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Talon cusp in a primary lateral incisor from a medieval child

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Summary. This paper describes talon cusp in an ancient skeleton and is a rare report of its occurrence in a primary lateral incisor. As well as talon cusp, the affected incisor also shows abnormal widening, probably representing a double tooth. There is also a supernumerary permanent incisor. The report shows that talon cusp existed in British populations more than 600 years before the first written description. A brief review of the literature on the occurrence of talon cusp in the primary dentition is presented.

Introduction

In 1892, William Mitchell sent a letter to the editor of *Dental Cosmos* describing an unusual incisor he had seen in a patient [1]. The tooth in question showed an accessory cusp-like structure, projecting lingually from the cingulum. This appears to be the first published example of the incisor crown variant known as talon cusp, the name reflecting its supposed resemblance to an eagle's talon. Following Mitchell's first identification of talon cusp, it initially seemed that the anomaly was restricted to the permanent dentition. Starting with the report of Sawyer *et al*. [2], however, cases began to be described in the primary incisors. The aim of the current work is to present what is only the second report of talon cusp in an archaeological specimen, and briefly, to review the literature on the occurrence of talon cusp in the primary incisors.

Case report

Six hundred and eighty-seven skeletons have been excavated during archaeological investigations at the church and churchyard at the deserted medieval village of Wharram Percy, North Yorkshire, UK. All burials have been examined by the author. The individual who is the subject of the current report is a child burial from the churchyard. Dental development [3] indicates an age at death of about 4–5 years. The sex cannot be determined. The skeleton dates from the period AD 950–1350.

The left lateral primary maxillary incisor has an anomalous form. A supernumerary cusp projects palatally from the area of the cingulum (Figs 1 & 2). It extends from the region of the cemento-enamel junction to the incisive edge. Radiography (Fig. 3) revealed that a small horn of the pulp cavity extends into the base of the cusp. The accessory cusp is an example of talon cusp. Using Hattab *et al*.'s [4] classification, it is a type 1 or true talon.

The affected tooth is noticeably broader mesio-distally than its antimere. The maximum mesio-distal width of the crown is 5·9 mm compared to 5·2 mm for the normal right lateral incisor. In addition, the

Fig. 1. Occlusal view of the remains of the maxillary dentition.

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Fig. 2. Left primary maxillary lateral incisor: lateral view.

Fig. 3. Left primary maxillary lateral incisor: latero-medial radiograph.

incisive edge of the crown lacks its normal smooth labial convexity, but instead, presents a double labial convexity separated by a shallow concavity about halfway along the incisive edge (Fig. 1). The mesio-distal width of the root at the cervix measures 4·4 mm versus 3·5 mm for the antimere, and a posterio-anterior radiograph indicates a widening of the upper part of the root canal in the affected tooth. The labio-lingual root width is not increased. All other primary teeth are of normal form, but radiography reveals a supernumerary element in the permanent anterior dentition in the left maxilla (Fig. 4).

The interpretation of the mesio-distal broadening of the incisor in the present case is rather uncertain. Possible causes include macrodontia, gemination and fusion. The difficulties of distinguishing between these diagnoses in cases such as the present one are well known [5], and in this light, no firm diagnosis is offered; however, the double convexity of the labial aspect of the incisive edge may suggest a very incomplete division of the crown rather than macrodontia. The tooth count is not reduced, which

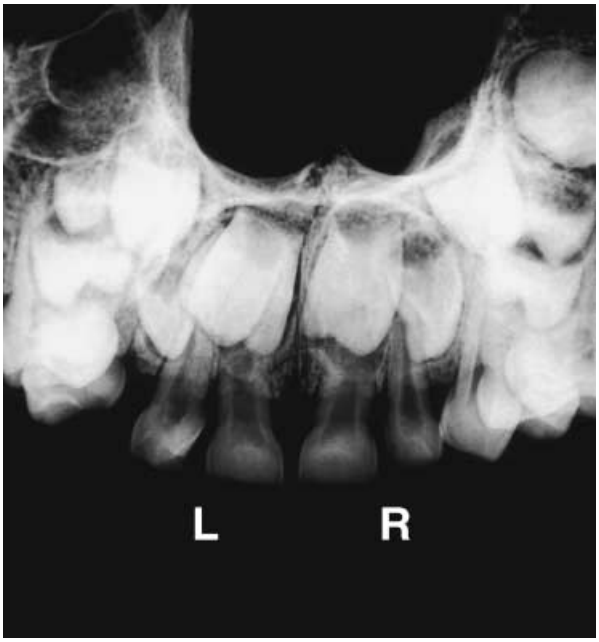

Fig. 4. Posterio-anterior radiograph of the maxillae: note the supernumerary element in the left maxillary permanent dentition.

eliminates a diagnosis of fusion between two normal teeth. It may be that gemination or fusion of the lateral incisor with a supernumerary element are the best explanations. In view of the difficulties often encountered in differentiating gemination from fusion, the term 'double tooth' is frequently used to cover both conditions [6].

