

Parastyle cusp: A rare morphologic variant of maxillary second molars

Zoya Chowdhary,
Disha Gupta¹,
Ranjana Mohan¹,
Aashima Bajaj¹

*Department of Periodontology,
Indira Gandhi Government
Dental College, Jammu,
Jammu and Kashmir,*

*¹Department of Periodontology,
Teerthanker Mahaveer Dental
College and Research Centre,
Moradabad, Uttar Pradesh, India*

Address for correspondence:

*Dr. Zoya Chowdhary,
Department of Periodontology,
Indira Gandhi Government
Dental College, Jammu,
Jammu and Kashmir, India.
E-mail: dr.zoya1988@gmail.com*

Abstract

Human jaws and teeth show a high diversity in the morphology, which varies from individual to individual. The variation in the morphologic feature is of great importance in the forensic field for identification. A tubercle or an accessory cusp is rare but is usually seen in the mandibular molar buccal aspect. From a forensic odontologist's point of view, the features though rare and unusual are useful for identification of the victim as well as criminal. The article presents three cases showing this rarest morphologic variation, i.e., the presence of a parastyle on a permanent maxillary second molar.


Key words: Maxillary molar, morphologic variations, paramolar tubercle, parastyle

Introduction

Human dentition shows a high variation in the morphology, both in primary and permanent dentitions.^[1] The variations in the tooth morphology maybe clinically seen as an accessory cusp or an increase in a number of roots. An accessory or a supernumerary cusp refers to an increase in the number of cusps and may occur as dental anomalies or anatomic variations.^[2] These may include cusp of carabelli of the molars, talon's cusp of incisors and Leong's tubercle of premolar, central accessory cusp or dens evaginatus, protostylid, sixth and seventh accessory cusp in second molars and abnormal triangular morphology of primary first molars.^[3]

A parastyle/paramolar cusp/paramolar tubercle is an accessory cusp on the buccal surface of the mesiobuccal cusp of maxillary molars.^[4] It is considered as a cingulum derivative expressed usually on the buccal surface of the

paracone of the upper molars and rarely on the metacone of the upper molars and the buccal surface of upper premolars.^[5] It was first described by Bolk^[6] in 1916 but was introduced in the paleontologic nomenclature in 1945 by Dahlberg.^[7] Kustaloghi called them as "upper paramolar structures" or "upper paramolar complex" and found that their prevalence is relatively lower in maxillary first molars (0%–0.1%) than second (0.4%–2.8%) and third molars (0%–4.7%), and they have a bilateral occurrence in deciduous dentition and unilateral occurrence in permanent dentition.^[8] Parastyle is rare in the present human population, and a very little information is available regarding its incidence in different races, owing to its low incidence.^[9] However, one study has reported higher occurrence in Indians as compared to other populations.^[8,9] These characteristics should, therefore, be identified and recorded as they have clinical and forensic significance.

Access this article online	
<p>Website: www.jfds.org</p>	<p>Quick Response Code</p> 
<p>DOI: 10.4103/jfo.jfds_9_17</p>	

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Chowdhary Z, Gupta D, Mohan R, Bajaj A. Parastyle cusp: A rare morphologic variant of maxillary second molars. J Forensic Dent Sci 2018;10:111-5.

The authors here report three cases of parastyle on the maxillary second molar in individuals from North Indian population.

Case Reports

Case 1

A 20-year-old female patient reported to the outpatient department (OPD) with a chief complaint of longer looking teeth in the mandibular front tooth region along with sensitivity in the same for 2–3 months. The medical and family history was not contributory. On general examination, the patient was of normal built and had a normal gait. Intraoral examination revealed RCT-treated teeth – 31, 32, 41, and 42; gingival recession in relation to 31 and 41; dentin hypersensitivity in relation to 31 and 41; and morphologic alterations in relation to 17 [Figure 1].

