Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/21529
DOI URL: http://dx.doi.org/10.21474/IJAR01/21529

RESEARCH ARTICLE

A NON-RADICAL APPROACH IN THE MANAGEMENT OF HORIZONTAL ROOT FRACTURE USING AN IMPLANT AND ENDODONTIC K FILE: A CASE REPORT

Harish Kumar A[1], Supriya Bhandage[2], Sonia Sahoo[3], Srirekha A[4], Pari Anand[5], Sneha Krishnan[6], Pradeepvpattar[2] and Kameshwari R A[5]

1. Professor and head of the department of oral and maxill of acial surgery.
2. Professor of the department of oral and maxilla of acial surgery.
3. Post graduate of the department of oral and maxilla of acial surgery.
4. Professor and head of the department of conservative dentistry and endodontics.
5. Post graduate student of the department of conservative dentistry and endodontics.
6. Senior lecturer of the department of oral and maxilla of acial surgery.

Manuscript Info

Manuscript History
Received: 07 June 2025
Final Accepted: 9 July 2025
Published: August 2025

Key words:-
dentoalveolar trauma, implant dentistry, functional and aesthetic restoration

Abstract

Background:In implant dentistry,meticulous diagnosis, and treatment planning are imperative for successful anterior implant restoration. Key considerations include analyzing the patient's smile, determining the type of load and material, and, most importantly, understanding the patient's expectations. This study presents a conservative approach to justifying the transition between the restoration and the soft tissue.
Case presentation: The patient's history involved trauma resulting in E LLI'S CLASS IV fracture,where the tooth was non-vital without the loss of crown structure.Given the necessity to retain both upper central incisors,one of the fractured incisors was supported with an endodontic file,while the other was supported with an endosseous implant. This study delves into the procedure and identifies prognostic factors favorable to the patient.
Conclusion: During his follow up period, the patient exhibited satisfact ory healing, which contributed to the restoration of function and aesthet ic well-being, concludingthis approach could be safe and effective for such cases. However, it would be beneficial to include more subjects and conduct a longer term follow up to solidify this conclusion and ma ke it a significant advancement in rehabilitation.Abbreviations – not applicable

Corresponding Author:- Sonia Sahoo
Address:-Post graduate of the department of oral and maxilla of acial surgery.

Introduction:-

Background : An unexpected impact on the teeth and the supporting structures causes dentoalveolar trauma, which may result in a variety of wounds, such as the whole avulsionof a tooth from its socket, regretfully which could have important aesthetic, functional, speech, and psychological impact on an individual as a result influencing their standard of living. [1]

Maxillary central incisors are the most commonly involved in trauma, having an epidemic rate of fracturesof up to 37% due to their prominent position in the arch. [2] Given the multifactorial harmful effects on the patient, trauma to the anterior teeth would leadto the fracture fragments requiring rapid attention.

The advancement and improvement of adhesive techniques and restorative materials have made it possible to reattach the fragment. [3] There is a plethora of evidence supporting the application of the acid-etch method for bonding composite resin to fractured enamel crowns. Most sources discuss using a feather-edge technique to glue the composite resin to the labial and lingual enamel, together, with an ultraviolet light polymerized material for repairing fractured maxillary central incisors.[4]

However when the requisites are not fulfilled for the above-mentioned treatment methods, extraction with either the immediate or conventional implant placement is opted for. The majority of patients seeking treatment with dental implants are partially dentate due to the tremendous expansion of the indications for implants over the last 20 years. [5]

The best case scenario for modern dentistry is to give the patient their lifetime of natural contour, function, comfort, esthetics, and dental health back. The advantage of implants is that they can accomplish this no matter how the stomatognathic system is functioning. An implant-retained prosthesis blends well with the surrounding natural structures because it is virtually entirely supported by the remaining hard and soft tissues in the mouth cavity. [6]

Given following the conventional methods of approach for management, which was time-consuming and surveying the intensity of trauma for this case, alternative treatment was formulated in the form of a case report, where we describe the management of a fractured maxillary right central incisor through both endodontic and surgical intervention, followed by restoration of the teeth in the socket, in a nonconventional approach keeping all the variables benefiting the patient in the longest term possible.[7]

Case presentation :

An 18-year-old male patient reported to the Department of Oral and Maxillofacial Surgery in Oxford Dental College, Bengaluruwith a complaint of horizontal fracture concerning 11 and 21 of the upper jaw respectively caused due by trauma 2 months ago..No relevant history of any debilitating or systemic disease associated like diabetes, hypertension, thyroid, asthma. Habit history like alcohol consumption, smoking nor any historyof parafunctional habits were queried and no relevant history was noted. The detailed case history also witnessed the absence of any familial history like genetic disorders. Thorough clinical examination intraorally revealed a horizontal fracture at the apical region of the upper anterior 11 and 21 and the patient desired a treatment that involved retaining the natural teeth. The teeth of interest were tender on percussion and grade III mobility was noted. There was the absence of any periapical lesion on radiological investigation.

