IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 23, Issue 6 Ser. 2 (June. 2024), PP 12-16
www.iosrjournals.org

SIMULTANEOUS NATURAL TOOTH PONTIC AND ROOT SUBMERGENCE: REPORT OF A RARE CASE.

Pooja M Warade, Manoj Likhitkar, Anantkumar Heda, Kavita Mahalle

Post Graduate Student, Dr Rajesh Ramdasji Kambe Dental College and Hospital, Akola

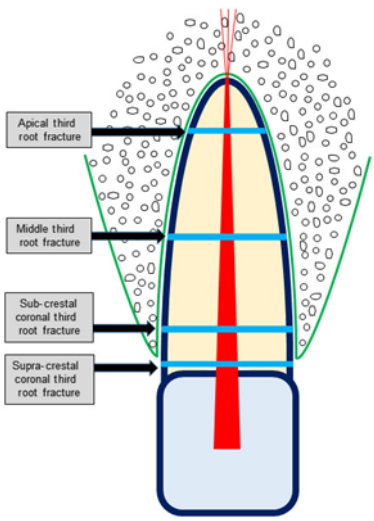
Professor, Head of Department of Conservative and Endodontics, Dr Rajesh Ramdasji Kambe Dental College and Hospital, Akola Maharashtra, India

Abstract:
The prognosis of root fracture varies according to the location and extent of fracture line. Root fracture involving a cervical third have poor prognosis than fractures involving apical third and middle third. This case present treatment for cervical third root fracture of mandibular left first incisor in 21-year-old patient. Coronal fragment of fractured tooth shown grade III mobility with bleeding from gingival sulcus and sensitivity with hot and cold intake. In this case natural tooth pontic was incorporated with root submerged to meet the esthetic and functional requirements of the patient. After 3 month follow up, this treatment approach has seemed to offer a long-term provisional and satisfactory solution to the consequences of a cervical root fracture injury

Date of Submission: 26-05-2024 Date of Acceptance: 06-06-2024

I. Introduction

Tooth fractures are most common emergency in dental clinic. It gets classified into crown fracture, crown-root fractures and root fracture according to part of tooth involve Root fracture is rare in permanent dentition; its prevalence ranges from 1.2%–7.0%[1]. A tooth fracture including the pulp, cementum, and dentin is referred to as a root fracture. When a strong, blunt item hits the tooth's crown, the crown's greater area of resistance to the force transfers the force to the tooth root, where it most usually causes a root fracture in the coronal, or cervical, third of the root. They are classified as follow [2]



1. The apical third of the tooth root
2. The middle third of the tooth root
3. The coronal third of the tooth root
   a. Subcrestal
   b. Supracrestal [5]

Root fractures may occur in any direction or orientation, and they are generally classified as vertical fractures (usually also involving the crown) or transverse (often called horizontal) root fractures. Its prognosis varies depend upon the location of fracture specifically in relation with crestal bone. Different treatment modalities are considered in root fracture according to the prognosis of involve tooth [3]. The more apical fractures generally require the least management and have the best prognosis, whereas coronal root fractures require the most complex management and may have the worst prognosis. Fractures in this section of the root are managed and the prognosis depends on the extremely precise location of the fracture with relation to the level of the crestal bone. The prognosis for root fractures situated subcrestally—that is, inside the bony socket—is significantly better than that of fractures located supracrestally—that is, outside the bone socket [4-5].

These articles described case in which fracture line was above alveolar crest but all margins are present subgingival. Management of supracrestal fracture in lower central incisor by using mobile coronal crown of tooth as Nature tooth pontics and the root below the fracture line is left in socket as Submerged root to preserve alveolar bone width [6].

There are some different treatment plans according to the position of fracture line.[4]

Position of fracture line	**Treatment**	
Apical	Watch and observation	
	Retain the segment	Pulp Vital
	Surgical extraction	Pulp necrosis
Middle	Reduction chances of healing	
	Healing	70-80% of intra -alveolar fractures
	Root canal treatment	Pulp necrosis
Cervical	Poorest chances of healing	
	Reduction and stabilization	Coronal segment is present Fracture below the alveolar bone crest
	Reattachment	Coronal segment is present Fracture at or above the alveolar bone crest
	Periodontal surgery	Sufficient root length fracture below the alveolar bone crest Aesthetic result is not required
	Orthodontic extrusion	Sufficient root length Fracture below the alveolar bone crest Aesthetic result is not required
	Surgical extrusion	Emergency treatment Fracture below the alveolar bone crest
	Extraction	Other conservative treatment Not possible Other conservative treatment Failed Poor Prognosis

II. Case Report:

A 21-year-old male patient, was apparently all right one day back after that he visited to Dr R.R.K dental college and hospital, Akola with complaint of pain and mobility in 31 since, he got blowout trauma from his friend elbow during playing cricket. After clinical examination (fig a), 31 crown was grade III mobile with bleeding sulcus. On radiograph shows transvers cervical root fracture of left central incisor (fig b).

