

Crack Tooth Syndrome

Dr. Aji Markose

Dept of Conservative Dentistry, Vivekanandha Dental College
Namakkal (dt), Tamilnadu – 637205

Abstract: - It is reported that 80% of patients over 50 years may exhibit cracked teeth. The incidence and prevalence of cracked teeth were commonly associated with intracoronal restorations; most prevalent in mandibular molars. The wedging effect of the prominent mesiopalatal cusps of the maxillary first molars may account for this fracture.

Key words:- Rebound pain, Large restoration, Intra coronal restoration, bite test, methylene blue dye.

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I. Introduction

Cracked teeth are defined as an incomplete fracture initiated from the crown and extending subgingivally, usually directed mesiodistally. The fracture may extend through either or both of the marginal ridges and through the proximal surfaces. The fracture is located in the crown portion of the tooth only or may extend from the crown to the proximal root. Cracked tooth is a variation of the cusp fracture, but the associated fracture is centered more occlusally.

II. Synonyms of Crack tooth Syndrome:

- * Incomplete tooth fracture
- * Tooth infraction
- * Split tooth Syndrome
- * Green stick fracture
- * Hairline fracture
- * Cuspal fracture odontalgia

III. Classification of Cracked teeth

(I) According to American Association of Endodontists

- i, Craze line
- ii, Cuspal fracture
- iii, Cracked tooth
- iv, Split tooth
- v, Vertical root fracture

(II) Luebke's Classification: Luebke classified cracks into three classes:

Class I: Incomplete, supraosseous with no periodontal defect

Class II: Incomplete, intraosseous with a minor periodontal defect

Class III: Complete or incomplete, intraosseous with a major periodontal defect

(III) Williams Classification: William divided cracks into four categories:

Category I: Incomplete vertical fracture through the enamel into the dentin but not into the pulp

Category II: Incomplete crown fracture involving the pulp

Category III: Incomplete vertical fracture crossing the attachments

Category IV: Fracture divides the tooth completely

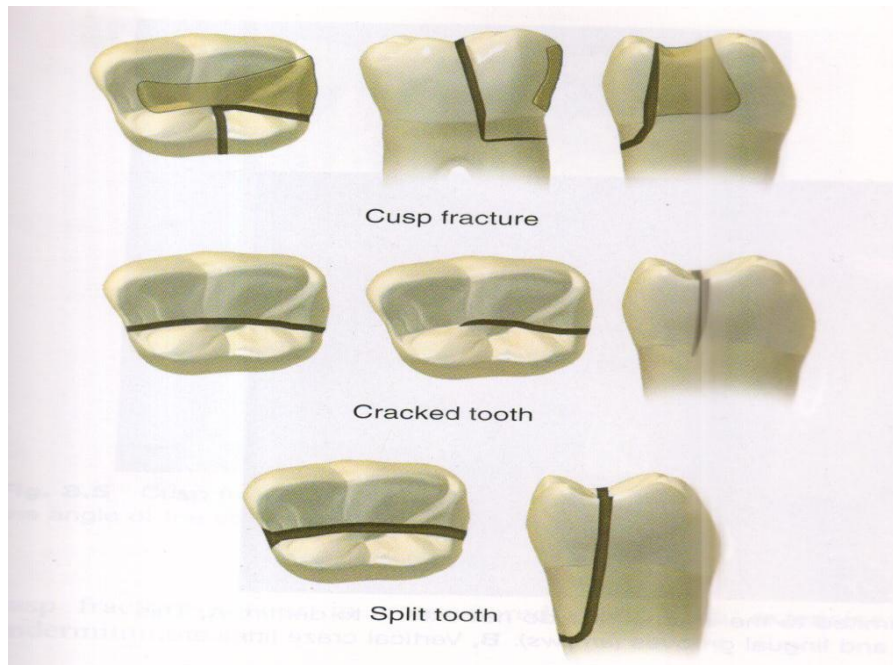


Fig: 1 The three fracture types that originate occlusally and then extend toward the root.



Fig: 2 Centered Fracture on the restored second molar extends towards the apex

IV. Incidence

The teeth usually involved are the mandibular second molars (both restored & unrestored), followed closely by the mandibular first molars and then by either the maxillary second molars or the maxillary premolars. Cracks rarely occur on mandibular premolars.