Discussion

Talon cusp is said by some to be a rare anomaly [4], but others [7] have disputed this. Evaluating prevalence figures is problematic because of differences in methodology between authors, particularly in their definitions of the trait. Frequencies published for various world populations range from 0·06% to 7·7% [8]. Frequencies greater than 1%, however, come either from work which uses very broad definitions of the trait [9] or from studies on populations comprising patients seeking treatment for dental problems [10]: given the complications (such as caries or interference with the tongue space) which may arise from talon cusp, dental patients seeking treatment might be expected to show a greater frequency than the general population.

About 75% of published studies describe talon cusp in the permanent incisors [4]. A literature review yielded data on 37 individuals (including the current one) showing the variant in primary incisors (Table 1). A total of 50 teeth are involved:

Table 1. Published cases of talon cusp in primary incisors: (M) male; and (F) female.

			Patient	
Author(s)	Year	Tooth	Ethnic origin	Sex
Sawyer *et al*. [2]	1976	L max. I1	Peru (prehistoric)	?
Henderson [16]	1977	L max. I1	USA Filipino	F
Mass *et al*. [17]	1978	L max. I1	?	M
Davis *et al*. [18]	1981	L max. I1, R max. I1	?	?
Natkin *et al*. [7]	1983	L max. I1	?	?
Mader & Kellogg [19]	1985	R max. I2	USA white	M
Chen & Chen [15]	1986	L max. I1, R max. I1	Chinese	M
		L max. I1	Chinese	F
		L max. I1	Chinese	M
		L max. I1	Chinese	M
		R max. I1	Chinese	M
		L max. I1	Chinese	M
Davis & Brook [20]	1986	L max. I1, R max. I1	British Chinese	M
		L max. I1, R max. I1	British Chinese	M
		R max. I1	British Chinese	M
		L max. I1, R max. I1	British Chinese	M
		R max. I1	British Chinese	F
		R max. I1	British Chinese	M
Morin [21]	1987	L max. I1, R max. I1	USA Hispanic	M
Subba Reddy & Mehta [13]	1989	R max. I2	Indian	F
Meon [22]	1990	L max. I1	Singapore	M
Salama *et al*. [11]	1990	Max. supernumerary	USA white	M
Acs *et al*. [14]	1992	R max. I2	USA Hispanic	M
Ooshima *et al*. [23]	1992	R max I1	Japanese	?
		Max I	Japanese	?
Liu & Chen [24]*	1995	L max. I1, R max. I1	Taiwan	F
		L max. I1	Taiwan	F
		L max. I1, R max. I1	Taiwan	F
		L max. I1, R max. I1	Taiwan	F
Hattab & Yassin [12]	1996	L max. I1, R max. I1	Jordanian Arab	M
Hegde & Kumar [25]	1999	L mand. I2	Indian	F
Güngör *et al*. [26]	2000	L max. I1, R max. I1	Turkish	M
Sarkar & Misra [27]	2000	L max. I1	Indian	M
Chin-Ying *et al*. [28]	2001	L max. I1, R max. I1	Chinese	M
		L max. I1, R max. I1	Chinese	M
Tsai & Chang [29]	2003	R max. I1	Taiwan	F
Present report	2004	L max. I2	British (medieval)	?

*Report of two sets of twins.

43 maxillary central incisors, four maxillary lateral incisors, one unspecified maxillary incisor, one maxillary supernumerary tooth and one mandibular lateral incisor. Excluding the case involving the supernumerary tooth, 23 are unilateral and 13 bilateral. Of the unilateral cases, 13 involve an incisor on the left side of the dental arch, nine others one on the right, and in one instance this was not specified. The left–right imbalance is not statistically significant ($\chi^2 = 0{\cdot}73$, $P > 0{\cdot}05$), and therefore, provides no evidence that the left side is preferentially involved. Overall, 21 individuals were male and 10 were female; in six cases, the sex was unreported or, in the case of archaeological material, could not be determined. The bias in favour of males is statistically significant ($\chi^2 = 3{\cdot}9$, $P < 0{\cdot}05$). Of the 34 cases where the ethnic group is known, 23 were of Far Eastern origin.

Of the cases of talon cusp listed in Table 1, six show additional dental anomalies. All involve the presence of a maxillary supernumerary tooth, either in the primary anterior dentition [11,12], or in the permanent dentition beneath the tooth with the talon cusp [13,14] (as in the present study) or beneath an adjacent element [15].

