

## Immediate Implant Placement for Root Fracture: A Case Report

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**Abstract:** Traumatic dental injuries are the main causes of emergency treatment in dentistry. Root fracture comprise 0.5 to 7% of the injuries affecting the permanent dentition. One of the treatment options for root fracture cases are immediate implant placement. This article explains the advantages, disadvantages and clinical requirements for immediate implant placement and describes a case report for immediate implant placement in 34 region with root fracture.

**Keywords:** Immediate Implant, Root Fracture, Esthetic Zone, Osseointegration.

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### I. Introduction

Root fractures are one of the main causes of tooth loss necessitating emergency treatment in dentistry. Trauma to the tooth can vary in severity from enamel infraction to a complete ex-articulation of tooth /avulsion. Treatment options for these cases varies from root canal treatment, splinting and stabilization, reattachment, post & core and crown, orthodontic extrusion, periodontal surgery, surgical extrusion and extraction.<sup>1</sup> Root fractures are one of the common causes of tooth loss. Root fractures are defined as fractures involving the dentine, cementum and pulp. Management of these fractures may involve an interdisciplinary treatment approach. Depending upon the type of fracture, the treatment options are chosen. When an extraction is indicated, immediate post extraction implants can be considered as an effective option.<sup>2</sup> The success of immediate implants depends on careful planning and case selection. This case report describes the placement of immediate implant in mandibular first premolar region followed by the prosthetic phase.

### II. Root Fractures

Root fracture is defined as a microscopic or macroscopic cleavage of the root in any direction. They are classified as horizontal and vertical root fractures.<sup>3</sup>

Horizontal root fracture /transverse root fractures are subclassified on the basis of;

1. Location of fracture line -cervical, middle and apical,
2. Extent of fracture- partial and total,
3. Number of fracture lines -simple, multiple and comminuted,
4. Position of coronal fragment -displaced and not displaced.

Vertical root fractures are tooth fractures that run along the long axis of the tooth or deviate in a mesial or distal direction. Vertical root fractures are classified on the basis of

1. Separation of the fragments -complete or incomplete
2. Relative position of fracture to the alveolar crest -supraosseous and intraosseous.<sup>1</sup>

### III. Immediate Implant Placement

Glossary of Implant Dentistry defines immediate implant as an implant placement immediately after tooth extraction. This allows clinicians to reduce the number of surgical procedures, resulting in shorter treatment times.<sup>4</sup>

#### **IV. Advantages of Immediate Implant Placement as Compared to Delayed Implant Placement.**

1. **Time**-The time required for treatment is reduced as prosthodontic therapy is initiated as early as 3 to 6 months after extraction.
2. **Surgery**-Reduced surgical interventions.
3. **Bone**- Width and height of the alveolar bone is preserved that enables the maximal utilization of bone-implant surface
4. **Esthetics**- Tooth angulation i.e., ideal implant location mesiodistally and buccolingually can be attained provided that the extracted tooth has a desirable alignment, crown length is in harmony with the adjacent teeth, natural scalloping and distinct papilla are easier to achieve, and there is maximal soft tissue support.<sup>5</sup>

#### **V. Disadvantage of Immediate Implant Placement**

1. **Tooth location**- Misalignment of the extracted tooth may lead to the unfavorable angulation of fixture.
2. **Anchorage**- Stabilization may require more bone than is available beyond the apex. Situations where vital structure like the maxillary sinus or the inferior alveolar nerve, are closely related to the apex, immediate implantation may have hazardous consequences.
3. **Flap design**- The mucogingival condition around the extraction socket may be unfavorable to primary closure.<sup>5</sup>

#### **VI. Clinical Requirements for Immediate Implantation**

An ideal immediate implant procedure involves an atraumatic extraction of tooth, stabilization of the implant within the confines of the extraction socket such that it has maximal contact with freshly prepared bone and is in proper angulation, primary closure of the surgical flap, uneventful healing, and final restoration of the implant with a functioning prosthesis.<sup>6</sup>

The requirement includes the standard procedures for conventional implant placement with attention to;<sup>6</sup>

##### **1. The tooth that is to be extracted and surrounding structures.**

It is vital to consider the general dental health, root anatomy, and root orientation of the tooth to be extracted. Teeth with periapical pathology are not a choice for immediate implant. Presence of caries is not a contraindication but it may cause traumatic extraction. The root orientations have direct bearing on the angulation of the implant, placement of the implant along the long axis of the extraction socket (long axis of the root) may result in buccally angulated implants. Root shape has a direct bearing on both the type of implant bone interface that can be expected once the implant is placed and the angulation of the implant.

