
AN UNUSUAL ROOT FRACTURE: A CASE REPORT

James Puryer¹, Andrew Barber²

1.School of Oral and Dental Sciences,Bristol Dental Hospital,Lower Maudlin Street,Bristol,United Kingdom

2.Cambridge University Hospital,Cambridge Biomedical Campus,Hills Road,Cambridge,United Kingdom

ABSTRACT:

A vertical root fracture (VRF) can have a significant effect on the prognosis of a tooth. VRFs can be difficult to diagnose clinically as well as radiographically. Various factors have been suggested in increasing the risk of a VRF developing within a tooth including: excessive canal preparation, excessive pressure during lateral condensation and post preparation for support of a core material. The use of a cast restoration incorporating a 'ferrule' can help to minimise the risk of VRF occurring. This case report describes the progression of root fracture in an endodontically treated molar tooth, which had not been subject to post preparation, despite being restored with a full coverage cast gold restoration.

Keywords: Vertical Root Fracture, Molar, Ferrule, Diagnosis, Radiograph



INTRODUCTION

A vertical root fracture (VFR) has been described as a longitudinally orientated fracture, extending from the root canal to the periodontium [1]. A VFR will usually affect heavily restored and endodontically treated teeth [2]. A VFR may have a significant effect on the tooth's prognosis, and a VRF has been reported to be the third most common reason for the extraction of an endodontically treated tooth [3].

The clinical presentation of a VRF may be confused with localised periodontal disease [4], root perforation or failed endodontic treatment, although an isolated pocket in an otherwise periodontal stable dentition is usually pathognomonic of the condition. Due to the difficulty in clinical diagnosis, findings should also be supplemented with radiographic investigation, and the use of

Cone Beam Computed Tomography (CBCT) has been shown to be beneficial [5]. Current guidelines for the use of CBCT in endodontic treatment are available from the European Society of Endodontology [6].

The use of excessive forces during lateral condensation has been implicated in the aetiology of VRF, [1, 7, 8] as has the use of excessive forces during post cementation [9]. Posts should only be placed in cases where they are essential for increased core support due to the increased risks of both VRF and medico-legal claims [10].

This case report describes the progression of root fracture in an endodontically treated molar tooth, which had not been subject to post preparation, despite being restored with a full coverage cast gold restoration

CASE DETAIL

A 53-year-old male with no relevant medical history attended the general practice of one of the authors (JP), complaining of intermittent, mild discomfort of a few weeks duration in his lower right quadrant. No analgesics had been taken. The discomfort was exacerbated on biting, but not affected by hot or cold stimuli. There was no history of trauma.

On clinical examination, there was no lymphadenopathy or extra-oral swelling. Intra-orally, there was a small draining sinus buccal to the lower right first molar tooth 46. The tooth was not mobile or tender to percussion, and it had been restored with a full coverage gold crown 5 years previously. No caries was seen and there were no apparent cracks on the remaining visible aspects of the tooth between the crown margin and gingival margin. An isolated 8mm periodontal pocket was found on the mesiobuccal aspect of the tooth, whilst generalised periodontal screening revealed no other areas of periodontal pocketing greater than 3mm. There was no pus exudate and oral hygiene was good.

A long cone periapical radiograph was taken (Figure 1) which demonstrated a well condensed root canal filling and the appearance of a direct amalgam core and full veneer gold crown on tooth 46. There was an obvious radiolucency associated with the mesial aspect of tooth 46. No other pathology was evident, and adjacent bone quality and quantity was good. This endodontic treatment had

been carried out 5 years previously, just prior to the tooth being restored with the amalgam core and gold crown.

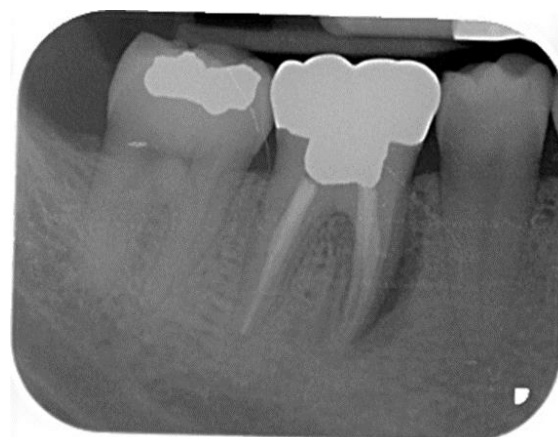


Figure 1. Long cone periapical radiograph of tooth 46 on first presentation

A provisional diagnosis of VRF of the mesial root of tooth 46 was made, and the options of either hemisection or extraction were discussed. Due to the mild symptoms and the potential impact of the treatment decision needed, the patient asked to be given time to make a decision.

