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# A Case of Mistaken Identity of a Mesiodens

**Abstract:** This case report discusses the characteristics, sequelae and management of the supernumerary tooth in a developing dentition, particularly the mesiodens. The case describes when an eruption of a mesiodens was misdiagnosed as a microdont maxillary central incisor, leading to ectopic and late eruption of the permanent maxillary incisor. This case highlights the importance of clinical and radiographic investigation where tooth size asymmetry is observed in the upper anterior region.

**CPD/Clinical Relevance:** The incidence of a single microdont maxillary central incisor is rare and is not known to be documented in the literature. If a small tooth erupts in the midline it should be considered a supernumerary tooth until proven otherwise. Further clinical and radiographic investigation should be performed to determine the presence and location of the maxillary central incisor(s).

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## Introduction

### Definition and prevalence

Supernumerary teeth or hyperdontia is the presence of teeth in excess of the normal number. The most common supernumerary tooth is the mesiodens,<sup>1</sup> which is a supernumerary tooth located in the maxillary central incisor region. The reported prevalence of mesiodens ranges between 0.15% and 1.9%<sup>2</sup> and can occur as single or multiple entities, present either unilaterally or bilaterally.<sup>3</sup> Mesiodens are reported to occur in conjunction with other dental anomalies; a third of all mesiodens patients present with other supernumerary teeth, whilst some present with congenitally missing teeth.<sup>4</sup>

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### Features

Mesiodens can be classified on the basis of their occurrence in the permanent or primary dentition and morphology. Morphologies reported in the literature include conical, tuberculate, supplemental, molariform and odontomes (compound and complex odontomes),<sup>5</sup> of which the conical form is the commonest type,<sup>6</sup> comprising approximately two-thirds of all mesiodens.<sup>5</sup> The conical mesiodens is typically a peg-shaped, singular entity and often has a completely formed root with potential for eruption into the oral cavity.<sup>2</sup>

### Cause/theories

The mesiodens may be seen as an isolated entity or in association with various syndromes, such as cleft lip and palate, Gardner's syndrome and cleidocranial dysostosis.<sup>7</sup> The aetiology of mesiodens remains controversial, however, three theories have been suggested in the literature:<sup>3</sup>

1. Phylogenetic reversion, whereby it was hypothesized that the mesiodens represented a phylogenetic relic of extinct ancestors who possessed three central incisors;<sup>4</sup>
2. The dichotomy theory which proposes that the tooth bud splits into two teeth, one of

which is the mesiodens;<sup>8</sup>

3. The last theory, which relates to hyperactivity of the dental lamina, may be considered as the most acceptable aetiological factor.<sup>3</sup> In this theory, palatal offshoots of active dental lamina or remnants of the dental lamina are triggered to develop into an additional tooth bud, giving rise to a supernumerary tooth.<sup>2</sup>

Whilst most supernumerary teeth appear to be idiopathic,<sup>9</sup> a genetic basis has been proposed as a positive family history appears to be a predisposing factor.<sup>6</sup> Genetic transmission via an autosomal dominant trait with incomplete penetration,<sup>8</sup> as well as via an autosomal recessive pattern,<sup>1</sup> have both been suggested. Moreover, the 2:1 male to female incidence ratio<sup>10</sup> may also be explained by the possibility of an X-linked inheritance pattern.<sup>8</sup> However, the heredity of the mesiodens does not follow a simple Mendelian pattern and environmental factors were also proposed to have an influence on genetic susceptibility.<sup>11</sup>

### Sequelae

Various complications have been reported to occur in association with the presence of mesiodens. However, the commonest of these are ectopic eruption (28–82% prevalence)



**Figure 1.** (a) Initial facial frontal view smiling. Initial intra-oral views: (b) centre; (c) right side; (d) left side. Initial intra-oral occlusal views: (e) upper; (f) lower.

