

Content available at: <https://www.ipinnovative.com/open-access-journals>

The Journal of Dental Panacea

Journal homepage: <https://www.jdentalpanacea.org/>

## Case Report

## Correction of ectopic eruption of teeth by “SPA” appliance

Shivaprakash PK<sup>1</sup>, Anjana Subash<sup>1\*</sup>, Priyanka Mane<sup>1</sup><sup>1</sup>Dept. of Pediatric & Preventive Dentistry, P.M.N.M Dental College & Hospital, Bagalkot, Karnataka, India

## ARTICLE INFO

## Article history:

Received 29-07-2024

Accepted 04-11-2024

Available online 13-12-2024

## Keywords:

Ectopic tooth eruption

Orthodontic traction

Eruption disturbances

## ABSTRACT

A pleasing smile can boost a child's confidence and social interactions. Hence aesthetics in pediatric dentistry should focus on maintaining and improving the dental alignment, which in turn function better, aiding in clear speech and effective chewing, and thus contributing to the overall oral health.

The 6 maxillary anterior teeth i.e. the incisors and canines are often quoted as the “social six”, as they are the most prominent and noticeable teeth. Hence, any of these teeth not following its normal path of eruption and is erupting in an unusual location or angle (ectopic eruption), will cause esthetic and functional concerns.

This case report describes the case of a 9-year-old patient who presented with an early mixed dentition with ectopically erupted maxillary right central incisor. The aim was to align the tooth into the dental arch with sufficient bone and periodontal support, which will provide improved upper lip support and aesthetic smile.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution 4.0 International License](#), which allows others to remix, and build upon the work. The licensor cannot revoke these freedoms as long as you follow the license terms.

For reprints contact: [reprint@ipinnovative.com](mailto:reprint@ipinnovative.com)

## 1. Introduction

Eruption guidance in mixed dentition refers to the strategic management and intervention during the transition from primary teeth to permanent teeth, so as to ensure proper alignment and occlusion. This period typically occurs between the ages of 6 & 12 years and is crucial for establishing a healthy, functional and aesthetically pleasing dental arch.

An abnormal eruption of a tooth in an incorrect position in the dental arch is referred as ectopic eruption. The eruption anomalies are classified as position-related disorders (ectopic eruption and transpositions) and timing related disorders (premature eruption, delayed eruption or impaction).<sup>1</sup> Nikiforuk defined ectopic eruption 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”.<sup>2</sup> There can be various reasons for

teeth to erupt ectopically, such as genetic factors, trauma (injury to the primary teeth), space constraints, pathological conditions (presence of cysts/ tumors) and abnormal tooth anatomy.

Early detection and intervention are pivotal to effectively manage ectopic eruptions, as untreated cases can lead to complications including malocclusion, cyst formation, and even resorption of the adjacent teeth. Besides, abnormal eruption may increase the risk of dental caries and periodontal problems if the teeth are in harder-to-clean areas.

The maxillary central incisors are crucial for both function and aesthetics in the dental arch, as they are the most visible teeth when smiling, speaking, and interacting socially; their proper alignment improves appearance and boosts self-confidence. Additionally, their correct position in the dental arch ensures effective biting and chewing while playing a vital role in articulating sounds such as “s” and “th”.

Interceptive orthodontic intervention helps to manage the ectopic eruption and correction of teeth alignment.

\* Corresponding author.

E-mail address: [anjanaprasadam@gmail.com](mailto:anjanaprasadam@gmail.com) (A. Subash).

There are various approaches which could be followed that depends mainly on the severity of the displacement, the age of the patient and the specific tooth involved. It is a multistep process that requires careful planning & co-ordination among dental professionals. Also, regular follow ups and a tailored treatment plan are essential for achieving the best outcomes. In this case report, we describe the management of an ectopically erupted maxillary permanent right central incisor.

