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RESEARCH ARTICLE

A CASE REPORT ON MANAGEMENT OF COMPLEX CROWN FRACTURE BY NON SURGICAL ENDODONTIC TREATMENT AND FRAGMENT REATTACHMENT-A NOVEL APPROACH.

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Abstract

Anterior crown fractures are common form of traumatic dental injuries that mainly affect the maxillary anterior teeth in children, teenagers as well as adult population. A trauma with accompanying fracture of anterior teeth is an agonizing experience for a young individual which requires immediate attention, not only because of the physical disfigurement but also because of the psychological impact on the patient. Over time numerous techniques and materials have evolved for the restoration of the injured teeth: resin composite with or without pin, orthodontic bands, resin crown and ceramic crowns. Since the development of the adhesive dentistry, many case reports of crown fractures restored using adhesive reattachment techniques were published. Reattachment of fractured tooth fragments can provide good and long-lasting esthetics (because the tooth's original anatomic form, colour , and surface texture are maintained). It also restores function, provides a positive psychological response, and is a relatively simple procedure. Patient cooperation and understanding of the limitations of the treatment is of utmost importance for good prognosis. This article reports management of one coronal tooth fracture case that were effectively treated using tooth fragment reattachment on palatal aspect specially along with the use of adhesive resins for coronal build up.

Introduction:-

Dental trauma often has a severe impact on the social and psychological well being of a patient. Coronal fractures represent a high proportion of the dental trauma in the permanent dentition ranging between 26‑76% of dental injury, and approximately 16% of coronal fractures are complicated presenting pulp exposure. Reports suggest that 70% of such injuries involve the maxillary central incisors followed by maxillary lateral incisors and mandibular incisors [1,2,3,4]. Depending on age, the incidence is higher in male than in female, with male:female ratios varying from 2:1 to 3:1[5].Coronal fractures of permanent incisors represent 18-22% of all trauma to dental hard tissues, 28-44% being simple (enamel +dentin) and 11-15%, complex (enamel +dentin +pulp).The main causes of trauma that affect the permanent incisors are falls, collisions, sports, violence (fights), and road traffic accidents.Aesthetic and functional rehabilitation is the primary goal of the treatment of crownfractured tooth. A number of techniques have been developed to restore the fractured crown which ranges from simple composite resin restoration to jacket crown with acrylic resin or porcelain, orthodontic bands to stabilize the fracture fragment and also to some extent pin retained resin restoration. An alternative approach, which is becoming more attractive due to the advancements in the field of dental adhesives, is fragment reattachment [6,7]. In dentistry, teeth that were once considered irreparable after fracture and recommended for extraction can now be preserved, specially since the advent of dental adhesives. Tennery was the first to report the reattachment of a fractured fragment using acid-etch technique [8]. Subsequently, Starkey and Simonsen have reported similar cases [9,10] .Reattachment of fragment may offer following advantages e.g. better aesthetics and achievement of lifelike translucency, incisal edge wear at a rate similar to that of the adjacent teeth, replacement of fractured portion involving less time, positive emotional, social response and feeling of a well being from patient [11] and last but not the least relatively inexpensive procedure.

This article reports a case of a permanent maxillary lateral incisor with split crown fracture treated by non surgical endodontic treatment followed by fragment reattachment.

Case Report:-

A 25 year old male patient reported to the Department of Conservative Dentistry and Endodontics with the chief complain of fractured right upper front tooth. Dental history revealed that he had sustained trauma in face due to road traffic accident (RTA) 4 hours back.

Clinical examination:-

On extra-oral examination it was observed that there was laceration and swelling of lower lip.(Fig.1)

Intra-oral examination revealed that the crown of right maxillary lateral incisor was split into two parts [labial and palatal] with pulp exposure(Complex fracture) (Fig.2) .The palatal fragment was mobile. Fracture line extended sub-gingivally at the palatal aspect of the tooth. There was also fracture of incisal third of crown in labial fragment.

