

Multiple Supernumerary Teeth in Non-Syndromic Patient- A Case Report and Review of Literature

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ABSTRACT

Introduction: Supernumerary teeth (ST) are additional teeth that are in addition to the normal number of either primary or permanent teeth. The presence of supernumerary teeth is not uncommon in the general population. They occur more frequently in patients with family history of such teeth, but it is unusual to diagnose multiple supernumerary teeth in patients with no other signs of associated disease or syndrome.

Case Report: In the present article, review of literature with a case report of 35 years old male with 6 supernumerary teeth (4 erupted and 2 impacted) is presented.

Conclusion: Therefore, after diagnosis of ST, patient should be managed appropriately in order to facilitate early intervention, minimizes complications to the adjacent teeth and structures. Each patient should be individually assessed clinically and radiographically and the appropriate treatment option should be determined.

Key Words: Dental lamina, Hyperdontia, Mesiodens, Supernumerary tooth, Supplemental teeth, Syndrome.

INTRODUCTION

The development of an increased number of teeth is known as hyperdontia and the additional teeth are termed as supernumerary teeth.¹ Its prevalence is higher in males than females.² The supernumerary teeth may occur in both dentitions, but they are more frequently seen in the permanent dentition with the prevalence ranging from 0.8 in deciduous and 2.1 % in the permanent dentition.^{3,4}

Primosh³ classified supernumerary teeth according to their shape in following categories:

- **Supplemental or eumorphic.** It is a duplication of the normal dental series, the most common supplementary teeth are permanent upper lateral incisors, bicuspid and molars.
- **Rudimentary or dysmorphic.** These are teeth presenting abnormal shape or size. They are smaller-sized teeth. They can be:
 - Conical.
 - Tubercular.
 - Molar-shaped.
- **Conical teeth.** These are small teeth located between upper central incisors, they are called mesiodens.
- **Tubercular Teeth.** They present one or more accessory cuspids, most commonly found in the palatal area, at the level of upper central incisors.
- **Molar-shaped.** They can be found in upper and lower jaws. They can present the same shape as third molars, or

they can present irregular shape.

According to their location they are classified as:

- Mesiodens,
- Paramolar (situated usually in the interdental region of the maxillary molars),
- Distomolar (fourth permanent molar placed distal to the third molar).

CASE REPORT

A 35 Year old male visited the department of oral medicine and radiology, Dayananda Sagar college of dental sciences, Bangalore with the chief complaint of pain in the right lower back tooth. Patient had no significant medical and Dental history. Family history was non - contributory. An extra oral examination did not reveal any abnormality. The patient does not present any syndrome or systemic disease (Figure 1). Intraoral examination reveals presence of retained deciduous canines in the maxillary arch and 4 supernumerary premolars (2 on each side), present lingual to the mandibular premolars (Figures 2 and 3).

Maxillary and mandibular cross sectional occlusal radiographs was advised for bucco-lingual extension of impacted supernumerary teeth (Figures 4 and 5).

Panoramic radiograph was taken to rule out any other supernumerary teeth. The radiograph shows the presence of 2 impacted supernumerary teeth situated in each side of the maxillary arch. One impacted supernumerary teeth is present in the right half of maxillary arch just above the roots of 13,53,14,15 lying obliquely, while other lying horizontally over the roots of 23,63,24,25 with their coronal portion facing towards the midline. Both had fully formed crowns and roots, and appeared to be of the same size and morphology of a normal premolar (Figure 6).

The impression of both the arches was taken and cast were poured for future record (Figure 7).

DISCUSSION

The etiology of supernumerary teeth is still not clear. A num-

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Figure-1: Clinical photographs of the patient



Figures-2: Intraoral Picture of Maxillary arch showing the presence of retained deciduous canines.

Figure-3: Intraoral picture of mandibular arch showing presence of 4 supernumerary teeth (2 on each side of the arch, present lingual to mandibular premolars)

ber of theories have been put forward which tries to explain the presence of these teeth. These include phylogenetic theory (evolutionary throwback), tooth germ dichotomy, hyperactivity of the dental lamina, genetics and environmental factors. The atavism or phylogenetic theory suggested that occurrence of these teeth is the result of the reversional phenomenon to the extinct ancestral tissues of anthropoids. It is generally thought that during evolution, the total number of teeth per dentition decreases (from polyodonty to oligodonty), whereas the morphology of teeth has become more complex (from homodonty to heterodonty). Over the course of evolution, the teeth in mammals tends to disappear which is opposite to the sequence of their eruption.

