

CASE REPORT Orthodontic Management of a Dilacerated Maxillary Central Incisor with an Unusual Sequela

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A dilaceration is a deformity of a tooth due to a disturbance between the unmineralized and mineralized portions of a developing tooth germ.¹ The dilaceration, which can occur in either the crown or the root, results in the disruption of the normal axial relationship of the tooth. Although dilacerations have been reported most frequently in the maxillary permanent incisor region, they have been observed in the primary maxillary incisor and mandibular permanent incisor regions as well.^{2,3}

Dilacerations are estimated to occur in about 3% of all permanent dentitions, but little epidemiological data are available on their occurrence in the primary dentition.² Females are six times more likely than males to be affected.

The etiology of dilacerations is not fully understood. It is generally accepted that an acute episode of mechanical trauma to the primary predecessors, whose apices lie close to the developing permanent tooth germ, may result in dilaceration of the permanent successor. While traumatic episodes to the developing dentition are frequent and may be under-recorded,⁴ many studies have found no history of trauma. Dilacerations usually involve only a single central maxillary incisor, whereas if trauma were the sole contributing factor, the adjacent incisors would more often be affected.

The most common orientation of a dilacerated maxillary central incisor is with the crown directed upward and labially, even though the primary incisor is labial to the developing permanent crown. The flawless appearance of these dilacerated teeth when examined microscopically further reduces the likelihood of trauma being the sole etiological factor. Dilacerations have been observed in teeth with no predecessors, suggesting that they may be due to ectopic development of the tooth germs.⁴⁻⁷

The following case involved a dilacerated maxillary central incisor that was associated with a trauma in early childhood.

Case Report

An 8-year-old male was referred for orthodontic consultation regarding an unerupted maxillary permanent right central incisor. The patient was in the mixed dentition, with a Class II, division 1 malocclusion on a mild skeletal Class I dental base. The maxillary labial segment was proclined, the overjet was 3mm, and the overbite was less than normal.

There had been a trauma to the primary incisors at age 3. Space loss had occurred in the region of the unerupted central incisor.

Radiographic examination showed that the maxillary right permanent incisor was dilacerated, with the crown inverted (Fig. 1). The adjacent incisors were normal in morphology and vitality. Because of the incomplete development of the root, a combined surgical-orthodontic approach was used to align the dilacerated incisor. Surgery provided access for coronal pin placement. The first phase of orthodontic treatment involved an upper removable appliance with power chain traction to the incisor

(Fig. 2).

The dilacerated incisor was aligned through 84° (Fig. 3), but full coronal alignment was impossible because of the space loss in the incisor region. Reestablishing space for the dilacerated incisor was considered, but was deemed a significant risk due to the close proximity of the unerupted permanent canines to the adjacent lateral incisor roots (Fig. 2). This phase was completed in seven months.

The second phase of orthodontic treatment was carried out at age 12. An upper fixed appliance was used to correct the patient's Class II, division 1 malocclusion and complete the alignment of the dilacerated central incisor (Fig. 4). During this phase of treatment, however, a labial swelling was observed. The apical portion of the dilacerated incisor had penetrated the labial cortical plate and was exposed to the oral cavity (Fig. 4E). This complication necessitated an apicoectomy.

No further complications have arisen to date. The patient continues to be checked every six months and remains symptom-free two years after treatment.

Discussion

Many factors, such as the severity of the dilaceration, incisor position, or degree of coronal dysmorphology, may influence the available treatment options when managing unerupted dilacerated incisors. A combined surgical-orthodontic approach is a well-recognized treatment modality,⁸ although it has not been extensively reported. Surgical extraction of the dilacerated incisor is a common practice, but commits the patient to extensive future restorative care.

In this case, the trauma to the primary incisor at age 3 was consistent with the location of the dilaceration at the crown-root junction. The labially inverted direction of the crown, with the root development in a palatal plane, was consistent with the most common type of central incisor dilaceration. When the patient presented at age 8, root formation of the permanent maxillary incisor was still very incomplete. The surgical intervention permitted direct visual examination of the incisor crown, which was found to be normal in morphology, with no enamel defects.

Odontogenic epithelium plays an essential role in root development through the influence and activities of Hertwig's root sheath. In studies of dental transplantations, continued normal root development depends on the integrity of the epithelial root sheath.⁹ In the management of dilacerated incisors, manipulation of the inherent potential of the epithelial root sheath is fundamental to a successful outcome. Therefore, if orthodontic treatment is considered, it is critical that the treatment be started early enough. This permits the epithelial root sheath to be redirected so that the root develops in a correct spatial relationship to the aligned crown.

The dilaceration in this patient was particularly marked, and its successful alignment could not have been considered had the root form been complete. The early surgical-orthodontic treatment was successful in providing the patient with an intact maxillary arch.

