

Restoration of Endodontically Treated Teeth

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Lecture 2: Post and Core Classification



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

- Discuss the evaluation of endodontically treated teeth before being restored
- Discuss the clinical indication of posts
- Understand the classification of post and cores
- Discuss different types of posts

Role of the Post – Updated View

Evidence-based conclusions:

- Posts do not reinforce ETT
- Posts redistribute stress; depending on design they may increase stress in some regions
- With adequate tooth structure and ferrule, survival differences with and without posts are small

When Do We Place a Post?

Indications for a post:

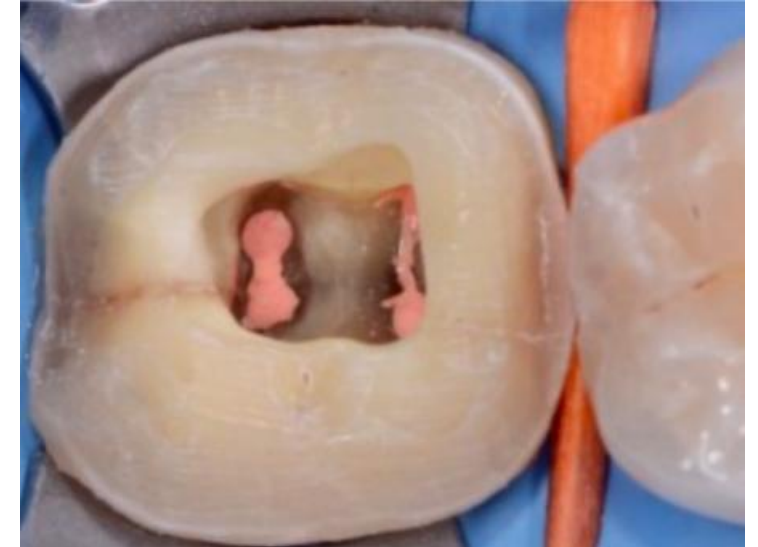
- Inadequate coronal tooth structure to retain a core or crown by adhesion and macro-retention alone
- Need for a core that will support a full coverage restoration or FPD retainer

Contraindications:

- Sufficient tooth structure for bonded/core retention
- Short or curved roots where post would jeopardize integrity

Situations in between - need to assess:

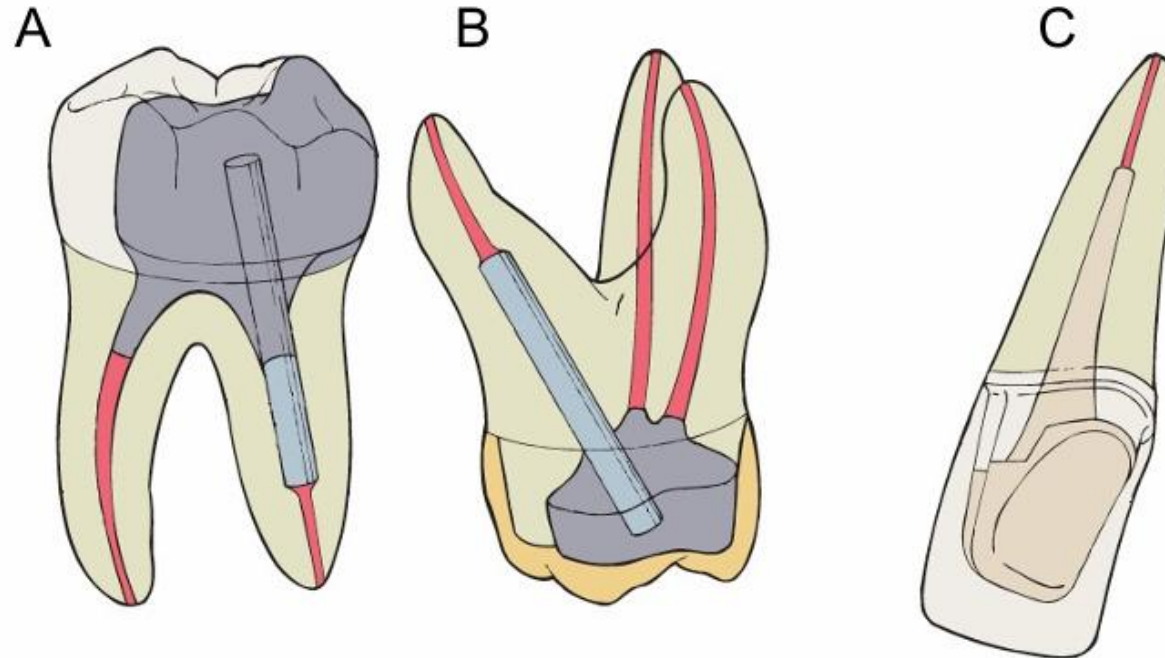
- Occlusal load
- Tooth position
- Type of opposing tooth
- Function: abutment of FPD or RPD



Clinical Applications of Posts

Typical scenarios:

- A) Post + Direct restoration (amalgam, composite) – separate
- B) Post + Core (amalgam, composite) for a crown preparation – separate
- C) Cast Post and Core (metal alloys such as gold) for a crown preparation – one-piece



