

# Dental Anatomic Variations in Primary Dentition: A Case Series

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**Abstract** Many morphological variables have been identified both in primary and permanent dentitions. This report describes incidental finding of some uncommon dental traits like central accessory cusp or dens evaginatus, seventh accessory cusp in primary second molars and protostylid, triangular morphology of primary first molars. These characters have been amply documented in the permanent dentition. Presence of these extra cusps may have dental problems such as caries, sensitivity, occlusal interference and hence there is a need for continuous dental surveillance.

**Keywords:** dental traits, primary dentition, accessory cusp

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## 1. Introduction

Many morphological variables have been identified both in primary and permanent dentitions. Accessory cusps are common variations of tooth morphology that are occasionally seen clinically [1]. The most commonly reported of them are cusp of carabelli of the molars, talon's cusp of incisors and leong's tubercle of premolar which are seen both in the primary and permanent dentitions. There are also some uncommon dental traits like central accessory cusp or dens evaginatus, protostylid, sixth and seventh accessory cusp in second molars and abnormal triangular morphology of primary first molars. These characters have been amply documented in the permanent dentition.

These morphological anomalies have great significance both orally and anthropologically. Presence of these extra cusps may have dental problems such as caries in the pits or developmental grooves between the accessory cusp and the tooth [2,3], sensitivity or devitalisation due to fracture or attrition of the protruded portion of the cusp that has pulpal extension [4,5,6], premature tooth contact that leads to occlusal interference and habitual repositioning of the jaw [7]. Some anatomical variants can cause pulpal or periapical disease that does not have a very obvious cause and it is most commonly seen with dens evaginatus [8]. Hence recognizing anatomical variations is of great significance.

The etiology of these extra cusp formation or abnormal shape is unknown. However previously it was said that genetically these features are probably due to over activity of the dental lamina. But now it is believed that the PAX and MSX genes are responsible for the abnormal shape of the teeth [9].

The purpose of this report is to highlight incidental finding of these uncommon dental traits in primary dentition.

## 2. Case Reports

**Case 1:** A 7 year aged boy reported to the department of Pediatric dentistry for treatment of carious teeth. Intra oral findings revealed dental caries in multiple teeth and a large carious lesion in 75 with buccal abscess. In addition to the above findings, a central accessory cusp was present on the center of the oblique ridge in 55,65,16,26 (Figure 1).



Figure 1.

Presence of a large carabelli cusp and rudimentary mesiopalatal cusps of the molars primary second and permanent first molars were seen. The teeth with additional extra cusp had caries in the pits and grooves between the accessory cusps. With respect to the mandibular arch, triangular morphology was seen in 74 and 84 (Figure 2).

An extra cuspal projection was seen on the buccal surface of 84 and 64 which could be termed as protostylid (Figure 3).

In addition the intra oral periapical radiograph (IOPA) taken for 75 revealed an extra root in 74 and 75 which is

termed as radix entomolaris (Figure 2). Mandibular molars having an additional root lingually is termed as radix entomolaris. Pulpectomy followed by SS crown was the treatment performed for 75. All of the pit and fissure caries were restored with composite restoration.



Figure 2.



Figure 3.

Case 2: A twelve year old boy reported to the Department for a general dental check up. Detailed examination revealed seventh accessory cusp on both the second primary and first permanent molars (Figure 4).



Figure 4.



Figure 5.

Case 3: A 5 year old boy reported to the Department for treatment of decayed teeth. An incidental finding noticed was a 3 mm slender occlusal projection from central groove of 84 (Figure 5). There was no obvious wear or fracture in the tubercle. This finding was diagnosed as dens evaginatus with no occlusal interference with the opposing teeth.

Case 4: A 9 year old girl reported to the Department with the chief complaint of pain in the right upper back tooth region of the jaw. Intra oral examination revealed a large carious lesion in 54. In addition an extra additional cuspal projection was seen on the mesiobuccal surface of 64 which could be termed as protostylid on maxillary left first primary molar (Figure 6). Pulpectomy followed by SS crown was the treatment performed for management of 54.



Figure 6.