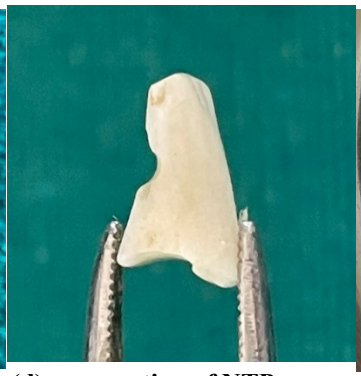
a) Preoperative clinical photograph

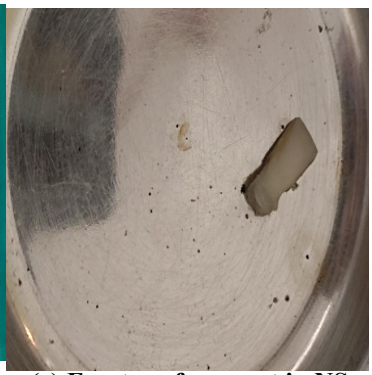
b) Preoperative radiograph

The fracture line present above the crestal bone. There are different treatment modalities for supercrestal cervical root fracture as mention in table 1. They are Reattachment of coronal fracture fragment of tooth. Reattachment is possible when the fracture line is superficial that is supragingival. In this case all marines of the fracture fragment are present subgingival (fig c). If we consider gingivectomy with reattachment of fragment, the gingivectomy margin shloud be on non esthetic aspect of teeth [2]. So, management of supercrestal cervical fracture through reattachment of fracture fragment was eradicate in this case.

While considering patients demand for esthetic and patient were not ready for immediate implant due to economic reasons. Hence, it was decided to use the patient's own teeth as a natural tooth pontic and splint it to the adjacent teeth using composites. Treatment was started with extraction of mobile coronal fractured fragment. Pulp chamber of fracture fragment is cleaned and sealed with composite resin and stored in normal saline (NACL 0.9%) till replacement (fig c,e).


(c) fracture coronal fragment


(d) preparation of NTP


(e) Fracture fragment in NS

Bleeding at the site of extracted coronal fracture fragment were controlled with Local anaesthesia soak cotton. Root canal treatment was carried out on the root of fracture teeth with length of 14 mm **(fig f)**. Biomechanical preparation was done with rotary file (Dentsply protaper gold) and after obturation 3mm space was preprepared for MTA placement **(fig g,h,i).** Suture is placed with 04 suture X matters and patient recalled after 7 days.

Suture removal was done on seventh day. Follow which the adjacent teeth to fracture teeth were prepare lingual aspect of the adjacent teeth 41 and 32 were prepared as abutments for the provisional fiber-reinforced resin bridge. A standard class III preparation with dimensions of 1.5 mm lingo-buccal depth, 1.5 mm mesiodistal depth and 2 mm inciso-gingival depth was used for the index case at the level of the middle third of the teeth which provides maximum tooth bulk **(fig g)** [7]. A trough was made in the middle third of the palatal aspect of the natural tooth pontic to receive the Ribbond fibre according to the manufacturer's instruction. [8] The trough measured 1.5 mm lingo-buccally and 2 mm inciso-gingivally **(fig d)**.


(f) WL of root


(g) Master cone

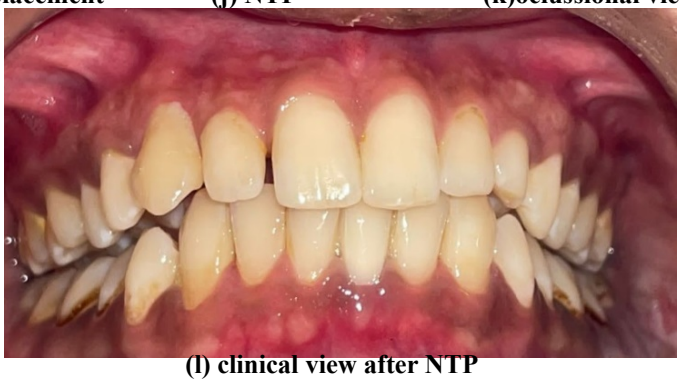

(h) 3mm space for MTA

The adequate lengths Angelus Interlig fiber Strip required were measured using the dental floss. Angelus Interlig fiber Strip and nature tooth pontic is etched with 36% phosphoric acid and bonding agent was cured for 30 sec. Bonding agent was applied on Angelus Interlig fiber Strip and whole assembly were cured with Tetric-N flow composite **(fig j)**. All composite surface was smoothened to avoid plaque accumulation and nature teeth pontic should be infraocclusion to avoid forces on it **(fig k, l)**


(i) MTA placement


(j) NTP


(k)oclussional view of NT


(l) clinical view after NTP

III. Discussion

According to Andreasen et al the management and prognosis for a root fracture vary according to its location. The more apical fractures generally require the least management and have the best prognosis, whereas coronal root fractures require the most complex management and may have the worst prognosis [9]. As mention in table 1 the apical third root fracture does not required treatment if the apical fracture segment is infection free. In case of infection surgical removal of infected fragment is needed [10].

