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New Treatment Option for an Incomplete Vertical Root Fracture;Case Study

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Abstract:
Aim:*Vertical root fractures (VRFs), typically are characterized by an incomplete or complete fracture line that extends through the long axis of the root down to apex. The cause of VRFs is mainly trauma and iatrogenic reasons. Complete or incomplete VRFs constitute an ongoing problem in dentistry because they are difficult to be diagnosed in the early stages. The treatment options can extends from tooth extraction to saving the tooth with more conservative approaches. This case report presents an alternative treatment option for a maxillary premolar with a vertical root fracture (VRF) Methods:Before Access opening and BMP, fracture is reattached with dual core resin, Irrigation is done with normal saline, and final obturation is done with Biodentine as root canal sealer. The treatment of VRF with bioceramicsappears to be a promising option. Results:After 6th months the tooth was found to be asymptomatic. There was no signs of periapical radiolucency were noticeable, A Radiological follow-up showed an asymptomatic tooth. Clinicalsign of ankylosis was not found, reduction of the periodontal probing depths and increased gingival reattachment in the area of the fracture was present.*
Key words:*Biodentine, ankylosis, probing depth, gingival reattachment*

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I. Introduction:

According to the American Association ofendodontics vertical root fracture (VRF) is "A longitudinally oriented fracture of the root that originates from the apex and propagates to the coronal part".Tooth fracture is considered the third most common cause of tooth loss and composes 2–5% of whole tooth fracture cases [1].It occurs mainly in patients above forty years of age, and twice higher in males thanfemales[2].The most susceptible teeth in order are premolars, molars, incisors then canines[3].The incidence of VRF in mandibular molars is two times higher than maxillary molars. Many etiological factors contribute to cause VRF. An anterior tooth VRF is related mainly to traumatic injuries, while fracture in the posterior teeth is more related to the excessive force during mastication and para-functional habits,[4]Root depressions in the mesial root of mandibular molars and the buccal root of bicuspid premolars lead to more susceptibility for VRF. Prevalence of VRF in extracted endodontically treated teeth lies in the range of11%-20%. [5]

II. Case report:

A 26-year-old male with no contributing medical history was referred to the Endodontic Department in faculty of dental sciences, BHU, Varanasi. He has complained of pain during eating or chewing food since 2 days, in upper right back region of teeth (fig.1). After careful clinical examination, a longitudinal fracture on the palatal surface of the maxillary right 1st premolar tooth was observed with slight mobility.
Radiographic examination revealed that the fracture line runs along the long axis of tooth upto middle 3rd of the root, indicating an incomplete vertical root fracture (fig.2)

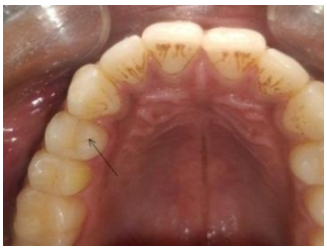

Fig.1 Pre-op image showing the fracture line

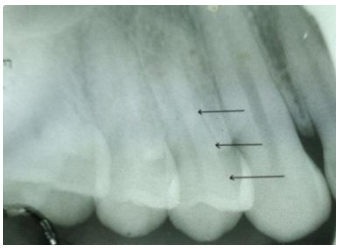

Fig.2 Pre-op IOPA shows fracture line up to middle 3rdof the root (Palatalcusp of maxillary 1stpremolar)

III. Management:

Taking in consideration of incomplete vertical fracture without much mobility and pathology associated with the tooth, single visit root canal is planned after reattachment (fig.3) of the fracture with dual core resin cement.After giving local anesthesia (Lignox 2%;Indoco Remedies Ltd., Mumbai), access opening, BMP, was done with protaper (DentsplyMailleferProtaperUniversal;Tulsa Dental's) hand file system. Normal saline is used only as irrigation solution.Working length is confirmed with IOPA (fig.4) and with apex locator**(**Canal Pro Apex Locator, coltene; USA).Canal is irrigated with copious amount of saline and dried with paper points before obturation.Guttapercha is sterilized by keeping it in a 5.2 % sodium hypochlorite (Parcan; Septodont) solution for 1 minute (fig.5).Obturation is done using biodentin (Septodont, Saint-Maur-des-Fossés, France) as root canal sealer (fig.6) & (fig.7). Remaining space of pulp chamber after obturation is filled with biodentin and condensed with light pressure. Finally tooth is restored with porcelain jacket crown (fig.8).

