Endodontic and Esthetic Management of Hypoplastic Turner’s Teeth with Severely Dilacerated Roots

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Authors’ contributions

Author JJ done the treatment planning. Authors S. Shukla and S. Singh done the diagnosis and evaluation of case. Author KS has done editing in the text.

ABSTRACT

Dilaceration refer to an angulation or sharp bend or curve in the root or crown of formed tooth. It is usually occur due to trauma that lead to white or yellow brown discoloration, crown dilaceration, root dilacerations, crown duplication, root duplication, odontoma like malformation etc. This paper elaborated a useful clinical considerations for diagnosis and treatment planning of a severely dilacerated root of malformed tooth having turner’s hypoplasia.

Keywords: Dilaceration; turner’s hypoplasia; hyflex files; bee fill; metal ceramic crown.

1. INTRODUCTION

‘Dilaceration’ is severe curvature or angulations that may occur anywhere along the length of a root and crown. The term dilaceration was first coined by Tomes in 1848 [1] who defined that the traumatic injury leads to displacement of calcified portion of the permanent tooth germ in such a
way that the remainder of the permanent tooth germ forms at an angle to it.

Trauma is one of the most common etiologic factor for root dilacerations [2,3] but some authors proposed that idiopathic developmental disturbance may be a possible cause of root dilacerations in those cases that have no clear evidence of traumatic injuries [4-7].

Andreasen & Ravn [4] reported that only 25% of injuries resulted in root dilacerations in permanent teeth when trauma occur in the primary dentition and majority of cases involving maxillary central incisors because they are close to the primary incisor and more prone to traumatic injuries.

Epidemiologic studies demonstrated that the prevalence of dilacerations in general was approximately 3.8%. Maxillary anterior teeth and mandibular incisors were the least affected teeth, exhibiting dilacerations in approximately 1% of cases (Hamasha et al. 2002, Malcic et al. 2006). The incidence of severe curvature was highest in the mandibular third molars (19.2%) and mandibular first molars (5.6%), suggesting that dilaceration is a true dental anomaly affecting mostly posterior teeth (Malcic et al. 2006).

Dilaceration is one of the factors that may complicate the endodontic treatment so the operator should take great care to avoid mishaps in these teeth during root canal treatment.

The prognosis of dilacerated teeth that require endodontic treatment varies according to the severity of the deformity. In this paper we have elaborated management of a severely dilacerated root of malformed tooth having turners hypoplasia.

2. CASE DESCRIPTION

2.1 Chief History

A 30-year-old female patient was referred to the department of conservative dentistry & Endodontics with history of pain & discoloration in maxillary left central incisor and right lateral incisor.

2.2 Chief Complain

Patient wants to correct aesthetics.

2.3 Diagnosis

Clinical examination of maxillary left central incisor (21) revealed that the brownish discoloration of crown with short crown length. Hypoplastic enamel present on its labial surface and the tooth was more labially inclined (Fig. 1). Thermal pulp testing was negative and patient give no response to EPT up to 80 and the tooth was tender to percussion. Radiographic examination (IOPA) revealed that a sharp bend present in its mid root region (Fig. 2). On the basis of clinical and radiographic finding the diagnosis of crown and root dilacerations with type 2 Environmantle type enamel hypoplasia was arrived. Clinical examination of maxillary right lateral incisor (12) revealed that the brownish discoloration of crown with compromised esthetics and function. Radiographic examination (IOPA) revealed the open apex with large periapical radiolucency (Fig. 3). Thermal pulp testing was negative and patient gives no response to EPT up to 80. On the basis of clinical and radiographic finding the diagnosis of this was a nonvital tooth with immature open apex. Clinical examination of maxillary right lateral incisor (12) revealed that the brownish discoloration of crown with compromised esthetics and function. Radiographic examination revealed the open apex with large periapical radiolucency (Fig. 3). Thermal pulp testing was negative and patient gives no response to EPT up to 80. On the basis of clinical and radiographic finding the diagnosis of this was a nonvital tooth with immature open apex.

