Functional and esthetic reconstruction of root canal treated teeth

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Endodontically treated teeth – special kind of problem to restore

- Desiccation – not proved
- Loss of tactile function – higher load when bite
- Loss of tooth structure
  - Caries – especially on approximal surfaces
  - Preparation – access cavity

Requirements for restoration

- Proper coronal seal for the root canal filling
  - Prevent the infection by bacteria from the oral cavity
- Protect remaining tooth structure
  - Avoid fracture
  - Prevent recurrent caries
- Functional restoration – Restore original chewing ability
- Esthetics – Especially important on front teeth

Design of restoration

- Location of the tooth
  - Front teeth
  - Premolars and molars
- Degree of destruction
  - Direct or indirect restoration
  - Intracoronal restoration or crown
  - Using the root canal space for retention
    - post systems
  - Position of the gingival margin of the restoration
    - crown lenghtening methods

Core buildup

- Without using post systems
  - Amalgam
  - Composite
  - Glass ionomer cement

Core buildup

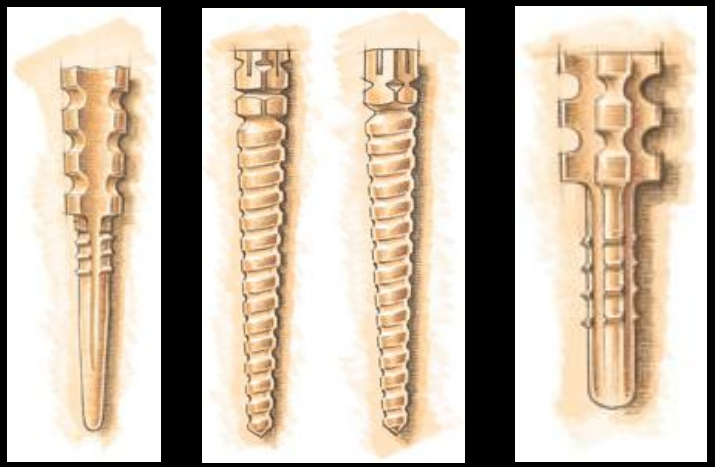
- Post systems
  - Custom made
    - Dowel-core
      - Metal
      - Ceramic
  - Prefabricated
    - Adhesive (bonded to tooth with composite type material)
      - Glass fibre/carbon fibre posts
        - » Tapered
        - » Non tapered
    - Metal (luted to tooth with glass ionomer/phosphate cement)
      - Screw type
      - Passive

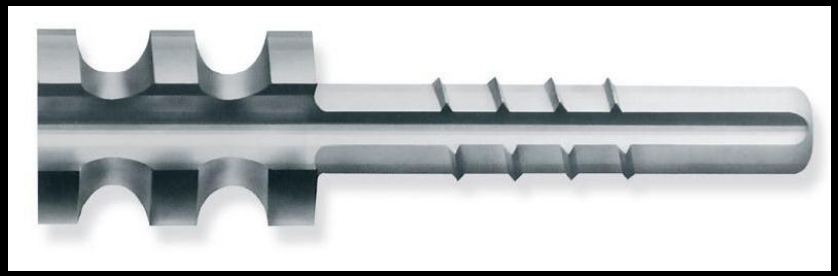

CARBONITE
CARBON FIBRE POST
NO2
SWISS MADE
NORDIN

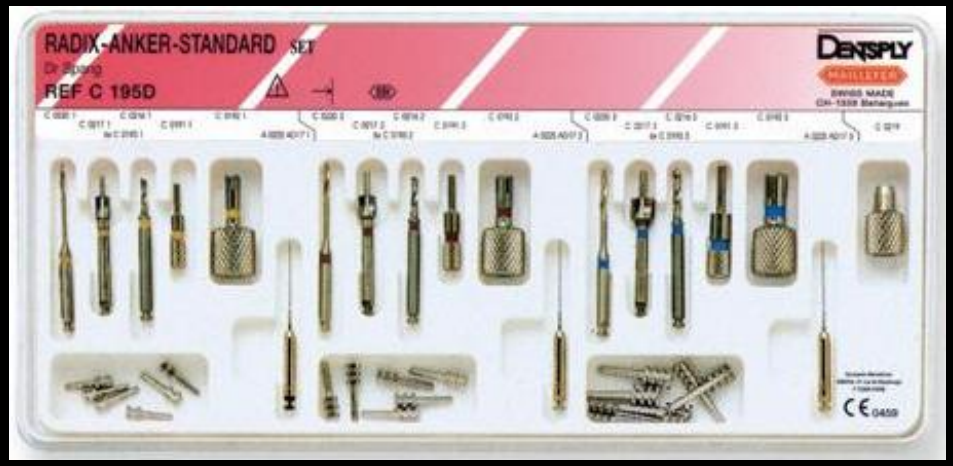

GLASSIX
GLASS FIBRE POST
NORDIN


Ø 1.50
Ø 1.35
Ø 1.20
GLASSIX RADIOPAQUE
NORDIN


GLASSIX+



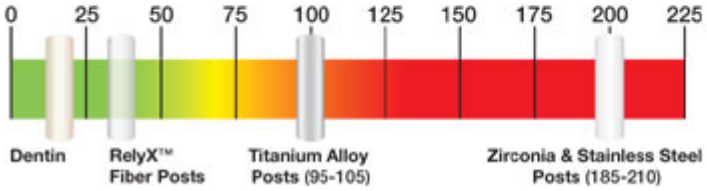



RADIX-ANKER-STANDARD SET
REF C 195D
DENTSPLY
MAILLEFER
SWISS MADE
CE 0459

Why switch from metal to fiber posts?