The observations that reports of talon cusp in the primary dentition are almost entirely restricted to the maxillary teeth, there is no preference for expression on the left or right sides, it is more frequently reported in Asian populations, and it is most often an isolated abnormality resemble findings for the variant in permanent incisors [4,8,30]. There is a lack of consensus as to whether a bias toward males exists in the occurrence of talon cusp in the permanent dentition [4,8,10,30]. Unlike the situation for primary teeth, the preference in the permanent teeth is for expression of the variant in lateral rather than central maxillary incisors [30].

Talon cusp appears to arise early in odontogenesis. Its precise cause is unclear, but it may be a result of aberrant hyperactivity of the anterior part of the dental lamina [31]. Dental development appears to be primarily polygenic with some environmental influences [32]. There is some anecdotal evidence for a genetic influence in the aetiology of talon cusp [8,20,22,24,33–35], but there is currently no decisive empirical evidence regarding the relative importance of genetic and environmental factors in its causation. The current study provides no direct evidence on this point although, if genetic influence over the trait was strong, it is surprising that it was not found in any of the other burials from Wharram Percy: most people in the small rural community must have been closely related genetically.

The co-occurrence of talon cusp and double tooth in the same dental element has not previously been reported in the primary dentition, but it has been noted in permanent teeth [8,36–41]. None of the above authors have suggested a causal link, except for Lomçarli *et al*. [39], who postulated that the co-occurrence of these variants may be explained by Rantanen's [31] theory for talon cusp of hyperactivity of an anterior part of the dental lamina. The observation that in all cases of talon cusp in the primary dentition where coexisting anomalies were noted they involved the presence of anterior supernumerary elements may also be consistent with this.

Conclusions

The case described in this paper is the first published example of talon cusp of which the author is aware in either the primary or permanent teeth in European archaeological remains. It indicates the presence of talon cusp in Caucasian populations 600 years before it was first described clinically. The affected tooth also showed mesio-distal broadening, probably representing a double tooth. If this interpretation is accepted, this is the first description of the co-occurrence of talon cusp and double tooth in the primary dentition. The findings in the present case, together with the fact that the first published description of talon cusp in the primary teeth was on an ancient burial [2], remind us of the value of archaeological remains in extending our knowledge of the range of dental variation in man.

Archaeological skeletal remains form a valuable resource for assessing the frequency of dental morphological variants in earlier populations and may provide a useful baseline with which to compare modern frequencies. Talon cusp is readily recognizable in dental remains. Examples of well-formed type 1 [4] talons, as in the present case, are not easily overlooked in the routine recording of archaeological material, even given the time constraints under which such work is normally carried out. Despite this, the author is aware of only one other instance [2] where talon cusp has been described on the lingual surface of an incisor in archaeological remains. Although it is a matter of dispute whether talon cusp is truly a rare variant in modern populations, there seems little doubt that it was rare in many earlier ones.

Résumé. Il est décrit dans ce rapport une évagination cingulaire rarement décrite au niveau d'une incisive latérale temporaire, retrouvée dans un squelette ancien. L'incisive atteinte était également anormalement large, probablement la marque d'une dent double. Il y avait également une incisive permanente surnuméraire. Cette étude montre que l'évagination cingulaire était rencontrée dans les populations britanniques plus de 600 ans avant la première description écrite. Une brève revue de la littérature sur la fréquence de cette anomalie en denture temporaire est présentée.

Zusammenfassung. Dieser Fallbericht beschreibt einen Talon Cusp bei einem alten Skelett in einer seltenen Form an einem seitlichen Milchschneidezahn. Neben der Zahnformveränderung im Sinne eines Talon Cusp war an dem betroffenen Zahn eine weitere Veränderung im Sinne einer Gemination zu erkennen. Außerdem fand sich ein überzähliger bleibender Schneidezahn. Damit wird gezeigt, dass ein Talon Cusp in einer britischen Population mehr als 600 Jahre vor Erstbeschreibung vorkam. Ein kurzes Review über die Literatur zum Talon Cusp und dessen Auftreten an Milchzähnen wird präsentiert.

Resumen. Este informe trata sobre una descripción de una cúspide en garra en un esqueleto antiguo y una rara comunicación de ello en un incisivo lateral primario. Como toda cúspide en garra, el incisivo afectado también muestra un ensanchamiento anormal que probablemente representa a un doble diente. Hay también un incisivo permanente supernumerario. El estudio muestra que la cúspide en garra existía en las poblaciones Británicas 600 años antes de la primera descripción escrita. Se presenta una breve revisión de la literatura sobre la aparición de la cúspide en garra en la dentición temporal.

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