

# Management of an Erupted Mesiodens Affecting the Normal Occlusion: A Case Report

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**Abstract:** *Mesiodens is the most common supernumerary tooth, occurring in 0.15–1.9% of the population. It can cause various complications like midline diastema, rotation, displacement, root resorption and cyst formation. It should be properly diagnosed for the appropriate management to reduce the complications to the developing dentition. In the present case, mesiodens was found in between the two maxillary central incisors. So, this case report features the management of erupted mesiodens that caused the rotation of the right maxillary central incisor in a 12 year old male who was treated successfully by fixed orthodontic treatment.*

**Keywords:** Mesiodens, Rotation, Maxillary central incisors, Fixed orthodontic treatment

## 1. Introduction

A supernumerary tooth is an irregularity in dental development where there is an extra tooth present in addition to the normal set. Its occurrence ranges from 0.3% to 3.8% within the population.<sup>1</sup>

Although supernumerary teeth can appear in various locations within the dental arch, the most frequent site is the palatal midline between the two central incisors of the upper jaw, a condition known as Mesiodens. Coined by Balk in 1917, the term "mesiodens" denotes an extra tooth situated mesial to both central incisors, often presenting as peg-shaped and positioned either normally or inverted. There are two types of mesiodens distinguished by their shape and size. The first type is eumorphic, characterized by a regular morphology resembling the central incisor. The second type, dysmorphic, encompasses various shapes and sizes and is further categorized into subtypes including supplemental, odontomas, conical, and tuberculate.<sup>2,3</sup>

The exact cause of supernumerary tooth development remains unclear. Several etiological theories have been proposed to explain this phenomenon. One theory suggests that it could result from the organized and excessive growth of the dental lamina, leading to the formation of a third tooth germ or splitting of the permanent tooth bud.<sup>4</sup> Another theory proposes that the dichotomy of the tooth bud could be responsible for the occurrence of supernumerary teeth.<sup>1</sup> Additionally, the hyperactivity theory, well-documented in the literature, suggests that the supernumerary teeth may result from the hyperactivity of the dental lamina.<sup>5</sup> Moreover, genetics play a significant role in the occurrence of supernumerary teeth, as these anomalies are more prevalent in the families of affected individuals compared to the general population.<sup>6</sup>

Mesiodens, often aesthetically displeasing, can lead to various complications such as impaction, resorption, displacement, and rotation of the central incisors.<sup>2</sup> Tooth rotation refers to "the observable displacement of a tooth within its socket, typically towards the mesiolingual or distolingual direction along its longitudinal axis." A rotated central incisor can cause significant aesthetic and psychological concerns for a patient.<sup>7</sup>

Therefore, it is crucial to diagnose and extract mesiodens early to prevent such complications.

## 2. Case Report

A 12 year old male patient reported to the department of Pediatric and Preventive dentistry with the chief complaint of irregular teeth in the upper front teeth region since 5 years. Patient did not produce any relevant medical history.

