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# The Migration of a Mesiodens over Eight Years: A Case Report

**Abstract:** The term mesiodens describes a conical supernumerary tooth located between the maxillary central incisors. Complications of these teeth include: disturbance of the eruption pattern of neighbouring teeth; spacing; crowding; displacement or total failure of eruption. Finally, they can migrate and cause damage to neighbouring structures. This case report describes a clinical case in which a mesiodens migrated over an eight-year period distally from the anterior of the maxilla along the palate. Radiographic techniques of plain radiography and Cone Beam Computed Tomography were used to locate its exact position.

**Clinical Relevance:** This paper discusses briefly the aetiology and complications of mesiodentes, and highlights the fact that they can migrate in the maxilla significant distances from their original position. This raises the question as to whether or not their position should be monitored.

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A supernumerary tooth is one that is additional to the normal series and can occur singly, in multiples, unilaterally or bilaterally and in the maxilla, the mandible or both.<sup>1</sup> Their reported prevalence ranges between 0.3–0.8% in the primary dentition and 0.1–3.8% in the permanent dentition.<sup>2,3,4</sup>

The aetiology of supernumerary teeth is not completely understood, with various theories existing for the different types of supernumerary teeth, including:

- Atavism;
- The dichotomy theory; and
- The dental lamina hyperactivity theory.<sup>5,6</sup>

Their exact aetiology remains unknown, but current knowledge suggests a complex interplay between developmental processes, genetic factors and favouring the dental lamina hyperactivity theory.<sup>7,8</sup>

## Classification

Classification is according to morphology or location.<sup>9</sup>

Morphological classification can be:

- Conical;

- Supplemental.

Classification based on location may include:

- Mesiodens;
- Paramolar;
- Distomolar;
- Parapremolar.

## Mesiodens

A mesiodens is usually a conical supernumerary tooth located between the maxillary central incisors.<sup>2</sup> It may also take a tuberculate, supplemental or an odontome form, and be found in a regular, inverted or horizontal orientation.<sup>10</sup> These supernumerary teeth are usually located palatal to the permanent incisors, rarely lying in the line of the arch or labially.<sup>11</sup> The mesiodens is usually small and short, with a triangular or conical crown.<sup>12</sup> As a result, mesiodentes tend to be initially detected radiographically following clinical examination, often as a result of dental disturbances in the premaxilla. In order to determine the position of a supernumerary tooth accurately, several conventional

radiographic views are required.<sup>13</sup> However, the use of Cone Beam Computed Tomography (CBCT) can be used to provide accurate three-dimensional (3D) images of related dental and bony structures and has been shown to be helpful in pre-treatment evaluation.<sup>14</sup>

## Associated complications of mesiodentes

Mesiodentes have the potential to result in a range of complications in their surrounding area. A common occurrence is disturbance of the eruption pattern of neighbouring teeth which can result in their displacement or total failure of eruption.<sup>2</sup> In one radiographic investigation of mesiodentes and their associated complications it was found that delay of eruption of the permanent central incisor occurred in 6% of cases; malposition or rotation of the central incisor in 2.5% and dentigerous cyst formation arising from the mesiodens in 11%.<sup>10</sup> Extraction of a mesiodens is indicated as a result of such complications or if local orthodontic movement of teeth is required. This may, however, result in iatrogenic damage to neighbouring structures.<sup>1</sup>



**Figure 1.** Age 5 – Upper anterior occlusal showing erupted mesiodens inbetween URA, URB with second mesiodens associated with UL1.

### Mesiodens migration

The intrabony migration of mesiodentes has been demonstrated from their initial location in the premaxilla using sequential radiographs. Case reports in the literature have demonstrated movement towards the nasal cavity, the middle of the palatal vault or the maxillary sinus. Distal migration adjacent to premolar and molar root apices has also been reported.<sup>10,15–20</sup>

Localized migration is the more common and it has been hypothesized that awaiting movement of the mesiodens could result in a more favourable approach to any extraction decision.<sup>13</sup> However, migration pathways of mesiodentes are difficult to predict and may result in a compromised surgical approach.<sup>17</sup> Hence, early removal to prevent such issues and so reduce the risk of damage to neighbouring teeth may be recommended.<sup>21</sup> If left *in situ*, some authors advocate yearly radiographic examination of the unerupted tooth to monitor for pathological changes.<sup>9,12</sup> However, as supernumeraries should be considered in the same way as other unerupted or impacted teeth, it is difficult to justify radiographic monitoring, as the pick-up rate of pathological change is not justified by the additional radiation burden.<sup>22</sup>