The treatment recommended for the middle third root fracture is immediate tooth repositioning with a passive intraradicular splinting done with fiber post or endodontic instrument to stabilized internal fracture fragment. The external splinting is given for 2 weeks [9]. In cervical third root fracture, the prognosis is compromised but according to the position, extent, and mobility of the coronal fragment, treatment is planned. There are various treatment plans like stabilization of fracture fragment if mobility is absent. Fragment reattachment of fracture coronal fragment will be considered a treatment plan when the fracture line is oblique and all margins are present supragingival [11]. Gingivoplasty with fragment reattachment is done where nonaesthetic margins are present subgingival [9]. Orthodontic extrusion is one of the treatment plans where there is adequate root length is present even after a 2mm extrusion of the root portion [12].

In this case, the fracture line is present equicrestal and subgingival circumferentially as well as fracture coronal fragment has grade III mobility which eradicates stabilization and fragment reattachment both treatment plans for this given case. For orthodontic extrusion sufficient root length is mandatory but the tooth of interest in the given case are lower incisors and have less circumference among other teeth in the oral cavity Also interested teeth had a root of 14 mm after removal of fracture coronal fracture which is unable to satisfy crown root ratio [14]. So as Table 1 suggests if other conservative treatment is contraindicated then extraction is suggested and eventually implant.

But as the patient was young and willing for immediate fulfillment of aesthetic, natural teeth pontic incorporated with root submergence was the best treatment plan at that point. Nature teeth pontic would fulfill patient esthetic demand and root submergence would preserve the tooth socket as well as alveolar width for future placement of the implant.

Natural teeth pontics is a process in which natural teeth is used as resin bonded pontic. Considerations for Nature teeth pontic of treatment include the following:

(1) Periodontally involved teeth warrant extraction
(2) teeth have fractured roots
(3) teeth are unsuccessfully reimplanted after avulsion
(4) root canal treatment has been unsuccessful [15].

The immediate replacement of a natural anterior tooth has great psychologic value for most patients, although the procedure may be temporary. The esthetic result of NTP is best as one got perfect shade and shape pontics teeth. There are various methods of splinting natural teeth pontic with adjutant teeth, like splinting with metal orthodontic wire, or attaching with casted metal framework [16]. Recently splinting with fiber reinforce composite resin is being used. From 1990 FRC 's was used in fix partial prosthesis and eventually resin bonded fiber reinforced FPD are preferred over resin bonded cast metal frame work as it provides better strength and durability [17]. As the resin bonded metal framework were unable to be chemically incorporated into the dental and resin material. Except with all this the bulking of restoration with resin bonded NTP increases food and plaque retention result in difficult to maintain good health [18]. These fibers are of different type material wise glass fibers, carbon, polyethylene and Kevlar fibers. Pattern of fiber further differentiate them into unidirectional and weave or mesh-type architectural patterns. The fiber supplied by manufacturer is either pre-impregnated or require chairside pre-impregnation [19]. The interlig (Angelus) was used in this case as its glass fiber and braided which provide better strength and pre-impregnated.

According to the International Association of traumatology guidelines for the management of traumatic dental injuries in complicated crown root fracture root submergence is one of the treatment options [20]. In these case after management fracture crown, if fracture root were extractioned than the surrounding alveolar process loses height and width resulting in narrowing and shortening of the residual ridge. This compromises the placement of an implant. In order to avoid these adverse outcomes, non-vital root submergence procedure was performed to support alveolar bone growth until the patient need implant [21].

IV. Conclusion

The treatment of root fracture should be an evidence-based clinical approach should be followed for the successful treatment of root fractures. In this case nature teeth pontic restores patient esthetic demand and the root submergence will avoid all the adverse of teeth extraction so future implant have proper ridge.

Reference

[1] Andreasen FM, Andreasen JO, Tsilingaridis G. Root Fractures. In: Andreasen JO, Andreasen FM, Andersson L, Editors. Textbook And Color Atlas Of Traumatic Injuries To The Teeth. 5th Ed. Oxford, UK: Wiley Blackwell; 2018. P. 377–412.