##### **2. Surgical difficulties**

Surgical complications can be associated with several factors:

1. Complicated extractions
2. Perforation of the cortical plate
3. Socket anatomy that precludes ideal implant placement
4. Close proximity to adjacent teeth, sockets or implants
5. Difficulties associated with barrier techniques
6. Problems associated with flap closure.

##### **3. Possible prosthodontic complication;**

These complications are:

1. Reduced vestibular depth
2. Angulation problems
3. Deep or shallow implant placement within the socket.

#### **VII. Case Report**

A 21-year-old female patient reported to the out-patient department of our institution with history of trauma in the lower left back teeth region, 6 months ago (fig 1). Clinical and radiological evaluation revealed adequate alveolar bone, absence of periapical pathology and a horizontal root fracture with 34 at the level of coronal third portion of root (fig 2). The treatment plan was to extract fractured 34 and placement of an immediate implant with the same.

For the implant surgery, surgical fitness certificate was procured from a general physician prior to the surgical procedure. A written informed consent by the patient was obtained before the implant placement. Necessary lab investigations like CBC, BT, CT, PT-INR, HbsAg and ELISA were done and taken into consideration. Oral prophylaxis was done, followed by radiographs and CBCT scan to evaluate the available bone dimensions and the implant size was finalized.

Loading dose of antibiotic and analgesic was given. Local anesthetics- lignocaine with adrenaline was administered. Atraumatic tooth extraction was done with 34 using periosteal elevator (fig 3). As the fractured fragment of the root was below bone level an envelope flap was raised, slight bone drilling was done on mesial aspect to facilitate root removal. The tooth fragment was slowly luxated without excessive enlargement of the socket and pulled out of the socket (fig 4). The socket was debrided with curettes. Drilling was done upto adequate length, into the socket sequentially (fig 5). An Osstem implant (TS III SA, OSSTEM IMPLANT CO. LTD) was torqued with 30 Ncm into the extraction socket of size 3.5 × 13-mm (fig 6). The jumping distance was grafted (Xenograft) and collagen membrane (PerioColGTR, Eucare, India) was placed (fig 7). Healing abutment was torqued over the implant followed by interrupted suture placement. Post-operative instructions were given to the patient and the patient was asked to report for suture removal after 7 days. After the surgical procedure, patient was prescribed with nonsteroidal anti-inflammatory medication for pain and antibiotics to prevent possible infection. The implant placed in 34 region was allowed to osseointegrate for 3 months.

For the prosthetic procedures, the healing abutment was removed (fig 8) and an open tray impression coping was screwed into the implant. An open tray impression was made in putty and light body of poly vinyl siloxane impression material. Lab analog was attached to the open tray impression coping picked up in the impression and the cast was poured in type IV gypsum product. An irreversible hydrocolloid impression was made for maxillary arch and cast pouring was done in type III gypsum. Shade was selected in natural light. A cement retained prosthesis was planned. A straight abutment was fixed to the implant (fig 9) and porcelain fused metal crown was cemented using luting type of GIC cement (fig. 10).

### **VIII. Discussion**

Branemark's protocol for dental implant suggests placement of implants 6 to 8 months of healing post extraction followed by 3 to 6 months stress-free healing period for osseointegration. It was observed that there was volume loss of alveolar bone, increased time of edentulism, longer treatment time, additional surgical procedure, and psychological impact on the patient. The established fact is that after tooth extraction, the alveolar ridge undergoes bone remodeling, especially within the first year. Patient's demand for quicker treatment in the implant field has resulted in immediate implant placement and continues to remodel year after year which has become more relevant and popular.<sup>4</sup> Immediate placement of a dental implant in an extraction socket was initially described by Schulte and Heimke in 1976. Barzilay et al.<sup>7</sup>, Lazzara et al.<sup>8</sup>, Fugazzoto et al.<sup>9</sup> conducted experimental animal studies and concluded that osseointegration occurs after placement of implants into fresh extraction sockets. Pedro et al. reported 93.5% survival rate of immediately placed implants for 5-year period.<sup>10</sup>

A review concluded that, implants placed into fresh extraction sockets have a high survival rate, between 93.9% to 100%. Implants must be placed 3 to 5 mm beyond the apex to gain a maximal degree of implant stability. Implants should be placed as close as possible to the alveolar crest level (0 to 3 mm). There is no consensus regarding the need for gap filling and the best grafting material.<sup>5</sup> The reduced number of surgical appointments, reduction of time of edentulism, prevention of bone loss and preservation of soft tissue architecture are the major advantages.<sup>11,12</sup>

In the Clinical Outcomes of ITI consensus, review gave strong evidence that immediate placement does not prevent vertical or horizontal resorption of the ridges in post-extraction sites. Bone augmentation following immediate placement reduces horizontal resorption on the facial bone. However, these augmentation procedures appear not to influence vertical resorption on the facial bone. The review also provided strong evidence that augmentation procedures are more successful with immediate implant placement than with delayed implant placement.<sup>13</sup> Krump and Barnett<sup>14</sup> reported high success rates with dental implants placed at the time of extraction. Quirynen *et al.*<sup>15</sup> concluded that the incidence of implant failure is significantly higher when combining immediate implant insertion with immediate loading. In this aforementioned case report, a delayed loading protocol was followed. Reports also state that the immediate implant treatment using autogenous bone grafts or xenografts may improve the process of bone formation between the implant and the surrounding socket walls as well as survival rates.

