Endodontic access and beyond: part two

John Barclay[1]

Introduction

For years, we've debated access cavity design like it's the holy grail of tooth preservation, but the evidence tells a different story. Maybe it's not about TEC, CEC, or Ninja access at all. Maybe it's about the tooth's pre-existing condition long before we even pick up a bur.

Many endodontically treated teeth are already structurally compromised before access is initiated. The challenge is balancing visibility with conservation – how do we remove just enough tooth structure to work efficiently without increasing fracture risk? Traditional access designs often assume intact coronal structures, but in reality many teeth requiring endodontic treatment already exhibit significant loss of dentine due to decay, fractures or prior restorations. This raises key questions:

- How can we optimise access for compromised teeth without further weakening them?
- What alternative techniques can be employed to maximise success while preserving as much healthy dentine as possible?
- When is an ultra-conservative approach justified, and when does it hinder predictability?

By integrating modern access techniques (CEC, Truss, Ninja access) with a structural risk assessment, we ensure endodontic success without sacrificing long-term restorability.

Understanding structural weakness in endodontic cases

Teeth requiring root canal treatment often have pre-existing damage due to caries, fractures or previous restorations. Before initiating access, it's crucial to assess:

- Remaining dentine thickness (RDT): how much dentine is left around the access cavity, especially at the cervical level?
- Cusp and marginal ridge integrity: are these structures intact or at high risk of fracture?
- Previous restorations and decay: large composites, crowns, or undermined enamel influence the access strategy
- Tooth location and load considerations: molars endure higher occlusal forces and require different conservation techniques than anteriors.

Understanding stress distribution within the tooth post-access can help predict failure points. For example, premolars under high occlusal loads are more prone to vertical fractures, meaning that an overly aggressive TEC approach may be a greater risk than in molars, where marginal ridge integrity is more critical.

A thorough preoperative assessment helps determine whether the access should be traditional, conservative, or ultra-minimal to balance visibility and structural preservation.

[1] Dr John Barclay
BSC (HONS) BDS (HONS) DIP ENDO
Private practice, Wrexham, UK,

Table 1: Access approaches

Access type	Best for	Advantaged	Challenges
Traditional endodontic cavity (TEC)	Fracture-resistant teeth with complex anatomy	Clear visualisation, straight-line access	Greater dentine loss, potential for weakening
Conservative endodontic cavity (CEC)	Moderately weakened teeth	Preserves peri-cervical dentine, balances visibility and strength	Requires precise technique, slight reduction in visibility
Truss access	Highly compromised molars	Preserves maximum dentine, reduces post treatment fractures	Reduced visibility, higher technique sensitivity
Ninja access	Teeth with minimal remaining structure	Extreme dentine preservation, long-term strength	Very challenging canal negotiation, increased risk of missed canals

TEC, CEC, Truss and Ninja access: adapting to the tooth's frailties

Unlike conventional cases, access design for structurally compromised teeth must minimise unnecessary dentine removal while maintaining adequate visualisation.

The approaches in Table 1 can help. Key adjustments for weakened teeth:

- Minimise occlusal dentine removal – adjust access only as needed to locate canals
- Use ultrasonic troughing instead of large burs – enhances precision without excessive cutting
- Preserve peri-cervical dentine (PCD) – avoids unnecessary weakening of critical stress-bearing areas
- Leverage CBCT and magnification – improves visualisation while allowing conservative access.

By tailoring the access approach based on the degree of structural compromise, clinicians can optimise both endodontic success and restorative longevity.

Endodontic access, shaping efficiency and fracture susceptibility: evidence

Endodontically treated teeth experience a measurable loss of structural integrity compared to vital teeth. However, the root cause of increased fracture risk remains debated.

Several competing arguments exist:

- Canal shaping and cleaning: removing infected pulp and dentine may compromise structural integrity, but modern techniques aim to minimize unnecessary removal
- Access cavity design: larger or poorly placed access cavities could weaken the coronal structure, making the tooth more prone to fracture
- A combination of both: is it truly access or shaping, or is it

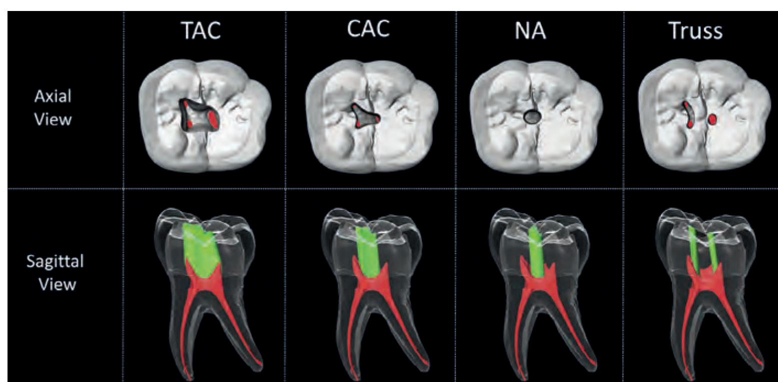


Figure 1: Access cavity preparations (Shabbir et al, 2021)

