



## UNUSUAL WAYS USUAL DESTINATION

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### ABSTRACT

Endodontic access cavity is one of the most important step for a successful endodontic treatment. The design of the traditional endodontic cavity (TEC) for different tooth types has been established several decades ago and has remained unchanged with only minor modifications. In TEC, it has a properly access cavity with straight line access. Whereas in conservative access cavity (CEC), there is preservation of the pericervical dentin and complete deroofing of the roof is avoided.

#### Key words:

Pericervical dentin, Deroofing

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## INTRODUCTION

Endodontic therapy comprised of three factors and they were cleaning and shaping, disinfection and three-dimensional obturation of the root canal system. However, Access cavity preparation is known to be one of the most challenging and important step for a successful endodontic treatment.

Inadequate access cavity preparation may also result in difficulty in locating or negotiating the root canals, instrument separation and aberrations of the canal shape which may result in inadequate cleaning, shaping and filling of the root canal system. This may lead to failure of the treatment. For a long time G. V. Black's preparations were totally accepted by the profession. Traditional endodontic access cavities (TEC), it emphasizes on straight line access into the root canals and this helps to increase the biomechanical preparation efficacy and reduce the procedure errors. However, a concern related to TECs is the amount of tooth structure removed, which may reduce its resistance to fracture under functional loads.<sup>1, 2</sup> The most current evolution is a minimalistic approach to access design by shifting the outline configuration toward greater dentin preservation and idealizing the endodontic-restorative interface.<sup>3</sup> Recently, Clark and Khademi modified the endodontic access cavity design to minimize the tooth structure removal and this was known as the Conservative endodontic access cavity (CEC). The aim of the CEC was to preserve some of the chamber roof and the pericervical dentin.<sup>4</sup>

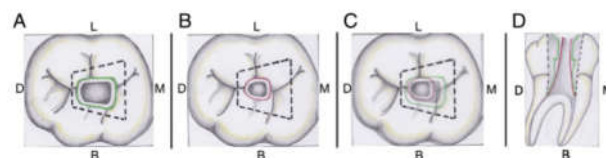


Figure 1 (A–D) Sketches with an (A–C) occlusal view and (D) sagittal view of access cavity designs of a first mandibular molar.

(A–D) A traditional access cavity (black line dashed), (A, C, and D) conservative access cavity (green), and (B–D) ultraconservative “ninja” access cavity (red). Comparison of the 3 access cavity designs in the (C) occlusal and (D) sagittal view, respectively. The sagittal view shown as a conservative access cavity maintains a robust amount of pericervical dentin. B, buccal; D, distal; L, lingual; M, mesial

#### Traditional endodontic access cavity

The access cavity preparation depends on the G.V.Black's principles. One of its fundamental concepts, ‘extension for prevention’, had been followed universally for many decades. A little modification of the principles and they include the outline form, the convenience form, removal of the carious dentin and the toilet of the cavity<sup>6</sup>

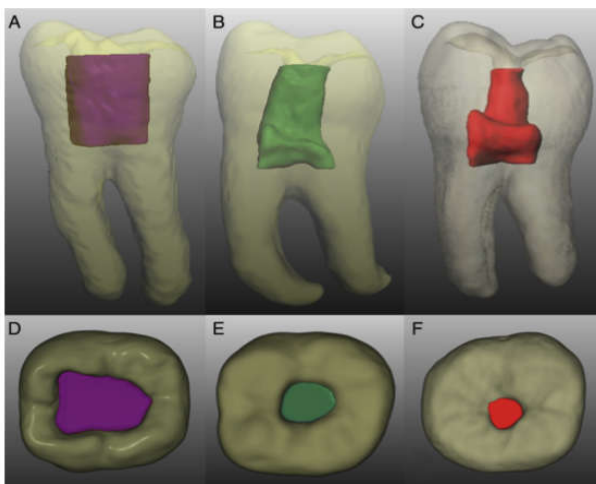
During cavity preparation, the centre of the pulp chamber should be the target of the initial penetration, at a point where the roof and floor of the pulp chamber are at the widest. The outline form is then determined by the shape of the pulp chamber which also determines the occlusal extent of the

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cavity. The convenience form is achieved by removing a certain degree of dentin for specific locations and thus gaining a straight line access to the root canal orifices. Underlying these principles is Black's concept of 'extension for prevention', which promotes the sacrifice of additional tooth structure to prevent iatrogenic complications and to best achieve the ultimate goals.<sup>6</sup>

The designs of the traditional endodontic access cavities have remained unchanged for past few decades. Due to existing limitations with the diagnostic or the imaging techniques, the variations and complexities of the root canal are not known. Thus during the traditional access cavity preparation, more of dentin is removed in order to explore the expected pulp chamber floor anatomy and canal openings.

