

Multidisciplinary management of an unusual case of multiple developmental defects in lateral incisor followed by intrusive injury to primary incisors

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Abstract

Dental traumatic injuries occur frequently in children. The close relationship between the apices of primary teeth and germ of the permanent successors can lead to developmental disturbances in the permanent dentition. Developmental disorder can occur in any tooth. One of the most common teeth affected is lateral incisor. These developmental anomalies can cause various clinical problems. Clinical and radiographic characteristics of these anomalies may sometime present confusing picture. Therefore, recognition of this condition, early diagnosis, and treatment are important to avoid complications. High prevalence of dental trauma in young children emphasizes the need of educational and preventive programs in schools. Dentist plays important role in early diagnosis of disturbances in the permanent successor teeth by rigorous clinical and radiographic follow-up examination.

Keywords: Intrusive luxation, primary tooth, tooth injury, treatment

Introduction

Traumatic injuries in the primary dentition are routinely encountered in the dental practice. The prevalence of primary teeth injuries varies from 15% to 30%.^[1,2] Luxation injuries constitute the majority of primary teeth injuries.^[3,4] Intrusion is a type of luxation injury, which occurs frequently in the primary dentition with prevalence ranges between 4.4% and to 22%. Intrusion injuries of the primary dentition are highly associated with developmental disturbances of their successor teeth.^[5]

These anomalies can cause various clinical problems such as unaesthetic appearance, malocclusion or crowding, dental caries and periodontal problems, occlusal interference, displacement of the affected tooth, attrition, irritation of the tongue, loss of space.^[6] Not only that, endodontic management of such abnormal tooth root canal morphology is a challenge to the most experienced professionals.^[7]

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The present article discusses a case of single tooth (permanent) affected by 3 varied anomalies (enamel hypoplasia, dilaceration, and fusion with a supernumerary tooth). These 3 anomalies, especially in permanent anteriors, could be the result of trauma to primary dentition.^[7,8] Concomitant presence of these defects in a single permanent tooth, as a result of trauma to primary teeth, is a rare phenomenon. Esthetic management and total rehabilitation of such involved tooth can be intricate. Through knowledge of trauma, its related developmental defects, early diagnosis, and a multidisciplinary treatment approach had lead to successful and desirable outcome.

Case Report

A 14-year-old female patient reported with chief complaint of discoloration and pain in right upper front tooth since 10 days. Pain was dull and intermittent in nature. Past medical history was non-contributory. Past dental history revealed trauma to primary central incisors and right lateral incisor 10 years back, after fall from stairs. On reporting to local dentist, intrusion (grade I) was diagnosed for all 3 mentioned teeth. Patient was kept under observation. Later, these primary teeth exfoliated corresponding to their age.

The extra-oral examination of head and neck structures were within normal limits and corresponded to normal growth and development for that age. Intra-oral examination of hard tissues revealed the presence of abnormal, discolored, hypoplastic permanent right maxillary lateral incisor. Labial surface of crown was having notch-like structure in cervical third region of crown [Figure 1]. Palatal view revealed presence of cusp-like structure of 4-5 millimeters extending less than half the distance from CEJ [Figure 2] and a developmental groove run deep between palatal aspect of lateral incisor and this additional cusp [Figure 2]. Tooth was

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tender on percussion, and electric pulp testing indicated negative response. The crown of the lateral incisor had normal mesio-distal width and was tilted palatally. Primary right maxillary canine was retained, and the tip of erupting permanent right maxillary canine was observed distal to crown of lateral incisor [Figure 1]. Intra-oral periapical radiograph revealed the presence of an extra root-like structure superimposing right lateral incisor.[Figure 3]. Periapical radiolucency was present with respect to same tooth. Maxillary permanent right canine was seen impacted above the retained right primary canine and distal to permanent right lateral incisor.

Treatment was planned in order to prevent periodontal disease and development of dental caries on palatal groove and to correct the esthetic status of hypoplastic tooth. To achieve the desired outcome, treatment was done in 3 steps. In the first step, endodontic treatment was performed followed by orthodontic alignment of the tooth and finally, esthetic rehabilitation was done.

The tooth was isolated with rubber dam, and access preparation was done. Pulp tissues were removed with barbed broaches. An extra canal was observed palatally to main canal, which was quite smaller in dimension. Canal was negotiated, and pulp tissue was removed with the help of barbed broach. The cleaning and shaping for both the canals were achieved using K files (Mani, Japan) and simultaneously, irrigation with normal saline and 5.2% sodium hypochlorite was done. The final apical file used was 30 size (ISO 0.02 taper) for both the canals. The canals were finally flushed with normal saline and dried with absorbent paper points. The canals were filled with calcium hydroxide powder (Deepashree products, Ratnagiri, India), mixed with saline, and were kept under observation for 4 weeks. The periapical radiolucency remained unchanged after 1 month; however, the tooth was asymptomatic. Final obturation was done using sealer (Endoflux, Ammdent, Mohali, India) with gutta-percha (Dentsply, France, SAS) by lateral compaction technique [Figure 4]. Patient was recalled again after 3 months for check-up. Periapical lesion was healed. Patient was referred to department of orthodontics for correction of malposed canine.