V. Etiology of Cracked tooth Syndrome

I, Restorative Procedures

- Over preparation of Cavities
 - Insufficient cuspal protection
- Physical forces during placement of restoration, eg., amalgam
 - Non incremental placement of composite restoration

ii, Occlusal

- Excessive biting forces
- Eccentric contacts & interferences
- Bruxism

iii, Miscellaneous

- Enamel cracks
- Cracking associated with high speed handpieces

VI. Clinical Symptoms

- a, Sharp pain on biting, which may get worse if the biting force is increased. “Rebound pain” i.e. sharp, fleeting pain occurs when the biting force is released from the tooth.
- b, Sharp pain on eating or drinking cold and/or sugary substances because of stimulation of A delta fibers due to dentinal fluid movement.
- c, If the fracture propagates into the pulp, it may result in pulpitis or necrosis. If the crack propagates further into the root, a periodontal defect may develop or even a vertical root fracture.
- d, Patient may have difficulty in identifying the affected tooth as there are no proprioceptive fibers in the pulp.
- e, Pulp is usually vital.
- f, Tooth is not tender to percussion in an axial direction.
- g, Tooth often has an extensive intracoronal restoration or history of extensive dental treatment involving repeated occlusal adjustments or replacement of restorations

Involved tooth tissue

- * Enamel
- * Crack Involving Dentin specially on release of biting forces, sensitivity to cold, etc
- * Crack Involving Pulp Pulpitis

Signs & Symptoms

- Asymptomatic
- Pain on Biting
- Symptoms related to

VII. Diagnosis

Chief Complaint: Patient usually complains of pain on chewing & sensitivity to cold and sweets. If these symptoms are associated with non-carious teeth, one should consider the possibility of infraction.

Visual Examination: One should look for presence of

- Large restoration
- Wear facets and steep cusps
- Cracked restoration
- Gap between tooth structure & restoration
- Sometimes removal of restoration is required for examination of fracture line in a cavity.

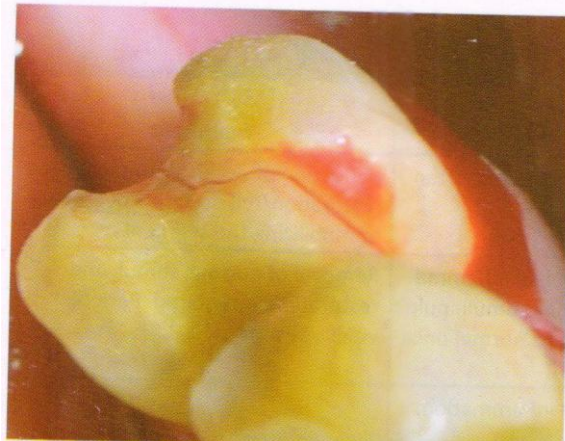


Fig: 3 Mandibular Molar showing cracked tooth Syndrome along with clinical evidence of pulpal exposure.

Tactile Examination: While carrying out tactile examination, one should gently pass the tip of the sharp explorer along the tooth surface, it may catch the crack.

Bite test: Orange wood stick, rubber wheel or the tooth sloth are commonly used for detecting cracked tooth. Pain during biting or chewing especially upon the release of pressure is classic sign of cracked tooth syndrome.

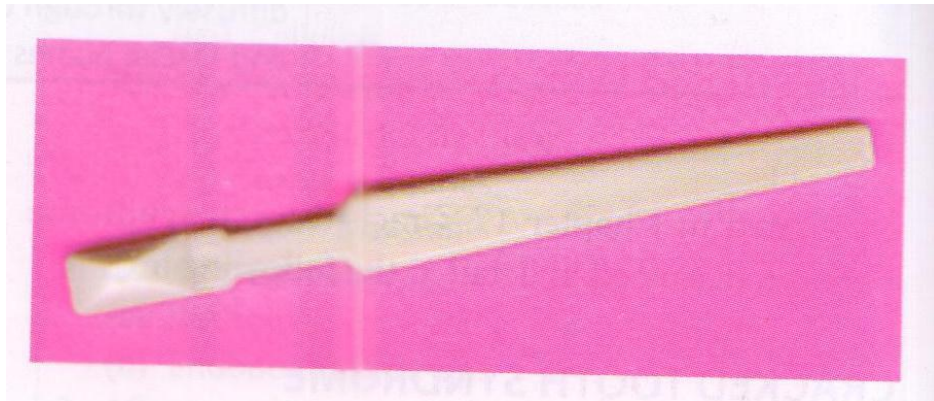


Fig: 4 Tooth Slot

Transillumination: Use of fiber-optic light to transilluminate a fracture line is also a method of diagnosing cracked tooth syndrome.

