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# Pulpal Tissue in Bilateral Talon Cusps of Primary Central Incisors: Report of a Case

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## Abstract

Talon cusp is a tooth anomaly that affects both the primary and the permanent dentitions. However, the occurrence of this anomalous cusp is rather infrequent in the primary dentition. Only 7 cases of bilateral talon cusps affecting the primary teeth have been reported in the dental literature. This is a case report of bilateral talon cusps on primary maxillary central incisors whose histologic evaluation revealed the existence of pulpal tissue in the anomalous cusps.

The accessory cusp-like structure that resembles an eagle's talon and projects lingually and incisally from the cingulum area of a maxillary or mandibular tooth is defined by the term *talon cusp*. It occurs in both primary and permanent dentitions. Composed of normal enamel and dentin, this anomalous cusp may or may not contain pulpal tissue.<sup>1,2</sup>

There are insufficient data regarding the prevalence of talon cusp. The occurrence of talon cusp is reported to be 3 times higher in the permanent dentition than in the primary dentition. Among the 73 cases reported in the literature, only 18 were in the primary teeth.<sup>3</sup> Seven cases of bilateral occurrence for talon cusps affecting primary maxillary central incisors have been published.<sup>1</sup> In most of these reported cases, the maxilla seems to predominate. In the primary dentition, all reported talon cusps have involved the maxillary central incisors. However, in the permanent dentition, the maxillary lateral incisors have been most frequently involved, followed by central incisors and canines. Men have a higher frequency than women.<sup>3</sup>

Although this anomalous cusp has not been reported as an integral part of any specific syndrome, it appears to be more prevalent in patients with Rubinstein-Taybi syndrome, Mohr syndrome (oral-facial-digital syndrome, type II), Sturge-Weber syndrome (encephalotrigeminal angiomas), or incontinentia pigmenti achromians.<sup>4, 5, 6, 7</sup> However, the etiology of the condition is inconclusive. As with other dental abnormalities, talon cusp occurs during the morphodifferentiation stage of odontogenesis. Sicher and Bhaskar<sup>8</sup> suggest that disturbances during morphodifferentiation (such as altered endocrine function) might affect the shape and size of a tooth without impairing the function of the ameloblasts or odontoblasts. Another theory, by Hattab et al,<sup>2</sup> suggests that talon cusp might occur as a result of an outward folding of the inner enamel epithelial cells (precursors of ameloblasts) and a transient focal hyperplasia of the mesenchymal dental papilla (precursors of odontoblasts).

Clinical problems noted with talon cusp cases include attrition, breast-feeding problems, compromised esthetics, occlusal interference, accidental cusp fracture, interference with tongue space, temporomandibular joint pain, displacement of the affected tooth, irritation of tongue during speech and mastication, periodontal problems because of excessive occlusal force, misinterpretation of radiographs of taloned teeth before eruption, and caries susceptibility because of developmental grooves on the talon.<sup>1, 2, 3, 9, 10, 11, 12, 13</sup> Talon cusp may be associated with other dental anomalies such as peg-shaped lateral incisors, impacted mesiodens and canines, odontoma, megadontia, dens invaginatus, supernumerary teeth, shovel-shaped incisors, bifid cingulum, additional tubercle on incisors, exaggerated Carabelli cusps, and microdontia.<sup>2, 3, 10, 11, 14</sup> The association of talon cusp with other dental abnormalities suggests that this is not an isolated trait and may be genetically determined.<sup>2</sup>

The existence of pulpal tissue in a talon cusp has been of interest because of potential treatment difficulties. This case presentation reports on the existence of pulpal tissue in talon cusps affecting primary maxillary central incisors bilaterally and discusses anatomic features and treatment considerations.

## Case report

A 14-month-old boy was referred to the pediatric dentistry clinic. The patient was the first child of parents with no consanguinity. The mother had a normal period of gestation but discontinued breast-feeding soon after her son's maxillary central incisors had erupted (7 months of age) because of sharpness of the teeth. The parents did not report a similar anomaly in dentitions of their family members. The patient's medical history was unremarkable.

Intraoral examination revealed a normally developing primary dentition. Carious lesions were observed on the labial surfaces of the maxillary central incisors. In addition, anomalous cusp-like structures were detected on the palatal surfaces of these teeth. These structures were sharp, prominent, separated, and standing away from the palatal surfaces of the affected teeth, extending over half of the gingival-incisal distance. A diagnosis of bilateral talon cusps of the primary maxillary central incisors was made.

Intraoral photographs and a radiographic examination were impossible this visit because of the patient's lack of cooperation. The treatment plan called for a gradual reduction of the talon cusps on consecutive visits and an application of fluoride at each visit, but the patient did not attend the clinic after the first visit.

As reported by his parents on the second visit 4 months later, the boy had traumatized his maxillary teeth after falling on a hard object at home. The trauma had resulted in complicated crown fractures of both incisors. Purulent exudate was detected over the exposure sites of both teeth (Figs 1 and 2).



Fig. 1. Patient exhibits type 1, true talon cusps on primary incisors after incisal fracture.



Fig. 2. Purulent exudate from exposure sites of traumatized teeth.

Radiographic evaluation confirmed the clinical signs of the inflammation affecting the central incisors' roots (Fig 3).

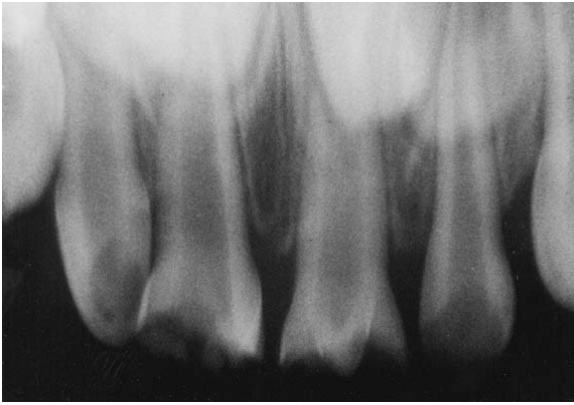


Fig. 3. Maxillary anteriors after exposure. Note prominent talon on left central incisor.