### Case history

A 5-year-old female attended the Child Dental Health department of the Glasgow Dental Hospital and School for removal of an erupted midline supernumerary, conical mesiodens, associated with the upper right deciduous central incisor (URA). Radiographic investigation with an upper anterior occlusal view revealed a second unerupted supernumerary associated with the unerupted upper left deciduous central incisor (UL1) which appears on this view to be inverted (Figure 1). The erupted supernumerary and URA were removed



**Figure 2.** Age 6 – Upper anterior occlusal showing erupted mesiodens removed, second mesiodens associated with UL1 with radiolucent slightly enlarged follicle.

under inhalational sedation to allow eruption of the permanent central incisors; at that time it was considered that the second supernumerary did not pose a threat to their eruption. The patient's dental development was subsequently reviewed in the orthodontic department over a four-year period, and the position of the unerupted supernumerary tooth was assessed when a further radiograph was indicated to assess the upper anterior crowding (Figure 2). At this stage, she was unable to tolerate planned premolar extractions to relieve crowding with upper removable appliance therapy to be used as a space maintainer. She was discharged to be re-referred by her dentist after further dental development.

The patient returned to the orthodontic department to assess her malocclusion at 13½ years of age. A full orthodontic assessment and records including photographs, study models and radiographs were undertaken (Figures 3–6).<sup>23</sup> There were no clinical signs or symptoms of the mesiodens, with the patient and parent unsure if there was another supernumerary. They were aware of the previously extracted tooth at 5 years of age, and this contributed to the confusion about the existence of another mesiodens. However, close examination of the written records confirmed the historical presence of a second mesiodens.

### Discussion

The upper anterior occlusal radiograph taken at age 5 shows the erupted mesiodens and the second unerupted mesiodens associated with UL1 (Figure 1). The view taken at age 6 shows that the mesiodens is still associated with the UL1. However, there



**Figure 3. (a–e)** Age 13½ – Intra-oral photographs when patient returned to department for new assessment.

is a radiolucency associated with the crown, which could indicate an enlarged follicle or cystic change (Figure 2).

A panoramic radiograph taken aged 13½ did not show the mesiodens as it was presumably out of the focal trough (Figure 4). Close inspection of the lateral cephalometric radiograph taken at the same time shows the mesiodens faintly visible in line with the maxillary permanent molar apices (Figure 5). Finally, only the apex of the



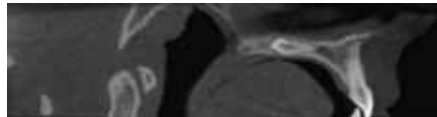
**Figure 4.** Age 13½ – Dental panoramic radiograph with no sign of mesiodens.



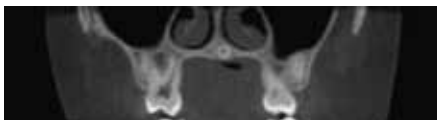
**Figure 6.** Age 13½ – Upper anterior occlusal view showing the apex of mesiodens, left of the midline.

mesiodens is displayed on the upper anterior occlusal radiograph taken at age 13½ (Figure 6). The plain radiographic views did not enable complete localization of the mesiodens and prevented adequate judgement about any associated pathology or possible interference with adjacent structures. In view of this, it was decided to carry out a Cone Beam Computed Tomography (CBCT) examination.

The CBCT scan was obtained using an i-Cat® (Imaging Sciences International, Hatfield, PA, USA). A 4 cm high field of view (FOV) scan of the maxilla was obtained using a 20 second exposure time and 18.45 mAs, thus following the principle of keeping the radiation dose as low as reasonably practicable (ALARP), but ensuring the images are still of diagnostic quality.<sup>24</sup> The image was reconstructed from the DICOM (Digital Imaging and Communications in Medicine) data using Maxilim software (Maxilim® 2.2.0 (Medicim, Mechelen, Belgium)) which can create a 3D image for assessing maxillofacial anatomy and simulating surgical moves with soft tissue response. It contains various



**Figure 7.** Age 13½ – Parasagittal CBCT slice view at midline of UL1.



**Figure 8.** Age 13½ – Coronal CBCT slice view at amelodentinal junction of mesiodens showing it is clearly left of the midline, in UL1 region with close proximity to floor of nose, but no penetration.