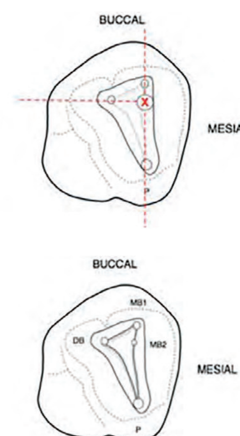
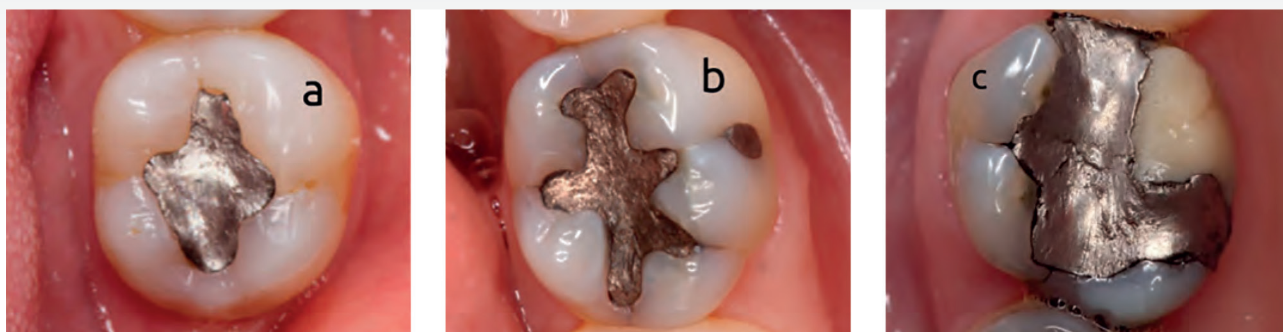


Figure 2: The MB2 search (Darcey et al, 2015)



Figures 3a - b: Three lower first molars all diagnosed with irreversible pulpitis but different clinical complexity and access challenges

the cumulative effect of both?
- The impact of pre-existing restorations: marginal ridge preservation appears to be more critical than access design alone.

Essentially, the evidence suggests restorability and structural preservation matter more than access size alone – access cavity design should be dictated by the pre-existing condition of the tooth, while also considering instrumentation efficiency.

MB2: the hidden challenge in maxillary molars

While much of the access cavity debate focuses on structural preservation, an equally critical issue is canal location and negotiation – particularly MB2 in maxillary molars.

MB2 is present in more than 90% of maxillary first molars, yet studies consistently show it is frequently missed, leading to treatment failure and the need for retreatment. Access design impacts MB2 identification in the following ways:
- TEC provides clear visualisation and enhances MB2 detection
- CEC and Truss require magnification and ultrasonics to avoid missing MB2
- Conservative access may reduce visibility, increasing MB2 failure rates.

Studies indicate MB2 detection drops significantly when access is too restricted (Ballester et al, 2021; Krishan et al, 2014).

Balancing bacterial removal and dentine preservation

These are the competing ideologies – bacterial removal versus dentine preservation. Currently, I concur with the conclusion in Maqbool and colleagues (2020) that says: 'There is no conclusive evidence that conservative or ultra-conservative access cavities increase fracture resistance or adequately allow for complete disinfection. While these designs should be used cautiously, the goal should shift from "removing the smallest possible amount of tooth structure" to "removing as little as necessary."'

So how do we apply this in clinical scenarios? Let's go back to our images from the first article (Figures 3a, 3b and 3c), each with identical diagnosis of irreversible pulpitis without apical periodontitis, requiring at least expulp at an emergency appointment..
- Remove compromised restorations fully before finalising the access shape
- Identify and eliminate caries and fractures first – this will often dictate access shape naturally
- Balance coronal disinfection with preservation too conservative and you risk missing critical areas; too aggressive and you compromise strength
- Cuspal coverage should be considered early restorative planning begins at the access stage.

This approach ensures the best possible endodontic and restorative outcomes. In the end, it's about strategic preservation, not blind conservation.