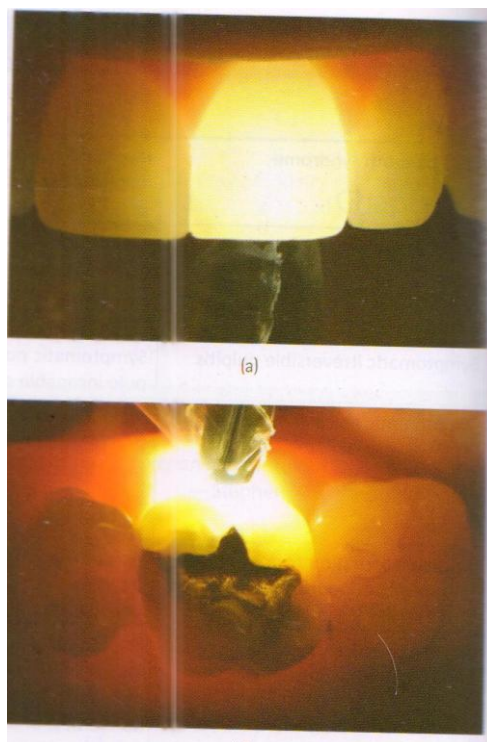


Fig: 5 Transillumination test for diagnosing cracked tooth syndrome.

Use of dyes: Staining of fractured teeth with a dye such as methylene blue dye can aid in diagnosis.

Radiographs: Taking radiographs from more than one angle can help in locating the crack. A tooth with crack may show widened periodontal ligament space and diffused radiolucency especially with elliptical shape in apical area.

Surgical exposure: If a fracture is suspected, a full thickness mucoperiosteal flap should be reflected for visual examination of root surface.

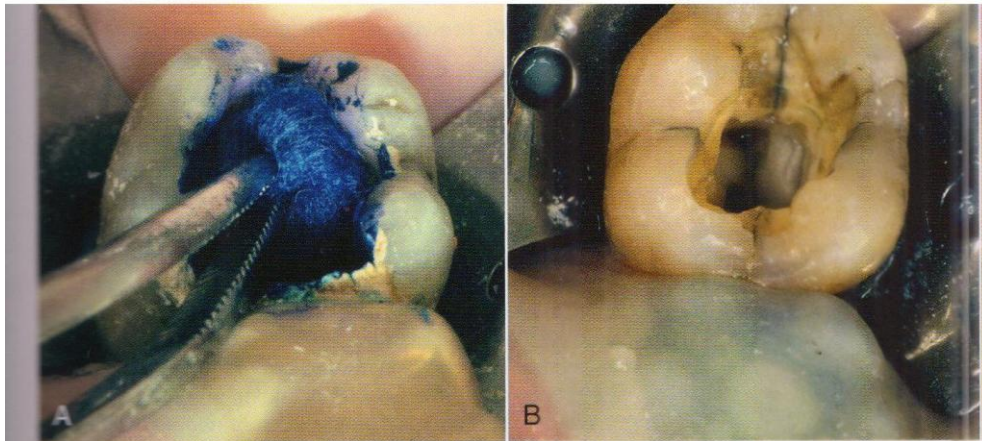


Fig: 6 Methylene blue die test used to diagnose the crack

VIII. Differential Diagnosis of Cracked tooth Syndrome:

Crack tooth should be differentiated from a fractured cusp. The tooth crack occurs more towards the center of the occlusal surface as compared to the cusp fracture which is more peripheral in position. If there is no movement with wedging forces, it indicates a cracked tooth. A fractured cusp may break off under slight pressure with no further mobility. Possibility of cracked tooth syndrome should be considered when there is pain on biting.

If crack involves pulp, patient may have spontaneous pain or thermal sensitivity which lingers even after removal of the stimulus. The crack line in a cracked tooth syndrome extends in a occlusocervical direction and is to be distinguished from a tooth with vertical root fracture wherein the crack extends from the tip of the root towards the cervical margin.



Fig: 7 Cracked tooth Running in a mesiodistal direction on a cavity floor.

IX. Treatment:

Urgent care of the cracked tooth involves immediate reduction of its occlusal contacts by selective grinding of tooth at the site of the crack or its antagonist. When crack involves the pulpal floor, endodontic treatment is initiated. If the crack is partially visible across the floor of the chamber, the tooth may be bonded with a temporary crown or orthodontic band, till the endodontic therapy is completed. If the patient has an incomplete fracture of the enamel & dentin, a full crown restoration immobilizing the fragments may be successful. Definite treatment of a cracked tooth attempts to preserve vitality by requiring full occlusal coverage for cuspal protection.

X. Prevention

- i, Perform Conservative tooth preparation if possible.
- ii, Line angles should be rounded instead of sharp to avoid stress concentration.
- iii, Incorporate adequate cuspal coverage if required.
- iv, Cast restoration should fit passively to avoid building of hydraulic pressure during placement.
- v, Pins should be placed at appropriate distance from the enamel to avoid stress concentration.
- vi, Remove eccentric contacts & adjust occlusion after restoration.

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