The protrusion of the root apex through the labial cortical plate was unexpected. We believe it may have been due to the decision to delay total coronal alignment of the dilacerated incisor until all the permanent teeth had erupted.

A case with a similar complication was described by Kilpatrick and colleagues,² but it involved a 6-year-old boy with a dilacerated primary central incisor that had failed to resorb and exfoliate. The tooth was symptom-free but nonvital, with the apical portion penetrating through the labial cortical

plate. The primary incisor was simply extracted.

Mattison and colleagues described a case in which an orthodontically aligned dilacerated permanent central incisor subsequently required endodontic therapy.¹⁰ In this case, the later devitalization of the dilacerated incisor was believed to be due to caries. In addition, the dilaceration was lateral, with no risk of disruption to the overlying labial bone.

Rengaswamy reported a case of a 20-year-old female who presented with two nonvital dilacerated central incisors that produced recurrent labial swelling.¹¹ Direct communication between the two pulp chambers and the periodontal ligament spaces was suggested as the cause of the nonvitality.

Mattison emphasized the importance of a coordinated, multidisciplinary team approach to the treatment of unerupted dilacerated permanent incisors.¹⁰ Close cooperation between the orthodontist and the surgeon at the time of surgery permits the selection of the best treatment option. Since the effects of maxillofacial trauma on the pulp may not become evident for months or even years, he also recommended that an endodontist be included early in the management of dilacerated incisors.

Conclusion

The case presented in this article supports Mattison's suggestions that:

- A coordinated, multidisciplinary team approach is necessary in the management of patients who present with unerupted dilacerated incisors.
- Intervention must be early, so that normal root development can continue in a correct spatial relationship to the aligned crown.
- Orthodontic alignment of the crown should be early and complete, so that the complication seen in this case can be avoided. □

FIGURES



Fig. 1 Degree of inversion of dilacerated maxillary central incisor.



Fig. 2 Phase I of orthodontic therapy. Dilacerated incisor was surgically exposed, and pin was inserted coronally. Traction was applied with removable appliance; as incisor erupted, attachments were bonded to available enamel surfaces. Space loss was not addressed until second phase.



Fig. 3 A. Sequence of periapical views during Phase I. Coronal pin traction device is superseded by bondable attachments. B. Dilacerated central incisor after Phase I.



Fig. 4 Phase II of orthodontic therapy. A-C. Lost anterior space was reestablished, and maxillary fixed appliance was used to align central incisor. With final rectangular archwire in place (D), apical portion of incisor root penetrated labial plate (E). F. Final position of incisor following endodontic therapy and palatal retainer placement. G. Total coronal alignment of dilacerated incisor after Phase II. H. Continued root development in apical area that penetrated labial cortical plate.

REFERENCES

- 1 British Standards Institute: Glossary of Dental Terms, BSI 4492, 1983.
- 2 Kilpatrick, N.M.; Hardman, P.J.; and Welbury, R.R.: Dilaceration of a primary tooth, *Int. J. Paed. Dent.* 1:151-153, 1991.
- 3 Chadwick, S.M. and Millet, D.: Dilaceration of a permanent mandibular incisor: A case report, *Br. J. Orthod.* 22:279-281, 1995.
- 4 Stewart, D.J.: Dilacerate unerupted maxillary central incisors, *Br. Dent. J.* 145:229-233, 1978.
- 5 Andreasen, J.O. and Ravn, J.J.: Epidemiology of traumatic dental injuries to primary and permanent teeth in a Danish population sample, *Int. J. Oral Surg.* 1:235-239, 1972.
- 6 Andreasen, J.O.; Sundstrom, B.; and Ravn, J.J.: The effect of traumatic injuries to primary teeth on their permanent successors, I. A clinical and histological study of 117 injured permanent incisors, *Scand. J. Dent. Res.* 79:219-283, 1971.
- 7 Kinirons, M.J.: Dilaceration and failure to erupt of non-successional teeth, *J. Ir. Dent. Assoc.* 29:53-54, 1983.

8 Howard, R.D.: The congenitally displaced maxillary incisor: A differential diagnosis, Trans. Br. Soc. Stud. Orthod., 1969-1970, pp. 31-41.

9 Monsour, F.N.T. and Adkins, K.F.: Responses of periodontal tissues and cementum following transplantation of teeth, J. Oral Maxillofac. Surg. 42:441-446, 1984.

10 Mattison, G.D.; Bernstein, M.L.; and Fischer, J.W.: Lateral root dilaceration: A multi-disciplinary approach to treatment, Endod. Dent. Traumatol. 3:135-140, 1987.

11 Rengaswamy, V.: Roentgeno-oddities: Bilateral dilaceration of maxillary central incisors, Oral Surg. Oral Med. Oral Pathol. 47:200, 1979.