Post Classification – Overview

Classify posts by:

- **Fabrication method:** prefabricated vs custom cast
- **Material:** metal, fiber-reinforced composite, ceramic
- **Shape:** parallel, tapered, anatomic
- **Surface:** smooth, serrated, threaded

Post Classification- Fabrication Method

Prefabricated vs Custom Posts

Prefabricated posts:

- Off-the-shelf, standardized dimensions
- Best suited to relatively circular canals
- Cemented in the root canal and the core is directly produced in composite or amalgam

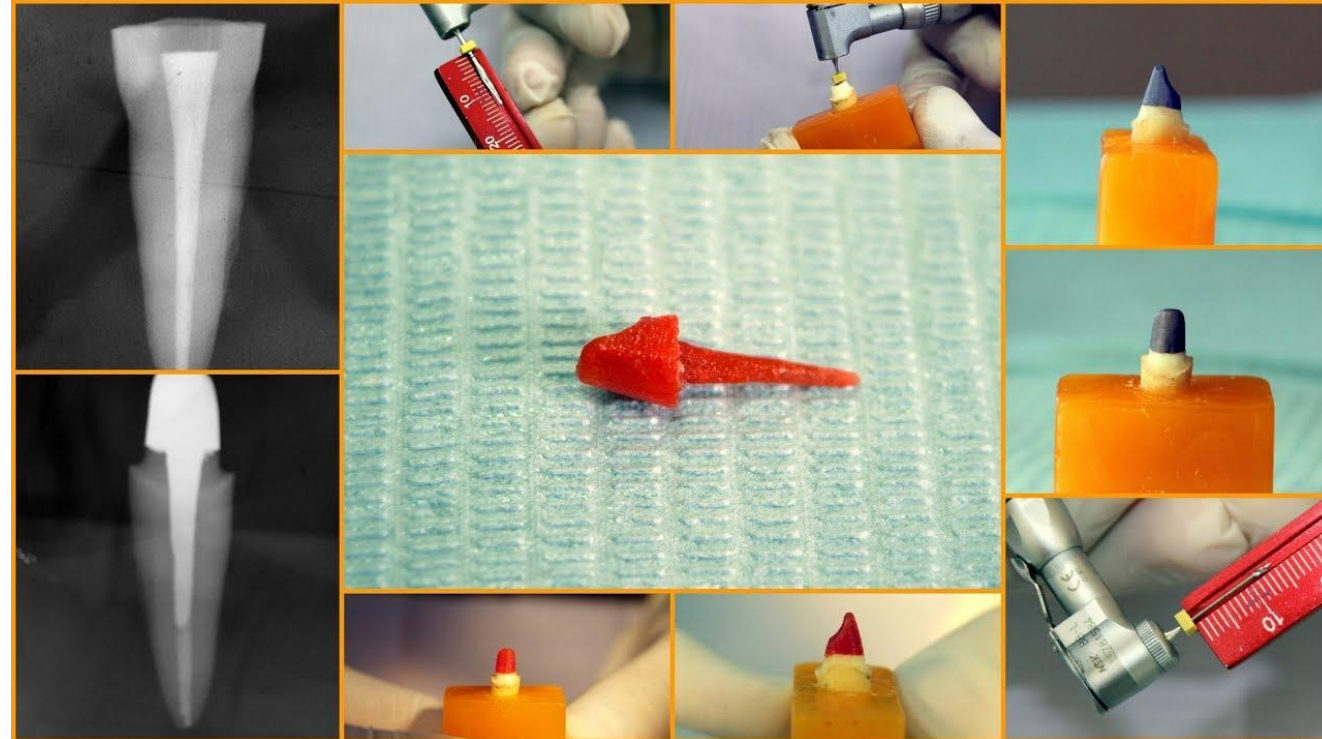


Post Classification- Fabrication Method

Prefabricated vs Custom Posts

Custom cast posts and cores:

- Indicated in flared or irregular canals
- Allow ideal fit and core shape but require more appointments
- The post and the core are cast as a single unit



Post Classification- Shape

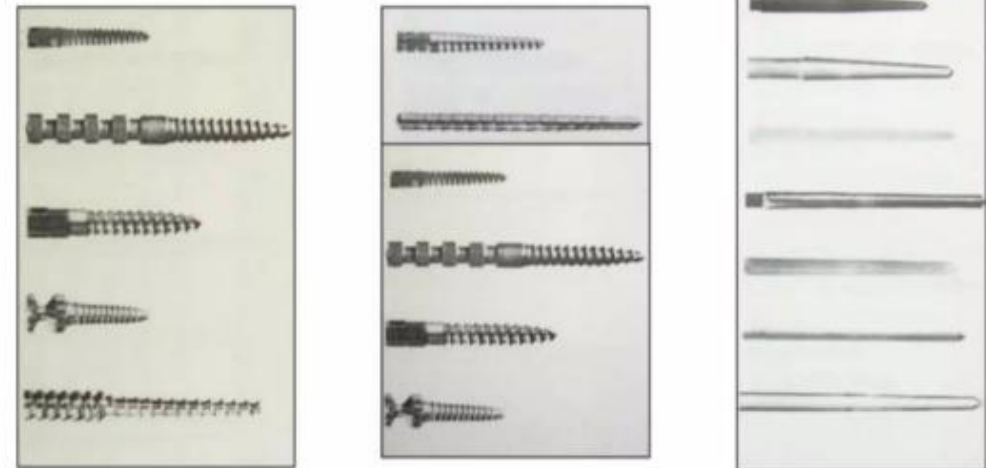
Parallel

- Increased retention (parallel walls)
- Produce uniform stress distribution along the post length
- Less root fracture
- Stress concentration at the apical portion