## 2. Case Report

A healthy 9-year-old patient had visited the department of pediatric and preventive dentistry, P.M.N.M Dental College and Hospital, Bagalkot with the chief complaint of irregularly arranged teeth in the upper front region. No significant medical or habitual history was noted, but the parents reported a history of delayed exfoliation of a deciduous tooth in the same region, which was extracted at a private dental clinic 3 months ago. (Figures 1 and 3)

Upon intraoral examination, the patient was found to be in the early mixed dentition stage, with Angle's class 1 molar relation bilaterally and a fair oral hygiene. Her maxillary right central incisor had erupted ectopically, positioned high in the labial sulcus, resulting in an overjet measuring 9 millimetres w.r.t tooth 11. (Figures 2 and 4) Further intra-arch examination revealed that her teeth were non-carious, although there was crowding observed in the mandibular anterior region. (Figure 5)

### 2.1. Treatment plan

Moyer's mixed dentition analysis indicated that the space available is greater than the space required to accommodate the erupting permanent teeth. However, it is important to note that Moyer's analysis may lead to over- or underestimation of values, particularly in the Indian population, as it is not fully accurate or calibrated for this demographic.

The initial treatment planning comprised of 2 stages:

1. Orthodontic traction of ectopically erupted 11 to a more palatal and incisal position.
2. Followed by, alignment of 11 using a 2\* 4 appliance.

### 2.2. The "SPA" Approach

For facilitating controlled movement of 11, a specialized orthodontic traction appliance was designed called as the SPA appliance. The components were

1. MBT Bracket (slot size 0.022 inches) for the tooth 11
2. An 18\*25 Rectangular NiTi wire
3. A short crimpable hook
4. Chain elastics
5. Red orthodontic elastics

After performing oral prophylaxis, an MBT bracket (pre-adjusted edgewise bracket of slot size 0.022 inches) was carefully bonded onto the labial aspect of tooth 11. Afterwards, the 18\*25 rectangular NiTi wire was cut and contoured accordingly and was bonded to 21 to 12 using the composite and wire splinting technique. A short crimpable hook was attached to the centre of wire and chain elastic was engaged from the hook to the bracket of 11.

Before engaging the elastic, the crimpable hook was firmly secured. A short elastomeric chain was cut to the appropriate length, ensuring proper engagement from the hook to the bracket. Using a Mathew plier, one end of the chain elastic was carefully stretched and hooked around the crimpable hook, ensuring it was securely placed to prevent slippage during function. The other end of the chain was extended to the bracket and wrapped around it. The chain elastic was checked to ensure it provided the correct amount of tension for the intended tooth movement—neither too tight, which could cause excessive pressure, nor too loose, which would render it ineffective. The force exerted by the elastics on the tooth was maintained at 50 grams. After engagement from the hook to the bracket, the chain's positioning and patient comfort were verified. (Figure 6) Then, the patient was instructed to maintain proper oral hygiene and to do tooth brushing with caution so that the elastic won't get dislodged from the hook.

During the patient's follow-up appointment, conducted 15 days later, positive results were observed, including significant orthodontic movement of tooth 11 in both the incisal and palatal directions, as well as improved upper lip support. (Figure 7) In the next visit, in an effort to improve the traction force (60 grams), the chain elastic was replaced with a red orthodontic elastic. (Figure 8) Radiographical evaluation was conducted with respect to tooth 11, which showed sufficient bone support and no signs of root resorption. (Figure 9) Within one month of treatment, notable improvements were observed: the pre-operative overjet of 9mm, was reduced to 6mm, and the distance between the incisal edges of 11 and 21 reduced from 8.5mm to 6.5mm (measured using digital vernier calliper). This proved the efficacy of the new traction appliance in the treatment of ectopically erupted incisor.