Case 5: A 5 year old boy reported to the Department for the treatment of carious teeth. Intra oral examination revealed carious lesions in 54 and 64 and in addition revealed bilateral occurrence of central accessory cusp on the maxillary second deciduous molars (Figure 7). As a preventive measure sealant application was done on the primary second molars.



Figure 7.

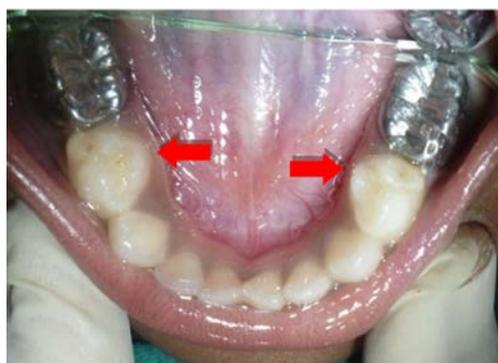


Figure 8.

Case 6: A 5 year old patient reported to the Department and on examination triangular morphology of both the

primary mandibular first mandibular molars was observed (Figure 8). Topical fluoride application was done at the recall visits.

### 3. Discussion

Cusp of carabelli, protostylid, central accessory cusp, variations in the cusp number and number of roots are all termed as “Non metric dental traits”. The non metric features are recorded visually in terms of presence, absence, degree of development or expression of these features [10].

The four uncommon dental traits of the primary dentition reported in this paper are explained below:

**Protostylid:** An additional cusp on the buccal surface of the mesiobuccal cusp of a mandibular molar is referred to as protostylid. The protostylid may be expressed on the buccal surface of protoconid of the primary first molar. There are six subdivisions in the classification which was proposed by Hanihara (1961) [11].

**Table 1. Classification of protostylid by Hanihara (1961) [10]**

Type 0 – Absent	Buccal groove is straight and no trace of irregularity.
Type 1 – Absent	No evidence of protostylid, but the beginning of one is suggested by the curvature and branching of the buccal groove. There may be a small, but distinct pit at the lower end of the buccal groove separating protoconid from the hypoconid and the buccal groove is slightly bent in a distal direction at the point of the pit.
Type 2 – Present 1	Divergence of buccal groove is more developed than Type 3. Small triangular area with tip downwards between the branches of the buccal groove.
Type 3 – Present 2	The two branches of the buccal groove are more developed than Type 3. Small triangular area with tip downwards between the branches of the buccal groove.
Type 4 – Present 3	A very shallow groove appears at the corner of the buccal surface. The area between this groove and mesial branch of the buccal groove bulges slightly and gives triangular shape with its tip upwards.
Type 5 – Present 4	Triangular area is more strongly developed than Type 5.
Type 6 – Present 5	Protostylid is strongly developed so that the tooth seems to have an extra cusp on the buccal surface.

The protostylid trait was first reported by Bolk (1914) [12] and is also termed as paramolar cusps [12]. The protostylid trait has been regarded as a characteristic feature of the Mongoloid dentition with a prevalence rate of 40% [13]. The protostylid trait occurs more frequently on the primary than on permanent molars. In the primary dentition, protostylid is found on the buccal surface of the protoconid of the mandibular second molar<sup>11</sup>. But in two of our cases we found the same appearance on the primary maxillary and mandibular first molars.

**Triangular shape:** The primary mandibular first molar generally has four cusps. However, in some instances, there is a tendency for fusion of metaconid and the entoconid; consequently the occlusal surface pattern appears triangular in shape [11].

The triangular morphology of the primary mandibular first molar for Inamgon Indian children was reported to be 4.2% [14]. This trait appears to be a trend of mostly the Mongoloids. In two of our cases we found the bilateral

occurrence of this trait. Case 1 showed presence of triangular morphology of the primary mandibular first molar associated with an extra root. An extra cusp or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity, can indicate the presence of an additional root [15]. Radix entomolaris can be associated with variations in the morphology of the primary mandibular first molar crown as seen in case 1. Clinical implications may be difficulty in placement of stainless steel crowns and possibility of failure of pulpectomy due to missed canal.