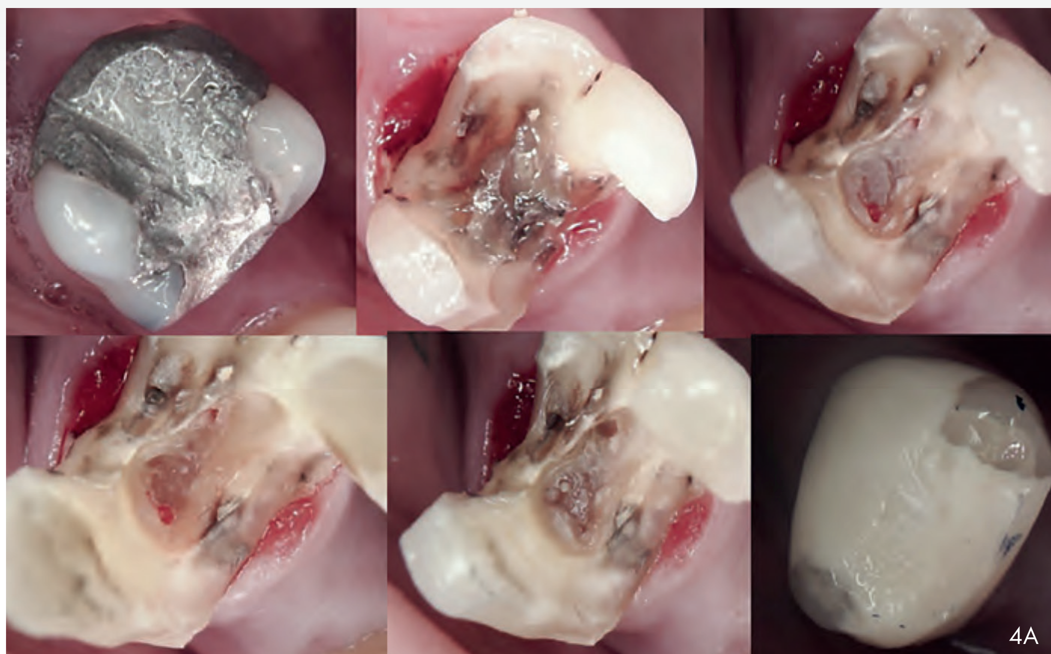
Clinical scenario

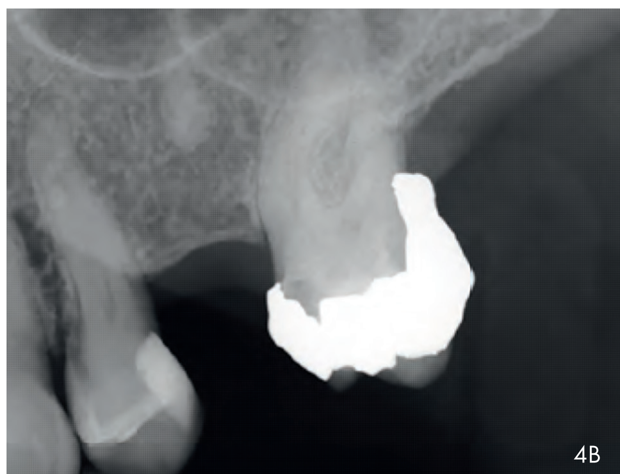
In the following clinical scenario, the UL7 was diagnosed with irreversible pulpitis (Figures 4a and 4b). The dentist was eager to treat, but the dental nurse was sceptical. The dentist checked their watch, it was 12:35pm. They made a deal with the dental nurse: 'We'll be done before 1pm.'

Treatment summary:
- Complete caries removal
- Access cavity refined
- Unsupported cusps reduced
- Located three canals (fourth TBD – not visible)
- Irrigated with bleach and HVS
- 10/15/SX/Ledermix placed
- PTFE pledget applied
- RM GIC build-up with matrix band

They finished at 13:05pm.

Endodontics evolves, and so should we.





Figures 4A and 4B: UL7 – diagnosed with irreversible pulpitis

Key research findings

- Premolars versus molars: TEC significantly weakens premolars, but marginal ridge loss is a bigger factor in molars (Zelic et al, 2015; Ballester et al, 2021)
- CEC versus TEC: CEC can increase fracture resistance, but only when instrumentation efficiency is not compromised (Krishan et al, 2014)
- Is access design overrated? In some cases, remaining dentine walls matter more than access shape alone (Corsentino et al, 2018)
- CEC and Truss impact on shaping: while CEC and Truss access designs preserve dentine, they can limit instrument penetration and cleaning efficiency, particularly in molar distal canals (Krishan et al, 2014)
- Marginal ridge influence: when marginal ridges remain intact, conservative access improves fracture resistance, but if even one ridge is missing, access design has minimal impact on fracture strength (Ballester et al, 2021).

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