In the fourth visit, the treatment plan was advanced with the initiation of 2x4 appliance therapy, which involved bonding MBT brackets to the upper central and lateral incisors, as well as molar tubes to both upper first permanent molars, and engaging a 0.012 NiTi arch wire. (Figure 10) After 2 weeks, the arch wire was changed to 0.014 NiTi wire. (Figure 11) The alignment of 11 was achieved within 2 weeks of wire change and the appliance was debonded and a removable thermoform retainer (2 mm thickness) was delivered to prevent relapse. (Figures 12 and 13)



Figure 1: Pre – op extra oral profile



Figure 2: Frontal view



Figure 3: OPG showing ectopic eruption of 11



Figure 4: Bilateral Angle's class1 molar relation



Figure 5: Pretreatment occlusal view of upper and lower arch



Figure 6: Chain elastics placed from crimpable hook to bracket of 11



Figure 7: Follow up after 15 days



Figure 8: Chain elastics replaced with red orthodontic elastic

3. Discussion

Tooth eruption refers to the process by which a tooth moves from its initial formation (developmental) position within the jaw to its final, functional placement in the dental arch. Ectopic eruption is defined as a condition in which the tooth follows an improper path of eruption, deviating from its usual course, often resulting in the tooth appearing in an unexpected location in the mouth. The order of ectopic eruption observed is mandibular lateral incisors > maxillary



**Figure 9:** IOPAR w.r.t 11,21



**Figure 13:** Thermoform retainer delivered

central incisors > maxillary canines > maxillary lateral incisors > mandibular central incisors > maxillary first molar > mandibular canines > mandibular first molar.<sup>3</sup> Also ectopically erupted tooth may result in midline shift,<sup>4</sup> root resorption of adjacent teeth,<sup>5</sup> may lead to infection, cyst formation,<sup>6</sup> abnormal growth of jaw, loss of arch length, and abnormal relationship with opposing dentition.<sup>7</sup>

These variation in the normal eruption patterns of maxillary incisors are common in children. Due to the prominent location of these teeth, parents often become concerned when the eruption does not follow typical patterns and they seek treatment to prevent any psychological impact associated with it.

Ectopic eruption is prevalent in almost 5.6% of general population and majority of cases reported showed the involvement of permanent central incisors. The incisors are reported to erupt ectopically or seen as impacted due to supernumerary tooth in about 2% of population.<sup>8,9</sup> Ectopic eruption, typically unilateral in the maxillary incisors,<sup>8</sup> occurs more frequently in girls,<sup>9</sup> however, Huber et al. found no significant correlation between sex and the incidence frequency of ectopic eruptions.<sup>8</sup>

In the present case, retained deciduous tooth was the cause for ectopic eruption of the respective permanent tooth. Barberia et al. reported that the ectopically erupted tooth corrected itself spontaneously after the removal of the etiological agent.<sup>10</sup> Huber et al. suggested extracting the corresponding primary incisor to allow for natural guidance of ectopically erupted teeth in cases where the deviation is minimal.<sup>8</sup> Suresh et al. reported two cases of retained primary incisors with ectopically erupting central incisors unilaterally. In these cases, self-correction occurred within three months after the removal of the etiological agent. They also described a case of an ectopically erupting central incisor due to an interfering mesiodens, where self-correction did not occur. For this case, the authors used a 2x2 Begg's appliance to align the ectopically erupting tooth after the mesiodens was removed.<sup>9</sup> Ebru et al. reported a case of an ectopically erupting maxillary central incisor



**Figure 10:** 2\*4 Appliance under follow up



**Figure 11:** Follow up after 4 weeks



**Figure 12:** Post operative view showing 11 alignment



caused by an intrusive injury to the predecessor tooth where they used a combination of fixed and removable orthodontic appliances to align the tooth.<sup>11</sup> Jacob et al. reported a case of ectopic eruption of maxillary central incisors due to retained primary incisors bilaterally. Here, fixed orthodontic treatment using a 2×2 appliance was opted following the extraction of retained primary incisors.<sup>12</sup>

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.<sup>11</sup> Clinical experience has shown that light forces are more effective than strong ones in moving ectopically erupted teeth and achieving a good gingival position.<sup>13</sup>

In the current case, a novel approach on orthodontic traction appliance was taken by designing the “SPA” approach, instead of directly opting for fixed orthodontic therapy. The components used in this appliance require only less chair side time and is extremely well tolerated by the patient. Orthodontic elastics were placed from the bracket of tooth 11 to the crimpable hook attached to the splinted rectangular NiTi wire running from tooth 12 to tooth 21. The slow and continuous force applied through the elastics facilitated a more controlled tooth movement. The appliance proved its efficacy in reducing the overjet by correcting the increased palatal root torque. Another significant benefit of this new appliance is that it does not interfere with the patient’s ability to maintain proper oral hygiene. This fresh perspective on treating the ectopically erupted incisor reduced the risk of incisal flaring due to minimal anchorage and thereby the complexity & treatment duration of 2 \* 4 appliance.

