ANATOMY OF THE PULP CAVITY

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Pulp cavity

the central cavity within a tooth and is entirely enclosed by dentin except at the apical foramen
Pulp cavity

1. Pulp chamber
2. Root canal(s)
ROOF OF PULP CHAMBER

- Dentin covering the pulp chamber occlusally or incisally
Floor of pulp chamber

Dentin bounding the chamber near the cervix of the tooth, particularly dentin forming the furcation area.
PULP HORN

: an accentuation of the roof of the pulp chamber directly under a cusp or developmental lobe
: the prolongation of the pulp itself directly under a cusp
Canal orifice(s)

: openings in the floor of the pulp chamber leading into the root canals
ROOT CANAL

: portion of the pulp cavity from the canal orifice to the apical foramen
ACCESSORY CANAL:
lateral branchings of the main root canal generally occurring in the apical third of a root or furcation area in multi-rooted tooth.
LATERAL CANAL:

An accessory canal that branches approximately right angle to the main root canal to the lateral surface of the root and may be visible on a radiograph.
**Apical Foramen**

An aperture at or near the apex of a root through which the blood vessels and nerves enter or leave the pulp cavity.
APICAL FORAMEN

root apex

cementum

apical foramen

apical constriction

dentine

0.5-0.7 mm

0.5-0.7 mm
ACCESSORY FORAMINA

: the openings of the accessory and lateral canals on the root surface
ACCESSORY FORAMINA
APICAL CONSTRICTION

the narrowest part of the root canal at the apex where cementum join with dentin (CDJ)
Walls of a pulp chamber:

- derive their names from the corresponding walls of the tooth surface
  - buccal wall of a pulp chamber
  - lingual wall of a pulp chamber
ANGLES OF A PULP CHAMBER

: derive their names from the walls forming the angle

➢ mesiobuccal angle of a pulp chamber
ROOT AND ROOT CANAL ANATOMY

Cross section of a root:

- round
- oval
- deep oval
- bowling pin
- hourglass
- kidney bean
Common variations in root and root canal in cross section (from Walton and Vertucci, 1996)
Common variations in root and root canal in cross section  (from Walton and Vertucci, 1996)
Classification of root canal configuration

(Weine et al., 1969)
Type I

Type II

Type III

Type IV
Classification of root canal configuration

(Vertucci, 1984)
young

Increasing age
APICAL FORAMEN
PULP STONE
Maxillary central incisor

Average tooth length: 22.5 mm.

Pulp chamber:
- center of the crown
- follows the contours of the crown
- broad mesiodistally
- broadest part incisally
- three pulp horns (correspond to the developmental mamelons)
- indistinct division between PC and RC
Root and root canal:
- one root and one RC
- conical in shape
- centrally located
- large and simple in outline
- broad labiopalatally
Maxillary lateral incisor

Average tooth length: 22.0 mm.

Pulp chamber:
- similar to maxillary central incisor but smaller
- two pulp horns (correspond to the developmental mamelons)
- broad mesiodistally
- broadest part incisally
- indistinct division between PC and RC
Maxillary lateral incisor

Root and root canal:
- one root and one RC
- conical in shape
- smaller than maxillary central incisor
- ovoid labiopalatally in cervical third
Maxillary lateral incisor

Variations:
- dens invaginatus
- peg shape
- dental tubercle (talon cusp)
- developmental groove (palatogingival groove)
Maxillary canine

Average tooth length 26.5 mm.

Pulp chamber:
- largest of single-rooted teeth
- one pulp horn
- narrow mesiodistally
- broad labiopalatally
- indistinct division between PC and RC
Maxillary canine

Root and root canal:
- One root and one RC
- One pulp horn
- RC is larger than maxillary incisor
- RC is wider in labiopalatatal than in mesiodistal
- Indistinct division between PC and RC
Maxillary first premolar

Average tooth length 20.6 mm.

Pulp chamber:
- narrow mesiodistally
- broad buccopalatally
- cross section: ovoid (B-Pa)
- two pulp horns (B, Pa)
- roof of PC is coronal to cervical line
- floor of PC is convex
- usually 2 orifices: B, Pa
MAXILLARY FIRST PREMOLAR

Root and root canals:

- Two roots and 2 RCs (Pa, B)
- Palatal RC is larger than buccal RC
Variations:
- One root and 1 or 2 RCs
- Three roots and 3 RCs
Maxillary Second Premolar

Average tooth length 21.5 mm.

