RESTORING ENDODONTICALLY TREATED TEETH POST RESTORATIONS CROWNS

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Why is the risk of fracture greater?

- **loss of tooth structure**
  - large caries
  - trepanation cavity
    - access to pulp chamber, pulp horns
    - straight access
  - mechanical root canal preparation
  - root canal preparation for post

Why is the risk of fracture greater?

- **receptor function of pulp** (perception) **changes**
  - normally defense reflex against intensive stimuli
  - masticatory loading is proven to be greater

Guidelines for restoring endodontically treated teeth

1. Hermetic coronal sealing of root canal filling

2. Prevention of fracture

3. Restoring function

4. Restoring aesthetic

Guidelines for restoring endodontically treated teeth

1. Hermetic coronal sealing of root canal filling

(3D seal)

- prevents bacteria from enterig root canal from the oral cavity

All root canal obturations must be changed that are exposed to oral cavity for more than 3-4 weeks!

Guidelines for restoring endodontically treated teeth

2. Prevention of fracture

- during root canal treatment:

  take out of occlusion

  cuspal reduction

- final restoration:
  - cuspal coverage
  - ensuring Ferrule-effect if needed

Guidelines for restoring endodontically treated teeth

3. Restoring function

- minimizing torsional effect on cusps
  - during chewing:

    axial and lateral forces

    torsional forces
- protect remaining dental tissue from fracture and decay
  - cuspal coverage
  - ensuring Ferrule-effect

Guidelines for restoring endodontically treated teeth

4. Restoring aesthetic

- caries
- used root canal filling material
- used post restorations

Timing of restoring endodontically treated teeth

- root canal obturation ASAP

  most frail to fracture because of temporary filling

- final coronal restoration ASAP

  most optimal right after root canal obturation(ex. filling)

  uncertain prognosis:

    long-term, hermetically sealing restoration

    fracture prevention

Success of root canal obturation after 4 years.

Long-term temporary restorations

- *Amalgam core*
- Composite filling
- Direct composite onlay
- Temporary crown
- Final post restoration

  + temporary crown

Prognosis is better with final restoration!

Uncertain prognosis:

perforation: MTA + glass ionomer cement + temporary restoration
large periapical lesion
furcation envolvement with endodontic origin

Factors influencing coronal restorations

Which group of teeth?

- front (greater lateral force)
- premolar/molar (greater axial force)

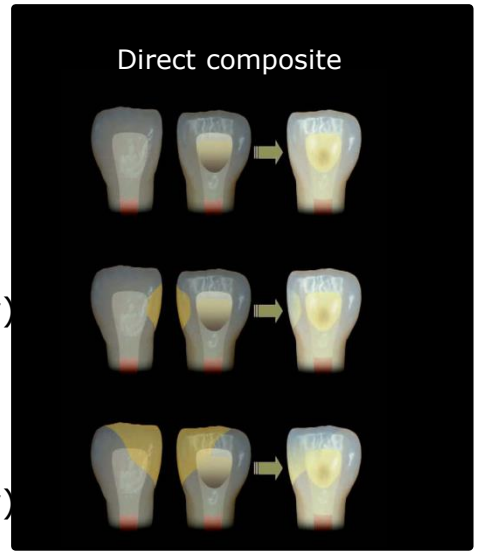
Extent of coronal damage

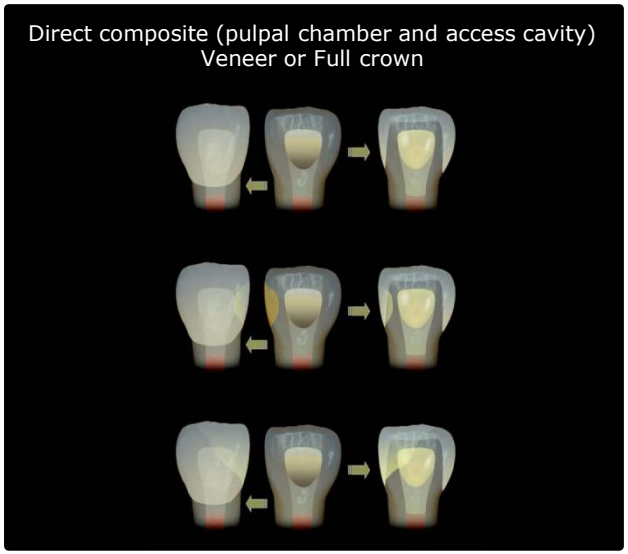
- tooth or radix (retention on crown or in root)

Individual treatment plan!