The fixed orthodontic treatment was started on patient using MBT (McLaughlin, Bennett, Trevisi) straight wire appliance with slot size of 0.022×0.028 dimensions. Brackets were bonded on the upper arch, but the malformed tooth was banded due to its convexity and hypoplasia.

Initially, alignment was done to mildly de-rotate the canine using 0.016" NiTi wire (Libral Traders, USA) for 4 weeks, followed by 0.016" stainless steel wire with NiTi coil spring (light force) for distalization of canine. This procedure took 6 months to distalize. During distalization, the posterior anchorage was reinforced with Nance palatal arch. After

distalization, a space of 1.5 mm was created between canine and lateral incisor. This space was closed with 0.018×0.025 " stainless steel wire (Libral Traders, USA) using 'T' loop mechanics. This took approximately 8 weeks. The remaining distopalatal rotation of canine was finally aligned with NiTi wire (Libral Traders, USA). This alignment took 3 weeks followed by a stabilizing wire (3 months). The total fixed orthodontic procedure took 10 months.

The orthodontic treatment was followed by esthetic rehabilitation of lateral incisor by all ceramic crown [Figure 5].

Discussion

Intrusive luxation injuries are associated with developmental disturbances of the permanent teeth.^[9-11] The prevalence of developmental disturbances of permanent teeth secondary to primary tooth trauma is reported to be between 12% and 69%.^[12] The age of the child at the time of injury, the direction and severity of the intrusion, and the presence of alveolar bone fracture are important variables influencing the effect of primary tooth intrusion on the developing permanent germ.^[5] Andreasen *et al.*,^[13] classified the sequelae affecting the permanent teeth as white or yellow-brown enamel discoloration with or without enamel hypoplasia, odontoma, crown/root dilaceration, root duplication or angulation, root development arrest, germ sequestration, and eruption disturbances.

In present case, yellowish-brown discoloration along with enamel hypoplasia and crown dilacerations was present with respect to permanent right maxillary lateral incisor. Simultaneously, and an extra cusp-like structure (on palatal aspect), two individual canals were present, which lead to diagnosis of fusion between supernumerary tooth and lateral incisor. Patient's past dental history revealed trauma to primary anterior teeth and jaw approximately when she was 3-4 year old. Germs of the permanent teeth are particularly sensitive in the early stages of their development, which occurs between the ages of 4 months and 4 years. At this critical time, injury or inflammatory changes can interfere with the different levels of odontogenesis, such as morphodifferentiation, organization, mineralization, or the final pre-eruptive maturation.^[5] Not only that, if the child is injured at critical age of 4-5 years, when the crown of the permanent tooth is in direct relationship with the resorbed root of the primary predecessor, the impact force will be transferred along an imaginary oblique line that goes through the incisal edge of the permanent incisor and a point on the labial aspect of its newly formed root. The resorbing apex of the primary incisor creates an impact point with the incisal edge of the crown of the permanent incisor and can cause this crown to turn upwards into its tooth follicle.^[14] Concomitant presence of this anomalies along with impacted permanent right maxillary canine was a challenging job for clinician. Early diagnosis and multidisciplinary treatment planning had lead to biomechanical, structural, and esthetic integrity in our case.



Figure 1: Intra-oral view showing hypoplastic permanent right maxillary lateral incisor



Figure 2: Palatal aspect of permanent right maxillary lateral incisor showing extra small cusp-like structure (circled) and retained primary right maxillary canine



Figure 3: Pre-operative IOPA radiograph, showing extra root canal with respect to permanent right maxillary lateral incisor



Figure 4: Immediate post-endodontic treatment IOPA radiograph



Figure 5: Post-endodontic treatment esthetic rehabilitation with all ceramic crown on lateral incisor

Conclusion

Traumatic injuries occur frequently in children, especially during early years of life. These injuries are considered emergency situations and require immediate attention.

Therefore, pre-school teachers and parents should have through knowledge about preventive measures and first aid management of these traumatic injuries. Children suffering from these injuries should be referred to dentist. Rigorous clinical and radiographic follow-up examination is must to detect any possible disturbances of the permanent successor teeth. In addition, the clinician must be fully aware of normal dental morphology and its variant, in order to provide better care. Early diagnosis and prompt treatment planning can lead to successful outcome. Dentists play an important role in educating, motivating patients regarding traumatic injuries and its prevention.

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