

Interdisciplinary Strategies in Management of Sub-Gingivally Fractured Teeth - A Sync at Various Levels

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Abstract

Sub gingivally fractured tooth requires a precisely planned interdisciplinary management strategies and complete understanding of the lesion. Complicated sub gingivally fractured teeth poses difficulties for the dentists to design efficient treatment plans as they demand interdisciplinary knowledge and approach. A comprehensive understanding of newer techniques, materials and their limitations is essential for achieving more functional and long-lasting anticipated results for the patient with such conditions. This review deals with various conventional treatment approaches and their contemporary modifications in treating a sub-gingivally fractured teeth.

Keywords: Sub Gingivally Fractured; Interdisciplinary; Contemporary; Treatment

Introduction

Regime for sub gingivally fractured tooth, is complex and an important criterion for success of a dentist. It requires a precisely planned interdisciplinary management strategies and complete understanding of the lesion. It all begins from a properly recorded case history including aetiology, history, clinical examination, pulpal status, radiographic examination, paving way for the diagnosis and relative treatment plan.

According to Olsburgh, *et al.* in 2002, The choice of treatment for a sub gingivally fractured tooth depends on the:

- Extent and Morphology of subgingival lesion,

- Length and morphology of the root,
- Zone of fracture line (cervical, middle and apical)
- Degree of fracture (partial and total);
- Count of fracture lines (simple, multiple and comminuted);
- Situation of coronal fragment (displaced and nondisplaced).
- Presence or absence of a coronal segment
- Restorability of the traumatized tooth.
- Appearance in the aesthetically sensitive region.

Factors determining the prognosis of the condition includes secondary trauma, availability of the fractured fragment and better

plaque control by the patient. Chances of healing with calcified tissue is poorest in cervical-third fractures.

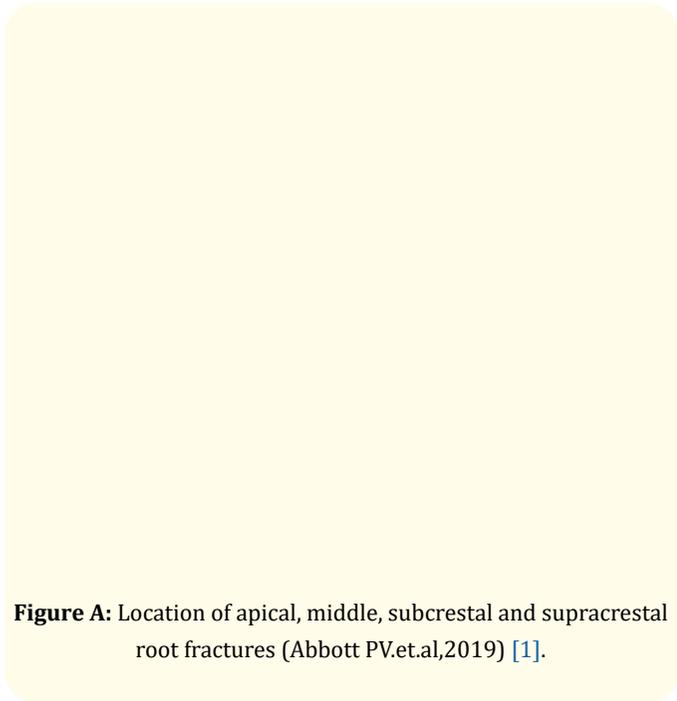


Figure A: Location of apical, middle, subcrestal and supracrestal root fractures (Abbott PV.et.al,2019) [1].

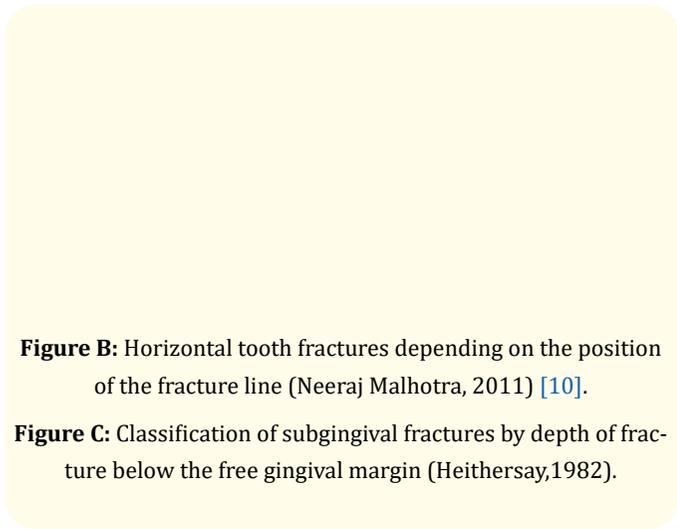


Figure B: Horizontal tooth fractures depending on the position of the fracture line (Neeraj Malhotra, 2011) [10].

Figure C: Classification of subgingival fractures by depth of fracture below the free gingival margin (Heithersay,1982).

Conventional treatment strategies

The interdisciplinary treatments require time, commitment and motivation both from the patient and the dentist. The literature reports several approaches for sub gingivally fractured teeth.

Reduction and stabilization

Subgingival fracture below alveolar bone crest with presence of coronal segment shows possible healing with conventional reduction and stabilization. Splinting in these cases should be maintained for 4 months. In patients with adequate oral-hygiene, permanent fixation and reattachment of the fractured fragment at the proximal contact areas to adjacent teeth with a resin-based or nano composite can be tried. Occlusal interferences on the injured teeth should be minimised.

