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Interdisciplinary Approaches to Manage Subgingivally Fractured Teeth

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ABSTRACT: Tooth injuries due to trauma cause lots of problems to the patient that include both functional and esthetic impairment. Tooth injury ranges from minimal enamel loss to complex fractures involving pulp tissue & even may lead to ex-articulation of tooth. Among these traumatic tooth injuries, tooth fracture that includes crown fracture, crown-root fracture & root fracture are considered as third most common cause of tooth loss. These injuries are also challenging for clinician also as they may require interdisciplinary treatment approach. The traumatic injury to a tooth represents acute transmission of energy to the tooth and its supporting structures that leads to fracture &/or displacement of tooth &/or maceration or separation of the supporting tissues.

KEYWORDS: Ex-articulation, Interdisciplinary, Traumatic injury, Maceration

I. INTRODUCTION

The interdisciplinary treatment has given bounteous results in modern dental practice. Subgingivally fractured teeth generally pose therapeutic quandary to the clinician. Damage caused due to trauma may ranges from slight loss of enamel to complex fractures involving pulp tissue and even loss of the coronal structure of the traumatized tooth.It has been found that tooth fracture (crown fractures, crown-root fractures &root fracture) is the third most common cause responsible for the loss of tooth.

II. CROWN-ROOT FRACTURE

A crown-root fracture is defined as a fracture that involves enamel, dentin and cementum, which may be grouped into uncomplicated and complicated based on the pulpal involvement.

ETIOLOGY-

Anterior region- Direct trauma and the direction of impact force mainly determines the type of fracture.

Posterior region- Fractures of cusps occur usually that extend below the gingival attachment without the pulp exposure (uncomplicated).

Factors responsible for the fracture-

- Injuries caused due to falls, bicycle and automobile accidents
- Trauma due to foreign bodies striking the teeth
- Indirect trauma- when lower arch forcefully close against the upper arch, generally causes fractures in posterior teeth
- Iatrogenic factors- Lateral pressure during root filling procedures, cementation of posts, corrosion of posts or improperly designed restorations[1].

PATHOGENESIS

Horizontal impact due to injuries leads to generation of compression zones at the point of impact cervically on the palatal aspect and apically on the labial aspect of the root. The course of

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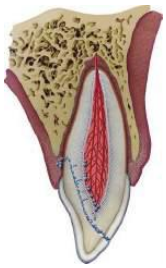
fracture is determined by the shearing stress zones that extend between the compression zones.

Pulp exposure occurs when the fracture initially follows the enamel rods of labial surface and then takes oblique course through dentin below the palatal gingival crest only if the impact force exceeds the shearing strength of the hard dental tissues. Usually, fracture line is single but multiple fractures can also occur, often commencing from the depth of the primary fracture.

CLINICAL APPEARANCE

Fracture usually starts facially at the mid-portion of the crown and palatally below the gingival level. In anterior teeth, crown-root fractures often expose the pulp & there is slight pain from occlusion occurs due to displacement of the coronal fragment in incisal direction. In posterior region, fracture is confined to buccal or palatal cusps and there is minimal displacement of the coronal fragment.



Rarely, vertical fracture occurs along the long axis of the tooth.

RADIOGRAPHIC APPEARANCE

Proximal crown-root fractures can be detected. Oral limit is difficult to determine due to close proximity of fragments but facial limit is always visible.

Vertical fractures can be detected radiographically. Use of CBCT will be highly effective in determining the exact location and path of the fracture.

BIOLOGICAL APPEARANCE

Histological events in pulp depends on the location of fracture. Inflammation may occur due to bacterial invasion because of the communication of pulp and periodontal ligament with the oral cavity. Plaque accumulation in the fracture line also leads to inflammation of PDL located next to the fracture line.

TREATMENT-

Uncomplicated (Without pulp exposure): Removal of fragment with or without gingivectomy followed by restoration

Complicated (With pulpal exposure) and immature roots:

Partial pulpotomy should be done to preserve the pulp vitality.

Complicated (With pulp exposure & having mature roots):

- Root canal treatment followed by post & core retained crown.
- Expose the margins by orthodontic or surgical extrusion of apical fragment followed by permanent restoration.
- Extraction of the fractured tooth followed by immediate or delayed implant-retained crown restoration or a conventional bridge.
- Extraction of fractured tooth in case of vertical fracture & fracture with severe extension.[2]

III. MANAGEMENT

RESTORATIVE APPROACH

BONDING OF CORONAL FRAGMENT

PRINCIPLE- Removal & reattachment of the fragment with bonding technique. Because of the advantageous evolution in resin composites and bonding system, it can be easily performed by adhesive reattachment of coronal fragment mostly without the necessity of additional restorative interventions.

