

POSITION-RELATED ERUPTION DISORDER WITH ECTOPIC ERUPTION OF MAXILLARY CENTRAL INCISOR - case report

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Abstract

Differential growth is the basis for normal and harmonious completion of various physiologic processes including the eruption of the teeth. The disturbance of the differential growth pattern of tooth eruption can be revealed as ectopic tooth eruption or tooth impaction. Ectopic teeth are similar to impacted teeth and can be both ectopic and impacted.

The difference is that ectopic teeth do not follow their usual course and erupt somewhere they shouldn't (referred to as an 'abnormal eruption path'), whereas impacted teeth may be on course to erupt in the right spot, but are simply not able to erupt. The occurrence of ectopic eruption is most commonly associated with maxillary incisors.

This condition compromises facial aesthetics, phonation as well as masticatory function. Therefore, an early and accurate diagnosis supported by clinical and radiological examinations, such as OPG X-ray is essential in order to avoid complications and failures. Appropriate orthodontic treatment can prevent a more complicated malocclusion.

The purpose of following case report is presenting an orthodontic treatment in case of early mixed dentition with ectopically erupted maxillary right central incisor. The treatment plan involved utilization of Schwartz removable appliance designed to expand the upper jaw. The aim was to obtain more space for the central incisor in the first phase and positioning the tooth into the dental arch with good bone and periodontal support in the second phase.

The patient had improvement in the upper lip support and the smile aesthetics. The treatment is ongoing.

Keywords: eruption disturbances, ectopic tooth eruption, impacted teeth, removable orthodontic appliance.

Introduction

The teeth eruption is basis for normal and harmonious facial growth. The aetiology of ectopic eruption can, therefore, be summarized as being a disturbance of the differential growth pattern of the individual. Different tissues and organs grow at different rates and at different times.

A delicate balance normally exists between the timing and rate of growth. Tooth eruption is a process whereby the forming tooth migrates from its intraosseous location in the jaw to its functional position within the oral cavity. A variety of eruption problems arise during the transitional dentition period and one such problem is ectopic eruption or tooth impaction. The occurrence of ectopic eruption is most commonly associated with maxillary incisors.

This condition compromises facial aesthetics, phonation as well as masticatory function. Therefore, early diagnosis is essential to avoid complications and appropriate orthodontic treatment can prevent a more complicated malocclusion. Nikiforuk defined ectopic eruptions as “a condition in which the permanent teeth, because of deficiency of growth in the jaw or segment of jaw, assume a path of eruption that intercepts a primary tooth, causes its premature loss and produces a consequent malposition of the permanent tooth [1].

Untimely ectopic eruption treatment can result in loss of dental arch length, inadequate space for the succedaneum tooth, and dental malocclusion. The tooth eruption and development of the primary, mixed and permanent dentitions is an integral component of comprehensive oral healthcare for all paediatric dental patients. Primary teeth maintenance is essential for establishing normal

permanent occlusion. The permanent dentition should contribute a stable, functional and aesthetically acceptable occlusion [2].

Missing upper front teeth are regarded unattractive and may have an effect on the self-esteem and social well-being of the individual. Thus, it is important to detect and manage the problem as early as possible to reduce complications in the future management. Incisors are among the first tooth to erupt in both primary and permanent dentition.

Maxillary anterior teeth are very important to facial aesthetics, often referred to as “social six”, as they are on maximum display during speech and smile in most individuals. The eruption anomalies are classified as position-related disorders (ectopic eruption and transpositions) and timing-related disorders (premature eruption, delayed eruption or impaction).

These anomalies are also linked to age, sex, race or ethnicity. Ectopic eruption and transposition are disturbances related to position which can cause a delay in eruption time; however, commonly the involved tooth erupts within the expected time frame with an abnormality in position [3]. The eruption of a tooth in a position that is not its normal position in the dental arch refers as ectopic eruption [4].

Eruption disorders are more frequent in the upper arch (69.9%) and the area of the incisors (51.2%) [5].

The prevalence of ectopic eruption is 5,6 % of the population and majority of these are permanent central incisors. Maxillary incisors can erupt ectopically or be impacted from supernumerary teeth in up to 2% of the population [6,7].

The aetiology of ectopic eruption is unknown and controversial. There are several theories which explain the cause for ectopic eruption but multifactorial process of the growth and development makes difficult to identify specific primary etiological factors responsible for it. O’Meara stated that insufficient intercanine and anteroposterior growth of the jaws related to evolutionary changes, resulted in gradual reduction in the number of permanent teeth of the human dentition [1].