Permanent right maxillary second molar, i.e., 17 showed a cusp-like pyramidal projection on the buccal surface of the mesiobuccal cusp and was not associated with any carious lesion. The tubercle formed a pyramidal prominence from the buccal aspect with its base below the gingival margin and apex toward the occlusal surface of

the tooth. Mesiodistally, its location was at the center of the mesiobuccal cusp and occluso-gingivally from the clinical cervical line to about 2.5 mm short of the mesiobuccal cusp tip. The cusp measured about 5 mm in dimension. The tip of the cusp was rounded and was separated as a cusp at the occlusal third by a deep developmental groove, making it as a free cup cusp [Figure 2]. Intraoral periapical radiographs revealed a dense radiopacity on the mesiobuccal cusp with no rudimentary root associated with the tooth [Figure 3]. Based on the clinical and radiographic findings, a parastyle cusp occurring on the maxillary second molar was made. The patient was unaware of the extracusp and was asymptomatic as the cusp showed no evidence of a carious lesion. The patient was on periodic recall for approximately 2 years but showed no evidence of any carious lesion.

Case 2

A 27-year-old male patient reported to the OPD for routine oral hygiene checkup. The medical, dental, and family history was not significant. On general examination, the patient was of normal built and had a normal gait. Intraoral examination revealed generalized mild stains; initial carious teeth – 36 and 37; and bilateral morphologic alterations in relation to 17 and 27 [Figure 4].

Both permanent maxillary second molar, i.e., 17 and 27 showed a cusp-like pyramidal projection on the buccal



Figure 1: Indirect view showing parastyle (black arrow) on mesiobuccal cusp of right maxillary 2nd molar

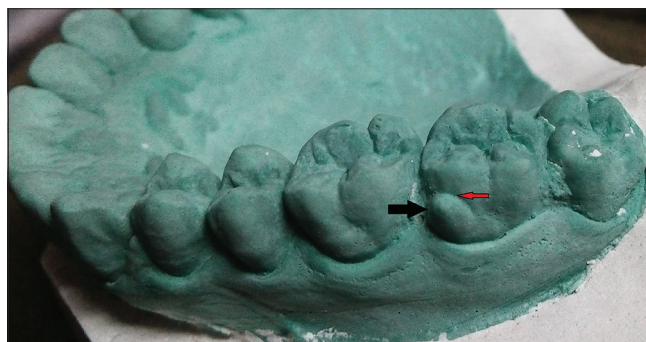


Figure 2: Dental model showing parastyle (black arrow) on paracone of maxillary 2nd molar with a deep developmental groove (red arrow)

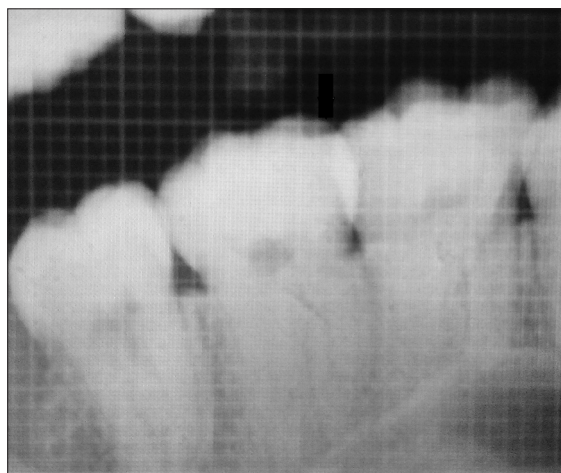


Figure 3: Intraoral periapical radiograph showing dense radio-opacity on the mesiobuccal cusp of 17



Figure 4: Intraoral photograph of bilateral parastyle on buccal surface of both right (red arrow) and left (black arrow) maxillary 2nd molars