and impaction (26–52% prevalence) of the permanent maxillary incisors.<sup>2</sup> The mesiodens is known to be the most common cause of central incisor impaction<sup>12</sup> and non-eruption. Other possible causes for unerupted permanent maxillary incisors are dilaceration following trauma to the primary incisor dentition, and space loss.<sup>13</sup> Hence, a mesiodens should be suspected where asymmetric eruption of the permanent maxillary incisors or asymmetric overretention of the primary maxillary incisors is observed, or where there is significant ectopic eruption of one or both permanent maxillary incisors.<sup>7</sup> The tuberculate mesiodens has been reported to be more likely to cause impaction, whereas the conical mesiodens frequently causes displacement of the adjacent tooth.<sup>14</sup> Whilst the use of panoramic, maxillary occlusal and periapical radiographs have been proposed to assist the practitioner in the early diagnosis of mesiodens, a more precise view of the midline region would be best provided by

maxillary occlusal or periapical radiographs,<sup>15</sup> due to the narrow focal trough of panoramic machines which may fail to provide a clear image of the region in question.<sup>16</sup> Emphasis is placed on early diagnosis of the mesiodens, which consequently prevents further complications to the developing occlusion and improves treatment prognosis.<sup>15</sup> Whilst an unerupted mesiodens bearing no significant effect on the adjacent teeth may present as a chance finding on radiographs, mesiodens are more commonly discovered when adjacent teeth have delayed eruption or are displaced.<sup>17</sup> Additionally, 25% of mesiodens cases do spontaneously erupt into the oral cavity<sup>15</sup> and may be mistaken as a permanent successor, as highlighted in this case report.

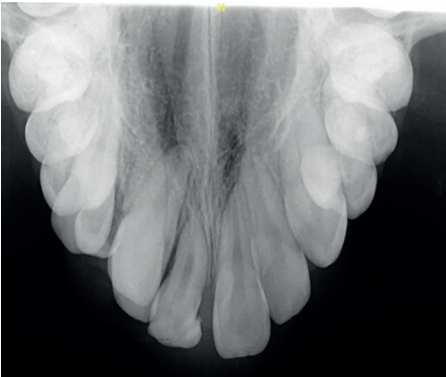
### Case report

A 10-year-old boy attended our hospital orthodontic department following a referral from his dentist. He was unhappy with the

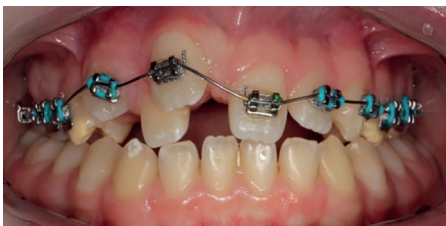
appearance of his upper front teeth, particularly the diminutive shape of the supposed upper right central incisor to which he had numerous composite build-ups for the past two years. The recent emergence of an extra tooth labial to the UR2 alarmed both patient and parents, as it was assumed that he had already established a full complement of permanent teeth in the upper anterior region. Medical and family history was unremarkable. Clinical and radiographic examination revealed Class III incisors on a mild Class II skeletal base, complicated by a diminutive and built-up tooth in the UR1 position. The patient presented in his late mixed dentition whereby the URC, UR2 and UL2 occluded in crossbite and the UR5, UR4, UL4 and UL5 had enamel hypoplasia (Figures 1a–f). Radiographs confirmed that the buccally palpable tooth imminently erupting above the UR2 was indeed the UR1 (Figure 2). The treatment option proposed following planned extractions of the supernumerary tooth and retained URC was upper and lower fixed appliances for full correction of the malocclusion and alignment of the UR1. It was felt that surgical intervention was of no benefit as the UR1 was beginning to erupt at initial presentation (Figures 1b and 3).

### Treatment progression

Following local anaesthetic extraction of the supernumerary tooth in the UR1 position, a round (016) nickel titanium (NiTi) wire was first utilized to gain vertical alignment and to apply traction to the UR1 (Figure 3). Once the UR1 was moved into position, an upper 018 stainless steel wire was used, in conjunction with NiTi push coil (Figure 4) to open space for the UR2. Satisfactory alignment of the UR1 was observed within 3 months of orthodontic treatment and the UR2 was bonded and picked up on the archwire (Figure 5). As the root of the UR2 was initially in a palatal position, the UR2 bracket was inverted to enable labial repositioning of the UR2 root during treatment. Once alignment of the UR1 was achieved, the lower arch was bonded up starting with an 016 NiTi wire. Treatment progressed with rectangular NiTi wires (18/25 NiTi) (Figure 6) and then 19/25 posted stainless steel wires to gain full torque expression using American Orthodontic MBT (McLaughlin, Bennett and Trevisi) prescription brackets. To achieve Class 1 buccal segments, Class II elastics (100 grams of force) were utilized during the space closure phase of treatment. Anterior box elastics were used to improve the overbite during the finishing phase