2.4 Treatment Plan

Endodontic root canal treatment with thermoplastic obturation followed by porcelain jacket crown was planned w.r.t 21 & endodontic treatment with white MTA apexification followed by metal ceramic crown was planned w.r.t 12.

Fig. 1. Pre-operative clinical view
2.5 Treatment Procedure

Access cavity was prepared under rubber dam. There was difficulty in instrumentation in maxillary left central incisor because of sharp distal curvature present in mid root region. Working length was determined with no. 15 nickel titanium HyFlex® X-File® (Coltene), it help in maintaining shape of the curve is because of its flexible curve to avoid errors like ledge, elbow or zipping of the canal. Working length of maxillary left central incisor was 20 mm and maxillary right lateral incisor was 14mm & coronal preparation is done up to 70 with frequent irrigation of 0.5% Naocl was done to avoid blockage by dentinal debris and to remove the necrotic tissue. Calcium hydroxide (pulpdent from pulpdent corporation) used as a intracanal medicament. Obturation of root canal of maxillary left central incisor was done by warm vertically condensed thermoplastic gutta percha injection obturation technique (Bee fill) at 178.68°C and MTA apexification was done in maxillary right lateral incisor (Fig. 4). Post obturation permanent restoration was done with composite resin. Tooth preparation for the crown was done and impression made with a rubber base impression material (Aquasil Ultra, Dentsply Caulk). The final crown was cemented for restoring esthetics and function (Fig. 5).

2.6 Recall Visit

Patient on subsequent recall after 3 month was asymptomatic with no sign of discomfort.

3. DISCUSSION

Traumatic injury leads to displacement of the already formed hard tissue portion which subsequently leads to dilacerations of crown and root. 3% injury of primary teeth lead to this type of malformation [8]. Dilaceration most commonly occur in the maxillary or mandibular central incisor because they are close to the primary incisor and more prone to traumatic injury [9].

In this, case dilaceration of the root of permanent central incisor occur due to traumatic injury [10] so that the position of the calcified portion of
the tooth is changed and the remainder of the tooth is formed at an angle. The curve or bend may occur anywhere along the length of the tooth, sometimes at the cervical portion, at other times midway along the root or even just at the apex of the root, depending upon the amount of root formed when the injury occurred. Traumatic injury in anterior reason also causes enamel hypoplasia because the location of the permanent tooth's developing tooth bud in relation to the primary tooth and the most likely affected area on the permanent tooth is the facial surface.

Theory of displacement of the mineralized portion of the tooth in relation to the dental papilla, inner and outer enamel epithelium, and cervical loops explained the pathology of crown dilaceration. Facialy, the stretched inner enamel epithelium is able to induce differentiation of new odontoblasts; hence, dentin formation is not affected but enamel formation is usually affected. The presence of dilacerated crown with hypoplastic enamel and dentin would have predisposed to pulpal and periapical involvement as it served as a nidus area for microorganisms and their easier penetration into the open dentinal tubules [11].

Treatment option for severely dilacerated root include: endodontic root canal treatment, extraction of tooth followed by bridge or implant placement but in this case patient was keen to retain her natural teeth, so root canal treatment was chosen as treatment option.

Prognosis of a root canal treated tooth partially depends on maintaining the original canal shape after instrumentation (Walton & Rivera 1996). So Hyflex files were used for the preparation of root canal because they help in maintaining shape of the curve and avoid errors like ledge, elbow or zipping.

0.5% sodium hypochlorite (low concentration) was selected for irrigation because higher the concentration of sodium hypochlorite lead to more cytotoxic reaction if extrude beyond the apex and cause lot of periapical tissue irritation with resultant pain and swelling and even permanent mimic musculature and nerve damage in some cases [12]. Moreover, there have been studies that report no significant difference between 0.5% and 5% sodium hypochlorite solution regarding its antibacterial or tissue dissolving ability [13].