Conservative approach

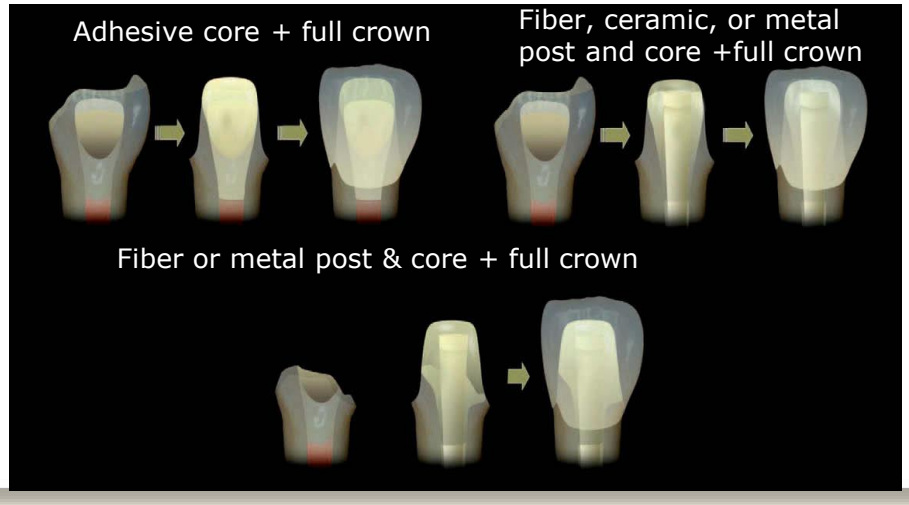
	No discoloration or discoloration responding to bleaching	Discoloration resistant to bleaching
Conservative lingual access cavity	Direct composite	Direct composite (pulpal chamber and access cavity) Veneer or Full crown
Class III cavities (conservative lingual access cavity)		
Class IV cavity (conservative lingual access cavity)		





Protective approach

	Limited over-bite and functional stresses	Deep over-bite and increased functional stresses
Large decay but >1/2 residual tooth structure	Adhesive core + full crown	Fiber, ceramic, or metal post and core +full crown
<1/2 residual tooth structure	Fiber or metal post & core + full crown	



Cohen's Pathways of the Pulp, 10th Edition

Restoring front teeth

- approximal walls are intact, small approximal cavity

  (I, III class cavity)

  glass ionomer lining + composite filling

  root canal obturation must end 2mm from gingival margin

Restoring front teeth

- greater approximal cavity

  (IV class cavity)

  glass ionomer lining + composite filling

  root canal obturation must end 2mm from gingival margin

Restoring front teeth

- **>1/2** residual tooth structure
  >2mm supragingivally
  adhesive core + crown

- **<1/2** residual tooth structure
  <2mm supragingivally
  adhesive post&core + crown
  metal post&core + crown

	Limited functional and lateral stresses*		Increased functional and lateral stresses**
	Small cavity size	Large cavity size	
Class I	Direct composite filling/inlay		Onlay/overlay
Class II OD/MO			Onlay/overlay
Class II MOD			Onlay/overlay

	Conservative	Conventional
>1/2 residual tooth structure	Endocrown Ceramic/composite	Composite core + full crown
<1/2 residual tooth structure		Post and core + full crown

Cohen's Pathways of the Pulp, 10th Edition

*Relatively flat anatomy and canine guidance, normal function; **group guidance, steep occlusal anatomy, parafunctions.

Restoring premolar/molar teeth

- both approximal walls are intact

  glass ionomer lining + composite filling

Restoring premolar/molar teeth

- one approximal wall is missing

  reduction of weakened cusp

  glass ionomer lining + composite lining + onlay

Restoring premolar/molar teeth

- two approximal walls are missing

  reduction of weakened cusp

  glass ionomer lining + composite lining + onlay

Restoring premolar/molar teeth

- **>1/2** residual tooth structure
  >2mm supragingivally

adhesive core + crown
endocrown

Restoring premolar/molar teeth

- **<1/2** residual tooth structure
  <2mm supragingivally

adhesive post&core + crown
metal post&core + crown

Onlays/overlays

Cast metal

- golden alloys
- silver-palladium

Aesthetic

- composite
- ceramic
- composite-ceramic hybrid (e.g. Enamic)

Post&core build-ups

~~Prefabricated metal posts~~

Rigid, individual post&core

- metal (golden alloy, Co-Cr, silver-palladium, titanium)
- zirconium
- ceramic

Elastic post + adhesive core

- prefabricated fiber post
- individual fiber post

Increases retentive surface for coronal restoration!
Does NOT strengthen tooth, it WEAKENS it!