Reattachment

Conditions where the coronal segment is available and fracture occurs at or coronal to the level of alveolar bone crest, reattachment of the fractured segments can be attempted with fibre-reinforced posts and dual cure resin-based composite material instead of fixed prostheses, implants or extraction.

Post crowns

The coronal segment is absent(lost), fracture line is above alveolar bone crest with apical sufficient root segment length. Exposure of crown margins by simple genioplasty or an apically repositioned flap surgery is performed.

Other treatment alternatives

Fracture line extending below the level of alveolar bone crest with sufficient apical root segment length, (or) fracture line is coronal and bacterial contamination is present through the gingival crest, the pulp tissue becomes necrotic, the following treatment alternatives are available:

- Crown-lengthening,
- Orthodontic extrusion,
- Intra-alveolar trans-positioning of fractured tooth.

Crown-lengthening (periodontal surgery)

Fracture line is not more than 1 - 2 mm below the alveolar bone crest with sufficient root length. Remove 1 - 2 mm of crestal bone along deepest part of the fracture and restore the normal 2 mm sulcus depth without violating biological-width. Periodontal osseous recontouring exposes the tooth margin with optimal root surface for an acceptable restorative finish-line. Later apical migration of gingival marginal tissue may compromise aesthetics.

Orthodontic extrusion

Forced eruption, orthodontic eruption, vertical extrusion or assisted eruption is carried out in teeth with fracture line extending deeply in the interproximal or labial surface up to 6mm below the alveolar crest and when crown lengthening would be un-aesthetic. The distance between fracture line and apex should more than 12 mm and a crown-root ratio of around 50:50 should be obtained.

Intra-alveolar trans-positioning of fractured tooth

It is done on an emergency basis, in severe luxation of fractured root. The tooth is precisely extruded by marginal luxation and stabilized at the appropriate position by interdental suturing and surgical dressing. In case fracture line is more apical on the labial side, a 180° rotation is given before fixation and usually here the bone support around root is lost.

Extraction

Conditions with untreatable scenario, the fractured tooth is extracted without causing any damage to the alveolar processes, in the labio-lingual direction. Preservation of the apical fragment is recommended, as it contains vital pulpal tissue and retards alveolar process resorption. Later new layer of cementum and bone is deposited on roots along the fractured surface.

Follow-up

Clinical and radiographic re-evaluation is done at 4th week, 6-8th week, 4-month, 6-month, 1-year and 5-year intervals. Patients is advised care for the injured teeth. Use of a soft brush and 0.1% chlorhexidine rinse prevents accumulation of plaque and debris.

A synchronisation at various levels

Interdisciplinary dentistry refers to dental treatment that uses more than one type of dental tactic. This type of multilevel care is taken for complex cases treated in multiple steps. The main benefits of this approach for clinician is advanced educational opportunities with improved coordination for patient management, through development of a streamlined treatment strategy. The patient is benefited with improved satisfaction as he gets the most appropriate treatment decision made by a team of experts.

Few recent innovative interdisciplinary strategies in treating a sub gingivally fractured teeth includes studies done by Parthiban., *et al.* in 2020 [12], treated sub gingivally fractured anterior tooth by an interdisciplinary approach using clear-aligner based orthodontic extrusion appliance. Singh., *et al.* in 2019 [17] treated a subgingival fractured tooth with active orthodontic treatment for 28 days, after sufficient extrusion, fibrotomy was done to evade relapse and stabilized for 8 - 12 weeks before the fabrication of a permanent post and core with adequate ferrule. Habbad., *et al.* in 2018 [7] successfully managed a sub gingivally fractured maxillary central incisor with biologic width invasion by surgical crown lengthening, endodontic treatment, cast post-core system and a crown. Gopal., *et al.* in 2017 [6] managed a sub gingivally fractured tooth using fiber-post and fragment reattachment. With 2years of follow-up for good esthetics as well as clinical and radiographic signs of periodontal health and root integrity, indicates success of an interdisciplinary treatment approach. Merve Mese., *et al.* in 2015 [11], treated a complicated subgingival fracture of an anterior tooth undergoing apexification. Multidisciplinary adhesive surgical approaches and fragment reattachment with an intracanal fiber-post provided successful clinically results while maintaining the structural integrity of the tooth.

Future trends

- Diode lasers are used to expose all the margins of the fracture and a study done by John R Christensen., *et al.* in 2018 [8] reported that use of lasers showed excellent haemorrhage control.
- Clear aligner -Parthiban., *et al.* in 2020 [12] used Clear aligner to fabricate the fractured segment template, and temporary tooth were placed to provide adequate esthetics.
- Flowable-Nano-Composite minimize the inclusion of air voids, reinforces the tooth by achieving higher bond strength with the fractured segments.
- Resin Based Sealers are used to treat teeth planned for restoration with light posts as eugenol-based sealers may inhibit the setting of resin cements.
- Minimally invasive microscopic approach.

Figure D: A glimpse of similar Interdisciplinary approach attempted in our Institute.

Conclusion

As the trend is shifting toward implants, conservative management to preserve the natural tooth are overlooked. Complicated sub gingivally fractured teeth poses difficulties for the dentists to design efficient treatment plans as they demand interdisciplinary knowledge and approach. Contrary to belief, interdisciplinary dentistry is not confined to complex cases. A comprehensive understanding of newer techniques, materials and their limitations is essential for achieving more functional and long-lasting anticipated results for the patient. Therefore, it is necessary to have an interdisciplinary synchronisation at various levels to attain precise and custom-made treatment plans by sharing each other's expertise for the complete and predictable outcome.

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