

DIAGNOSIS AND MULTIDISCIPLINARY MANAGEMENT OF A MANDIBULAR MOLAR WITH “CRACK TOOTH SYNDROME”

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Abstract:

Cracked tooth syndrome is one of the most commonly occurring entities in dentistry being passed unnoticed by most of the practitioners due to mere lack of knowledge about the condition. The present case is of a tooth having cracked tooth syndrome involving the distal occlusal half of the mandibular first molar. It is a longitudinal fracture which was mesio-distally oriented involving distal marginal ridge and the distal proximal area restricted to the coronal part of the tooth, but also involving the pulp space. The case was treated with proper root canal treatment after rigid immobilization with orthodontic band followed by periodontal surgery for coverage of bone loss distally with bone graft placement and finally followed by the crown prosthesis. The follow-up visit showed complete subsidence of signs and symptoms of the pain and sufficient bone loss coverage and the tooth was saved without any complications.

Keywords: Fractured tooth, bite test, sauserisation, glass ionomer cement.

Introduction:

Cracked tooth syndrome is one of the most commonly occurring complex conditions in dentistry with the bizarre set of signs and symptoms.[1] Due to the lack of knowledge about the condition, its causes and treatment, it is been frequently treated in wrong ways even involving extraction. To unleash the myths associated with the entity the present case has been discussed. After knowing the causes, signs and symptoms and treatment associated with the condition; a proper treatment plan can be formulated and care

can be provided to save the concerned tooth.[2] Many a times the incomplete fracture may involve the pulp space and the periodontal tissues on the affected side may be compromised with the loss of attachment, pocket formation and bone defects in advanced cases.[3] Hence, the management of such cases become very challenging, and it requires a multidisciplinary approach.

Case Presentation:

A female patient aged 46 years reported to the Department of Conservative Dentistry and Endodontics, SMBT Dental College and

Hospital, Sangamner. She had a chief complaint of pain in lower right first molar, for the past three weeks. The pain was sharp and intermittent in nature that increased on chewing hard substances and on taking cold food stuffs. The dental and medical history of the patient was non-contributory. Social and family history was not relevant. Clinical examination revealed incomplete fracture in the distal occlusal half involving the distal marginal ridge and distal proximal area restricted to the crown region and mesiodistally oriented (figure 1). The tooth had grade-1 mobility. Radiographic examination revealed bone loss distally with signs of periodontal involvement. Sulcus probing in the distal aspect was to a depth of 6 mm; suggestive of periodontal pathology and pocket formation.

Investigations:

Intraoral periapical radiographs
Dye penetration tests with methylene blue
Bite test on cotton rolls

Differential diagnosis:

Vertical crown root fracture

Treatment:

Immediate immobilization of the tooth with orthodontic steel band followed by a single visit root canal treatment was performed. The tooth was disoccluded. The patient was kept on medication for a period of one week. Periodontal surgery was done for bone loss coverage with bone graft placement. And subsequent crown prosthesis was given to the patient for the concerned tooth.

Immediate orthodontic banding was done in order to ensure safety. The tooth was treated with single visit root canal therapy. The treatment began with an alveolar nerve block using 1:200000 lignocaine hydrochloride. Ideal access opening was performed in order to obtain a straight line access to all the canals and apices. The vital pulp was removed using barbed broaches. The incomplete fracture line was evident on the walls of access preparation (figure 2).

The tooth was well irrigated using normal saline and 2% hydrogen peroxide. In order to ensure thorough cleaning and shaping of the canals, 17% EDTA was used intermittently. The biomechanical preparation was completed using ProTaper instrument kit where the apices were enlarged up to F1 with a 6% taper. The tooth was obturated with gutta-percha using AH plus that is a resin based sealer, followed by temporization with zinc oxide eugenol cement (figure 3).

After an observational period of one week; the patient was scheduled for a periodontal surgery with bone grafting in the distal aspect of the tooth. During this period, the patient was on analgesics. A conventional full thickness flap was raised with a vertical incision on distal axial angle of the second premolar. The distal aspect of the tooth was curetted, and root planning was performed. A synthetic bone graft; Perioglas was used to fill the bony defect on the distal aspect of the tooth (figure 4). The flap was then sutured with a 0.2 silk thread using conventional interrupted technique. Periodontal dressing was given for a week to ensure stability and care. After a week; the tooth was restored using a resin composite; upon finding satisfactory results. The sulcus depth had reduced, and the probing depth was 2.5 mm. After an observational period of four weeks, the tooth was prepared, and porcelain fused to metal full crown was cemented (figure 5).

Outcome and follow-up:

In follow-up visits, the clinical examination revealed no evidence of complications. The pain had subsided completely, and the gingival sulcus depth had reduced from 6mm to 2.5mm after periodontal treatment (figure 5).