Tapered

- Follow natural canal form and configuration
- preservation of tooth structure at the post apex
- Wedging effect – more stress
- Stress concentration at the coronal portion of root
- Lower retentive strength



Post Classification-Surface Features

Active Post:

- Engage the walls of the canal (Threaded)
- More retentive
- Introduce more stress into the root
- Require substantial amount of root dentin
- Indication: short roots in which maximum retention is needed (limited use)

Passive Post:

- Smooth, serrated
- Retained strictly by the luting agent
- Require close adaptation to the canal wall
- Less stress into the root
- Less catastrophic failures
- More commonly used



Ideal Physical Properties of Post Materials

Dentin-like stiffness (modulus of elasticity close to dentin) to promote favourable stress distribution

Reliable bondability to tooth structure (strong adhesion to dentin and core materials)

Biocompatible and corrosion-resistant in the oral environment

Energy-dissipating behaviour (helps absorb/attenuate functional forces rather than concentrate stress)

Post Classification- Fabrication Method /Material

Pre-fabricated posts

- **Metal:** stainless steel, titanium ($\pm$ titanium alloys)
- **Fibre-reinforced composite (FRC):** glass fibre, quartz fibre,
carbon fibre
- **Ceramic:** zirconia



Custom / cast posts (post-core)

- **Cast metal alloys:**
 - Noble / high-noble (e.g., gold-based)
 - Base-metal (non-precious) alloys
- **Custom ceramic:** zirconia (CAD/CAM or laboratory-fabricated)



Metal Posts – Advantages and Risks

Metal Posts (Cast or Pre-fabricated)

Advantages

Long clinical track record with predictable performance

High strength and stiffness → low risk of post fracture

Good retention when properly designed and fitted

Some studies report **higher retention for stainless-steel posts** compared with certain fibre posts (e.g., carbon fibre) (*Schwartz et al., 2004; Peutzfeldt et al., 2008; Figueiredo et al., 2015*)



Risks / Limitations

High modulus of elasticity may concentrate stress in root dentin → increased risk of root fracture

Corrosion possible with some alloys (rarely clinically significant, but may contribute to degradation)

Aesthetic limitations under translucent ceramic crowns

Cast post–core: increased chairside/lab time and cost, and more complex retreatment/removal

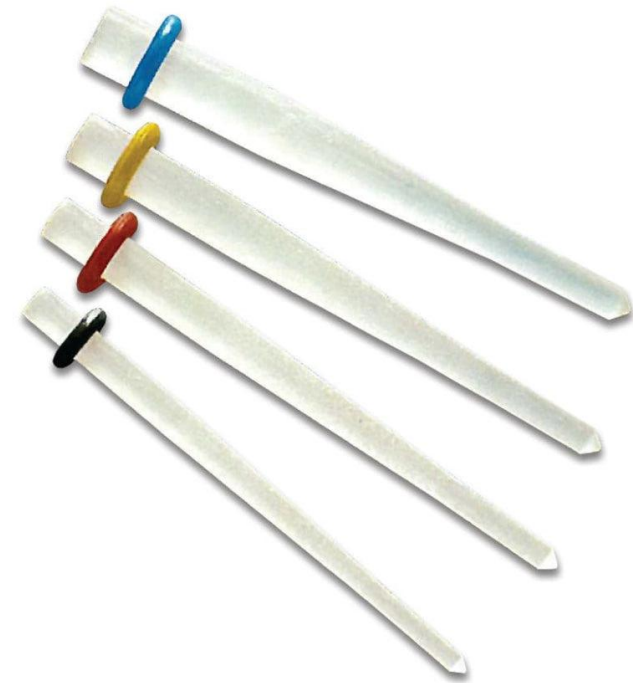
Fiber Posts – Evidence and Limitations

Advantages:

- Modulus closer to dentin → more favorable, repairable failure patterns
- Esthetically compatible under all-ceramic crowns
- Corrosion resistance
- Biocompatible

Limitations:

- Technique-sensitive bonding to radicular dentin
- Failure of cementation (adhesion to dentin is not reliable)



Ceramic and Zirconia Posts

- **Excellent aesthetics** — ideal under translucent all-ceramic crowns
- **High stiffness and brittleness** — may concentrate stress and increase risk of **root fracture**
- **Retreatment is challenging** — difficult to remove if endodontic re-intervention is needed
- **Less robust clinical evidence** compared with fibre and metal posts

