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"Monday Morning Pearls of Practice by Bobby Baig"

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Case Report: Is Orthodontic Extrusion an Ideal Approach for the Management of Clinical Crown Fracture in Esthetic Zone?

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Objective:

This case report describes a multidisciplinary approach involving periodontal and restorative considerations for the management of complicated horizontal crown-root fracture assisted by forced orthodontic extrusion.

Introduction:

Crown-root fracture in the cervical third of the root is a common event following trauma to the anterior region of the mouth. As a result, sound tooth structure coronal to the attachment apparatus may not be available for restorative needs. Fracture at the gingival margin presents a clinical challenge in restorative planning. Placing a restoration with minimal or no ferrule effect result in violation ideal treatment planning and could lead to a restorative failure.

There are several options for the treatment of tooth fracture involving the biologic width which include:

1. Extraction, and placement of a single implant: Extraction seems to be the easiest choice, yet it involves mutilation of adjacent dental tissues typically that occurs during subsequent prosthetic rehabilitation, or the patient may require a more complex implant therapy.

2. Surgical crown lengthening: Attempts to expose the fracture line by alveolar recontouring alone may compromise the functional root length. In addition, poor esthetics may result from any attempt to recontour the labial tissues with simple or complex periodontal techniques.

3. Forced Orthodontic extrusion: Orthodontic extrusion or forced eruption was proposed by Heithersay for the treatment of horizontal root fractures. Orthodontic extrusion is a conservative procedure that allows retention of a tooth without loss of bone or periodontal support.

4. Forced Eruption: Forced eruption can be described as a mechanical procedure that accelerates the eruption of a tooth and results in a complimentary alteration of the gingival and the supporting tissues

Indications:

A) In cases on an individual tooth when disease (caries),
B) Trauma (accident, sports) or iatrogenic reasons (restorations) have destroyed the clinical crown and compromising or making restoration impossible.
C) Lateral root perforation during root canal treatment has occurred and is located in the coronal third aspect of the root.
D) Preparation of Implant site.
E) In order to create gingival papillae.
F) An option for treatment of vertical intrabony defects, created from periodontal disease.

Exposure of impacted teeth to facilitate orthodontic tooth movement

CASE REPORT:

Introduction: A 21-year-old female patient reported with a fractured tooth in the upper left anterior region, 2 days after trauma from an accident. (Fig 1 and Fig 2), Patient was referred by a general dentist for a prosthodontic consultation.

Clinical and radiographic findings:

1. Clinical examination did not reveal any soft tissue injury. (Fig 2 and 3)
2. Clinical and radiographic examination revealed a horizontal crown-root fracture of the maxillary left central incisor (Fig 5).
3. The fracture line was located 1 mm supragingival on the buccal aspect (Fig 5) and about 1 mm above the gingival margin of the palatal aspect.
4. There was no damage to the adjacent teeth.
5. Average smile line, 10% overbite with 1mm of over jet.
6. Bilateral anterior cross bite in the canine region.

Fig 1.

Fig 2.

Fig 3

Fig 4.

Fig 5.

Definitive Treatment Plan:

1. Buildup of facial composite restoration,

2. Orthodontic extrusion of the tooth about 2mm above the alveolar crest about 1.0mm every month to achieve ferrule effect.
3. Circumferential supracrestal fiberotomy.
4. Stabilization period for 2 months.
5. Fiber post to support a core
6. Composite Core
7. Closure of Diastema space and repair of MIF point angle of 11.
8. Preparation for all ceramic crown.
9. Zirconia core with layered lithium disilicate (e.max) porcelain.

NOTE: surgical crown lengthening is not a treatment option is this case, it would have effected the harmonious gingival architecture and created uneven gingival margins. Patient was treatment planned for a comprehensive orthodontic treatment, due to financial limitations patient at this point did not accept comprehensive orthodontic treatment.

Management:

1. Four surface composite restoration: The fractured portion of the clinical crown is replaced with composite restoration following conventional technique to provide acceptable esthetics, and also for placement of the orthodontic brackets and wires (Fig 7).

2. Forced Eruption: The orthodontic brackets are bonded on teeth # 13-23, the bracket is bonded about 1.5mm above the level of the brackets placed on the adjacent teeth. The orthodontic appliances were activated monthly for 1.0mm with a force of approximately of 30-40g of force per month for 2 months.

