Apical Constriction: Location and Dimensions in Molars—
A Micro–Computed Tomography Study

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Aim
- To validate the existence of the apical constriction
- To determine its location and dimensions in molars by using MCT.

Materials & Methods
- 90 extracted molars (271 canals) were evaluated in this study.
- Teeth with apical resorption, incomplete root formation as well as wisdom teeth were extruded.
- Patients’ age was categorized into 3 groups: 15–30, 30–45, and 45–60 years.
- Teeth were scanned by micro–computed tomography
- The apical constriction was defined to be the apical cross sections having the smallest area extending along a distance of 0.1 mm or more.
- The size of the constriction was determined in the sections of minimal area and categorized according to endodontic instrument sizes.
- The canal form was identified as either:
  Parallel: the narrowest part of the canal extended for a long distance (>2.5 mm) and widened only at the foramen for a short distance
  Tapered: the canal constantly narrowed toward the apex.
- The most apical section of constriction was used as a reference for distance measurements.
- The distance from apical constriction to foramen (AC-AF) & to apex (AC-A) was recorded for each canal.
- Statistical analyses were performed to compare the parameters of different teeth.

Results
- The mean distance AC-AF was 0.2 mm and the mean distance AC-A was 0.9 mm
- No significant differences between MAX and MAN molars or between different canal types.
- The mean size of constriction was
  a) in roots with 1 canal = size 35
  b) In roots with 2 canals, =size 30
- Patients aged 30 or younger had significantly wider constriction (size 35) than older patients (size 25).
  There were no differences between middle-aged and older patients.
- Apical to the constriction, the canal widened toward the foramen in 86% of the cases
- In 14% of the canals, the constriction coincided with the foramen
- The mean extension of the apical constriction was 0.4 mm
  a) in the parallel form = 0.8 mm
  b) in the tapered form = 0.2 mm

Conclusion
- All canals showed an apical constriction with a close proximity to the foramen.
- The size of the constriction in molars corresponded to instrument size 30.
- Young patients had a significantly larger constriction.
- The traditional constriction with canal flaring apically and coronally from the constriction was present in only 10% of the canals. The most common form of constriction was the parallel form.

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