Nikiforuk and others also share the view of lack of regional bone growth. Several authors have also considered genetic factor to have influence on it.

Various etiological factors may be responsible for ectopic eruption of maxillary incisors:

- premature loss of the primary tooth;
- retained deciduous teeth;
- supernumerary teeth;
- traumatic injury to the primary teeth;
- the mean size of the permanent maxillary central incisors in the affected individuals are significantly larger;
- the length of the maxilla in affected individuals was significantly smaller than the known standards and
- congenital, developmental disturbance as single tooth macrodontia, cleft of palate [8].

The premature loss of primary teeth is a major factor that can cause malocclusion in the sagittal, transverse, and vertical planes and it is the major reason for tooth impaction or ectopic eruption. Dental trauma at a young age could damage the non-erupted permanent tooth germ, reduce development, and change eruption direction [9].

The management and orthodontic treatment of patients with ectopic erupted tooth depends on the position, aetiology, patient’s concern and age. Parents of an ectopically erupted teeth child are usually motivated to seek an earlier orthodontic treatment than parents of a child with other orthodontic problems [10].

Once a tooth is noticed to be ‘ectopically’ erupting, interceptive orthodontics should be carried out in order to reduce the severity of the developing malocclusion. Early treatment is essential because the non-erupted maxillary central incisor can cause various issues:

- compromise the aesthetic aspect, phonation and alveolar ridge formation,
- increase of adjacent teeth tip, reducing the space for the non-erupted incisor and
- alteration of the eruptive path (deviation and delay) of the ipsilateral canine [11].

Treatment options include:

- observation for spontaneous correction after removal of the etiological factors and
- orthodontic intervention with removable, mobile or fixed appliance in cases where ectopically erupted tooth needs assistance to be brought into the correct position.

Interceptive procedures should be undertaken as soon as sufficient permanent teeth have erupted. Furthermore, the success in this phase of treatment depends on the child's as well as on the parent's cooperation and child's ability to accept the various steps of the procedure [7].

Case report

Treatment objectives:

The objective of this paper is to report a case with ectopically erupted maxillary central incisor treated with removable orthodontic appliance.

The primary objectives in our treatment were:

- to create anchorage for the orthodontic traction;
- to expand maxilla and obtain more space for right-side ectopically erupted central incisor;
- to guide the tooth to its appropriate position and incorporate into the maxillary dental arch;
- correct the deviation of the left permanent central incisor and
- correct dental midline.

The other objectives were to establish a good occlusion, to obtain an optimal overbite-overjet relationship, to enhance the health of the periodontium, and most importantly to improve phonation, dental and facial aesthetics.

Treatment diagnosis

A 9-year-old girl with early mixed dentition was brought to our Clinic for orthodontic treatment. The chief complaint was aesthetic due to delayed eruption of the upper permanent central incisor. The girl's mother, complained about incomplete eruption of maxillary right incisor.

The medical history of the patient revealed that she didn't have any trauma in the maxillary region, but she had early loss of her primary maxillary central incisors. The patient had no complain of pain, no signs of infection and had a good oral hygiene. Extraoral clinical examination revealed normodivergent face and presence of good facial balance in all proportions. Intraoral clinical examination revealed unilateral, right-side ectopically erupted maxillary central incisor and shifted midline (Fig.1 a, b). The girl was in early mixed dentition.

The occlusal examination noted a unilateral, left-side Angle Class I. Left-side OJ was 3mm and OB 5mm and on the right-side there was presence of anterior open bite (ectopically erupted right central incisor). The left-side maxillary central incisor was deviated to the right about 2mm. There was a space deficiency for tooth alignment (Fig.1 c, d).



Figure 1.a) Intraoral clinical examination of a 9-year-old patient: a) left-side view of Class I occlusion and cross bite of the left lateral incisor, b) right view of open bite due to ectopically erupted

right-side central incisor, c) space deficiency for ectopically erupted central incisor and shifted dental midline, d) upper occlusal view.

The panoramic radiograph revealed all permanent teeth were present in manner early mixed dentition. The maxillary right central incisor posture was ectopic (Fig.2).



Figure 2. Panoramic radiograph of a 9-year-old patient.

Treatment plan

The present case describes the utilization of removable orthodontic appliance in order to provide more space and positioning the ectopically erupted central incisor in patient with early mixed dentition. Based on patient's symptoms, extraoral and intraoral examination, as well as on panoramic radiograph the initial therapy started five months ago with a Schwartz removable appliance designed to expand the upper jaw by turning the expansion screw once a week (Fig.3 a, b).

