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# Restoration of Endodontically Treated Teeth

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# Lecture 2: Post and Core Classification

# Learning Outcomes

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## 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

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**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?

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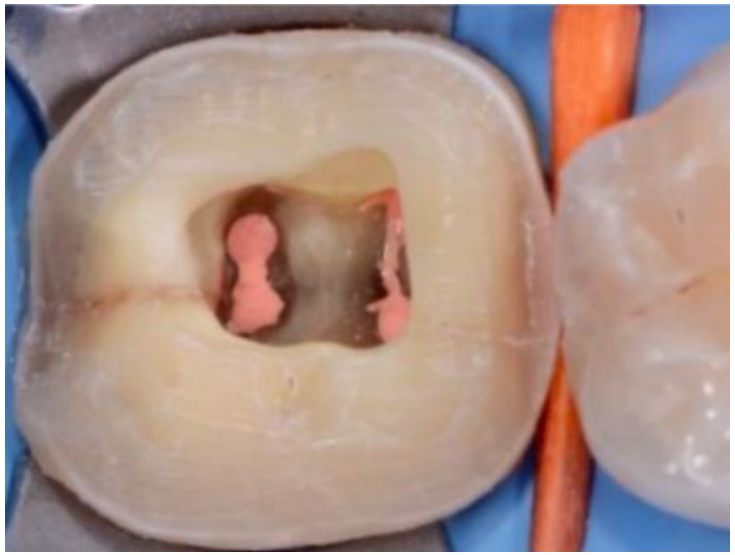
**Indications for a post:**

- 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

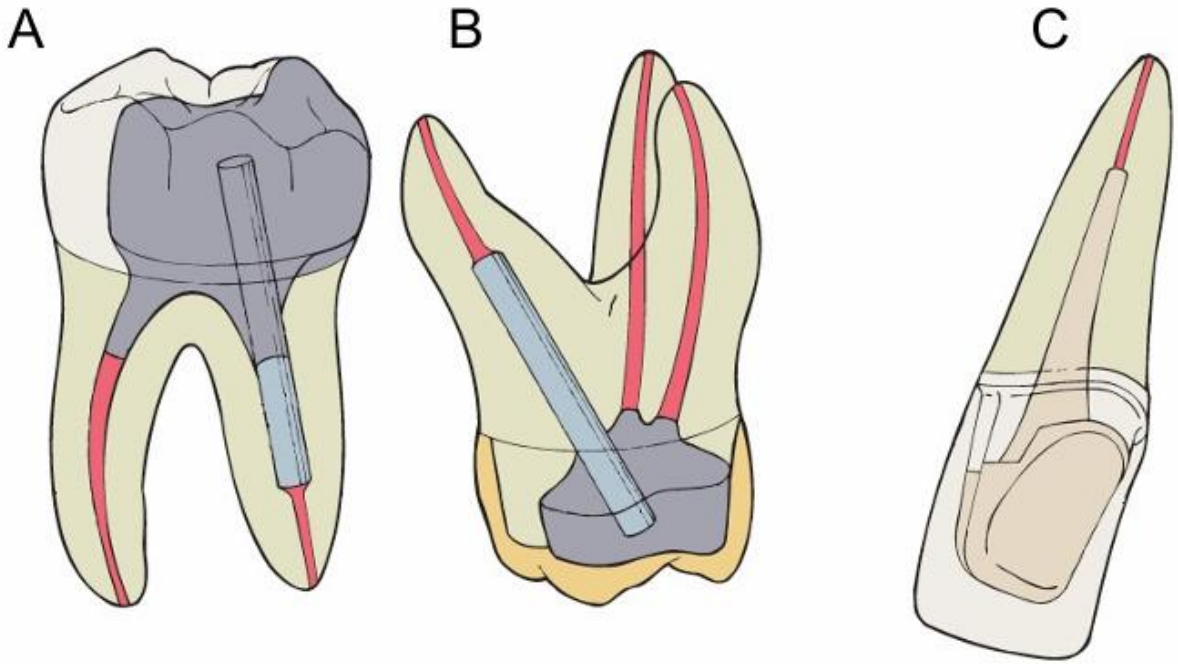
# Clinical Applications of Posts

**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

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**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:**