Clinical research, noted in the graph below, verifies how much more similar the elasticity of RelyX™ Fiber Post is to human dentin than is the elasticity of metal and ceramic posts – which means a much lower risk of root fracture due to the "wedge effect." If endodontic retreatment is required, it's reassuring to know RelyX Fiber Posts can be removed easily, without damaging the tooth.

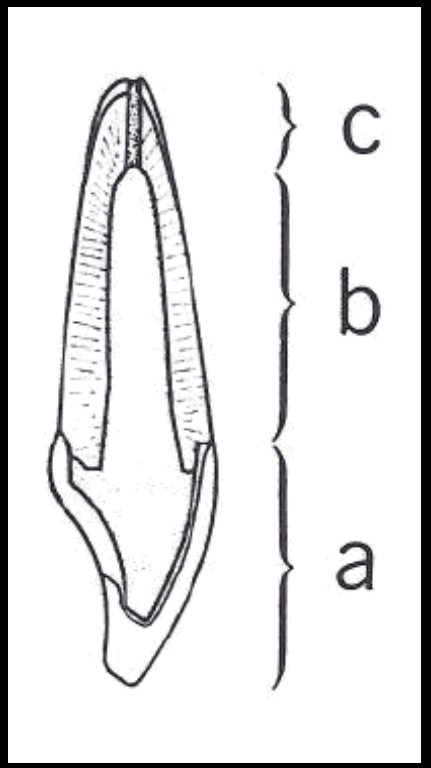
Elasticity Modulus of Dentin and Post Materials



[Source: 3M internal data and Materials Sicence and Eginnering: An Introduction, 8th Ed., Wiley]

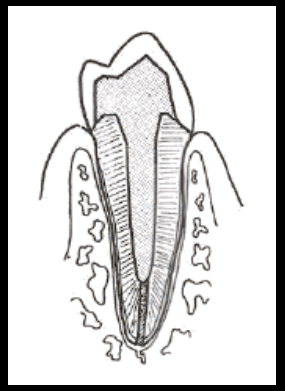
Dowel-core preparation

- The length of the dowel (b):
  - From two-thirds to three quarters the length of the root
  - The minimum length is the length of the crown (a)
  - While at least 4mm of the root canal filling should be remained at the end of the canal (c)
- The diameter of the dowel:
  - One-third the diameter of the root
- Coronal part:
  - Unsupperted tooth structure is removed
  - Ferrule effect: the crown should surround at least 2mm tooth structure towards apical direction from the margin of the dowel-core



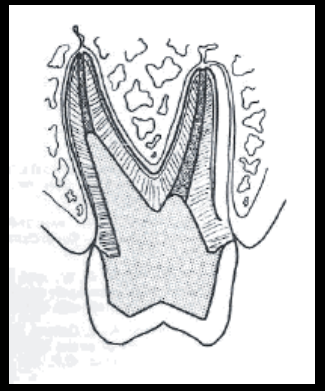
Dowel-core preparation

In teeth with one root canal

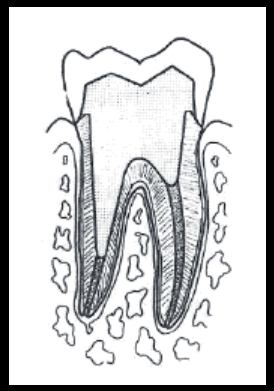


In maxillary premolars

In maxillary molars



In mandibular molars



Front teeth vs. premolars and molars

- Forces from different direction – different requirements

- Anterior teeth: forces from lateral direction
- Premolars and molars: forces along the axis of the tooth

Reconstruction of front teeth

- Direct:
  - Composite filling
  - Composite filling + glass fibre post
- Indirect:
  - Porcelain fused to metal crown
  - Zirconium based crown
  - Full ceramic crown

Reconstruction of premolars and molars

(cusps must be reduced to avoid fracture!!!)

- Direct:
  - Composite filling – if approximal surfaces are intact
- Indirect:
  - Ceramic or composite onlay
  - Porcelain fused to metal crown
  - Zirconium based crown
  - Full ceramic crown

Crown lenghtening methods

- Biologic width: vertical dimension of supraalveolar soft tissues

  1,07mm connective tissue attachment

  0,97mm epithelial attachment

Crown lenghtening methods

- Clinically: at least 2,5-3mm should be held between the alveolar bone and the margin of the restoration

Crown lenghtening methods

- Surgical crown lenghtening
- Orthodontic extrusion