The aim was to obtain the needed space for the central incisor.



Figure 3. a), b) Schwartz removable appliance designed to expand the upper jaw and to provide sufficient space.



Figure 3 c). Results after three months.

d). Results after five months.

Positioning of the central incisor into the dental arch with another individual mobile appliance will be second phase in our treatment. The treatment is ongoing.

Discussion

The best time for orthodontic treatment of ectopically erupted teeth, especially the central incisors is in the early stage, 7-10 years. The global aim of early treatment is to relieve the child's psycho-social problem [12-14].

Due to the anatomic proximity between the root of primary tooth and its permanent successor, trauma to primary dentition may cause either the developmental disturbances or deviation in the eruption path of their successors, leading to its impaction or ectopic eruption [15].

Studies have shown that premature loss of primary tooth is still the most important factor for ectopic tooth eruption. The early loss of primary teeth is the most commonly caused by inappropriate oral hygiene, tooth decay and dental injuries. Tooth decay continues to be the main causative factor for the high rate of tooth loss [16-18].

The premature loss of primary teeth is associated with the reduction of the dental arch length. Arch length deficiency can produce or increase the severity of malocclusions with crowding, rotations, ectopic eruption, impaction, crossbite, excessive overjet, excessive overbite [19]. In addition, the reduction of the dental arch length is greater in the mandible than in the maxilla and this effect is also apparent if tooth loss occurs at an earlier age and in crowded dentition [20]. There was a noticeable increase in the prevalence of extractions of primary teeth which were not followed by space maintenance.

There was not a statistically significant difference in the premature loss of primary teeth between boys and girls. The premature loss of the primary teeth can cause problems due to loss of function and the increased possibility of migration of other teeth as we presented in our case. The early loss of primary maxillary central incisor was causal factor for space lost for permanent central incisor. Therefore, the permanent tooth erupted ectopically.

The incidence of space closure increases with the time that elapses from the moment of extraction. Previous studies have demonstrated that the closing rate of a space is higher for the maxillary than the mandible arch but decreases after the first 6 months [21].

Therefore, it is necessary to increase awareness of the importance of oral health in our children and to inform parents of the potential for malocclusion problems caused by the early loss of primary teeth. Parents of the children with premature loss of a primary teeth, no matter the reason, should be advised to bring their children to the dental clinic to make space maintainers or some removable orthodontic appliance to keep the space for permanent teeth and preventing or reducing the severity of malocclusion [22,23].

Specific tooth lost, time elapsed since tooth loss, pre-existing occlusion, favourable space, presence and root development of permanent successor, oral hygiene, patient's cooperative ability, active oral habits, amount of alveolar bone covering permanent successor are considering factors for the orthodontic treatment [24,25].

When abnormally positioned ectopically erupted incisors are moved into the arch, discrepancies are often observed between the gingival levels of the affected and neighbouring teeth. Clinical experience has shown that light forces are more effective than strong ones in moving ectopically erupted teeth and achieving a good gingival position.

The literature pertaining to the use of space maintainers specific to the loss of a particular primary tooth type include expert opinion and details of appliance design. Treatment modalities may include: 1. removable appliances (partial dentures, Hawley appliance) or 2. fixed appliances (passive lingual arch, Nance appliance, transpalatal arch) [26,27].

The appliance should function until the succedaneous tooth have erupted into arch. The goal of space maintenance is to prevent loss of dental arch length, width, and perimeter as well maintaining the relative position of the existing dentition.

Conclusion

The premature loss of the primary teeth increased possibility of migration of other teeth. The early loss of primary maxillary central incisor was causal factor for space lost for permanent central incisor as we presented in our case.

Therefore, the permanent central incisor erupted ectopically. The incidence of space closure increases with the time that elapses from the moment of extraction. An early and accurate diagnosis supported by clinical and radiological examinations, such as OPG X-ray is essential. It is crucial to evaluate the predictive eruption factors that influence the treatment plan, such as: age of the patient, history, compliance, distance from the occlusal plane, vertical position of unerupted incisor and inclination in relation to the midline.

The early orthodontic interceptive treatment with removable orthopaedic appliance and elastic tractions for occlusal repositioning are preferred. After 5 months the ectopic incisor had better position in the occlusal plane with good bone and periodontal support.

The patient had improvement in the upper lip support and the smile aesthetics. The treatment is ongoing.

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