**Figure 2.** Initial upper standard occlusal radiograph.



**Figure 3.** Upper bond up.



**Figure 4.** Nickel titanium push coil to open space for the UR2.



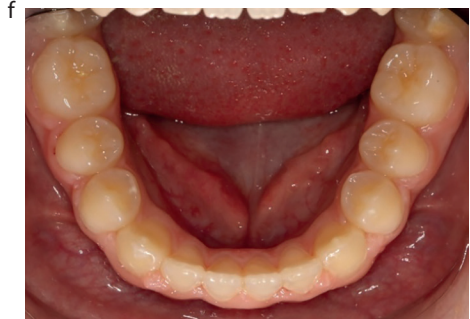
**Figure 5.** Satisfactory alignment of the UR1 with NiTi wire, bonding of UR2 (inverted bracket).

of treatment. The treatment duration totalled 16 months and the final result is shown (Figures 6a–f).

#### Critique

Upon review of the case, there was a small discrepancy in the clinical crown length of the UR1 and UL1. This has occurred due to the initially high position of the UR1 at the start of

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**Figure 6.** (a) Final facial frontal view smiling. Final intra-oral views: (b) centre; (c) right side; (d) left side. Final intra-oral occlusal views: (e) upper; (f) lower.

treatment. Unfortunately, the maxillary central incisors, in particular, were not parallel-sided, and so there was a small V-shaped gap mesio-incisally. This was discussed with the patient and parents before debond. It was suggested that the teeth could be built up by the general dental practitioner later in life if it became an aesthetic concern to the patient in later years.

#### Discussion

This case highlights the importance of having a high index of suspicion for the presence of mesiodens where asymmetry in the upper anterior region is observed. The finding of an asymmetrically smaller central incisor is rare, and has been theorized by Sofaer, who states that, if there is a microdont maxillary lateral incisor, where the other lateral incisor is present and of average dimensions, the central incisor adjacent

to the microdont lateral incisor will be smaller than the central incisor on the contralateral side.<sup>18</sup> This hypothesis is supported by trends in a recent study by Tadros *et al*, confirming the existence of interactions between adjacent developing teeth at the site of dental variation.<sup>19</sup> However, in this case, where both laterals are present and of equal dimensions, the presence of a mesiodens causing alteration to the eruption path and position of the permanent incisor<sup>4</sup> is a more likely possibility. As noted in the literature, the presence of a supernumerary tooth is responsible for impaction or delayed eruption of the permanent maxillary incisors in approximately 26–52% of cases.<sup>2</sup>

The principles of management of impaction or delayed eruption of the permanent maxillary central incisor are creation of space and removal of obstruction,

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| <b>Age</b><br>Spontaneous eruption is more likely to occur if supernumerary and retained deciduous teeth are removed early. The literature suggests that this is between 8–9 years old. <sup>23</sup>  |
| <b>Vertical position of impacted incisor</b><br>The higher the vertical position of an unerupted incisor, the less likely is its spontaneous eruption following supernumerary removal. <sup>24</sup>   |
| <b>Developmental stage of impacted incisor</b><br>Incisors with immature roots are more likely to erupt spontaneously following supernumerary removal. <sup>25</sup>   |
| <b>Morphology of supernumerary and degree of incisor displacement</b><br>Tuberculate supernumeraries and odontomes are more likely to impede permanent maxillary incisor eruption with greater resultant displacement, as compared to conical supernumeraries. <sup>23</sup> |
| <b>Space availability</b><br>Approximately 9–10 mm is required for a permanent maxillary central incisor.  |