3. Intra sulcular supracrestal fiberotomy: This is a periodontal treatment modality that is combined with orthodontics. This is preformed with #15C blade along with root planning from the coronal portion of the alveolar bone crest using (Gracey 5/6, Hu-Freidy) to release the circular fibers for coronal migration of the tooth only and leaving behind the bony and the gingival architecture. These incisions were made under papillary anesthesia, using a small quantity of anesthetic. (Fig 16).

4. Stabilization Period: Following the active period of extrusion, the teeth were stabilized for about 2 months after the extrusion is completed, using fixed orthodontic appliances to prevent relapse. (Fig 17).

5. Diagnostic Wax up: Upon completion of the orthodontic treatment, diagnostic casts were made to fabricate the ideal tooth anatomy of 21 and closed the diastema space between 11 and 21.

6. Fiber Post and core buildup: A Fiber Post (DT Light Post, Bisco Dental) of appropriate size was then cemented after the tooth is prepared using resin cement (Panavia F2 Kurarray). A core buildup was made using a light cure composite (Renamel Micro hybrid) to ideal tooth anatomy. (Fig 18).

7. Closure of the Diastema: Using a lingual matrix made from the wax up, a composite restoration (Renamel Micro fill) is placed to close the diastema space between 11 and 21. (Fig 22).

8. All ceramic restoration: (Fig 20-27). After creating a 2mm of ferrule effect, finally the tooth # 21 was prepared for all ceramic restoration, # 00 chord was placed to making the final impression with triple tray and polyether impression material (Impergum 3M), A temporary crown is fabricated using the index matrix and Protemp (3M), The impression is poured and the coping is scanned in 3 Shape software for CADCAM milled zirconia coping and after completion of the sintering processes, a layered e.max porcelain is buildup to achieve ideal esthetics. The Ideal tooth anatomy for the ceramic crown was not a mirror image of #8, Composite resin buildup is made to communicate with the lab to add additional porcelain. (Fig 23-24). This crown is cemented with resin cement (Panavia F2 Kurarray). (Fig 27).

The patient was examined for every three months during the follow-up period. This tooth did not show any signs of root resorption during the treatment and follow up periods.

Fig 7. Fig 8. Fig 9.

Fig 10.

Fig 11.

Fig 12.

Fig 13.

Fig 14

Fig 15.

Fig 16.

Fig 17.

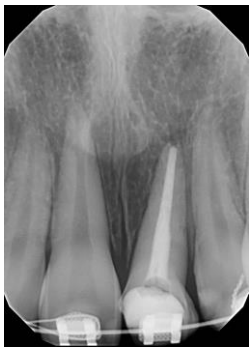

Fig 18.

Fig 19.

Fig 20.

Fig 21.

Fig 22.

Fig 23.

Fig 24.

Fig 25.

Fig 26.

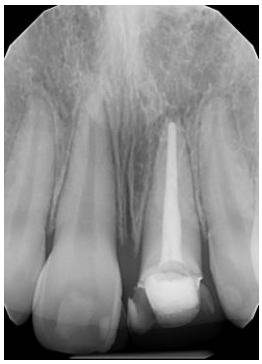

Fig 27.

Discussion: Do's and Don'ts.

1. Tooth fracture involving cervical third of the crown can create esthetic challenges and can effect a predictable esthetic restoration.
2. Violation of biological width while placement of the restorative margins should be considered as a potential restorative failure because it may lead to irreversible damage in the form of gingival inflammation, alveolar crest resorption and recession.
3. There should be about 2-3mm of biological width on all the teeth to protect the teeth from progression of infection from the gingival sulcus into the periodontium and must be reestablished before esthetic and functional recovery.
4. Surgical exposure of sound tooth structure will compromise the gingival architecture and ideal esthetics
5. Gingival and osseous surgery cannot be limited to the involved tooth and must be extended to the adjacent teeth in order to blend the gingival and osseous contours.

Conclusion:

1. Functional and esthetics needs should be balanced with the demands of healthy periodontium.
2. Maintaining a healthy periodontal attachment apparatus is crucial for a positive long term prognosis.
3. Orthodontic extrusion combined with fiberotomy presents the most suitable and predictable treatment modality for the management of horizontal crown –root fracture.

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