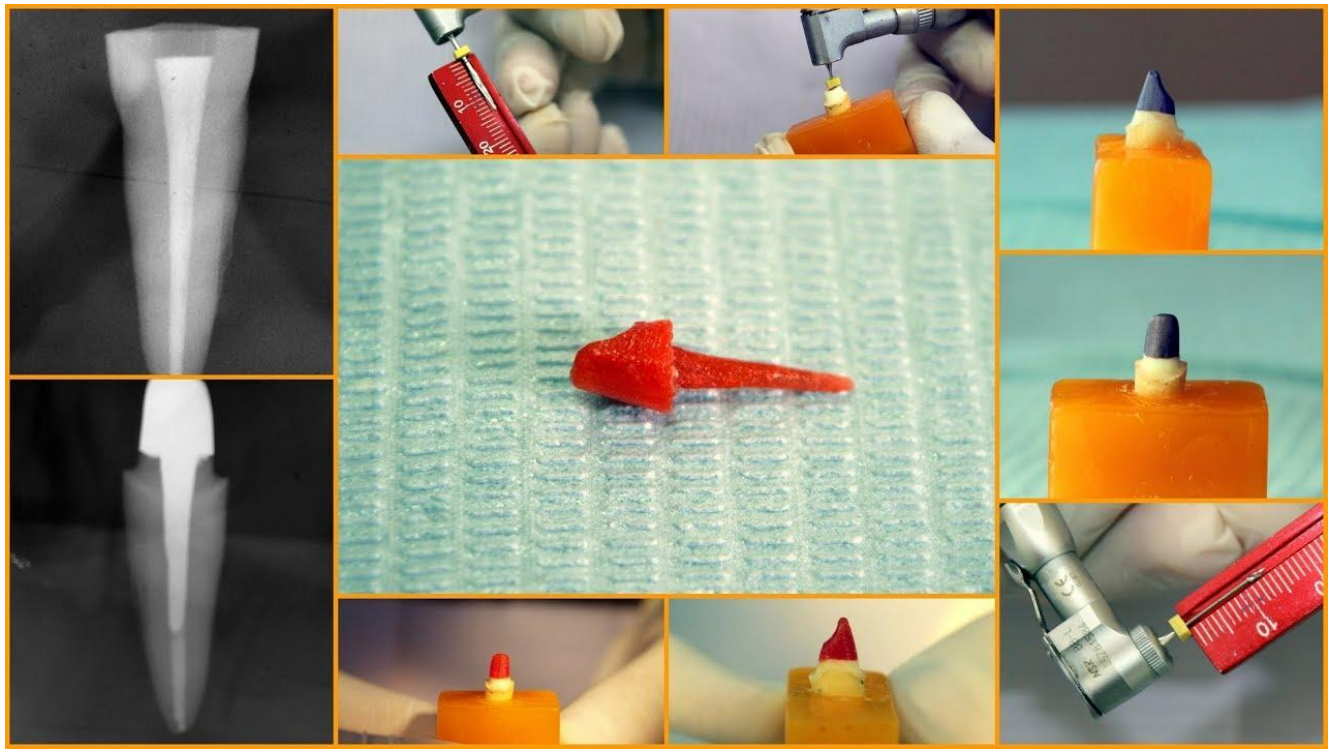
- Off-the-shelf, standardized dimensions
- Best suited to relatively circular canals
- Cemented in the root canal and the core is directly produced in composite or amalgam

# 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



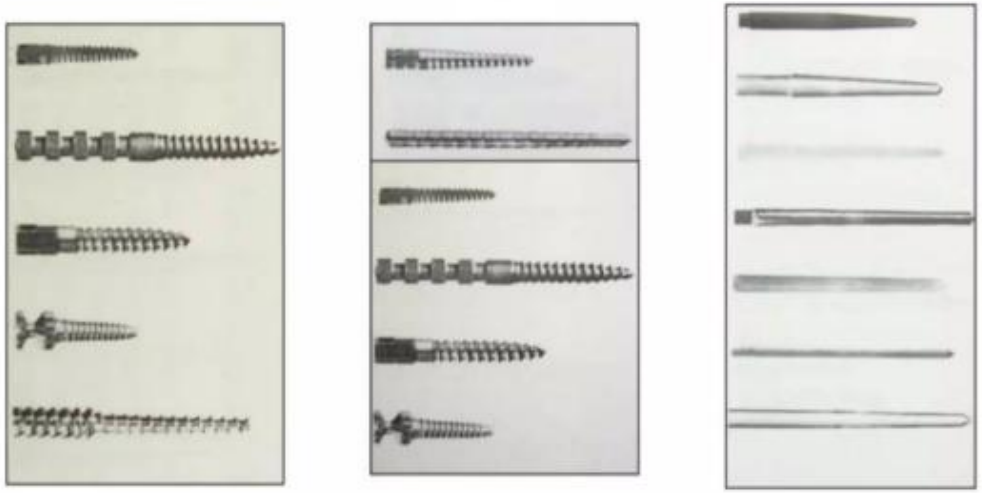
# Post Classification- Shape

## 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

# Post Classification-Material

## 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 (± 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

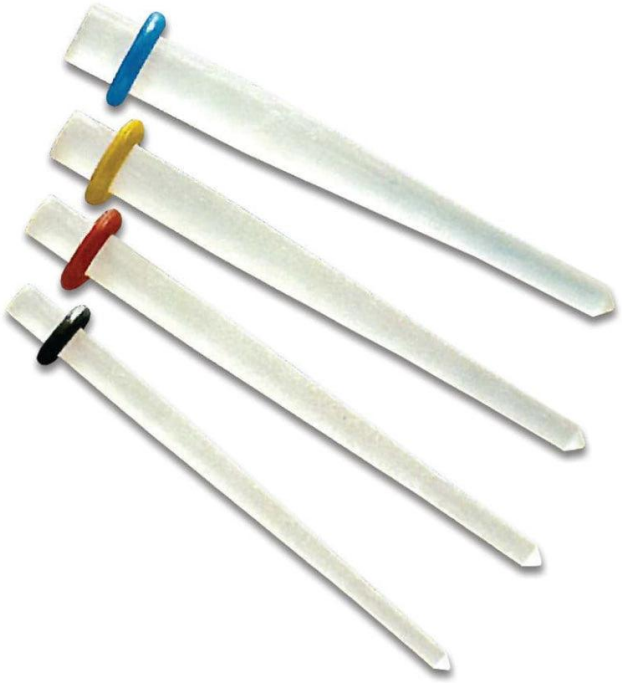
# Fiber Posts – Evidence and Limitations

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