

**CLINICAL
SECTION**

A late-forming mandibular supernumerary: a complication of space closure

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This case report describes a situation in which a mandibular supernumerary developed during orthodontic treatment and prevented space closure.

Key words: Late-forming supernumerary, space closure complication, radiographs

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Introduction

Supernumerary teeth are described as those in excess when compared to the normal dental formula.¹ Their reported prevalence ranges between 0.1 and 3.8% in the permanent dentition, and between 0.3 and 0.8% in the primary dentition.^{2,3} Potential complications of supernumerary teeth include failure of eruption, displacement, rotation or root resorption of adjacent teeth, crowding, abnormal diastema, cyst formation and eruption into the nasal cavity.^{1,2,4}

The incidence of supernumerary premolars is reported to be 1 in 10 000 individuals.⁵ Several studies have been conducted in order to determine their prevalence. Rubenstein⁶ reported 0.64% prevalence of supernumerary premolars. Grahnén and Lindahl⁷ reported that mandibular premolar supernumeraries occur in 0.29% of the general population. Mandibular premolar supernumeraries have been reported to represent 6.6%,³ 9.2%⁸ and 14%⁷ of all supernumeraries. The wide variation in percentages reported can be attributed to variations in size of study, age, range, racial composition and methods of detection.

The aetiology of supernumerary teeth is unclear and various factors, namely genetic and environmental, have been suggested.² Supernumerary teeth may result from hyperactivity of the dental lamina, proliferation of dental lamina remnants or cell rests, or division of tooth germs.⁹ The familial nature of supernumerary teeth may be supported by findings that they are more common in relatives of affected children.¹⁰ A sex-linked

mode of inheritance has been suggested by the observation that males are affected twice as often as females.² Supernumeraries have a tendency to begin their development later than their corresponding normal teeth.^{3,4} An unerupted supernumerary tooth may be found by chance during radiographic examination, with no apparent effect on adjacent teeth.

Classification of supernumerary teeth is based on location or morphology.² Ninety to ninety-eight per cent occur in the maxilla, most commonly in the premaxilla.¹ The majority of cases reporting one or two supernumerary teeth involve the anterior maxilla, followed by the mandibular premolar region. There are variations in the reported relative frequencies of supernumerary teeth in other regions.² Supernumerary maxillary premolars have variable morphology, but are predominantly conical. Those in the mandible tend to have the shape of a normal premolar crown.¹¹ A number of well known conditions, including cleidocranial dysplasia, Gardner's syndrome and cleft lip and palate can predispose to the development of supernumerary teeth.^{2,12,13} A study on multiple supernumerary teeth without associated systemic conditions or syndromes, found the highest frequency of occurrence (45%) in the mandibular premolar region.¹³ Supernumerary premolars can appear in more than one quadrant, are more likely to develop in the mandible than the maxilla and are more common in males than females.^{4,6,14–16}

There have been numerous case reports documenting the presence of supernumeraries in the mandibular premolar region.^{4,5,9,11,12,14,15,17–28} Several cases have

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been reported in which supernumeraries have developed during orthodontic treatment.^{6,11,14,17-19,28} This report describes how a late-developing supernumerary in the premolar region had an effect on the proposed orthodontic treatment and posed difficulties in space closure. This supernumerary was not apparent, radiographically, prior to treatment. Although the potential of supernumeraries to prevent space closure has been recognized,^{4,11,14} to our knowledge, there has been no reported case documenting this specific complication.

Case history

A 13-year-old autistic Caucasian male was referred to the Orthodontic department at Guy's Hospital for treatment of a Class II division I malocclusion. The history and subsequent clinical examination provided no information of a remarkable nature. There was no relevant family history.

Extra-oral assessment

- Mild skeletal Class II pattern
- Average lower face height
- Reduced FMPA
- At rest, lips were competent
- Acceptable facial profile; lips on Ricketts's E-Plane; obtuse nasolabial angle

Intra-oral assessment

- Mild mandibular arch crowding (approximately 4 mm)
- Severe maxillary arch crowding (approximately 9 mm) with exclusion of maxillary right canine. Maxillary left canine unerupted with insufficient space to erupt.
- Molar relationship 1/2 unit Class II bilaterally

Radiographic assessment

The pre-treatment dental panoramic tomograph (DPT) (Figure 1) showed normal dental development for the patient's age, with no presence of supernumeraries.

Aetiology of the malocclusion

- Skeletal: Class II skeletal base with mandibular retrognathia
- Dento-alveolar: tooth size/jaw size discrepancy (crowding)

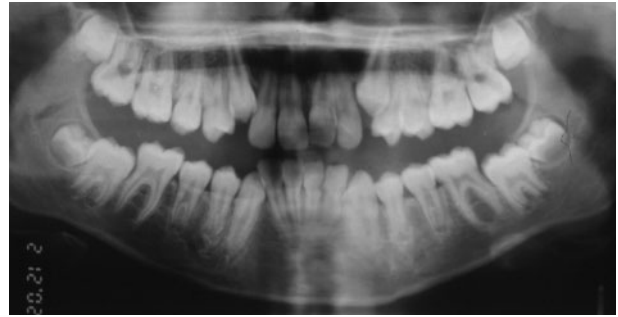


Figure 1 Pre-treatment dental panoramic tomograph

- Soft tissues: no obvious abnormality
- Habits: nil

Aims of treatment

- Preserve facial profile
- Relieve crowding in both arches
- Attain Class I incisor and molar relationships

Treatment plan and rationale

In order to avoid extractions, medium pull headgear could have been used to distalize the maxillary buccal segments. However, the patient refused to wear headgear and his parents felt he would be unable to tolerate this treatment regime. If possible, an alternative approach was thus required, so the following treatment plan was tailored to the patient's needs:

- Extraction of maxillary first premolars and mandibular second premolars.
- Nance palatal arch placement for anchorage reinforcement.
- Upper and lower fixed appliances, with or without Class II intermaxillary elastic traction.

