

TABLE 2. Summaries of Classic Studies Associated With Cracked Teeth and Vertical Root Fractures

Study	Participants	Data	Results
PradeepKumar AR, et al ¹⁷ (vertical root fracture)	Evaluation of 197 previously endodontically treated teeth that were crowned and diagnosed with vertical root fractures.	Mandibular molars (34%) and maxillary premolars (22.8%) were the most frequently affected teeth.	Common findings: <ul style="list-style-type: none"> ● Pain on percussion (60%) ● Pain on palpation (62%) ● Presence of a deep, narrow pocket (81%) ● Sinus tract/swelling (67%) ● Halo-type radiolucency (48.7%)
Tamse et al ¹⁸ (vertical root fracture)	Ninety-two vertically fractured, endodontically treated teeth were evaluated clinically and radiographically before and after extraction.	The maxillary second premolars (27.2%) and mesial roots of the mandibular molars (24%) were the most commonly fractured teeth.	Common findings: <ul style="list-style-type: none"> ● Narrow periodontal pocket on the buccal (67.4%) ● Fistula close to the gingival margin (34.8%) ● Lateral radiolucency or a combination of lateral and periapical radiolucency (> 50%) ● Other common signs included percussion sensitivity, localized swelling, and mobility
Sim et al ¹² (cracked tooth)	A 5-year survival study of 84 patients with cracked molars that were endodontically treated.	They found that an extension of the crack onto the pulpal floor increased the odds of tooth loss elevenfold.	Teeth with coronal cracks had a 95.2% survival rate, while teeth with radicular cracks had an 81.8% survival rate.
Krell and Caplan ¹³ (cracked tooth)	Looked at 3,038 cracked teeth with a 1-year followup after endodontic treatment.	The most common cracked teeth were mandibular first and second molars. The success rate at 1 year was 82%.	The 3 factors most significantly affecting the prognosis were pocket depth, distal marginal ridge crack, and periapical diagnosis.
Kang et al ⁹ (cracked tooth)	A 2-year evaluation of 88 cracked teeth that were endodontically treated.	The majority of patients with cracked teeth were above the age of 50. The mandibular second molar was the most common cracked tooth.	The most significant factor affecting survival rate at 2 years was probing depth. If the probing depths were less than 6 mm, then the survival rate was 96.8%. If the probing depths were greater than 6 mm, then the survival rate was 74.1%. Overall survival rate at 2 years was 90%.
Davis and Shariff ¹⁴ (cracked tooth)	A 4-year evaluation of 70 teeth that all had cracks extending into radicular dentin, beyond the level of the canal orifice internally, and into periodontal structures externally. All teeth had probing depths between 5 and 7 mm.	All canals that contained a crack were internally bonded with resin, and then the teeth were crowned.	A 100% survival rate in the first 2 years and 96.6% survival up to the 4-year period, and 90.6% were classified as “successes” in the 2- to 4-year term. Also, 98.1% displayed no increase in probing depths over the 4-year period.
Krell and Rivera ³ (cracked tooth)	A 6-year evaluation of 127 patients with cracked teeth and diagnosed with reversible pulpitis.	All teeth were treated with crowns.	Twenty-one percent converted to irreversible pulpitis and required endodontic treatment within the first 5 months. Seventy-nine percent remained asymptomatic and did not require root canal therapy in the 6-year period.
Cameron ² (cracked tooth)	Evaluated 102 posterior cracked teeth.	<ul style="list-style-type: none"> ● Mandibular first and second molars were the most commonly cracked teeth (66.7%) ● 23.5% of the patients had the symptoms for a year before seeking treatment ● Almost all cracks extended in a mesiodistal direction (98%) 	<ul style="list-style-type: none"> ● Chewing discomfort and unexplained temperature sensitivity were the most common findings ● 80% of the patients were above the age of 40 ● 69.6% of the teeth were vital ● 81.3% showed no periapical pathology
Berman and Kuttler ⁵ (cracked tooth)	Evaluated 27 teeth with non-vital pulps. These teeth had no restorations or minimally deep restorations and no signs of caries. These teeth were extracted and evaluated for depth and extent of the cracks.	<ul style="list-style-type: none"> ● All cracks extended from the occlusal surface into the pulp and progressed to an external root surface as well. ● Pulp necrosis, in the absence of restorations, caries, or luxation injuries, is likely caused by a longitudinal fracture extending from the occlusal surface and into the pulp. 	Conclusion: based on the available literature, teeth with “fracture necrosis” have a poor prognosis after endodontic treatment, with the potential ramification of extensive periodontal and/or periapical bone loss. Extraction may be considered as the primary treatment option.
Tan et al ¹¹ (cracked tooth)	A 2-year evaluation of 50 root canal-treated, cracked teeth.	The 2-year survival rate was 85.5%.	Conclusion: multiple cracks, terminal teeth in the dental arch, and pre-root-filling pocketing were significant prognostic factors for the survival of root-filled, cracked teeth.