Discussion:

Micro cracks are very commonly occurring problem in tooth structure; which may or may not lead to bigger issues. It is difficult

to diagnose these cracks during routine dental check-ups. But if found during early stages; one should intervene to treat the condition to prevent further damage. Many treatment modalities are currently used to treat a cracked tooth depending on its involvement. Factors that play an important role in deciding the treatment modality are location, extent and direction of these cracks. It could only be involving the enamel, or both enamel and dentin and sometimes also the pulp space. The symptoms could differ in each case from discoloration, sensitivity or even sharp shooting pain. [4] Studies have suggested that splinting the tooth should be prioritized before considering any option of treatment modality. One could also consider de-occluding the involved tooth. These should be done to prevent further damage or propagation of the crack that may lead to poorer prognosis. [5]

Orthodontic banding and de-occluding the cusps were done in this particular patient to splint the tooth and prevent further damage.[6] Studies have suggested only 20% of such cases may require a root canal therapy in cases where there are no symptoms after splinting.[7] This only suggests of cases with reversible pulpitis. However; in this particular patient, the crack was extending to the pulp chamber and the symptoms continued to suggest a case of irreversible pulpitis that required an endodontic treatment. Endodontic treatment was completed in a single visit with the use of resin based sealer for obturation. The access preparation was then restored with a resin composite. Composite resin has an advantage of holding the tooth structure together; as it is an adhesive material. It also has advantages like the fracture resistance being close to that of tooth structure.

The bone loss on the distal aspect of the tooth warranted an invasive treatment like the periodontal surgery with the use of

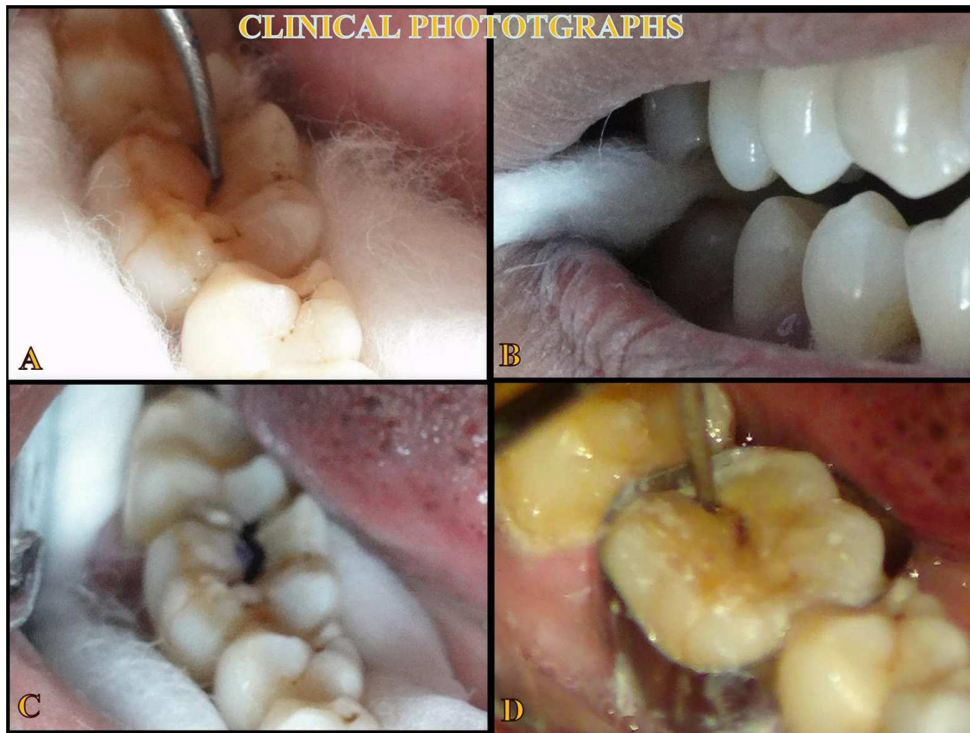
Perioglas bone graft. Studies have suggested that Perioglas bone grafting has many advantages. [8] It provides faster healing of bone defects and is fairly radio-opaque. However; the radio opacity of total healing could be appreciable radiographically only after about nine months to one year. [9] Upon completion of the periodontal therapy; and finding satisfactory results after an observational period of four weeks, [10] porcelain fused to metal crown was cemented. A full coverage crown is considered to be the best treatment modality in such cases, especially after the root canal therapy. [6, 7]

There are certain factors that are more important in this scenario. They are identification of the patients susceptible to generating cracks in routine dental check-ups and a preventive correction of occlusal contacts if required, diagnosis of such cracks at an early stage and providing good quality oral health care. All these should be done to provide long term care for the needy. Most importantly, the patient should be advised for good oral hygiene habits and regular check-ups for oral prophylaxis to ensure proper care.

Conclusion:

- Early recognition of the condition will help to prevent further cracking of the tooth structure thereby helping to avoid propagation of the crack into the pulp chamber and beyond leading to a complete fracture.
- The technique used to manage the condition will also have an important impact on the ultimate prognosis of the affected tooth.
- Extent and location of the fracture, the time when the restorative intervention is provided, and the type of restoration applied to splint the fractures are all important for a successful management.