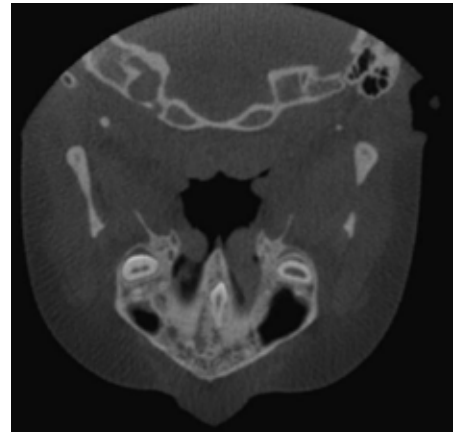
functions, including 3D CT modelling; performs a 3D cephalometric analysis; surgical osteotomies and accurate 3D movements of bony segments and simulates accompanying soft tissue changes.<sup>25</sup> The image is initially viewed in all three planes of space using the i-CAT® software, enabling detailed inspection (Figures 7–9). Cleansing the image of artefacts, using the software VRmesh (VirtualGrid, Seattle City, WA, USA), which is a 3D point cloud and mesh processing software package, allowed removal of scattering and noise from the image. The reconstructed hard tissue model of the maxillary teeth was then superimposed on to the axial CBCT slice (Figure 10).

Analysing the CBCT images clearly showed that the tooth had migrated distally in the midline of the hard palate and was now in line with the first permanent molars. Moreover, the coronal slice showed the tooth just left of the hard palate's midline. There was a possibility of thinning of the bone between the mesiodens and the floor of the nose, but no perforation (Figure 8).

Finally, the justification for each radiographic investigation was assessed



**Figure 5.** Age 13½ – Lateral cephalogram showing mesiodens in line with maxillary molars.



**Figure 9.** Age 13½ – Axial CBCT slice view at level of trifurcation of maxillary first molars showing mesiodens crown at level of molars.

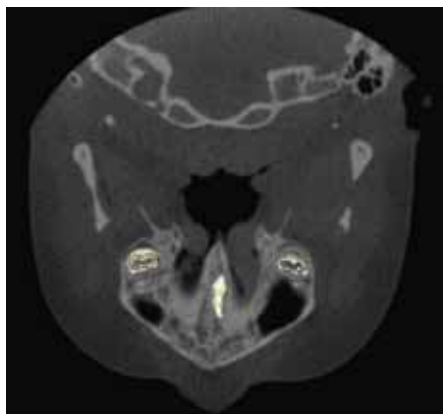
carefully to ensure that they adhered to the previously mentioned principle of keeping the radiation dose as low as reasonably practicable (ALARP) (Table 1).

## Treatment

All of these findings were relayed to both the patient and her mother, explaining that complications that could arise from the mesiodens included, further migration and, if that occurred, damage to adjacent structures. It was decided to undertake functional appliance therapy and keep the mesiodens under observation.

The patient did not comply with functional appliance therapy. The justification for a further CBCT after a year was considered but rejected, with only the suspicion of the nasal floor communication and the patient symptom free. Unfortunately, she did not want any orthodontic appliance treatment, and requested extraction only therapy to remove her misaligned teeth. She has now been discharged back to the care of her general





**Figure 10.** Age 13½ – Axial CBCT slice view with superimposed constructed models of mesiodens and second maxillary molars (white). The roots of the second molars clearly visible, with trifurcation of UR6 just visible showing mesiodens is positioned in line with molars.

dental practitioner who was fully informed of the situation, and advised to contact the department in future if required.

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Age	Radiographic Investigations	Justification
5 years and 6 months	Upper anterior occlusal	Assessment of erupted supernumerary tooth and possibility of others
6 years and 6 months	Upper anterior occlusal	Assessment of unerupted supernumerary tooth prior to planned orthodontic treatment
13 years and 7 months	Dental Panoramic Lateral Cephalometric	Orthodontic assessment of dentition and Class II skeletal relationship
13 years and 7 months	Upper anterior occlusal	Localization of unerupted supernumerary tooth not evident on panoramic
13 years and 10 months	Cone Beam CT scan of the maxilla	Localization of migrated unerupted supernumerary tooth

**Table 1.** Patient's age in years and months at the time of each radiographic examination undertaken with its justification.