Rigid, individual post&core

	cast metal post&core	zirconium/ceramic post&core
elasticity:	less than dentin	less than dentin
color:	not tooth colored	aesthetic
compared to canal:	fills out prepared space	fills out prepared space
fixation:	cement	adhesive cement
retention:	friction	adhesive + friction
cement thickness:	thin	thin

post&core is one unit

Cast metal post&core

1. Preparing the coronal structure

we must know the remaining amount of healthy dental tissue

Ferrule-effect

- circularly: 1,0-1,5mm healthy dental tissue

Cast metal post&core

2. Preparing the root canal

- length: minimum length of core height
  maximum 2/3 of root canal length
- diameter: maximum 1/3 root canal diameter
- apical seal: minimum 4mm root canal obturation remaining
- occlusal divergency on inner surface, no undercuts
  if too symmetric, circular make it oval
- all guttapercha, sealer must be cleaned fron root canal wall

Cast metal post&core

3. Based on individual impression

4. Temporary sealing
easily removed

Cast metal post&core

5. Fixation

cement:

glassionomer cement
carboxilate cement
phosphate cement

6. Preparing the crown

Elastic posts

	prefabricated fiber post	individual fiber posts
elasticity:	same as dentin	same as dentin
color:	aesthetic	aesthetic
compared to canal:	does not fill out space	fills out space
fixation:	adhesive cement	adhesive cement
retention:	adhesive	adhesive + friction
cement thickness:	thick	thin

post&core is NOT one unit

Elastic posts

1. **Preparing the canal**
   - length: minimum length of core heigth
     maximum 2/3 of root canal length
   - diameter: maximum 1/3 root canal diameter
   - apical seal: minimum 4mm root canal obturation remaining
   - all guttapercha, sealer must be cleaned fron root canal wall

Elastic posts

2. Post try-in
3. Reducing to size
4. Fixation

Elastic posts

5. **Composite core build-up**
6. **Preparing the core**

   Ferrule-effect

etch&rinse technique

root canal:
isolation
conditioning
primer and adhesive
(activator)

post:
length
try-in
cut to size
(alcohol)

dual-curing composite cement
polimerization
core build-up

self-etch technique

root canal:
isolation
primer and adhesive
(activator)

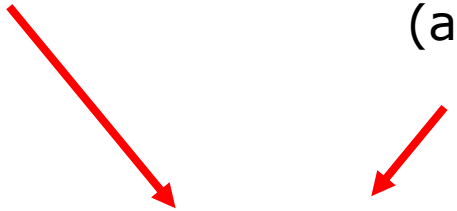
post:
length
try-in
cut to size
(alcohol)

dual-curing composite cement
polimerization
core build-up

using self-adhesive cement

root canal:
isolation

post:
length
try-in
cut to size
(alcohol)



self-adhesive
dual-curing composite cement
polimerization
core build-up

Solo crown

… preparation is indicated if clinical crown is so destructed that it is unable to give retention to filling or onlay/overlay.

Ferrule-effect is needed to restore proper function.

Solo crown

Cast metal crown:
occlusal reduction – 1-1,5mm
shoulder – 1-1,5mm

Porcelan veneered cast metal crown:
occlusal reduction – 1,5 - 2mm
shoulder – 1-1,5mm

Zirconium crown:
occlusal reduction – 2mm
shoulder – 1-1,5mm

Ceramic crown:
occlusal reduction – 2mm
shoulder – 1-1,5mm

Guidelines for preparation

- occlusal convergency: 5-8°
- core height: 4mm
- rounded corners and angles
- Chamfer-shoulder:
  - clear finish line
  - adequate width
  - rounded internal angles

flat-end tappered diamond bur

football shaped diamond bur

Solo crown

1. Tooth shade selection
2. Preparing the core
3. Based on individual impression
    - precisional situational impression
    - antagonistic impression
    - wax bite
4. Temporary crown
5. Frame work try-in
6. Biscuit probe try-in
7. Fixation

Thank you for your attention!

Megtartó fogászat és Endodoncia. Fazekas Árpád.