The tooth germ dichotomy theory states that during early tooth development, the dental lamina gets divided in two parts, which may be equal or of different sizes giving rise to two teeth having similar size, or one normal and one rudimentary tooth.

Munne *et al.*⁵ found that during incisor development in mice, the large incisor placodes forms as a result of the fusion of multiple small placodes. This fusion is the result of balance between activator and inhibitor molecules which regulates the size of the placodes. Any disturbances in the balance of these signaling molecules can cause splitting of the placode resulting in the formation of two or three smaller incisors.

Hovorakova *et al.*⁶ studied the development of deciduous lateral incisors using serial sections and computer-aided 3D reconstructions and found that these teeth originate from the fusion of two dental epithelial thickenings, separated by a groove at the formal fusion site of medial nasal and maxillary processes, and later formed a continuous dental lamina.⁷ Any



Figure-4: Cross sectional maxillary occlusal radiograph showing presence of 2 impacted supernumerary teeth situated in the palate opposite to premolar teeth lying horizontally



Figure-5: Cross sectional mandibular occlusal radiograph showing presence of 4 supernumerary teeth (similar appearance with that of premolars) situated bilaterally in the lingual aspect of premolar teeth

disturbances at this site can result in the formation of supernumerary teeth.

Dental lamina hyperactivity is another widely accepted theory for supernumerary teeth formation.⁸ During the initiation stages of development of deciduous teeth primary dental lamina (odontogenic epithelium), which is the thickening of oral ectoderm gives rise to the deciduous dentition. After the formation of the crown of the permanent tooth, the dental lamina undergoes apoptosis. It is suggested that supernumerary teeth are formed as a dental lamina hyperactivity alterations. Remnants of un-degenerated dental lamina epithelial cells persists as epithelial pearls or islands within the jaws or may cause eruption cysts formation,⁹ While over-proliferation of these cells may results in supernumerary tooth formation.

Heredity is also an important factor in supernumerary teeth formation as these teeth are more commonly found in the children of affected patients than in the general population.¹⁰ They can be transmitted as an autosomal dominant or recessive trait. Sometimes they may be associated with the X chromosome³ (Table-1).

Multiple supernumerary teeth are associated with syndromes like Apert syndrome, Gardner's syndrome, Down's syndrome, Ehler-danlos syndrome, Ellis Van Creveld syndrome, Fabry-Anderson syndrome, Cleidocranial dysostosis.

Syndrome	Genetics	Gene	References
Cleidocranial dysplasia	Chromosome 6p21, autosomal dominant	<i>RUNX2</i>	Jensen and Kreiborg.1990 Komori et al. 1997, Kreiborg et al.1999.
Familial adenomatous polyposis, including Gardner syndrome	Chromosome 5q21-q22,autosomal dominant	<i>APC</i>	Fader et al.1962. Ida et al. 1981
Ehlers-Danlos syndrome, type III	Chromosome 6p21.3 and 2q31, autosomal dominant	<i>Tenascin-XB</i> or <i>COL3A1</i>	Ferreira et al.2008.
Fabry disease	Chromosome Xq22, X-linked	<i>Alpha-galactosidase A</i>	Brindley et al.1975.
Tricho-Rhino-Phalangeal syndrome	Chromosome 8q24.12, autosomal dominant	<i>TRPS1</i>	<u>Giedion.1966</u> ; Kantaputra <i>et al.</i> 2008
Table-1: Showing association of the supernumerary teeth with syndromes and chromosome involved			

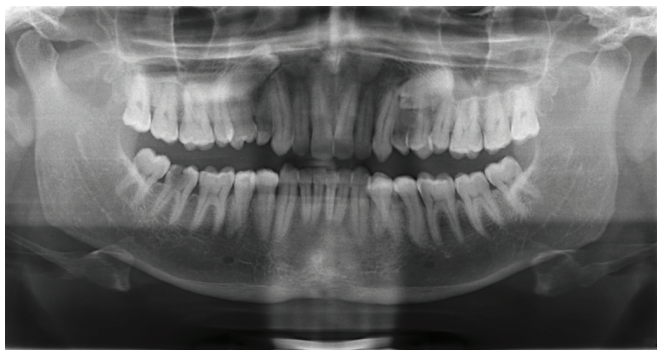


Figure-6: The panoramic radiograph confirmed the presence of 2 impacted supernumerary teeth located bilaterally above the apices of maxillary premolars lying obliquely

