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Anatomical Abnormalities in Multiple Permanent Teeth

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A 12-year-old female patient had reported to Department of Pedodontics and Preventive Dentistry of College of Dental Sciences and Research Centre, Ahmedabad, India with the Chief complain of forwardly placed upper front teeth. On general examination, shape of head was Dolicocephalic and facial form was Oval and Symmetrical [Table/Fig-1,2]. There were no other significant pathological findings. On careful clinical examination, both permanent mandibular first molars revealed the presence of an extra cusp on lingual surface and there was presence of an accessory cusp on buccal surface of mandibular second premolars [Table/Fig-3]. Another striking feature was that both the permanent maxillary first molars were wider in the mesiodistal dimensions [Table/Fig-4] which is in contrast to the normal morphology. There was increased overjet as well as spacing was seen in anterior maxillary dentition [Table/Fig-5]. Molar relation was found to be Angle's Class I on the left side [Table/Fig-6]. However, due to elongation of maxillary first permanent molar, a single tooth posterior cross bite was seen between 16 and 46 [Table/Fig-7]. Neither the siblings nor the parents had reported with such abnormalities. The intraoral periapical radiographs of all the first permanent molars were taken in order to assess for the root morphology. However, all the molars had normal root morphology. Then, Orthopantogram and Lateral Cephalogram were taken to assess the skeletal relationship, which appeared to be normal.

[Table/Fig-1]: Patient's frontal view **[Table/Fig-2]:** Patient's profile view

Hence, the primary treatment carried out was scaling, fluoride application and pit and fissure sealants over all permanent molars. The correction of single tooth posterior crossbite was carried out using Quad Helix [Table/Fig-8,9]. The complete fixed orthodontic treatment has been planned for the correction of increased overjet in co-ordination with Department of Orthodontics and the patient is still under orthodontic treatment.

Dental anthropology is the study of the origin and variations in the human dentitions. These structural variations are used to determine a population or a race. Tooth morphology may be an indicator of genetic disturbances between populations [1].

The etiology of extra cusp formation is unknown. Early school of thoughts for extra cusp formation was due to over activity of dental lamina. However, at present PAX and MSX genes are believed to be responsible for variation in shape of teeth [2]. The extra cusp develop during bell stage by abnormal proliferation and folding of portion of inner enamel epithelium (IEE) along with the adjacent ectomesenchyme cells of dental papilla into the stellate reticulum of enamel organ which results in either tubercle or supplemental solid elevation on crown surface [3].

Embryologically, the primary and secondary enamel knots direct the folding of IEE, which is responsible for the characteristic morphology of the crown. The development of primary enamel knot begins in cap stage of tooth development and location coincides with the presumptive apex of first forming cusp. Subsequently, the secondary enamel knots develop during bell stage and coincides with number and position of the other presumptive cusps [2]. Dahlberg presented evidence for a relationship between cusp number and tooth size.

Sexual dimorphism in cusp number was evident in that females tend to have more cusps for the same crown diameter [4].

According to number of cusps [2], a tooth can be classified as follows

- One cusp - Protoconid
- Two cusps - Metaconid
- Three cusps - Hypoconid
- Four cusps - Entoconid
- Five cusps - hypoconulid
- Six cusps - entoconulid

[Table/Fig-3]: Intraoral mandibular view showing bilateral 6 cusp 1st molar and accessory cusp on 2nd premolar **[Table/Fig-4]:** Intraoral maxillary view showing widened permanent 1st molar in mesiodistal dimension **[Table/Fig-5]:** Intraoral occlusal view showing single tooth posterior crossbite on right side **[Table/Fig-6]:** Intraoral occlusal view: left side showing normal occlusion

[Table/Fig-7]: Intraoral occlusal view: Right side showing single tooth posterior cross bite between 16 and 46 **[Table/Fig-8]:** Intraoral placement of quad helix in maxillary arch **[Table/Fig-9]:** Two months follow up: quad helix

Variations in number and frequency of different patterns are more common with mandibular molars as compared to maxillary molars. In the present case, Y6 pattern is present where Y groove is present with six cusps in mandibular first molar. The frequency of +5 and +6 cusps is comparatively low and +4 patterns are seen in 0.6% only. No ethnic difference was found, but there is significant difference (0.005<p<0.0005), because males exhibit the six cusp pattern more frequently than females [5].

Commonly mandibular second premolar has one buccal and two lingual cusps [1] whereas in the present case it has two buccal cusps and one lingual cusp, which develop from five lobes (mesial, distal, mesiobuccal, distobuccal and lingual).

These morphological abnormalities has certain clinical implications such as aesthetics due to peg lateral, plaque accumulation due to abnormal morphology of the fissures, caries due to presence of deep pits and fissure as well as plaque accumulation, occlusal disturbances due to abnormal location, difficulties in restorative, surgical and endodontic procedure. The presence of all these three different morphological abnormalities occurring together in a non-syndromic child is itself a unique and a rare finding.

As a dentist we should be aware of such morphological variations observed during routine dental examination and one should not be very dogmatic about the standard morphological features of the teeth. Such morphological abnormalities may impose difficulties in several treatments such as banding; crown preparation and RCT. Proper documentation of these variations may help anthropologists in their study of a population.

REFERENCES

[1] Nayak R, Kotrashetti V, Nayak A, Patil V, Kulkarni M, Somannavar P, et al.. Maxillary and Mandibular First Premolars Showing Three-Cusp Pattern: An Unusual Presentation. *Case Reports in Dentistry*. 2013; Article ID 734143: 4 Pages.

[2] Jernvall J, Kettunen P, Karavanova I, Martin LB, Thesleff I. Evidence for the role of the enamel knot as a control center in mammalian tooth cusp formation: non-dividing cells express growth stimulating Fgf-4 gene. *International Journal of Developmental Biology*. 1994;38(3):463–69.

[3] Anantharaj A, Praveen P, Karthik V, Rani P, Krishnan MB. Bilateral Six Cusped And three Rooted Mandibular 1st Permanent Molars. *World Journal of Dentistry*. 2011;2(3):255-28.

[4] Ling JYK, Wong RWK. Molar Cusps in Southern Chinese. *The Open Anthropology Journal*. 2010;3:16-19.

[5] SVSG Nirmala, RC Ramasubba, V Lalitha, N Sivakumar. Unusual occurrence of accessory cusp in the maxillary second primary molar. *Contemporary Clinical Dentistry*. 2011;2(2):127-30.

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