surface of the mesiobuccal cusp, which was not associated with any carious lesion [Figure 5]. From the buccal aspect, the pyramidal prominence had a base below the gingival margin and apex toward the occlusal surface of the tooth and was located at the center of the mesiobuccal cusp of both right and left maxillary 2nd molars. The tubercle on 17 (right maxillary 2nd molar) measured about 7 mm occluso-gingivally from the clinical cervical line and was about 0.5 mm short of the mesiobuccal cusp tip of 17; whereas, the tubercle on 27 (left maxillary 2nd molar) measured about 8 mm occluso-gingivally from the clinical cervical line and was about 2 mm short of the mesiobuccal cusp tip of 27. The tips of both teeth were separated as a cusp at the occlusal third by a deep developmental groove, making it as a free cup; cusp and cusp tip in relation to 17 was rounded, whereas in relation to 27 was sharp/pointed. Intraoral periapical radiographs revealed increased radiopacity with respect in relation to the crowns of 17 and 27 [Figure 6]. Based on the clinical and radiographic findings, a parastyle cusp occurring bilaterally on both right and left maxillary second molars was made. The patient was unaware of the extracusp and was asymptomatic as the cusp showed no evidence of a carious lesion. The patient was on periodic recall for approximately 1½ years but showed no evidence of any carious lesion.

Case 3

A 37-year-old male patient reported to the OPD with a chief complaint of bleeding gums while brushing for 3–4 months. The medical, dental, and family history was not contributory. On general examination, the patient was of normal built and had a normal gait. Intraoral examination revealed generalized stains and calculus; inflamed gingiva and bleeding on probing. was evident; and morphologic alteration was observed in relation to 27 [Figure 7].

Permanent left maxillary second molar, i.e., 27 showed a cusp-like pyramidal projection on the buccal surface of the mesiobuccal cusp, which had its base below the gingival margin and apex toward the occlusal surface of the tooth [Figure 8a], and also, the intraoral periapical radiographs revealed an increased radiopacity corresponding the same area of 27 [Figure 8b]. The tubercle measured about 8 mm occluso-gingivally, with approximately 2 mm short of the mesiobuccal cusp tip. The tip of the tubercle was pointed, which was separated as a free cusp at occlusal third by a deep developmental groove. The tubercle was diagnosed as a parastyle cusp occurring on the left maxillary second molar. The patient was unaware of the extracusp and was asymptomatic. The patient was on periodic recall visits for over a year but has shown no signs of any carious lesion or any other problem

Discussion

The supernumerary cups or cusp-like structures are either



Figure 5: Dental model showing parastyle (red arrow) on both maxillary 2nd molar, occlusal view

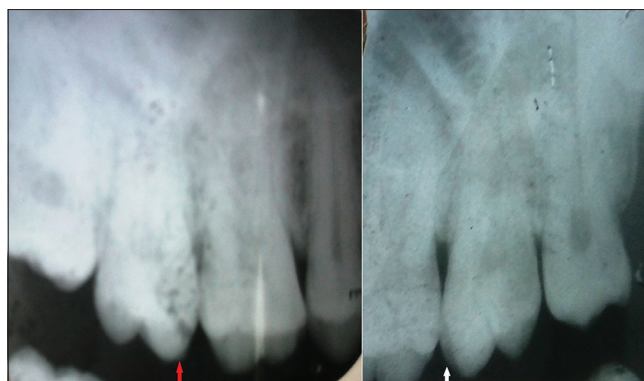


Figure 6: Intraoral periapical radiograph showing increased radiopacity in relation to the crowns of 17 (red arrow) and 27 (white arrow)



Figure 7: Intraoral photograph (red arrow) and indirect view (black arrow) of a parastyle on buccal surface of left maxillary 2nd molar

normal anatomical variants or anomalous structures, many of which have a strong racial predilection.^[2] They have a great significance orally, phylogenetically, and anthropologically.^[3] To explain the origin of multicusp mammalian teeth, many theories such as concrescence,^[10] differentiation,^[10] and tritubercular^[11,12] have been proposed. The main etiology for extracusp formation as well as the abnormal shape is unknown but has been suggested that these traits are