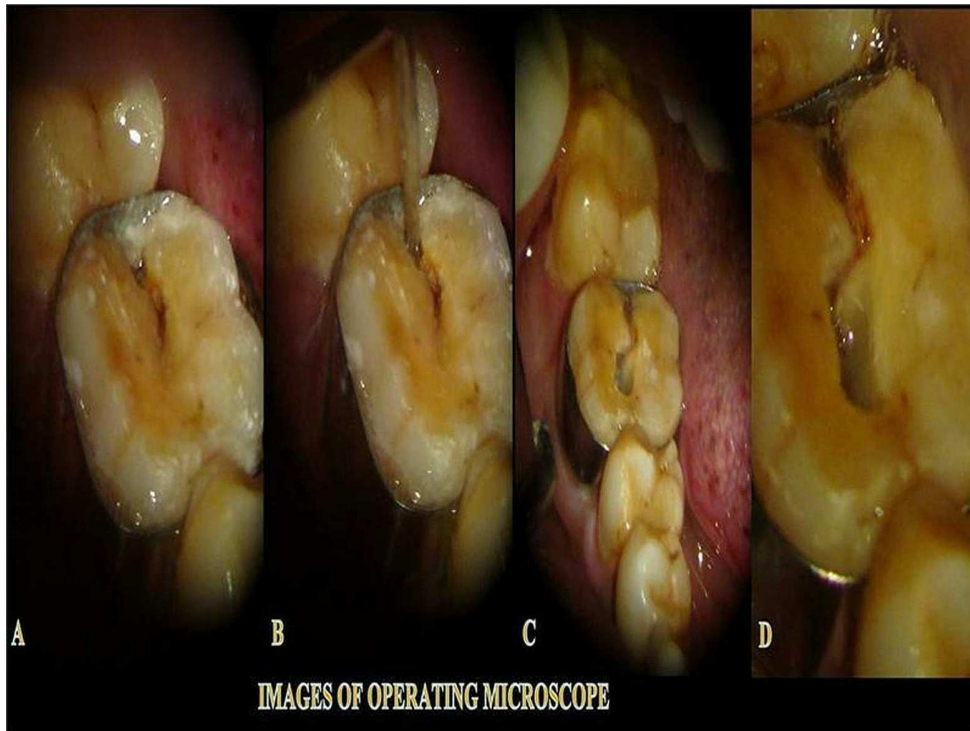
FIGURES/IMAGES:



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Figure1: Clinical Photographs

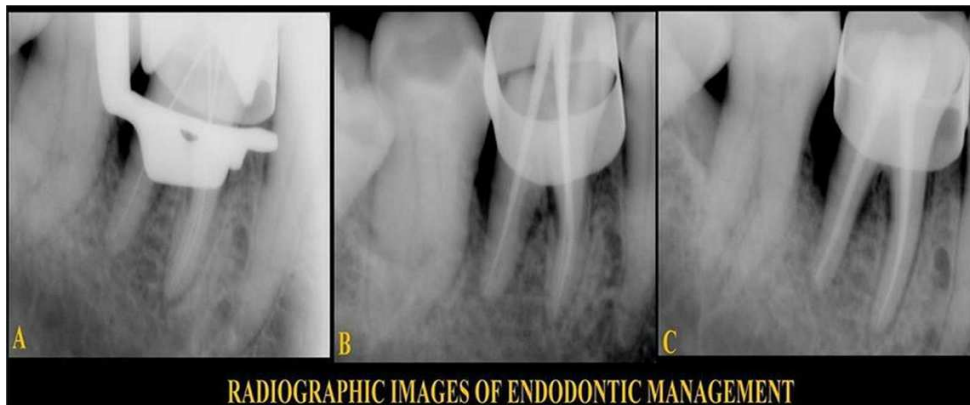
A: Probing the fracture line **B:** Bite test with a hard cotton roll
C: Dye penetration test **D:** Orthodontic banding



119x90mm (300 x 300 DPI)

Figure 2: Images of Operating End microscope

- A:** Preoperative view **B:** Probing of fracture line
C: Access preparation **D:** Fracture line extending to the pulp chamber and towards the distal aspect.



119x90mm (300 x 300 DPI)

Figure 3: Radiographic images of endodontic treatment

- A:** Working length determination **B:** Master cone selection after cleaning and shaping
C: Post obturation radiograph



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Figure4: Clinical Photographs of periodontal management

A: Initial probing and clinical examination **B:** Flap rose
C: Placement of bonegraft **D:** Sutured site.



285x90mm (300 x 300 DPI)

Figure5: Postoperative images and radiographs

A: Crown preparation **B:** Cementation of temporary crown
C: Cementation of permanent crown **D:** IOPA radiograph

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