Model Systems for Studying Supernumerary Tooth Formation
Mice have been used for a long time as the predominant model for studying tooth development. However, mouse dentition is highly reduced with only one incisor and three molars, lacking both premolars and canines and is separated by a toothless diastema region in each quadrant of the jaw. In this region vestigial tooth remnants can form at an early stage, some of them develop into tooth bud, but later regress and merge with the mesial crown of the first molar or undergoes apoptosis. In addition, mice have only a single primary dentition during their lifetime and their teeth are not replaced. Therefore, the mice may not be an optimal model for supernumerary tooth formation.¹¹

Signaling pathways for studying supernumerary teeth formation

Hedgehog signalling

Hedgehog signal transduction through Shh is important during tooth initiation. However, there is evidence suggesting that this pathway can cause disturbances in tooth number. These signals are mediated in target cells through primary cilia, a type of specialised single organelles projecting from the cell surface of all eukaryotic organisms. Any mutations in the ciliary protein, *IFT88/Polaris* which encodes for essential functional components of primary cilia leads to changes in the signal activity of these molecules and formation of additional teeth, resembling premolars in mice.¹²

Fibroblast growth factor (FGF) signalling

These signalling molecules are known to regulate growth



Figure-7: Showing casts made from impression for further records

and morphogenesis of the tooth germ. Some of these factors such as Fgf 4 and 9 in the developing primary enamel epithelium can induce proliferation of both enamel epithelium and mesenchyme, whereas Fgf 3 and 10 in the underlying mesenchyme can stimulate cell division in the dental epithelium¹³

WNT signaling

This forms a group of signal transduction pathways made of proteins that pass signals from outside of a cell through cell surface receptors to the inside of the cell through stabilisation of β -catenin. Lymphoid enhancing factor 1 (LEF1) is a cell-type-specific transcription factor expressed in lymphocytes and tooth bud of the adult mice during embryogenesis and is an indicator of normal tooth development. Inhibition of these signalling pathways can affect normal tooth development¹⁴, while over-expression of this factor may produce ectopic structures in the tooth forming regions.

Protein signaling

Bone morphogenetic proteins (BMPs) are multi-functional growth factors that belong to the transforming growth factor beta (TGF-beta) superfamily. Tooth formation relies on BMP4 expression, which induces *Msx 1* and *2*. These transcription factors turn the forming tooth to become an incisor, thus essential for normal tooth development. Lack of interactions between these molecules can arrest odontogenesis at the bud stage.¹⁵ Ectodin is a secreted BMP inhibitor, which possesses developmental anomalies associated with the mandibular dentition, including the presence of a supernumerary tooth in the molar region.

Diagnosis of supernumerary teeth

The exact position and the anatomical location of supernu-

merary teeth is important for appropriate treatment and prevention of future complications. Detection of supernumerary teeth is best achieved by detailed history, clinical and radiographic examination. They are also detected by chance during routine radiographic examination.

The most useful radiographic investigation is the panoramic radiograph in combination with occlusal or periapical radiographs using long cone paralleling technique. The use of CBCT in addition to conventional radiography is useful in the management of supernumerary teeth. CBCT provide 3D images for the precise location of impacted supernumerary teeth in relation to adjacent teeth and to design treatment plan that would result in more successful treatment outcomes and improved post-operative patient care.¹⁶

Consequences of untreated supernumerary teeth

Supernumerary teeth may cause crowding, diastema, cyst formation, resorption, and rotation of adjacent teeth and may delay or impede the eruption of the permanent teeth, or it may be symptomless.¹⁷ The most common clinical complications includes crowding (20.4%), failure of permanent teeth eruption (14.8%), and displacement of permanent teeth (9.2%). Cyst formation and eruption into the nasal cavity are clinical complications that have been reported to occur less commonly.

School of thought for early removal of supernumerary teeth This approach result in spontaneous correction of an existing malocclusion. If any supernumerary teeth eg. mesiodens, is detected, they are removal at an early stage. As a result the impacted incisors erupts spontaneously into their usual position, thus preventing midline spacing and deviation.¹⁸ However, there are some possible disadvantages of this approach which includes damage to adjacent teeth resulting in ankylosis, displacement and delayed eruption of permanent teeth.