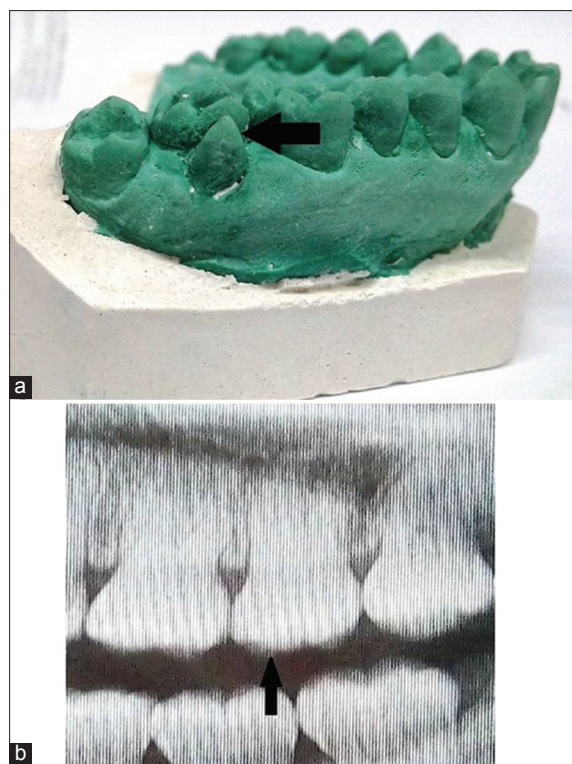


Figure 8: (a) Dental model cast showing parastyle (black arrow) on paracone of left maxillary 2nd molar and (b) intraoral photograph of parastyle on buccal surface of left (black arrow) maxillary 2nd molars

primarily polygenetic with some environmental influence.^[4] It is also believed now that the PAX and MSX genes are responsible for the abnormal shape of the teeth.^[13]

Parastyle/paramolar cusp/paramolar tubercle is a nonmetric dental trait considered as a cingulum expression usually on the buccal surface of the paracone of the upper molars^[5] and probably represents the remnants of the cingulum of mammals and lower primates.^[14] Kustaloghi has reported that the incidence of parastyle in both the dentitions is high among Indians^[8] as compared to other races, as the overall occurrence is low.^[15]

Joseph F Katich and Turner in 1974 (Arizona State University UM parastyle) developed a scale based on the degree and expression of parastyle, to described variety of clinical presentations of parastyle. The scores are as follows:^[16]

1. Buccal surfaces of the cusps 2 and 3 are smooth (Note: Cusp 2 - paracone/mesiobuccal cusp; Cusp 3 - metacone/distobuccal cusp)
2. A pit is present in or near the buccal groove between cusps 2 and 3
3. Small cusp present with attached apex, usually on the cusp 2
4. Medium-sized cusp present with free apex anywhere on the buccal surface
5. Large cusp present with free apex anywhere on the buccal surface

6. Very large cusp present with free apex anywhere on the buccal surface
7. Free peg-shaped crown is present, attached to the third molar root.

The significance of paramolar tubercle is unknown but may provide insights into dental evolution and development; the anthropological potential of this trait has yet to be demonstrated.^[17]

The presence of parastyle or an extracusp poses a dental problem to clinicians such as dental caries; sensitivity/devitalization due to attrition/fracture; premature tooth contact; pulpal or periapical disease; difficulty in placement of stainless steel crowns; interference with cementation of brackets, bands, and alignment of wires during orthodontic treatment, increased chances of food lodgment leading to plaque accumulation causing periodontal problems; difficulty in root canal treatment/pulpectomy and possibility of failure; and sharp extracusps which may result in frictional keratosis.^[3,18-20] Hence, recognizing anatomical variations is of great significance.

In the present case series, the patients have maintained a good oral hygiene in spite of the parastyle; they were educated and advised regular monitoring of the area. The parastyle reported in the case series are large with the free apex on the buccal surface and thus graded 4 as per the scale, given by Joseph F Katich and Turner (1974).

Conclusion

The authors present here a case series of parastyle occurring on the maxillary molars, rarest in of its kind. Documentation of such cases of morphologic anomalies aids in forensic recognition when required as well as increases awareness in dental practitioners of such rare entities in identification, management, and patient education. To avoid complications, early detection and management are important criteria to be taken into consideration by the dental practitioners.