#### 4. Conclusion

Treatment of the ectopically erupted incisors in early mixed dentition are often challenging due to its abnormal position and the insufficient arch length. However, newer alternative strategies must be attempted in intercepting this malocclusion in children. The ‘SPA’ appliance that is debuted in the present case has established its efficacy to address such misalignments in an easier and versatile manner.

#### 5. Source of Funding

None.

#### 6. Conflict of Interest


None.


#### References

1. Sribnoska D, Vesna T, Simona S, Chadikovska E. Position-related eruption disorder with ectopic eruption of maxillary central incisor-case report. *J Morphological Sci.* 2023;6(1):136–42.
2. Nikiforuk G. Ectopic Eruption: Discussion and clinical report. *J Ont Dent Assoc.* 1948;25:243–6.
3. Rajashekhar R, Sharada J, Suhasini K, Hemachandrika I, Shaik H, Singh PT, et al. Occurrence of ectopic eruption of different classes of teeth in growing children-A prospective Study. *IP Indian J Orthod Dentofacial Re.* 2023;5(3):96–103.
4. Russell KA, Folwarczna MA. Mesiodens-diagnosis and management of a common supernumerary tooth. *J Can Dent Assoc.* 2003;69(6):362–6.
5. Ericson S, Kurol PJ. Resorption of incisors after ectopic eruption of maxillary canines: a CT study. *Angle Orthod.* 2000;70(6):415–23.
6. Gugrani N, Pandit IK, Gupta M, Gugrani S, Vishnoi A, Sabharwal O, et al. Ectopic eruption of maxillary central incisor through abnormally thickened labial frenum: An unusual presentation. *J Indian Soc Pedod Prev Dent.* 2017;35(1):94–7.
7. Yaseen SM, Naik S, Uloopi KS. Ectopic eruption - A review and case report. *Contemp Clin Dent.* 2011;2(1):3–7.
8. Huber K, Suri L, Taneja P. Eruption disturbances of the maxillary incisors: a literature review. *J Clin Pediatr Dent.* 2008;32(3):221–30.
9. Suresh KS, Uma HL, Nagarathna J, Kumar P. Management of Ectopically Erupting Maxillary Incisors: A Case Series. *Int J Clin Pediatr Dent.* 2015;8(3):227–33.
10. Barberia-Leache E, Suarez-Clúa MC, Saavedra-Ontiveros D. Ectopic eruption of the maxillary first permanent molar: characteristics and occurrence in growing children. *Angle Orthod.* 2005;75(4):610–5.
11. Canoglu E, Akcan CA, Baharoglu E, Güngör HC, Cehreli ZC. Unusual ectopic eruption of a permanent central incisor following an intrusion injury to the primary tooth. *J Can Dent Assoc.* 2008;74(8):723–6.
12. Jacob C, Anupamkumar TV, Vadakkepurayil K. Orthodontic management of ectopically erupting maxillary incisors-a rare case report. *J Dent Med Sci.* 2018;17(4):76–9.
13. Cozza P, Mucedero M, Ballanti F, De Toffol L. A case of an unerupted maxillary central incisor for indirect trauma localized horizontally on the anterior nasal spine. *J Clin Pediatr Dent.* 2005;29(3):201–3.

#### Author’s biography

**Shivaprakash PK**, Professor and HOD

**Anjana Subash**, 3rd Year Post Graduate Student  <https://orcid.org/0009-0001-5466-3454>

**Priyanka Mane**, 3rd Year Post Graduate Student  <https://orcid.org/0009-0004-8056-4064>

**Cite this article:** Shivaprakash PK, Subash A, Mane P. Correction of ectopic eruption of teeth by “SPA” appliance. *J Dent Panacea* 2024;6(4):202-206.