Treatment progress

The patient was treated with pre-adjusted edgewise appliances. His treatment took 20 months until debond.

Towards the end of treatment, spaces remained in the regions of the extracted premolars. Class II intermaxillary elastic traction was utilized. However, the patient was not consistently compliant with this treatment regime. Elastic chain was used in order to close the mandibular right premolar space and correct the lower centreline, which was initially 3 mm to the left. After a few visits, it was apparent that this space was not closing. It was decided to take a DPT and lateral



Figure 2 Dental panoramic tomograph showing developing supernumerary in the lower right premolar region

cephalogram in order to determine why space closure was difficult, while simultaneously assessing the labial inclinations of the anterior teeth. These radiographs confirmed the presence of a late-forming supernumerary in the lower right premolar region (Figures 2 and 3). On careful clinical inspection of this region, the supernumerary could not be palpated buccally or lingually. This confirmed the supernumerary was in the line of the dental arch bucco-lingually.

Treatment results

There was no change to the maxillary or mandibular relationship, as growth modification or surgery were not utilized.

The maxillary dentition was well aligned and the canines were in the line of the arch. The mandibular dentition was aligned. However, approximately 3 mm of space remained in the lower right second premolar region. All space in the lower left quadrant was closed using elastic chain. The incisor relationship was Class I, but the lower centreline was 3 mm to the left. Consequently, the left buccal segment relationship was 1/2 unit Class II and the right buccal segment relationship was 1/4 unit Class II.

The presence of the lower right mandibular supernumerary was unexpected and prevented attainment of a Class I buccal segment relationship bilaterally.

Facial aesthetics were preserved and there was no worsening of the nasolabial angle.

Case assessment

In this case, it was believed that the surgical and general anaesthetic risks of removing the supernumerary could not be justified. Surgical risks included damage to the lingual and mental nerves and adjacent teeth. If the supernumerary was extracted, it may have then been possible to close the space and correct the lower



Figure 3 Lateral cephalogram also confirming the presence of a supernumerary while showing the labial inclinations of the anterior dentition

centreline orthodontically. However, if the extraction involved excessive bone removal, this may have complicated space closure. After careful explanation of the treatment options, the patient and parents felt the risks of extraction of the supernumerary outweighed the benefits of space closure. It was therefore decided to leave the supernumerary *in situ* and accept the lower right space and centreline discrepancy.

It was explained to both the patient and parents that the lower right mandibular supernumerary would require periodic clinical and radiographic monitoring by his general dental practitioner. If this tooth were to erupt, it would erupt lingually.

Discussion

Unless diagnosed early and managed adequately, supernumerary teeth may cause a variety of disturbances to the developing permanent dentition. They may cause delayed eruption, displacement, rotation, flaring, or root resorption of the adjacent permanent teeth.^{2,4,5,20} Occasionally, they may lead to the development of dentigerous or primordial cysts.^{2,4,5,20,21} As has been demonstrated in this report, they may also create an unexpected complication to orthodontic treatment.

The recommended management of supernumerary teeth is extraction, unless removal is hazardous to adjacent teeth and structures, contraindicated by a compromised medical status, or if the supernumerary tooth can be used for orthodontic purposes.^{21,22} It is important to monitor unerupted supernumeraries at reasonable intervals. The patient should be kept informed at all times of the possible complications such teeth can cause.

Complications during orthodontic space closure

Reasons for failure of space closure in cases with sliding mechanics may include:

- excessive friction;
- occlusal interferences;
- intra-alveolar causes;
- medications including non-steroidal anti-inflammatory drugs;^{29,30}
- systemic conditions;²⁹
- idiopathic.

Intra-alveolar causes include retained roots and supernumeraries. If the cause cannot be determined, a radiograph should be considered. This could reveal a supernumerary preventing space closure.

Summary

Difficulties were encountered when attempting to close the mandibular right premolar space, so radiographic investigation was required to determine any intra-alveolar factor preventing tooth movement. As the patient was approaching the end of active treatment, it was decided to take a DPT and lateral cephalogram in order to help determine why space closure was difficult, while simultaneously assessing the labial inclinations of the anterior teeth, thus minimizing exposure to radiation.

The possibility of supernumerary teeth interfering with occlusal development or orthodontic mechanics such as space closure should always be borne in mind.^{14,17} On occasion, treatment goals may need to be modified. Although a DPT radiograph should not be taken routinely during space closure, it may prove helpful in identifying unexpected factors complicating space closure.

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