Pulp chamber:

- similar to maxillary first premolar
- narrow mesiodistally
- broad buccopalatally
- Two pulp horns (B, Pa)
- cross section: ovoid (B-Pa)
Maxillary Second Premolar

Root and root canal:
- one root and 1 RC

Variations: 2 - 3 root/RCs
Maxillary first molar

Average tooth length 20.8 mm.

Pulp chamber:
- largest in the dental arch
- four pulp horns (MB, DB, MPa, DPa)
- pulpal roof: rhomboidal shape
- pulpal floor: triangular form
- orifices located in the 3 angles of the floor
- anatomic dark lines connect the orifices
Maxillary First Molar

Root and root canals:

- Three roots (MB, DB, Pa)
- Three - four RCs (MB1, MB2, DB, Pa)
- MB root : 2 RCs (MB1, MB2)
Maxillary First Molar
Maxillary first molar
Maxillary second molar

Average tooth length 20.0 mm.

Pulp chamber:
- similar to maxillary first molar but narrower mesiodistally
- pulpal roof: rhomboidal shape
- pulpal floor: triangular form
Maxillary Second Molar

Root and root canals:
- Three roots (MB, DB, Pa)
- Three - four RCs (MB1, MB2, DB, Pa)
- Two root and 2 RCs
- One root and 1 RC
Maxillary second molar
Maxillary third molar

The radicular anatomy of the third molar is completely unpredictable.
Mandibular central incisor

Average tooth length: 20.7 mm.

Pulp chamber:
- small and narrow mesiodistally
- broad labiolingually

Root and root canal:
- 1 root and 1 - 2 RCs
- narrow mesiodistally
- broad labiolingually
Mandibular lateral incisor

Average tooth length: 21.1 mm

Pulp chamber:
- similar to mandibular central incisor

Root and root canal:
- similar to mandibular central incisor

Variations:
- germination
- fusion
MANDIBULAR CANINE

Average tooth length 25.6 mm.
Pulp chamber:
- similar to maxillary canine but smaller
- narrow mesiodistally
- broad labiolingually
- one pulp horn
- indistinct division between PC and RC
MANDIBULAR CANINE

Root and root canals:
- one root and 1 RC

Variation:
- two roots and 2 RCs
Mandibular First Premolar

Average tooth length: 21.6 mm.

Pulp chamber:

- narrow mesiodistally
- broad buccolingually
- distinct buccal pulp horn (similar to canine)
- indistinct division between PC and RC
Mandibular First Premolar

Root and root canal:
- Conical shape
- One root and one RC
- Narrow mesiodistally
- Broad buccolingually

Variation/anomaly:
- Bifurcation or trifurcation of root or RCs
- Dens evaginatus
Average tooth length 22.3 mm.

Pulp chamber:
- similar to mandibular first premolar
- distinct lingual pulp horn

Root and root canals:
- similar to mandibular first premolar

Variations / Anomaly:
- bifurcation or trifurcation of root or RCs
- Dens evaginatus
Dens evaginatus
Mandibular First Molar

Average tooth length 21.0 mm.

Pulp chamber:

- pulpal roof: rectangular
- pulpal floor: rhomboidial
- four pulp horns
- Three - four orifices
  - (3 orifices: MB, ML, D)
  - (4 orifices: MB, ML, DB, DL)
Root and root canals:
- two roots: M, D
- broad buccolingually
- three – four RCs
- M: 2 RCs: MB, ML
- D: 1 - 2 RCs (D/ DB, DL)

Variations: three roots
Mandibular Second Molar

Average tooth length: 19.8 mm.

Pulp chamber:
- similar to mandibular first molar but smaller

Root and root canal:
- similar to mandibular first molar

Variations:
- one conical root with one RC
- C-shaped root / RC
Variations
C-SHAPED ROOT / ROOT CANAL
Radiographic Appearance

- Fused root
- Two distinct roots
- Large distal canal, narrow mesial canal and a blurred image in between
- Files tend to converge at the apex
- File may exit at the furcation
Radiographic Features

Type I  Type II  Type III

(Fan et al., 2004)
RADIOGRAPHIC FEATURES
C-SHAPED ROOT CANAL
Root canal system
“OFTHEALLTHEPHASESOF
ANATOMICSTUDYINTHE
HUMANSYSTEM,ONEOF
THEMOSTCOMPLEXISTHAT
OFPULPCAVITYMORPHOLOGY”

(BarrettM.T.,1925,citedbyGrossmanetal.,1988)
Any questions?
Bye - bye