School of thought for delayed removal of supernumerary teeth The optimum time for surgical removal of an erupted maxillary anterior tooth is highly controversial. Some authors advocate immediate removal of supernumerary tooth after detection, while others favors delay in removal of supernumerary teeth upon apical maturation of permanent incisors at the age of around 8 to 10 years, when the behavior of child is much easier to manage, the type of anesthesia can be less invasive and intra and post-operative complications are less likely to occur. The disadvantages associated with the delay in surgical intervention is loss of eruptive potential of incisors, loss of anterior arch space or midline shift indicating the need for more intensive surgical and orthodontic treatment.

CONCLUSION

Supernumerary teeth are relatively common causing a variety of complications Clinical and radiographic evaluation of these teeth should always be thorough in order to detect their presence. Early diagnosis by dentists facilitates early intervention, minimal complications and more favorable prognosis.

REFERENCES

1. Neville BW, Damm DD, Allen CM, Bouquot JE. Oral and maxillofacial pathology, 2009. St. Louis. Elsevier

- publications. 3rd ed. 77-80.
2. Kuchler EC, Costa AG, Costa Mde C, Vieira AR, Granjeiro JM. Supernumerary teeth vary depending on gender. *Braz Oral Res.* 2011;25:76-9.
3. Primosch RE. Anterior supernumerary teeth. Assessment and surgical intervention in children. *Pediatr Dent* 1981; 3:204-15
4. Luten JR. The prevalence of supernumerary teeth in primary and mixed dentitions. *ASDC J Dent Child.* 1967;34:346-53.
5. Munne PM, Felszeghy S, Jussila M, Suomalainen M, Thesleff I, Jernvall J. Splitting placodes: Effects of bone morphogenetic protein and Activin on the patterning and identity of mouse incisors. *Evol Dev.* 2010;12:383-92.
6. Hovorakova M, Lesot H, Peterkova R, Peterka M. Origin of the deciduous upper lateral incisor and its clinical aspects. *J Dent Res.* 2006;85:167-171.
7. Ferres-Padro E, Prats-Armengol J, Ferres-Amat E. A descriptive study of 113 unerupted supernumerary teeth in 79 pediatric patients in Barcelona. *Med Oral Pathol Oral Cir Bucal.* 2009;14:E146-E152
8. Garvey MT, Barry HJ, Blake M. Supernumerary teeth—An overview of classification, diagnosis and management. *J Can Dent Assoc.* 1999;65:612-6.
9. Cohen RL. Clinical perspectives on premature tooth eruption and cyst formation in neonates. *Pediatr Dermatol.* 1984;1:301-6.
10. Babu V, Nagesh KS, Diwakar NR. A rare case of hereditary multiple impacted normal and supernumerary teeth. *J Clin Pediatr Dent.* 1998;23:59-61.
11. Huysseune A, Thesleff I. Continuous tooth replacement: The possible involvement of epithelial stem cells. *Bioessays.* 2004;26:665-71.
12. Ohazama A, Haycraft C J, Seppala M, Blackburn J, Ghafoor S, Cobourne M et al. Primary cilia regulate Shh activity in the control of molar tooth number. *Development.* 2009;136:897-903.
13. Kettunen P, Karavanova I, Thesleff I. Responsiveness of developing dental tissues to fibroblast growth factors: expression of splicing alternatives of FGFR1,-2,-3, and of FGFR4; and stimulation of cell proliferation by FGF-2,-4,-8, and-9. *Dev Genet.* 1998;22:374-385.
14. Kratochwil K, Galceran J, Tontsch S, Roth W, Grosschedl R. FGF4, a direct target of LEF1 and Wnt signalling, can rescue the arrest of tooth organogenesis in *Lef1*(-/-) mice. *Genes Dev.* 2002;16:3173-85.
15. Tucker AS, Al Khamis A, Sharpe PT. Interactions between Bmp-4 and Msx-1 act to restrict gene expression to odontogenic mesenchyme. *Dev Dyn.* 1998;212:533-9.
16. Mah JK, Huang JC, Choo H. Practical applications of cone-beam computed tomography in orthodontics. *J Am Dent Assoc.* 2010;141(Suppl 3):7S-13S.
17. Mason C, Azam N, Holt RD, Rule DC. A retrospective study of unerupted maxillary incisors associated with supernumerary teeth. *Br J Oral Maxillofac Surg.* 2000;38:62-5.
18. Levine N. The clinical management of supernumerary teeth. *J Can Dent Assoc.* 1961;28:297-303

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