Treatment plan:

The patient was made aware of the range of therapy options, their respective benefits and drawbacks, and the likelihood of success. He chose the reattachment treatment since he knew it would quickly restore the aesthetics and relieve the patient. [8] In accordance, a treatment plan was formulated. We decided to retain the tooth structure with the help of an implant on both teeth. However since the patient expressed his discontent because of financial bridging towards placement of two implants, we decided to retain one of the teeth with the help of an endodontic file while placing a restorative material and the other with the help of a dental implant.

Procedure:

The patient read and signed an informed consent form. Following the Helsinki protocol, the treatment was started, where preoperatively antibiotic wasprophylactically, an hour before. The fractured teeth were secured orthodontically to maintain the alignment for 2 weeks.

Local anesthesia was administered and the procedure was started.
An envelope incision was given starting from 12 to 22 and a thick mucoperiosteal flap was raised exposing the area of interest [FIGURE 1].

FIGURE 1- REFLECTION OF THE PERIOSTEAL FLAP

Through irrigation, it was applied throughout the procedure. A bony window was created on either side of theanterior region to expose the fractured root segment, which was removed with the help of a surgical elevator. [FIGURE 2]

FIGURE 2- FORMATION OF A BONY WINDOW

Once the root segment was removed, a single pilot osteotomy was made using the surgical bur No: 703 through the coronal structure of the teeth to prepare the implant insertion and endodontic file insertion bed simultaneously. Ascending the pilot drill the osteotomy site was further prepared using subsequent drills of 1.5mm and 2mm to the length of 13mm to be in line with the selected length and width of the implant.

Once the suitable osteotomy beds had been prepared, a subsequent cylindrical miniimplant of length 13mm and width 2.2mm which was from the JDENTALCARE system of implant, and an Endodontic K file of size 120 were placed with careful observation under aseptic conditions. [FIGURE 3 & 4]

FIGURE 3 – PLACEMENT OF THE MINI IMPLANT

FIGURE4_PLACEMENTOF THE ENDODONTIC FILE

FIGURE 5 – CLINICAL PRESENTATION OF BOTH IMPLANT AND K FILE

The bony window was covered with the Xenograft called NOVABONE PUTTY for adequate osseointegration. The tooth 21 having an endodontic file was packed with biodentine.
Since it was a methodical study, we ensured to give all the prognostically favorable treatment for the yielding results. [FIGURE 5]

Discussion:-

As mentioned, The most affected region is the anterior maxilla. Occasionally posttraumatic problems result in tooth loss, necessitating future implant REHABILITATION. [9]

In the present case instead of opting for extraction followed by an immediate or conventional approach of implant placement, we have formulated the treatment with the retention of the coronal structure, which makes the case report at an embarking edge.
The reasons were, the patient's discomfort and noncompliance towards extraction and replacement with implant retained prosthesis, were not per conventional treatment options.

Evacuation of the teeth from the socket is a two-sided coin, with both pros and cons. Several investigations done to determine how tooth extraction affected the dimensions of both the hard and soft tissues showed that following extraction, the buccolingual ridge shrank by roughly 5 to 7 mm over the first four months of healing, with a 2 to 4.5 mm loss in vertical bone height. Using only the premolars and molars in both arches, Schroop and colleagues assessed the intraoperative dimensionAL changes in 46 healing sockets in 46 individuals. Over 12 months of monitoring, they documented a reduction in buccolingual breadth of nearly 50%, two-thirds of which occurred within the first three months after tooth extraction, with the biggest changes found in the molar locations.
Since this post-extraction resorption could negatively reduce the amount of bone available for implant insertion, doctors started placing dental implants right away after teeth were removed. [10]

Studies and sufficient literature have emphasized both the advantages and disadvantages of immediate implant placement. There are numerous benefits for immediate placement in almost all circumstances. Reduced surgical procedures, shorter treatment times, preservation of alveolar bone, maintenance of ideal soft tissue contours, improved implant placement, simplification of the prosthetic design, and an improvement in the patient's psychological readiness for dental treatment are a few of them.

Chances of infection, absence of soft tissue closure, thin tissue biotypes with the associated risk of recession, and incongruity between the socket wall and the endosseous implant shape are some potential drawbacks of rapid insertion. [11] .Hence retaining the tooth structure seemed a viable option supported by implant and endodontic file.
Following the crown root fracture, the endodontic therapy was indicated which was approached accordingly If the tooth is to be retained, it should be treated as a deep fracture of the crown and root, and if the root is to be kept, it can be treated endodontically. The fragment had to be splinted since there was a probability of mobility. The teeth need to be freed from occlusion in both cases.

It is currently advised to use non-rigid splinting for a maximum of four weeks for the majority of root-fractured teeth. However, longer splinting may be necessary if the fragment exhibits considerable movement. In this case, splinting was done for 2 months.