**Table 1.** Factors influencing spontaneous eruption.

with consideration for surgical exposure and orthodontic traction of the incisor.<sup>13</sup> A clinical dilemma lies in the timing for removal of the mesiodens, as this issue remains contentious.<sup>2</sup> Whilst some advocate early removal before root formation of the permanent incisor in order to encourage spontaneous eruption,<sup>2</sup> others advocate delayed removal after root formation, to reduce the risk of iatrogenic surgical damage to the permanent incisor's apical development.<sup>20</sup> If there is any doubt with regards to apical development, further imaging, including the use of parallax, and Cone Beam Computed Tomography (CBCT) in select cases may be useful. In addition, discussion with the surgical team would be appropriate. Nonetheless, immediate removal is indicated when there is inhibition or delay of eruption, displacement of adjacent teeth, presence of pathology, or spontaneous eruption of the mesiodens.<sup>15</sup> The age at presentation is an obvious factor here and, in the authors' experience, patients present only when disruption is noted by the general dental practitioner. In most cases, this is when one central incisor has erupted and a period of 6 months has passed, or the lateral incisors have presented, highlighting a disruption in the eruption sequence. In these cases, root development is rarely a cause for concern in the management of these cases.

Early clinical and radiographic detection of mesiodens facilitates early removal of the mesiodens in order to prevent complications<sup>21</sup> and, if commenced in the early mixed dentition stage, should enable normal eruptive forces to promote spontaneous eruption

of the permanent maxillary central incisor,<sup>17</sup> which may result in a better alignment of teeth, thus reducing the need for orthodontic treatment.<sup>15</sup> Delayed removal, on the other hand, poses a greater risk of non-eruption or malalignment of the incisor, which frequently requires more complex surgical and orthodontic management.<sup>17</sup> In this case, a delay in detection and removal of the conical mesiodens at 10 years of age resulted in displacement of the incisor, necessitating a course of orthodontic treatment to re-open space and bring the incisor into the dental arch. The persistence of the supernumerary tooth could have resulted in hopeless ectopia of the UR1 or root resorption of nearby teeth, due to its displacement. Thankfully, in this case, no detrimental effects occurred. Although complete root formation of the permanent maxillary central incisor was expected and radiographically confirmed, the incisor continued to erupt into the oral cavity following mesiodens removal, hence discounting a surgical procedure for its exposure. The success rates for spontaneous eruption of the incisor following supernumerary removal has been reported to be between 49%–91%,<sup>13</sup> with permanent incisors associated with conical supernumeraries being twice as likely to erupt spontaneously compared to those associated with tuberculate supernumeraries.<sup>22</sup> The factors which may influence spontaneous eruption of the incisor are listed in Table 1.

Whilst the figures for spontaneous eruption appear favourable, it is reported that between 30%–54% of impacted incisors require further surgical intervention following

supernumerary removal.<sup>13</sup> Hence, in cases where spontaneous eruption is unlikely and a general anaesthetic is planned, consideration should be made for surgical exposure and bonding of an orthodontic attachment at the time of supernumerary removal.<sup>13</sup> This avoids the need for a repeat general anaesthetic and enables immediate commencement of orthodontic traction, should the incisor fail to erupt spontaneously following removal of the supernumerary. An open exposure or closed eruption technique may be employed, however, current evidence is in favour of a closed eruption technique in terms of gingival and periodontal outcomes.<sup>12</sup>

As noted in this case, gingival heights are often asymmetric following delayed or orthodontic eruption and may require adjunctive procedures, such as gingival surgery, should aesthetic concerns arise.<sup>2</sup> Additionally, long-term retention is recommended due to an increased risk for tooth position to relapse.<sup>2</sup>

## Conclusion

The mesiodens is the most common cause of permanent maxillary central incisor impaction, and hence should be suspected in case of failure of eruption of one or both permanent maxillary incisors, or where asymmetry is observed. Clinical vigilance supplemented by the use of intra-oral radiographs will enable early diagnosis and time-appropriate treatment to facilitate eruption and alignment of the impacted permanent maxillary central incisor.

## Compliance with Ethical Standards

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Informed Consent:** Informed consent was obtained from all individual participants included in the article.

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