The patient went travelling overseas for 16 months. He returned for review complaining of intermittent discomfort from tooth 46 on biting only. On clinical examination, tooth 46 was now grade II mobile, and there was an obvious displaced root fracture in the mesial root of tooth 46. Periodontal pocketing greater than 5mm with pus exudate was seen associated with both the mesial and distal roots of tooth 46. A further long cone periapical radiograph was taken of the tooth (Figure 2).



Figure 2. Long cone periapical radiograph of tooth 46 on second presentation

This subsequent radiograph demonstrated displaced vertical fractures of both the mesial and distal roots of tooth 46, and large radiolucencies around both apices and the lateral aspects of both roots. The patient readily accepted that this tooth was now unrestorable, and the tooth was extracted. Healing was uneventful.

DISCUSSION

The presented case initially showed signs and symptoms that are often associated with an incomplete VRF: an isolated deep periodontal pocket, a draining sinus and a root-treated molar in an otherwise periodontally stable patient. It was the progression of the root fracture from the mesial root into the distal root that is unusual. On initial presentation there was no evidence either clinically or radiographically to suggest that there was a fracture in the distal root. On subsequent presentation, both roots had suffered complete and displaced vertical fractures.

REFERENCES

Vertical fractures occurred in both the mesial and distal roots, despite the endodontic access cavity appearing within normal limits and the absence of post space preparation in either root. Radiographically, the canals have a good taper, and are in close proximity to the outer surface of the roots in the mid-third. Over preparation of the canals may have led to an undiagnosed 'strip' perforation of the mesial root. Mesial roots of mandibular molars are highly susceptible to strip perforations because of thin dentinal walls and anatomical depressions [11], and rotary instrumentation has been associated with more fractures than with hand instrumentation [12, 13].

CONCLUSION

This case highlights the importance of careful endodontic technique in order to balance the requirements of preparing and disinfecting the root canal systems versus the potential risks involved with over-preparation. The oft quoted saying that 'prevention is better than cure' certainly applies to root fractures as once they have occurred, they can adversely affect the prognosis of a tooth and extraction is often the only treatment option available, as in this case where the tooth suffered unrestorable VRFs in both roots.

1. Pitt D, Natkin E. Diagnosis and treatment of vertical root fractures. J Endod 1983; 9: 338-346.

2. Nyman S, Lindhe J. A longitudinal study of combined periodontal and prosthetic treatment of patients with advanced periodontal disease. *J Periodontol* 1979; 50: 163-169.
3. Tourre B, Faye B, Kane A, Lo C, Niang B, Boucher Y. Analysis of reasons for extraction of endodontically treated teeth: A prospective study. *J Endod* 2011; 37: 1512-1515.
4. Tamse A. Iatrogenic vertical root fractures in endodontically treated teeth. *Endod Dent Traumatol* 1988; 4: 190-196.
5. Elund M, Nair M, Nair U. Detection of vertical root fracture using cone beam computed tomography: A clinical study. *J Endod* 2011; 37: 768-762.
6. Patel S, Durack C, Abella F, Roig M, Shemesh H, Lambrechts P, Lemberg K. European Society of Endodontology position statement: The use of CBCT in Endodontics. *Int Endod J* 2014; 47: 502-504.
7. Meister F, Lommel T, Gerstein H. Diagnosis and possible causes of vertical root fracture. *Oral Surg Oral Med Oral Pathol* 1980; 49: 243-253.
8. Wilcox L, Roskelley C, Sutton T. The relationship of root canal enlargement to finger-spreader induced vertical root fracture. *J Endod* 1997; 23: 533-534.
9. Polson A. Periodontal destruction associated with vertical root fracture: report of four cases. *J Periodontol* 1997; 48: 27-32
10. Hayashi M, Kinomoto Y, Jakeshige F, Ebisu S. Prognosis of intentional replantation of vertically fractured roots reconstructed with dentin bonded resin. *J Endod* 2004; 30: 145-148.
11. Yang S, Rivera E, Walton R. Vertical root fractures in non-endodontically treated teeth. *J Endod* 1995; 21: 337-340.
12. Bier C, Shemesh H, Tanomaru-Filho M, Wesselink P, Wu M. The ability of different nickel-titanium rotary instruments to induce dentinal damage during canal preparation. *J Endod* 2009; 35: 236-238.
13. Ashwinkumar V, Krithikadatta J, Surendran S, Velmurugan N. (2014), Effect of reciprocating file motion on microcrack formation in root canals: an SEM study. *Int Endod J* 2014; 47: 622-627.