#### Sixth and seventh accessory cusp

The sixth accessory cusp is the accessory cusp located on the distal surface between the entoconid and the hypoconid of the primary mandibular second molar.

The seventh accessory cusp is the accessory cusp located on the lingual surface between the metaconid and the entoconid of the primary mandibular second molar. The classification for the seventh accessory cusp, of the primary mandibular second molar, was based upon that of Hanihara (1961) [11].

**Table 2. Classification of seventh accessory cusp by Hanihara (1961) [10]**

Type 0 – Absent	No trace of the seventh cusp.
Type 1 – Present 1	A very weak and short groove which extends downwards from the lingual ridge of the metaconid.
Type 2 – Present 2	Groove on the metaconid is more definite. Small cusp-like formation is present.
Type 3 – Present 3	Seventh cusp is well developed and looks like an independent accessory cusp. It is small when compared with either metaconid or entoconid.

Seventh accessory cusp was originally described by Selenka (1989) and has been referred to as tuberculum accessorium, tuberculum intermedium, seventh cusp, median lingual accessory cusp and cusp seven [16]. Kaul and Prakash (1981) [17] and Lukcas and Walimbe (1984) [14] indicated that southern Asians (North Indians) are unique in exhibiting a lower prevalence than other Asians. In the second case that we reported we found the presence of the Type 3 well defined seventh cusp both in the primary and permanent mandibular molars. It is interesting to note that even the successors showed the same trait.

**Central accessory cusp or Dens evaginatus:** An accessory cusp formed on the occlusal surface of premolar or molars. Central accessory cusp or talon cusp both are referred to as dens evaginatus, which is composed of enamel and dentin with or without pulp projections [2].

Schulze (1987) distinguished the following five types of dens evaginatus for posterior teeth by the location of the tubercle [2].

**Table 3. Classification of dens evaginatus by Schulze (1987)**

1	A cone like enlargement of the lingual cusp.
2	A tubercle on the inclined of the lingual cusp.
3	A cone like enlargement of the buccal cusp.
4	A tubercle on the inclined plane of the buccal cusp.
5	A tubercle arising from the occlusal surface obliterating the central groove.

Central cusps (occlusal supernumerary cusps) are situated between the buccal and lingual cusp tips on the

occlusal surface of the premolars and molars and on the palatal surface of the incisors and canines. The central cusp and talons cusp both are referred to as dens evaginatus. The reported prevalence in the Asian population was 2%. The first description of central cusp was provided by Leigh (1925), who reported an enamel tubercle on the third maxillary right molar of an Eskimo skull [2]. The central cusp on the occlusal surface of posterior teeth has been given several descriptions such as supernumerary occlusal cusp, premolar odontome, occlusal tubercle, tuberculated premolar and leong's premolar [8]. Presence of a central cusp is often said to be due to abnormal proliferation of the epithelial fold during the morphodifferentiation stage of tooth development [18]. The location of the tubercle on the cuspal ridge makes it prone to occlusal wear in lateral excursive movement, resulting in exposure of the pulp projection within the extra cusp. Pulpal necrosis ranges from 14-40% in all teeth with evaginated tubercles. In case of central cusps, tubercular projection arises from the center of the occlusal surface with fragile enamel covering the cusp which can be reinforced by placing composite around it if it doesn't interfere with occlusion [8]. Two of the cases reported in this paper also had the typical bilateral distribution of central cusps. It is also interesting to note the presence of central cusps in the primary and permanent teeth in case 1. It could be proposed that whenever central cusp is present on the second primary molar, there are chances that the permanent molar may also present the same trait.

More prevalence data of the presence of the above non metric traits are required to prove hypothesis suggested like, traits in the primary dentition predisposes the permanent dentition to show the presence of the same and presence of variations in morphology of primary mandibular first molar associates an extra root with it.

#### 4. Conclusion

Patients with additional tooth projections should be placed under routine and periodic dental surveillance which include monitoring of the degree of attrition and tooth vitality. Early diagnosis and management are important if complications are to be avoided. The dental

polymorphisms described in this paper are some of the recent and paleodontological forms of the human dentition.

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