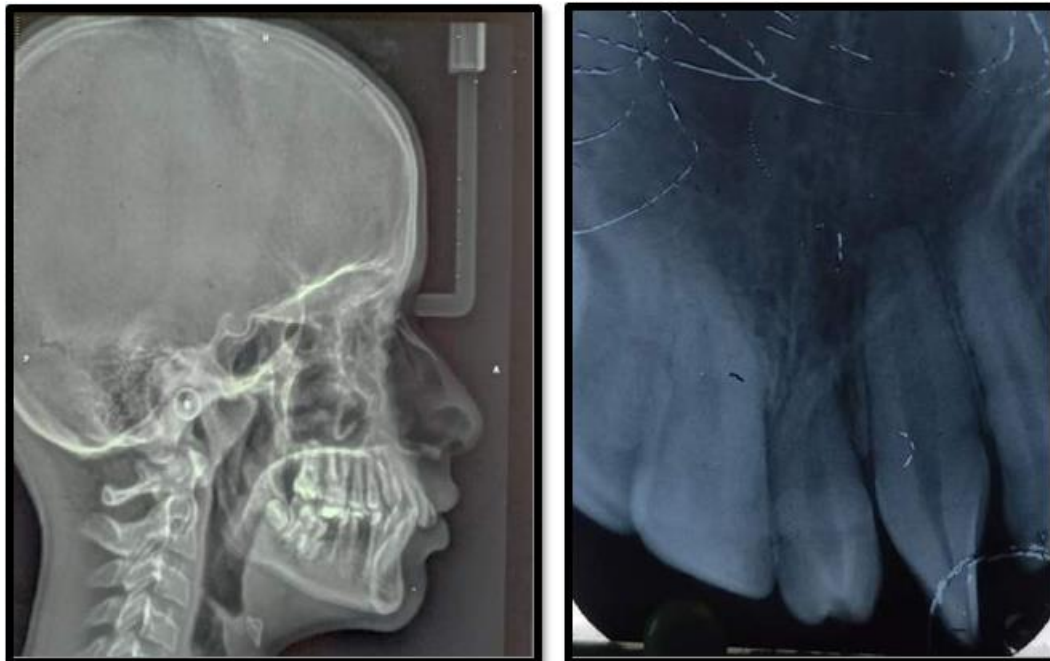
Upon extraoral examination, the child exhibited a convex facial profile. In frontal view, he displayed mesoprosopic features, with a symmetrical face and competent lips at rest.

On intraoral examination, patient revealed class 1 molar relationship in left side whereas on the right side, it couldn't be determined due to the missing 46. Mesiodens was found to be present between both the central incisors, right central incisor was found to be rotated at 90°. Anterior Deep bite was noticed, and 36 was found to be decayed. (Fig.1a)

Radiographic examination revealed the presence of mesiodens between two central incisors, rotated 11 and mesially tilted 47. (Fig.1b)



(a) intraoral photograph



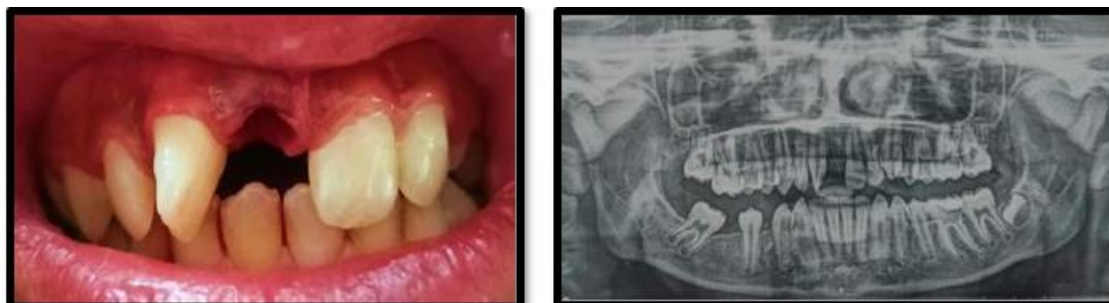
(b) Radiographic images Figure 1: Pre - treatment records

The treatment objectives were to extract the mesiodens, alignment of maxillary and mandibular arch, derotation wrt 11, and RCT followed by post and core and stainless steel crown placement wrt 36.

#### Treatment Progress

After extracting the mesiodens under local anaesthesia (Fig.2a) and complete healing, fixed orthodontic treatment was initiated using edgewise brackets in the upper arch, since patient didn't want any treatment for mandibular arch. Initial alignment and leveling was accomplished with the use of a 0.014" stainless steel arch wire along with simultaneous

placement of anterior bite plane to raise the bite (Fig.2b). Lingual buttons were placed on the labial and lingual surfaces of 11. Ligature wire was applied on both sides of the button to create a couple force, connecting the labial button to the right side of the buccal wire extension and the lingual button to the left side of the buccal wire extension (Fig.2c). The ligature wire was tightened and replaced every four weeks. It is crucial to maintain a pure derotation force along the long axis of the tooth through continuous low - force application. Finally after 3 months, the tooth was derotated (Fig.2d).