Intra-oral periapical radiograph [IOPA] revealed fracture of incisal third of upper right central incisor involving enamel and dentin .Though it did not show the fracture line clearly in lateral incisor. Radiographic evidence revealed absence of any luxation injury, root and bone fracture. A radiograph of lower lip was taken to exclude embedment of any fracture fragment.

Treatment options presented to the patient included single visit endodontic treatment followed by reattachment of the tooth fragments with resin based composite or extraction of the tooth and restoration of the site with fixed partial denture or an implant-retained crown. After some deliberation about the advantages and disadvantages of both the options, the patient decided on reattachment of the tooth fragments, as he would retain his natural tooth and other option could still be pursued if reattachment fails.

Fig.1**:** Labial view of fractured tooth

Fig.2**:**Palatal view of fractured tooth

After approval of the proposed treatment plan, non surgical endodontic treatment was performed in single visit. Patient was asked to rinse with 0.2% chlorhexidine mouthwash followed by administration of local anaesthesia (2% lignocaine) in buccal sulcus in relation to right maxillary lateral incisor. The tooth was isolated with cotton roll. Access cavity preparation was done with No.2 round bur. Working length was determined with the help of apex locator and confirmed by IOPA.(Fig.3) Effective cleaning and shaping was carried out by step back technique with intermittent copious irrigation with 1% sodium hypochlorite. 17% Ethylene Diamine Tetra acetic acid (E.D.T.A.) was used to remove the smear layer and 2% Chlorhexidine was used as a final rinse. Obturation was done with No.40 H-file as core obturating material and glass-ionomer cement as sealer following pressureless technique.(Fig.4)

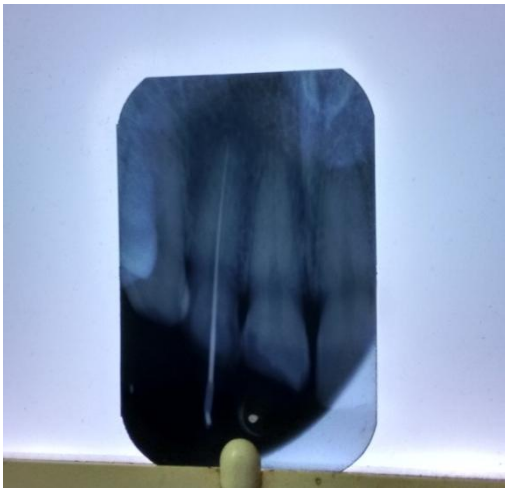

Fig.3**:**Working Length Radiograph.

Fig.4:Radiograph after obturation.

After the completion of obturation the tooth was etched with 37% phosphoric acid for 15 seconds. The acid-etched surface was rinsed thoroughly in order to remove the acid. Excess of water was removed and the dentin surface was dried with absorbent paper. Then, the bonding agent (Scotchbond Multi-Purpose Plus, 3M ESPE, St. Paul, MN, USA) was applied with a microbrush in two coats to both the fragments, gently air thinned and light cured for 20 seconds. A polyester matrix was fitted to protect the adjacent tooth and a flowable resin (Filtek Z350 XT 3M ESPE, St. Paul, MN, USA) was used incrementally to reattach the tooth fragments. The fragment was stabilized in position and light curing was completed with light emitting diode curing unit (Bluephase.Ivoclar-Vivadent). Composite resin build up was done for incisal third fracture.(Fig.5)

The restoration was polished with rubber abrasive at low speed. Occlusion was checked and adjusted using an articulating paper in the palatal surface and the patient was asked to bite in maximum inter-cuspal position and to make protrusive as well as lateral movement.

Post-operatively the patient was instructed to avoid exerting heavy pressure on the tooth treated and to follow regular home care procedures relative to oral hygiene. The patient was recalled after 24 hours for review and further finishing and polishing of the restoration.

Subsequently, the patient was recalled for follow-up at an interval of fifteen days, one month, three months, six months and one year. Patient was evaluated both clinically and radiographically. Clinically evaluation was based on the presence or absence of pain, swelling, sinus tract, tenderness on palpation or percussion etc. Radoigraphically it was observed if there was any widening of P.D.L space, radiolucency, status of alveolar bone etc. Patient was asymptomatic both clinically and radio-graphically throughout the follow up period.

