Masterclass in Clinical Practice

Endodontics

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Comparison between different molar endodontic access cavity designs

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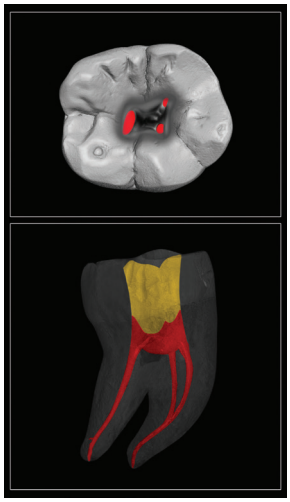
Introduction

Minimally invasive endodontics' specific focus on dentine preservation is gaining popularity on social media. The purpose of this article is to provide a summary of possible advantages and disadvantages of different endodontic access cavity designs with the focus on traditional, conservative and ultra-conservative endodontic access cavities, specifically in molar teeth.

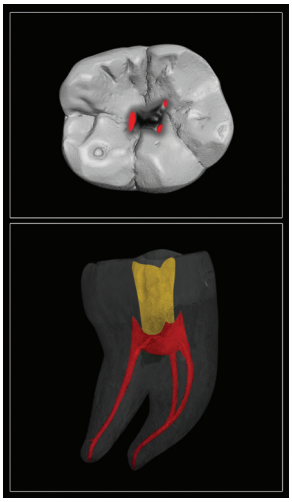
Many variations and modifications on endodontic access cavity (EAC) designs can be found in literature with more recent EAC focussing on the preservation of tooth structure to prevent post endodontic fracture. The exact parameters of each of the different EAC cavity designs however remain largely undefined. EAC preparation includes the removal of caries, the removal of the pulp roof, straight-line access and the identification and location of root canal orifices whilst preserving dentine.[1] Advances in clinical dentistry has made more conservative access cavity preparations a viable option. These advances include magnification, cone beam computed tomography (CBCT), irrigation activation devices and solutions, as well as improved metallurgy for the manufacturing of endodontic shaping instruments resulting in increasing flexibility and fracture resistance.[2,3]

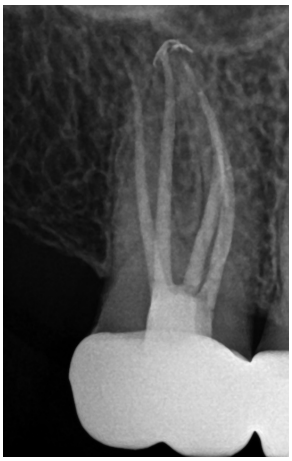
Traditional Access Cavities (TAC)



Complete removal of the pulp chamber roof to prepare straight line access into the coronal and middle third of the root canal systems. Slight divergence of canal walls.

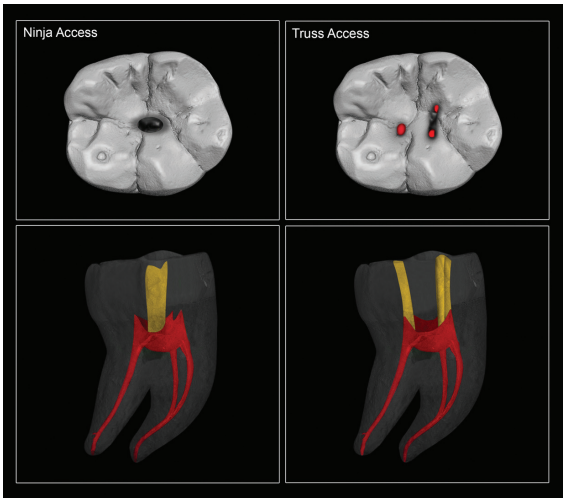
Conservative Access Cavities (CAC)

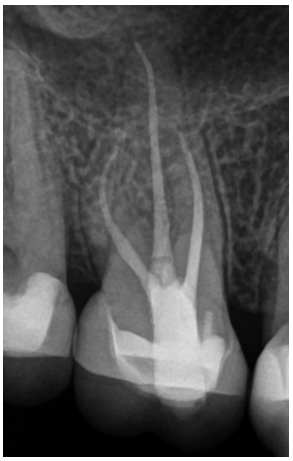




This design aims for partial removal of the chamber roof allowing for the location of root canals without necessarily achieving straight line access. Preparation starts at the central fossa extending the access in such a way that the canals are detected without deroofing the entire pulp. Access cavity walls can either be slightly convergent or divergent.[4,5]

Ultra-conservative Access Cavities (UAC)