The central incisors were extracted, and a removable partial denture was fabricated. The extracted teeth were rinsed with physiologic saline solution, photographed, and kept in neutral buffered formalin before histologic processing (Fig 4).



Fig. 4. Taloned teeth from proximal aspects. Note lingual talons (*arrows*).

The teeth were decalcified for 2 months. The specimens were washed in several changes of 95% alcohol and dehydrated in absolute alcohol. After the specimens were embedded in paraffin, 5- $\mu$ m sections were cut parallel to the long axis of both teeth in a bucco-lingual direction and stained with hematoxylin-eosin.

Histologic evaluation revealed that the talon cusps were composed of normal dentin. Pulpal tissue was detected in both talon cusps with odontoblasts located along the outer walls of the talons. In addition

to odontoblasts, the pulps contained collagen, fibroblasts, some reticular fibers, and undifferentiated mesenchymal cells. An extensive vascular supply was present in both anomalous cusps (Fig 5).

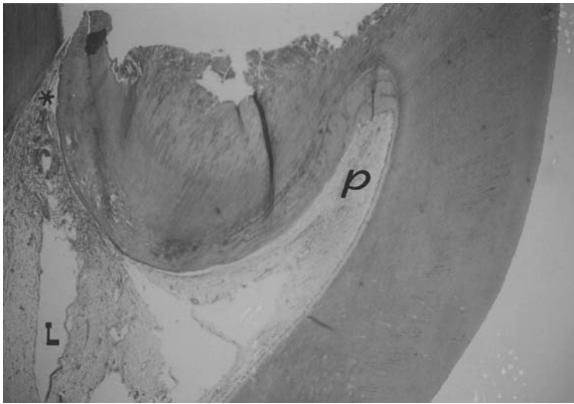


Fig. 5. Histologic section showing pulp exposure (*asterisk*) and extension of pulp horn (*P*) into talon cusp. *L*, Labial site (hematoxylin-eosin, original magnification  $\times 25$ ).

## Discussion

The term *talon cusp* defines a wide variety of accessory cusp-like structures, ranging from an enlarged cingulum to a well-delineated anomalous cusp.<sup>3</sup> Descriptions include “prominent cingulum,” “variation of enlarged cingula,” “tendency toward talon cusp formation,” “variation of hyperplastic cingula,” “primitive feature of talonism,” and “prominent lingual cusp.”<sup>3, 4, 5, 10, 14</sup> Thus, diagnostically, the condition necessitates more precise criteria and terminology for talon cusp.

Mader<sup>10</sup> has suggested the terms *enlarged cingula* or *prominent cingula* for defining lesser cusp-like formations in the cingulum area of succedaneous teeth. He reserves the term *talon cusp* for describing only those anomalous cusps of succedaneous incisor teeth that prominently project from the lingual surface of the tooth, are morphologically well delineated, and extend at least half the distance from the cemento-enamel junction to the incisal edge.<sup>10</sup>

A classification system includes 3 types of talon cusps.<sup>3</sup>

- Type 1, true talon. A morphologically well-delineated additional cusp that prominently projects from the palatal surface of a primary or permanent anterior tooth and extends at least half the distance from the cemento-enamel junction to the incisal edge.
- Type 2, semitalon. An additional cusp of 1 mm or more that extends less than half the distance from the cemento-enamel junction to the incisal edge and blends with the palatal surface or stands away from the crown.
- Type 3, trace talon. An enlarged or prominent cingulum with variations such as conical, bifid, or tubercle-like.

On radiographic examination, trace talon has the typical V-shaped radiopaque appearance as for type 1, true talon and type 2, semitalon or tubercle-like structure, originating from the cervical third of root.

The talon cusps presented in this case report coincide with the definition for type 1, true talon.

Because of clinical significance, several authors have mentioned the presence of pulpal tissue in a talon cusp; several cases have exhibited pulpal tissue in the dental anomaly.<sup>1, 3, 9, 14, 15, 16, 17</sup> However, these reports were based on radiographic evaluations in which the talon cusp was superimposed over the normal portion of the tooth. Mader and Kellogg<sup>16</sup> believe this is nearly an impossible way to interpret whether the talon cusp contains a pulpal extension. On the other hand, pulp exposures have been reported when attempts were made to reduce or remove those talon cusps that were creating esthetic and occlusal problems.<sup>9, 18</sup> However, pulpal tissue has not been detected on ground sections of extracted or exfoliated teeth with talon cusp that have been evaluated histologically and by SEM.<sup>14, 16, 17</sup> Davis and Brook<sup>11</sup> reported the histologic presence of pulpal tissue in primary maxillary central incisors. In Mader and Kellogg's<sup>16</sup> view, large talon cusps, especially when separated from the lingual surface of the tooth, seem more likely to contain pulpal tissue. In light of the histologic findings regarding the existence of pulpal tissue in the presented case, we favor this suggestion.

The treatment objectives for taloned teeth should include preserving pulpal vitality, meeting esthetic and occlusal requirements, establishing caries prevention or eradication in developmental grooves, and eliminating tongue irritation. Treatments may differ depending on each case. Small talon cusps are usually asymptomatic, necessitating no treatment. However, large, prominent, and separated talon cusps call for definitive treatment because they may cause esthetic, occlusal, periodontal, and carious problems. Treatment options of the permanent dentition have been reported.<sup>1, 9, 12, 13, 15, 19</sup>

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