(a) Extraction of mesiodens



(b) Anterior bite plane and brackets placed (c) Placement of Lingual buttons



(d) Correction of rotated 11 (e) Bonding of Bracket irt 11

**Figure 2:** Mesiodens extraction and Couple force system for central incisor rotation

Since right side of the upper quadrant was found to be little extruded as compared to the left side, placement of intrusion arch was planned (Fig.3a). A TMA wire was taken and a 90° bend was given anterior to the molar tube so that its anterior segment lies passively at the depth of the vestibule. Then the anterior segment was brought down incisally and was tied to the anterior segment arch wire by using E - chain. This helped in the intrusion of anteriors within 1.5 months (Fig.3b). Then, space closure between the two central

incisors was initiated with the help of E - chain and within 3 - 4 months, midline diastema was closed and anterior bite plane was also removed (Fig.3c).

**Maintenance Phase:** Patient was kept on 2 months of maintenance period. Then, the brackets were removed (Fig.4a) and retainers were placed from canine to canine in the maxillary arch (Fig.4b).



(a) Intrusion arch placed (b) Correction of extruded side of the arch

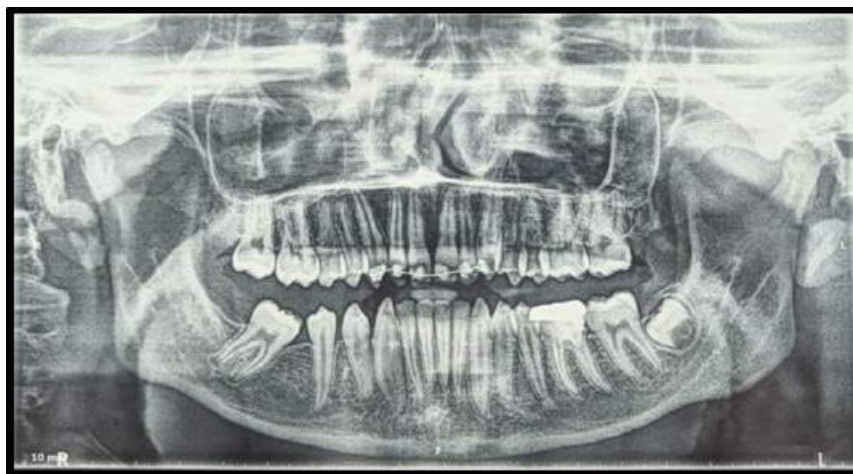


(c) Space closure by E - chain

**Figure 3:** Alignment of the upper arch



(a) Intraoral photograph b: Retainers placed



(b) Radiographic images

**Figure 4:** Post treatment records

### 3. Discussion

A mesiodens refers to a supernumerary tooth that typically emerges between the maxillary central incisors, often positioned palatally. Around 80% of impacted mesiodens are situated palatally, while approximately 6% are found

labially. Interestingly, in about 14% of cases, the mesiodens is located between the roots of the permanent central incisors, as observed in this particular case.<sup>8</sup> The presence of a mesiodens can occur as an isolated finding or may be associated with various craniofacial anomalies. These anomalies can include conditions such as cleftocranial dysostosis, Gardner's syndrome, and cleft lip and palate, and

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etc. Mesiodens can lead to various problems including failure of eruption, diastema or crowding, hindrance to orthodontic tooth movement, dilacerations of the developing root, displacement and / or rotation of adjacent teeth, enlargement of the follicle, and even space loss.<sup>9</sup> In this case, the presence of mesiodens had caused the right permanent central incisor to rotate at almost 90°. Therefore, in this case, it was recommended to remove the supernumerary tooth and initiate early orthodontic correction. This approach was successfully carried out, addressing the issues associated with the mesiodens and facilitating proper dental alignment.