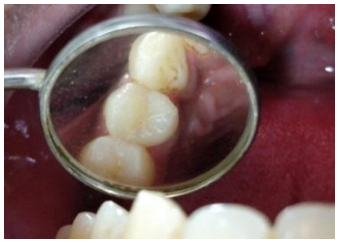

Fig. 3 After reattachment of fracture line with dual core resin

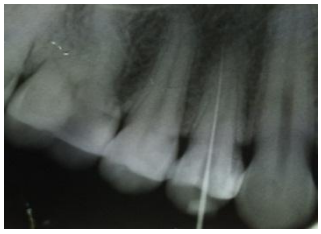

Fig.4 Working length IOPA of maxillary 1stPremolar

Fig.5 Guttapercha kept in 5.2% sodium hypochlorite solution

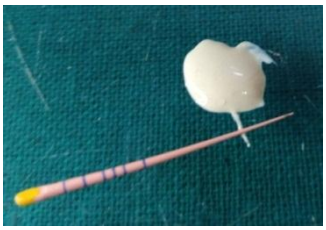

Fig.6 Biodentin mixed on glass slab

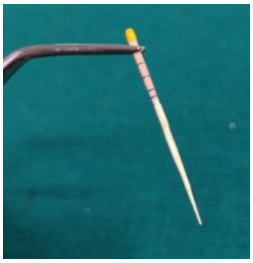

Fig.7Guttapercha coated with biodentin

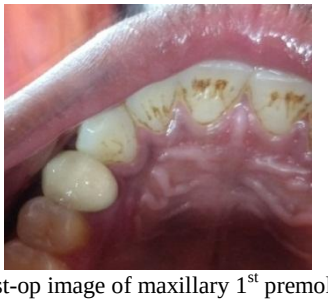

Fig.8 Post-op image of maxillary 1st premolar after cementation of crown

Clinical andradiographical follow up:Tooth mobility and sensitivity to percussion were examined every month.The percussion tone was evaluated and compared with adjacent teeth. At 6 months after, the tooth was completely asymptomatic, without any increase in physiologic mobility and periapical radiolucency.

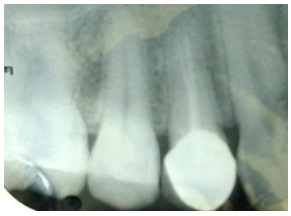
Fig.9 Post restoration IOPA

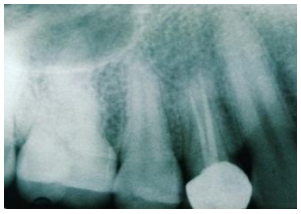
Fig.10 Six month IOPA

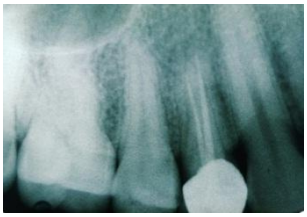
Fig.11 Three month IOPA

IV. Discussion:

VRF is a complicated condition that requires a clinician with wide vision and wise decision.[6]Comprehensive clinical and radiographic examination is recommended to reach the final diagnosis.The pain increases and becomes more diffuse as the time duration of undiagnosed VRF increases so early diagnosis of such cases is very important [7]. Even after correct diagnosis,prognosis of the root with VRF has poor prognosis, tooth extraction and root amputation are usually the treatment options available without much choices. But in recent years due to advancement in material sciences with enhanced properties i.e bonding strength, film thickness, biocompatibility, makes practitioners to think in more conservative and innovative way, that provide an alternative to tooth extraction.[8]

Sometimes the VRF located in accessible areas especially for anterior teeth, extraoral bonding of the fractured and separated [9] fragments with adhesive resin cements as treatment protocol used by many authors.Hayashi et al. [10] reported that no failure was observed in vertically fractured incisors treated with this method.Arıkan et al. [11] reported that this method had a successful outcome for VRF treatment. In the present case, the patient reported fractured tooth due to trauma, 2days before. Fracture line runs along the long axis upto middle 3rd of the root incomplete fractured root, with minimum tooth separation gives us an opportunity to think an alternative and more conservative way for saving the tooth.Dual cure resin seals the exposed fractured line from external surface[12] and biodentine coated guttapercha seals from the chamber space.Absence of symptoms, during multiple follow ups suggests the success of the treatment.

V. Conclusion:

VRF is one of the most complicated conditions in dental practice. The combination of comprehensive clinical and radiographic examination is essential as the diagnosis of such cases is challenging.While the extraction is considered the most predictable treatment, many alternative options have been suggested.However, the effectiveness of such treatment options should be evaluated with long-term follow up.Treatment plan should be discussed with the patient as part of evidence base practice.The prestige of saving the tooth should be evaluated up against the extraction treatment.

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