The dental examination is a powerful tool in the identification of deceased in mass disaster, adult/child abuse, natural/criminal/accidental deaths, bite-mark analysis, injuries, or bodies of burnt or drowned persons; and thorough knowledge of the rare morphological variants and/anomalies of the tooth structure aids in identification of the victim or the criminal by identifying the rare odontologic features.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given consent for images and other clinical information to be reported in the journal. The patients understand that name and initials will not be published and due efforts

will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Nagarajan S, Sockalingam MP, Mahyuddin A. Bilateral accessory central cusp of second deciduous molar: An unusual occurrence. *Arch Orofac Sci* 2009;4:22-4.
- Danish G, Hedge U, Mull P, Nabeel S. Dental cusps: Normal, supernumerary and cusp-like structure – An overview. *J Orofac Res* 2014;4:161-8.
- Surendran S, Babu P, Geetha V, Eapen Thomas A. Dental anatomic variations in primary dentition: A case series. *Int J Dent Sci Res* 2013;1:36-9.
- Omali PM, Philipose L, Mathew AL, Nair S, Varghese AK, Babu SS, *et al.* Parastyle in a permanent maxillary first molar tooth: A rare entity. *J Indian Acad Oral Med Radiol* 2013;25:137-40.
- Steele DG, Bramblett CA. *The Anatomy and Biology of Human Skeleton*. 1st ed. College Station: Texas A and M University Press; 1988.
- Bolk L. Problem of human dentition. *Am J Anat* 1916;19:91-148.
- Dahlberg AA. The paramolar tubercle (bolk). *Am J Phys Anthropol* 1945;3:97103.
- Kustaloghi OA. Paramolar structures of the upper dentition. *J Dent Res* 1962;41:75-83.
- Ash MM. *Wheeler's Dental Anatomy, Physiology and Occlusion*. 7th ed. Philadelphia: WB Saunders; 1993.
- Teaford MF, Smith MM, Ferguson MW. *Development, Function and Evolution of Teeth*. Cambridge: Cambridge University Press; 2000. p. 154.
- Johnson C. *Homoid Evolution; Dental Anthropology and Human Variation*. University of Illinois at Chicago Oral Sciences. Available from: http://www.uic.edu/classes/osci/osci590/3_1Trit.htm. [Last accessed on 2016 Dec 18].
- Bergquist LP. The role of teeth in mammal history. *Braz J Oral Sci* 2003;2:249-57.
- Sedano HO, Ocampo-Acosta F, Naranjo-Corona RI, Torres-Arellano ME. Multiple dens invaginatus, mulberry molar and conical teeth. Case report and genetic considerations. *Med Oral Patol Oral Cir Bucal* 2009;14:E69-72.
- Nagaveni NB, Umashankar KV, Radhika NB, Reddy PB, Manjunath S. Maxillary paramolar: Report of a case and literature review. *Arch Orofac Sci* 2010;5:24-8.
- Carolina R, Freddy M. Paramolar tubercle in the left maxillary second premolar: A case report. *Dent Anthropol* 2006;19:65-9.
- Turner CG 2nd, Nichol CR, Richard Scott G. Scoring procedures for key morphological traits of the permanent dentition: The Arizona State University Dental Anthropology System. *Adv Dent Anthropol* 1991;3:13-31.
- Scott GR, Turner CG 2nd. Description and classification of permanent crown and root traits. In: *The Anthropology of Modern Human Teeth-Dental Morphology and Its Variation in Recent Human Populations*. 1st ed. Cambridge: Cambridge University Press; 1997. p. 15-69.
- Desai VD, Gaurav I, Das S, Sunil Kumar MV. Paramolar complex – The microdental variations: Case series with review of literature. *Ann Bioanthropology* 2014;2:6573.
- Turner RA, Harris EF. Maxillary second premolars with paramolar tubercles. *Dent Anthropol* 2004;17:758.
- Desai VD, Sadnani H, Kumar SM, Pratik P. Protostylid: As never reported before! A unique case with variation. *J Indian Acad Oral Med Radiol* 2016;28:57-60.