### **IX. Conclusion**

The success of immediate implantation lies in careful planning and case selection to ensure implant success as well as final esthetic outcomes. The goal of the treatment is to shift to minimum invasive treatment in minimum time period. The immediate implant fulfills both the criteria's as it aims to reduce the process of alveolar bone resorption and treatment time. Therefore, immediate implants are considered as a reliable treatment options with higher success rate.

### References

- [1]. Malhotra N, Kundabala M, Acharaya S. A review of root fractures: diagnosis, treatment and prognosis. *Dental update*. 2011 Nov 2;38(9):615-28.
- [2]. Bhole M, Neely AL, Kolhatkar S. Immediate implant placement: clinical decisions, advantages, and disadvantages. *Journal of Prosthodontics: Implant, Esthetic and Reconstructive Dentistry*. 2008 Oct;17(7):576-81.
- [3]. Gpt 9
- [4]. Koh RU, Rudek I, Wang HL. Immediate implant placement: positives and negatives. *Implant dentistry*. 2010 Apr 1;19(2):98-108.
- [5]. Schwartz- Arad D, Chaushu G. The ways and wherefores of immediate placement of implants into fresh extraction sites: a literature review. *Journal of Periodontology*. 1997 Oct;68(10):915-23.
- [6]. Barzilay I. Immediate implants: their current status. *International Journal of Prosthodontics*. 1993 Mar 1;6:169.
- [7]. Barzilay I, Graser GN, Iranpour B, Natiella JR, Proskin HM. Immediate Implantation of Pure Titanium Implants Into Extraction Sockets of Macaca Fascicularis Part II: Histologic Observations. *International Journal of Oral & Maxillofacial Implants*. 1996 Jul 1;11(4).
- [8]. Lazzara RJ. Immediate implant placement into extraction sites: surgical and restorative advantages. *Int J Periodontics Restorative Dent*. 1989;9:332-43.
- [9]. Fugazzatto PA. Immediate implant placement and GBR in humans: a case report and histologic evaluation. *International Journal of Periodontics & Restorative Dentistry*. 1999 Oct 1;19(5).
- [10]. Tortamano P, Otávio Alves Camargo L, Stella Bello-Silva M, Hirokuni Kanashiro L. Immediate implant placement and restoration in the esthetic zone: a prospective study with 18 months of follow-up. *International Journal of Oral & Maxillofacial Implants*. 2010 Apr 1;25(2).
- [11]. Schropp L, Isidor F. Timing of implant placement relative to tooth extraction. *Journal of Oral Rehabilitation*. 2008 Jan;35:33-43.
- [12]. Polizzi G, Grunder U, Goené R, Hatano N, Henry P, Jackson WJ, Kawamura K, Renouard F, Rosenberg R, Triplett G, Werbit M. Immediate and delayed implant placement into extraction sockets: a 5- year report. *Clinical implant dentistry and related research*. 2000 Apr;2(2):93-9.
- [13]. SITES II. Consensus statements and recommended clinical procedures regarding surgical techniques.
- [14]. Krump JL, Barnett BG. The immediate implant: a treatment alternative. *International Journal of Oral & Maxillofacial Implants*. 1991 Mar 1;6(1).
- [15]. Quirynen M, Van Assche N, Botticelli D, Berglundh T. How does the timing of implant placement to extraction affect outcome?. *International Journal of Oral & Maxillofacial Implants*. 2007 Nov 2;22(7).



**Fig. 1** PRE OPERATIVE OCCLUSAL VIEW



**Fig. 2** PRE OPERATIVE RADIOGRAPH



**Fig. 3** EXTRACTED 34



**Fig. 4** EXTRACTION SOCKET OF 34



**Fig. 5** DRILLING OF OSTEOTOMY



**Fig.6** POST OPERATIVE RADIOGRAPH



**Fig.7** GRAFT AND MEMBRANE PLACEMENT



**Fig.8** SOFT TISSUE FORMATION  
AROUND GINGIVAL FORMER



**Fig. 9.** STRAIGHT ABUTMENT



**Fig. 10** POST OPERATIVE IMAGE IN OCCLUSAL AND FRONTAL VIEW

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