INDICATION- Superficial fractures limited to enamel and dentin.

ADVANTAGES- Relatively easy

RESTORATIVE & PERIODONTAL APPROACH

REMOVAL OF CORONAL FRAGMENT & SUPRAGINGIVAL RESTORATION

This approach is helpful in allowing the healing of gingival tissue with the formation of a long junctional epithelium, and subsequently performing the restoration of coronal portion.

For restoration of coronal fragment, original tooth fragment can be bonded for which the subgingival portion of the fragment should be removed before bonding, composite build up can be done using dentin & enamel bonding agents or full coverage crown could also be opted.

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RESTORATIVE & SURGICAL APPROACH

SURGICAL EXPOSURE OF FRACTURE SURFACE

PRINCIPLE- Main objective is to convert subgingival fracture into a supragingival fracture by performing gingivectomy& osteotomy.

INDICATION- In cases where surgical technique would not compromise the esthetics, therefore only the palatal aspect of the fracture should be exposed. Also, the coronal fragment should comprise one-third or less of the clinical root.

PROCEDURE- After successful administration of local anaesthesia, the coronal fragment is removed which enables clinician to carefully examine the fracture surface.

After performing gingivectomy, lingual step as well as axial fracture line must be explored by using sharp explorer or similar instrument.

Conventional cast core & separate crown is preferred over single unit restoration as in future it would be easy to correct the changes in the position of gingiva & subsequent loss of esthetics.

ADVANTAGE-

- Relatively easy
- Soon after injury, restoration can be completed.

DISADVANTAGE-

- Labial migration of the restored can occur due to the accretion of granulation tissue in the deep palatal pocket.

SURGICAL, ENDODONTIC & RESTORATIVE APPROACH

Introduced by Tegsjöet al. in 1978.

PRINCIPLE- To surgically move the fracture to a supragingival position.

INDICATION- In cases where root is completely developed and apical fragment is long enough to accommodate a post retained crown.

PROCEDURE- Apical fragment is luxated using periosteal elevator, moved into coronal position and stabilized using sutures &/or splint. After 3-4 weeks, endodontic therapy is performed & after another 1-2 months, tooth is restored with a post-retained crown.

ADVANTAGES-

- Rapid procedure
- Allow inspection of root for additional fractures

DISADVANTAGES-

Can't be performed in uncomplicated fractures.

ENDODONTIC, ORTHODONTIC & RESTORATIVE APPROACH

This approach was first introduced by Heithersay in 1973.

PRINCIPLE- The main purpose of using this method is to move the fracture to a supragingival position orthodontically.

INDICATION-

Indicated in uncomplicated fractures if it is desired to preserve the pulp vitality.

As it is time consuming, therefore in cases of complicated fracture, slow orthodontic extrusion could be an option only if it is desirable to reconstruct the osseous &/or gingival defects by guiding the down growth of these tissues.

Analysis of cervical diameter is essential & should be analysed before extrusion.

PROCEDURE-

In cases of complicated fracture, firstly endodontic therapy usually performed prior to the removal of coronal fragment. Thereafter, orthodontic extrusion is performed. The goal of extrusion is to achieve crown-root ratio of approximately 1:1 and its deviation can be accepted only if would not result in excessive mobility or periodontium breakdown. Finally, restorative procedures carried out.

Cervical gingival fibers must be incised which prevents the returning of tooth to its original position.

Various methods apart from conventional one are-

- Using 1 or 2 Neodymium-iron-boron magnets
- J-Hook, elastic chain concealed with clear aligners.[3]
- Using removable appliance. [4]

ADVANTAGE- Re-establish the biologic width

DISADVANTAGE- Time-consuming

IV. CONCLUSION

Traumatic tooth injuries always cause hassle both in functional and esthetic aspects. Desirable outcome can be achieved by multidisciplinary therapies and regular follow up is also necessary.

REFERENCES

[1]. Andreasen FM, Andreasen JO, Cvek M. Crown- Root Fractures, In: textbook &color atlas of traumatic injuries to teeth, 5th edition: Blackwell Publishing Ltd: 355.

[2]. The Recommended Guidelines of the American Association of Endodontists for The Treatment of Traumatic Dental Injuries. American Association of Endodontists Revised 9/13: 2013.

[3]. Gayathri P, Shweta N, Rupali K et al. Multidisciplinary approach to the management of a subgingivally fractured anterior tooth using an aligner based esthetic orthodontic extrusion appliance – A case

report. Saudi Endodontic Journal 2020; 10(2): 157-161.

[4]. Verma KG, Juneja S, Kumar S. et al. Orthodontic extrusion of subgingivally fractured tooth using a removable appliance: An alternative treatment to re-establish biological width. Indian Journal of Dental Research, 2014; 25(5): 678-680.