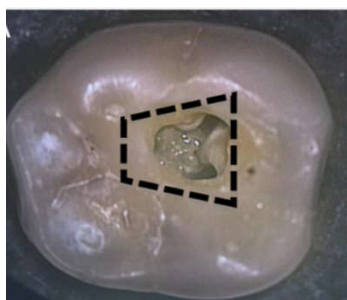


**Figure 2.** (A–F) CBCT 3-dimensional reconstructions and segmentations of lower molars prepared with different access cavity designs in (A–C) the sagittal view and (D–F) the axial view at the occlusal surface. (A and D) A traditional access cavity (purple), (B and E) conservative access cavity (green), and (C and F) ultraconservative ‘ninja’ access cavity (red) are segmented on CBCT reconstructions.

### Conservative endodontic access cavity

David Clark and John Khademi have modified the traditional access cavities and these new designs are known as constructed or conservative endodontic access cavities. The designs are been advocated to minimize the tooth structure removal.<sup>4,5</sup>

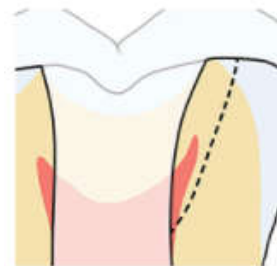
The conservative endodontic access cavity was considered as an alternative to the traditional endodontic access cavity in maintaining the mechanical stability of the tooth. This mechanical stability helps in the long-term survival and the function of the endodontically treated teeth.



**Figure 3** CEC in mandibular first molar. The occlusal view; for comparison purposes, the outline of TEC is demarcated with a dotted line.

In conservative endodontic access cavity, the teeth are accessed at the central fossa and they are extended only as

necessary to detect canal orifices. This helps in preserving the pericervical dentin and part of the chamber floor. The pericervical dentin is the dentin that is located 4 mm above and 4 mm below the crestal bone and they serve in distribution of functional stresses in teeth. Thus it is necessary that we preserve this pericervical dentin in order to maintain the biomechanical response of the radicular dentin.<sup>4,5</sup> The preservation of this dentin roof above the pulp chamber is known as the ‘soffit’.



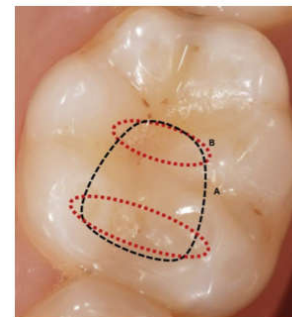
**Figure 4** Dotted line shows the typical cut made to remove the entire pulp horn. Area between the lines should be maintained and is referred to as the soffit.

### Ninja endodontic access cavity

To obtain an access ‘ninja’ outline, the oblique projection is made towards the central fossa of the root orifices in an occlusal plane. As the endodontic access is parallel with the enamel cut of 90° or more to the occlusal plane, it is easier to locate the root canal orifices even from the different visual angulations.<sup>7</sup>

### Orifice-directed dentin conservation access cavity

The orifice –directed design is also known as the ‘truss’ access cavity. It is an approach to conservative access cavity where separate cavities are prepared to approach the canals.



**Figure 5** A schematic representation of the (A) TEC access (black dotted line) and (B) DDC access (red dotted line) cavity in a mandibular molar.

In mandibular molars, two separate cavities are prepared to approach the mesial and the distal canals. In maxillary molars, the mesio- and the distobuccal cavities are been approached in one cavity and another separate cavity for the palatal canal. The aim of preparing such conservative cavities is to preserve the dentin ie. Leaving a truss of dentin between the two cavities that has been prepared.<sup>8</sup>

### CONCLUSION

Although traditional access cavity has been established several decades ago, the conservative access cavity designs mentioned in this article are also better options in order to preserve pericervical dentin to enhance the strength of endodontically treated teeth.

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