In this case calcium hydroxide was used as an intracanal medicament for disinfection of root canal system. Calcium hydroxide also used for apexification in immature apices but the time interval for apexification is more, ranging from 12 to 24 months [14]. So that patient suffers from reinfestation of root canal system due to loss of temporary restoration, tooth fracture [15] and microleakage due to formation of incomplete barrier. Patient want immediate treatment in this case so single step apexification with white MTA was decided. It provides a good apical seal, biocompatibility, pulpal, and periodontal regenerating capabilities [16]. It implies nonsurgical compaction of a biocompatible material into the apical end of the root canal, thus creating an apical stop and enabling immediate filling of the root canal [17]. White MTA was preferred over the gray MTA as it has shown significantly less leakage [18].

4. CONCLUSION

Root dilaceration is one of the variations that may complicate the endodontic therapy hence correct diagnosis and adhering the basic principles of endodontic treatment; it is possible to achieve endodontic success without extraction or prosthetic treatment approach for more functional and esthetic results.

CONSENT

All authors declare that written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Tomes J. A course of lectures on dental physiology and surgery delivered at the Middlesex Hospital School. London: John W. Parker; 1848.
2. Duncan Ashrafi WK, Meister MH, Pruhs RJ. Management of unerupted maxillary
anterior tooth. J Am Dent Assoc. 1983;106:640-44.

3. Smith DH, Winter GB. Root dilacerations of maxillary incisor. Br Dent J. 1981;150:125-27.

4. Andreasen JO, Sndstrom B, Ravn JJ. The effect of traumatic injuries to primary teeth on their permanent successors. I. A clinical and histologic study of 117 injured permanent teeth. Scand J Dent Res. 1971;79:219–83.

5. Kilpatrick NM, Hardman PJ, Welbury RR. Dilaceration of apromary tooth. Int J Paediatr Dent. 1991;1:151–3.

6. Chadwick SM, Millett D. Dilaceration of a permanent mandibular incisor: A case report. Br J Orthod. 1995;22:279–81.

7. White SC, Pharoah MJ. Dental anomalies. In: White SC, Pharoah MJ, editors. Oral radiology: principles and interpretation. St Louis: Mosby. 2000;303–37.

8. Andreasen FM, Andreasen JO. Textbook and color atlas of traumatic injuries to the teeth, in edition. 1994;457-94.

9. Prabhakar AR, Reddy VV, Bassappa N. Duplication and dilacerations of crown with hypercementosis of root following trauma. Quint Inter. 1998;29(10):655-67.

10. Standerwick RG. A possible etiology for the dilaceration and flexion of permanent tooth roots relative to bone remodeling gradients in alveolar bone. Dent Hypotheses. 2014;5:7-10.

11. Sarang Sharma, Shibani Grover, Vivek Sharma, Dhirendra Srivastava, Meenu Mittal. Endodontic and Esthetic management of a dilacerated maxillary central incisor having two root canals using cone beam computed tomography as a diagnostic Aid. Case Reports in Dentistry. 2014;7. Article ID 861942.

12. Pelka M, Petschelt A. Permanent mimic musculature and nerve damage caused by sodium hypochlorite: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008;106:80-3.

13. Zehnder M, Kosicki D, Luder H, Sener B, Walimo T. Tissue dissolving capacity and antibacterial effect of buffered and unbuffered hypochlorite solutions. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002;94:756-62.

14. Cohen S, Hargreaves KM. Pathways of the Pulp. 9th ed. Missouri: Elsevier Publishers; 2006.

15. Andreasen JO, Farik B, Munksgaard EC. Long-term calcium hydroxide as a root canal dressing may increase risk of root fracture. Dent Traumatol. 2002;18:134-7.

16. Torabinejad M, Watson TF, Pitt Ford TR. Sealing ability of a mineral trioxide aggregate when used as a root end filling material. J Endod. 1993;19:591-5.

17. Steining TH, Regan JD, Gutmann JL. The use and predictable placement of mineral trioxide aggregate in one-visit apexification cases. Aust Endod J. 2003;29:34-42.

18. Ghaziani P, Sadeghi GH. An in vitro comparison of apical leakage of Biocalcex, white MTA, gray MTA, and amalgam as root-end fillings. J Dent. 2008;5:131-5.