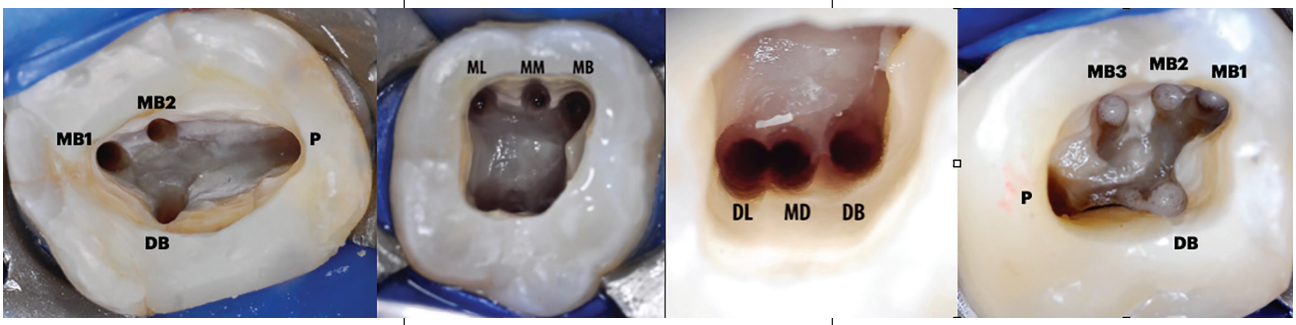




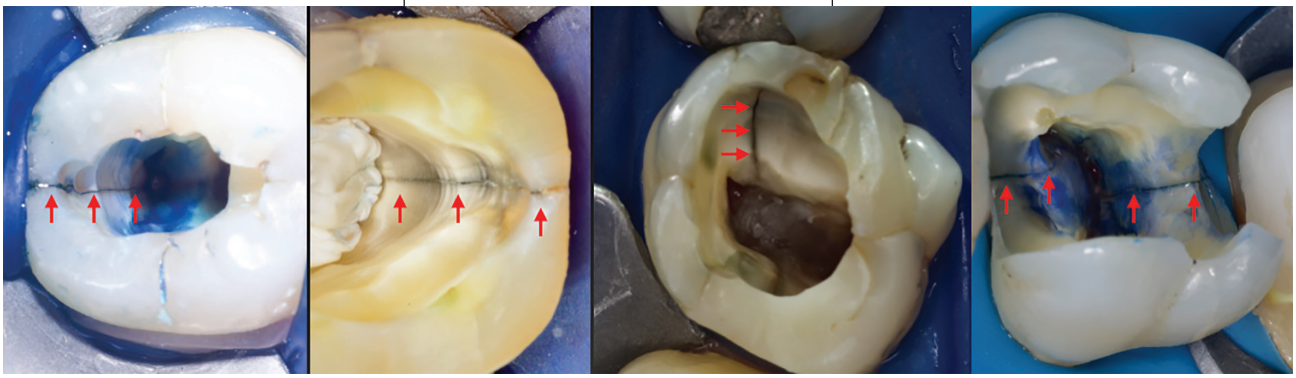
Ninja access cavities is a form of ultra-conservative access cavity preparation prepared by a "point access" in the central fossa.[6] Truss access is another form of UAC designs. The design is aimed in targeting the canal orifices without breaking the dentine structure between the mesial and distal canals.[7] This design aim to preserve as much as possible tooth structure.

More loss of pericervical dentine.[1,8,9]	Minimized amount pericervical dentine removal.	Pericervical dentine preservation is the only objective and straight-line access or visibility is often compromised.
Medium resistance to fracture	Med-high resistance to fracture	Very high resistance to fracture
Easy and more predictable canal debridement	More difficult predictable canal debridement	Inferior debridement of root canal systems especially in mesial canals of mandibular molars

Traditional Access Cavities (TAC)	Conservative Access Cavities (CAC)	Ultra-conservative Access Cavities (UAC)
Excellent root canal anatomy preservation	Good root canal anatomy preservation	Moderate canal anatomy preservation
High incidence of additional canal location, especially MB2 or MB3 canals in maxilliary molars or mid-mesial or mid-distal canals in mandbular molars	Slightly lower incidence of additional canal location requiring more skill and level of magnification	Low incidence of additional canal location requiring higher skill level and level of magnification.



Shorter root canal preparation time	Slightly more time required for root canal preparation	Increased amount of time for root canal preparation
Easy to place multiple files in root canals for length determination	More difficult to place multiple files in root canals for length determination. Might require more than one radiograph	Often impossible to place multiple files in root canals for length determination with Ninja access and will require multiple radiographs.
Low incidence of file fracture	Medium incidence of file fracture	Higher incidence of file fracture
Easy to identify cracks in teeth that can compromise long-term prognosis	More difficult to identify cracks in teeth unless it is viewed under microscope magnification	Cracks are often missed even under high magnification because of the restricted access



Conclusion

Literature provides no consensus or conclusive evidence favouring conservative or ultra-conservative molar access cavities above traditional molar access cavities in term of fracture resistance and post-endodontic treatment outcomes. Conservative/minimally invasive access cavities could also increases preparation time and could compromise endodontic treatment in terms of debridement, canal location and proper irrigation whilst trying to preserve dentine. The authors therefor strongly recommend the use of advanced endodontic irrigation protocols, adjunct irrigation devices as well as CBCT and magnification in cases where conservative or minimally invasive endodontic access cavities are considered. The authors further recommend that clinicians should evaluate each case based on preserving dentine, whilst balancing the risks associated with removing too little dentine during access cavity preparation when deciding on the ideal molar access cavity design prior to endodontic treatment.

References

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