Fig.5**:**Post-operative photograph.

Fig.6**:**Smile Profile.

Fig.7**:**Palatal aspect of maxillary arch

Discussion:-

Effective management of traumatic injuries has always been a challenge to the dentists. Proper diagnosis, treatment and follow-up care are required to ensure the best possible outcome. Traumatized anterior teeth require quick functional and aesthetic repair. With advancement in the field of dental adhesives, it is now possible to achieve excellent results with reattachment of fractured tooth fragments provided that the biologic factors, materials and techniques are logically assessed and managed [12,13]. In the pre-adhesive era, fractured teeth needed to be restored either with pin retained or cast restoration that sacrificed healthy tooth structure and were a challenge for the clinicians to match with the adjacent teeth both aesthetically and functionally. Whenever possible, reattachment of the fractured tooth segment is one of the best technique for the immediate restoration of a fractured anterior tooth.[14,15] It is aesthetically more predictable for translucency, opalescence, fluorescence, characterizations and texture of the surface. In addition, it is less time consuming compared with other direct and indirect restorations. The rate of wear is the same as that for the natural tooth while composite resin will be worn away more quickly than enamel by the opposing dentition. The use of natural tooth substance clearly eliminates the problems of differential wear of restorative material, unmatched shades and difficulty of contour and texture reproduction associated with other techniques.[16] Treatment plan can be made after evaluation of the periodontal, endodontic, coronal and occlusal status [17] .Other factors that might influence the choice of technique include the need for endodontic therapy, extension of fracture, quality of fit between fragments and the fracture pattern.

Studies have reported that about one out of every four persons under age of 18 will sustain a traumatic dental injury in the form of an anterior crown fracture. [18-20]. Fracture lines seen in crown-root fractures can be single or multiple and commonly seen in horizontal direction. A rare type of injury is a vertical fracture of crown-root running along the long axis of the tooth or deviating in a mesial or distal aspect.[21] The traditional approach in restoring a crown-root fracture is by using cast post or prefabricated post and a core buildup but this procedure has numerous disadvantages . Also extraction followed by immediate implant placement is another option. These approaches turn out to be time consuming, elaborate and not so very cost effective.[22,23]

As the reattachment procedure does not preclude any future treatment so whenever an intact fragment is available, reattachment of fractured fragment should be considered as a viable first treatment option.[24] Although the application of rubber dam for the purpose of isolation provides an environment conducive to quality adhesive dentistry. In this case it was not to be used because the base of the fracture line was sub-gingival and the application of rubber dam clamp would have lead to excessive uncontrolled bleeding from the soft tissues hence other means of isolation such as cotton rolls, 2 × 2 gauze and high vacuum suction were used along with the hemostatic agent.

Sodium hypochlorite was used as the main irrigant as it has got the unique capacity to dissolve vital as well as necrotic pulp tissue. E.D.T.A was used to remove the smear layer. Chlorhexidine as a final rinse was used because of its excellent antibacterial effect, its substantivity and its relatively low toxicity compared to other agents.

H-file and Glass Ionomer Cement was used as core obturating material and as sealer respectively as minimal preparation of root canal space was done and additional preparation for post were not required with this technique. Flowable composite resin was used to reattach the fragment as it reinforces the tooth, helps in achieving higher bond strengths and minimizes the inclusion of air voids.[25]

The pulp chamber was used for increasing the surface area for composite resin bonding and without the use of post. Amir et al in 1986 showed that when endodontic therapy is required, the space provided by pulp chamber may be used as an inner reinforcement, thus avoiding any excess preparation of teeth.[26]

CMC Taguchi et al reported a case on tooth fragment reattachment by using dual cure resin cement.[27]
In this case the patient was recalled at regular intervals and healing was monitored both clinically and radiographically.

Conclusion:-

In this case report endodontic treatment of the traumatised tooth followed by reattachment of the tooth fragment proved to be effective as it restored form, function and aesthetics in single visit and patient was asymptomatic both clinically and radio-graphically during the follow up period. Though further long term evaluation is necessary .

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