[2] Abbott PV. Diagnosis And Management Of Transverse Root Fractures. Dent Traumatol. 2019;35(6):333-347. Doi:10.1111/Edt.12482

[3] Andreasen JO, Andreasen FM, Tsukiboshi M. Crown-Root Fractures. In: Andreasen JO, Andreasen FM, Andersson L, Editors. Textbook And Color Atlas Of Traumatic Injuries To The Teeth. 4th Ed. Oxford: Blackwell Munksgaard; 2007. P. 314-36.

[4] Malhotra, Neeraj, Mala Kundabala And Shashirashmi Acharaya. "A Review Of Root Fractures: Diagnosis, Treatment And Prognosis." *Dental Update* 38 9 (2011): 615-6, 619-20, 623-4 Passim.

[5] Lam R, Abbott PV, Lloyd C, Et Al. Dental Trauma In An Australian Rural Centre. Dent Traumatology 2008; 24:663–70.

[6] Abbott PV. Indications For Root Canal Treatment Following Traumatic Dental Injuries To Permanent Teeth. Aust Dent J. 2023;68 Suppl 1: S123-S140. Doi:10.1111/Adj.12989

[7] Joy Ucheonye Ifesanya, Management Of Unerupted, Inverted And Dilacerated Upper Central Incisor And Restoration With Natural Tooth Pontic And Fiber-Reinforced Resin Bridge Open Access Library Journal > Vol.10 No.5, May 2023; 10.4236/Oalib.1108906

[8] Idris, Mohamed & Daniel, Jacob & Sakkir, Nasil. (2012). Natural Tooth Pontic – A Case Series. International Journal Of Contemporary Dentistry. 3. 14-17

[9] Andreasen JO, Andreasen FM, Tsukiboshi M. Crown-Root Fractures. In: Andreasen JO, Andreasen FM, Andersson L, Editors. Textbook And Color Atlas Of Traumatic Injuries To The Teeth. 4th Ed. Oxford: Blackwell Munksgaard; 2007. P. 314-36.

[10] Jethi N, Maheshwari K, Kaur K Management Of Apical Third Root Fractures In Radiculomegaly Of Mandibular Anterior Teeth: A Rare Case Report. Cureus (February 27, 2024)16(2): E55012. Doi:10.7759/Cureus.55012

[11] Neslihan Yilmaz And Mustafa Murat Kocak, Intraradicular Splinting With Endodontic Instrument Of Horizontal Root Fracture, Case Report Hindawi Volume 2015;505370 | Https://Doi.Org/10.1155/2015/505370

[12] Sinha N, Lakinepally A, Diwan M, Samarthy DK. Management Of Cervical Root Fracture By Reattachment Using Fibre Post. BMJ Case Rep. 2018;2018: Bcr2018225546. Published 2018 Jun 4. Doi:10.1136/Bcr-2018-225546.

[13] S. Nagarajan M.P.Sockalingam. Sectional Fixed Orthodontic Extrusion Technique In Management Of Teeth With Complicated Crown-Root Fractures: Report Of Two Cases; Volume 2018, Article ID 8715647, 6 Pages Https://Doi.Org/10.1155/2018/8715647.

[14] Wheeler's Dental Anatomy, Physiology And Occlusion 11th Edition.

[15] Retzschmar JL. The Natural Tooth Pontic: A Temporary Solution For A Difficult Esthetic Situation. J Am Dent Assoc. 2001;132(11):1552-1553. Doi: 10.14219/Jada.Archive.2001.0089

[16] Butterworth C, Ellakwa AE, Shortall A. Fibre-Reinforced Composites In Restorative Dentistry. Dent Update. 2003;30(6):300-306. Doi:10.12968/Denu.2003.30.6.300

[17] Kukreja, Bhavna & Kukreja, Pankaj. (2012). Use Of Natural Tooth As A Pontic–A Case Report. Clinical Dentistry. 6. 6.

[18] Garoushi, Sufyan & Lassila, Lippo & Vallittu, Pekka. (2009). Fibre-Reinforced Composite In Clinical Dentistry. 12. 101-108.

[19] Cecilia Bourguignon,International Association Of Dental Traumatology Guideline For The Management Of Traumatic Dental Injuries;1. Fracture And Luxations, Dental Traumatology \Volume 36, Issue4/ P314-330 Https://Doi.Org/10.1111/Edt.12578

[20] Keçeli TI, Kutlu B, Gungor HC. Preserving Alveolar Bone Growth Following Cervical Root Fracture: A Case Report. J Can Dent Assoc. 2013;79:D158.

[21] Ataol E, Erbaş Ünverdi G, Güngör HC. Management Of Cervical Root Fracture Injury In A Patient With Epilepsy: Case Report With 5-Year Follow-Up. Spec Care Dentist. 2018;38(5):319-323. Doi:10.1111/Scd.12304