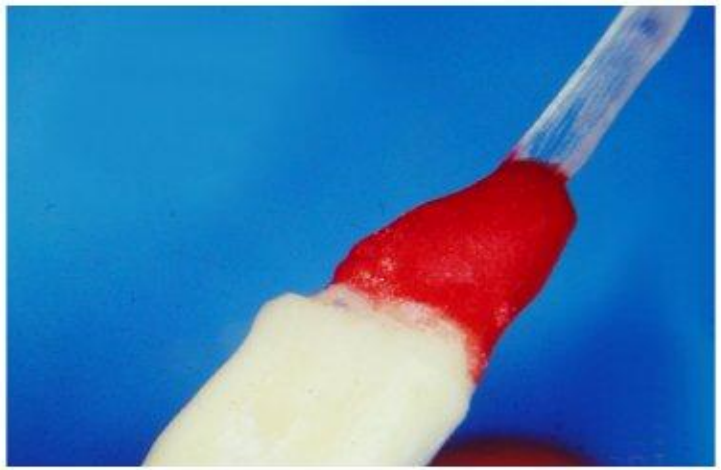


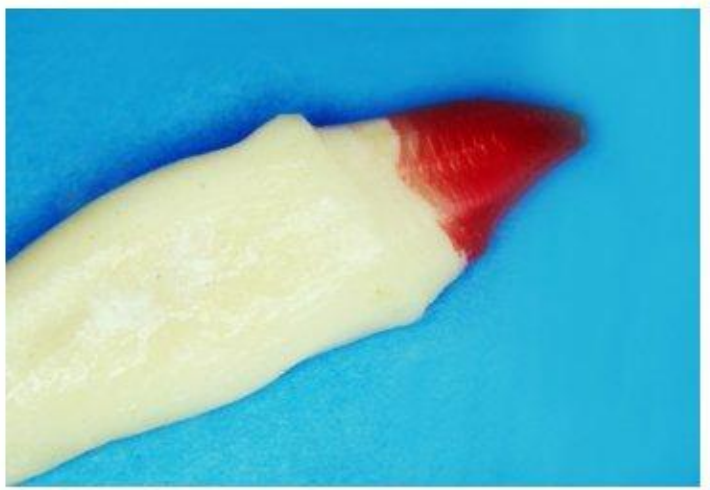


Mori

BURN-OUT RESIN TECHINIQUE

- 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





Mori, Pegoraro

POSTERIOR TEETH - CAST POST AND CORE

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

Parallel canals – Single piece cast post and core

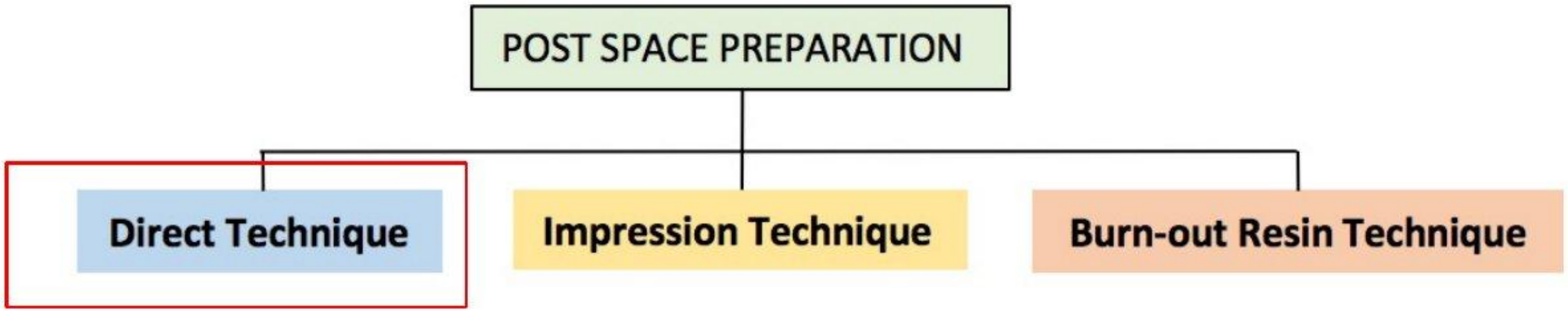
Divergent canals

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

Main Post

Upper molars: Palatal

Lower molars: Distal

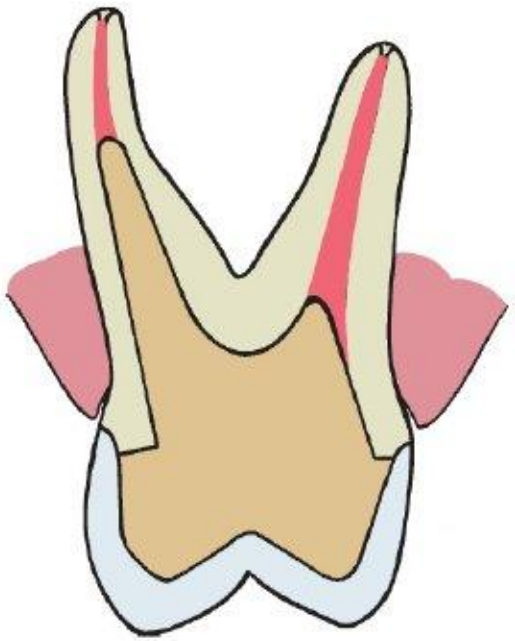

POST SPACE PREPARATION
Direct Technique
Impression Technique
Burn-out Resin Technique

DIRECT TECHINIQUE

(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 TECHINIQUE

(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. Permacem) – metal

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

DIRECT TECHINIQUE

(Pre-fabricated post)

- Core build-up

Before crown prep

After crown prep

Schwartz and Robbins. Post Placement and Restoration of Endodontically Treated Teeth: A Literature Review. Journal Of Endodontics. 30(5) 2004

Fernandes et al. Factors determining post selection: a literature review. The Journal of Prosthetic Dentistry 90(6), 556-562. 2003

Peutzfeldt et al A survey of failed post-retained restorations/ Clin Oral Invest (2008) 12:37–44

Figueiredo et al. Do Metal Post–retained Restorations Result in More Root Fractures than Fiber Post–retained Restorations? A Systematic Review and Meta-analysis. J Endod 2015;41:309–316

Rosenstiel et al. Contemporary Fixed Prosthodontics 4th ed

Jotkowitz et al. Rethinking ferrule – a new approach to an old dilemma. British Dental Journal 2010; 209: 25–33