Rotation is indeed one of the most prevalent anomalies within dental malocclusion. It is commonly observed that rotations fall within the range of 45° to 90°, followed by less than 45°. Various methods are available for correcting rotated teeth, including removable, semi - fixed, or fixed appliances. The choice of treatment modality depends on the severity of the rotation.<sup>10</sup>

The removal appliance method includes double cantilever/Z spring with labial bow or labial bow with vertical M - loop, labial bow with retractive canine loop whereas fixed appliances include: by using a rotation wedge which corrects rotation by exerting a push force, employing off - centered brackets to achieve slight over correction of rotations, exerting a greater pull force on the side with the maximum rotation, engaging NiTi archwire into the bracket slot, utilizing palatal/lingual attachments to engage force from the lingual side, thereby applying a couple force (from labially or buccally placed brackets and lingual attachments).<sup>11</sup>

Indeed, a couple force can be applied to a rotated tooth through various methods. Rotation wedges, elastomeric chains, insertion of a NiTi archwire into the bracket slot, or the use of ligature wires are all effective techniques for generating this force. In the specific case mentioned, ligature wires were utilized to create the necessary couple force for correcting the rotated tooth.<sup>7</sup> Simultaneously, anterior bite plane was also used to raise the bite. An acrylic extension of the anterior bite plate holds the lower incisors and helps open up the bite in the posterior segment. This posterior disocclusion facilitates the further eruption of the posterior teeth, ultimately leading to a reduction in the anterior deep bite.<sup>12</sup>

Maxillary incisor intrusion is often advised for non - growing patients with deep overbites, particularly those with a gummy smile. However, the positioning of the maxillary incisors, especially in relation to the upper lip, plays a crucial role in determining the appropriate treatment approach. Overbite correction via maxillary incisor intrusion in patients with insufficient incisor display can result in flattening of the smile arc and a reduction in smile attractiveness. Therefore, careful consideration of incisor positioning is essential in treatment planning to ensure optimal aesthetic outcomes.<sup>13</sup> In this case, intrusion arch was used to correct the extruded right side of the arch. To achieve true intrusion, the point of force application is indeed crucial, as it should be directed through the center of resistance of the anterior teeth.<sup>14</sup> It is recommended that an intrusive force be consistent and applied using low load -

deflection mechanisms during incisor intrusion.<sup>15</sup> Various force ranges have been reported in recent literature, typically ranging from 40 to 100 grams. Steenbergen compared the effect of 40 g and 80 g. Polat used 80 g, and Senisik used a range from 90 to 100g while Deguchi et al. used 80 - 120 g.<sup>13</sup> Conventional intrusion - arch mechanics often result in labial tipping of the incisors, which may not always lead to favourable treatment outcomes.<sup>16</sup> To minimize this undesired effect, forces are applied through the center of resistance (CR) to intrude the teeth without inducing any labial or lingual rotation. The center of resistance (CR) of the incisors is commonly estimated to be situated near the geometric center of their roots. Various in - vitro studies utilizing different methods such as photoelastic stress analysis, laser reflection technique, finite element method, holographic interferometry, as well as in - vivo studies, have been conducted to determine the CR of the incisors. These studies consistently indicate that the CRs of the four incisors typically lie approximately 8 to 10 millimeters apically and 5 to 7 millimeters distally to the lateral incisors.<sup>13</sup>

In this case, complete derotation and alignment of the upper arch was obtained within 1 year of treatment.

#### 4. Conclusion

A careful clinical and radiographical examination can reveal the presence of mesiodens. The treatment planning can be done based on the clinical case. In the present case, the mesiodens led to the rotation of the adjacent teeth leading to disharmony in the occlusion which was successfully treated.

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