Following which If pulp necrosis develops, it usually just affects the coronal portion. To prevent pulp necrosis, the root canal was temporarily filled with calcium hydroxide to the extent of the fracture, and then the root canal was filled with gutta-percha. [12]

Given the usage of the K file, the patient was determined to retain his teeth when he reported them to the hospital. Since the fracture was close to the alveolar crest with the coronal segment mobile, a File was utilized in this procedure as an endodontic implant since it is affordable, readily available, autoclavable, and useful as an interradicular splint. [1]

In the literature following conditions were the major indications for placement of an endodontic implant: (a) periodontal bone loss, especially involving a single tooth where extraction and replacement are challenging; (b) a horizontal tooth fracture requiring the removal of the apical segment because the remaining coronal portion is too weak to remain; (c) pathological resorption of the root apex because of a persistent abscess; and (d) a pulpless tooth with an abnormally short root. The fact that endodontic implants have a 91% success rate in trials, this approach is a reasonable preventive measure to save movable teeth.[13]

The patient has been followed up since surgery,and was very cooperative during the intervention for consecutive of 3, 6, and 9 months and both clinical and radiological outcomes show satisfactory healing. [FIGURE 6a and 6b]

FIGURE 6a

FIGURE6b FIG 6a and 6b POST OPERATIVE FOLLOW-UP RADIOGRAPH SHOWING THE FAVOURABLE HEALING

Conclusions:-

We would like to conclude through this unique case report that the endodontic file and the implant placed through the intact crown structure could be safely used to rehabilitate the root fractures. However, including the procedure in a larger number of subjects over a longer follow-upperiod could be useful in creating an incorrigible conclusion and marking a stepping stone in rehabilitation.

SUMMARY:-

The technique implemented in this case reportis an innovative approach formulated by conglomerating endodontic and surgical interventions. The strategy involves rehabilitation of bilateral horizontal upper anterior tooth fracture with the natural crown through an implant placedon one side and an endodontic K file on the other. On analysis of the two techniques, it was observed that restoration ofnatural esthetics, alleviation of pain, and economic feasibility were significant as opposed to conventional approaches. However, further case reports are warranted for a pragmatic conclusion in this field.

Declarations:-

I hereby declare that "all authors have read and approved the manuscript",

1. Ethics approval and consent to participate – not applicable
2. Consent for publication – applicable
3. Availability of data and materials- data sharing is not applicable to this article as no datasets were generated or analysed during this current study.
4. Competing interests – the authors declare that they have no competing interests.
5. Funding – not applicable
6. Authors' contribution- hk under his mentorship from respective departments played a crucial role in implementing the case and performing the necessary clinical steps which included outlining the complete treatment protocol and SR being the head of the department of the endodontic department contributed to devising the treatment plan , SS analyzed and interpreted the patient data regarding theplacement of the implantthrough the fractured tooth segment, SB and SK has helped provide professional writing materials and was a major contributor in writing the manuscript, PP he has been a constant source of support and monitored the patient during the follow-up. PA and KR have helped with endodontic restoration and clinical photography.

Reference:-

1. Ladino LG, Rosselli D. Use of extracted anterior teeth as provisional restorations and surgical guide for immediate multiple implant placement: A clinical case report. J EsthetRestor Dent 2019; 31: 209–212.
2. Turkistani J, Hanno A. Recent trends in the management of dentoalveolar traumatic injuries to primary and young permanent teeth. Dent Traumatol 2011; 27: 46–54.
3. Kadulkar N, Kataki R, Deka A, et al. Replantation of an Avulsed Tooth: A Case Report. Cureus 2023; 15: e39198.
4. Kumari NBPS, Sujana V, Sunil CHR, et al. Reattachment of complicated tooth fracture: An alternative approach. Contemp Clin Dent 2012; 3: 242–244.
5. Simonsen RJ. Restoration of a fractured central incisor using original tooth fragment. J Am Dent Assoc 1982; 105: 646–648.
6. Bernhart G, Koob A, Schmitter M, et al. The clinical success of implant-supported and tooth-implant-supported double crown-retained dentures. Clin Oral Investig 2012; 16: 1031–1037.
7. Maxillary Anterior Tooth Replaced with Immediate Implant along with Combined Graft Materials: A Case Report, https://www.wjoud.com/doi/10.5005/jp-journals-10015-1740.
8. Akhtar S, Bhagabati N, Srinivasan R, et al. Reattachment of subgingival complicated fractures of anterior teeth. Armed Forces Med J India 2015; 71: S569–73.
9. Schwartz-Arad D, Levin L, Ashkenazi M. Treatment options of untreatable traumatized anterior maxillary teeth for future use of dental implantation. Implant Dent 2004; 13: 120–128.
10. Tadi DP, Pinisetti S, Gujjalapudi M, et al. Evaluation of initial stability and crystal bone loss in immediate implant placement: An in vivo study. J Int Soc Prev Community Dent 2014; 4: 139–144.
11. Beagle JR. The immediate placement of endosseous dental implants in fresh extraction sites. Dent Clin North Am 2006; 50: 375–89, vi.
12. Moule AJ, Moule CA. The endodontic management of traumatized permanent anterior teeth: a review. Aust Dent J 2007; 52: S122–37.
13. Yadav RK, Tikku AP, Chandra A, et al. Endodontic implants. Natl J MaxillofacSurg 2014; 5: 70–73.