International Journal of Paediatric Dentistry 2004; **14:** 295–300

Talon cusp associated with other dental anomalies: a case report

J. K. DASH, P. K. SAHOO & S. N. DAS
Department of Paediatric Dentistry, Dental Wing, S.C.B. Medical College, Cuttack, India

Summary. Talon cusp is an uncommon dental anomaly referring to an accessory cusp projecting from the cingulum area, or cemento-enamel junction of maxillary or mandibular anterior teeth, in both the primary and permanent dentition. This paper reports a rare case of talon cusp affecting the mandibular right central incisor and maxillary right lateral incisor, together with other dental abnormalities, viz. an inverted impacted migrating mandibular right second premolar; complete agenesis of the maxillary and mandibular third molars, the maxillary right second permanent molar, and the mandibular left permanent central incisor; severe crowding; deep bite; hypoplastic teeth; bilateral reverse cross-bite in the premolar region; and a retrognathic mandible. The presence of this number of dental anomalies in a single patient is rare.

Introduction

Talon cusp is an anomalous structure composed of normal enamel and dentin containing varying extension of pulp tissue. The first recorded case of talon cusp was in 1892, when Mitchell [1] described an accessory cusp on the lingual surface of an upper central incisor as 'a process of horn like shape curving from the base downward to the cutting edge' in a female patient. Mellor and Ripa [2] named the accessory cusp as talon cusp because of its resemblance in shape to an eagle's talon. Shulze [3] referred to the anomaly as a very high accessory cusp, which may connect with the incisal edge to produce a T-form or, if more cervical, a Y-shaped crown contour. Other names include dens evaginatus, interstitial cusp, tuberculated premolar, odontoma of the axial core type, evaginated odontoma, occlusal enamel pearl, occlusal anomalous tubercle and supernumerary cusp [4].

The prevalence of talon cusp is low, with estimates ranging from less than 1% [5] to approximately 8% of the population [6]. A review of the literature suggests that 75% of talon cusps are in the permanent dentition and 25% are in the primary dentition, males show a higher frequency than females, and that the anomaly shows a greater predilection for the maxilla. Ninety-two per cent of cases affect the maxilla and the mandible accounts for only 8% of the cases. With regard to tooth affinity, only central incisors are involved in the primary dentition, and the maxillary lateral incisor is most often affected in the permanent dentition (67%), followed by the central incisor (24%) and canine (9%). The shape, size, structure, location and the site of origin of talon cusp varies widely. The anomaly is commonly unilateral, but one-fifth of the cases are bilateral in occurrence [7]. In the present case, the talon cusps were observed in both maxillary and mandibular teeth, but more prominently in the mandibular right central incisor, which is rare, with extension of the cusp to the incisal edge, which is also rare.

Impaction refers to those teeth which are prevented from erupting by some physical barrier lying in the path of eruption [8]. The aetiological factors responsible for impaction may include hereditary, evolutionary and local factors such as dense bone, fibromatosis, soft tissues, and rotated or malposed tooth buds. It may also occur in certain syndromes such as Gardner syndrome or Gorlin–Goltz syndrome [9]. This case report describes the occurrence of a

Correspondence: Dr J. K. Dash, Plot No. 510, Vivekananda Marg, Bhubaneswar – 753002, India. E-mail: dashjayant@rediffmail.com

inverted impacted migrating right mandibular second premolar to the lower border of the mandible.

Developmental absence of teeth (hypodontia) may present with varying degrees of severity ranging from absence of a single tooth to the entire dentition (anodontia). Hypodontia may occur as an isolated anomaly of odontogenesis, or as a syndromic component of a genetic or chromosomal defect [10–12]. This case report also describes the absence of all the mandibular and maxillary third molars, along with congenital absence of the maxillary right permanent second molar and mandibular left permanent central incisor.

The case report describes a female of 15 years of age in whom these dental anomalies presented together with the presence of talon cusp in the mandibular right central incisor and maxillary right lateral incisor.

Case report

A healthy 15-year-old girl presented for orthodontic treatment. Her presenting complaints were crowding in both the mandibular and maxillary segments. Her general medical history was not significant. Immediate family members were found to be free from any dental anomaly. Intraoral clinical examination revealed that she was in good oral health with low caries experience and good periodontal status. All the permanent teeth with the exception of the mandibular right second premolar, maxillary right second molar, mandibular left central incisor and all the permanent third molars were erupted.

The mandibular right central incisor exhibited a prominent talon cusp (Figs 1 and 2), conical in shape, projecting from the cemento-enamel junction and extending to the tip of the incisal edge. Similarly, the right maxillary lateral incisor exhibited a talon cusp extending just below the incisal edge (Figs 3 and 4). There were no carious lesions associated with either tooth, and both responded positively to electric pulp testing. The cusp neither irritated the tongue during speech and mastication, nor interfered with occlusion.

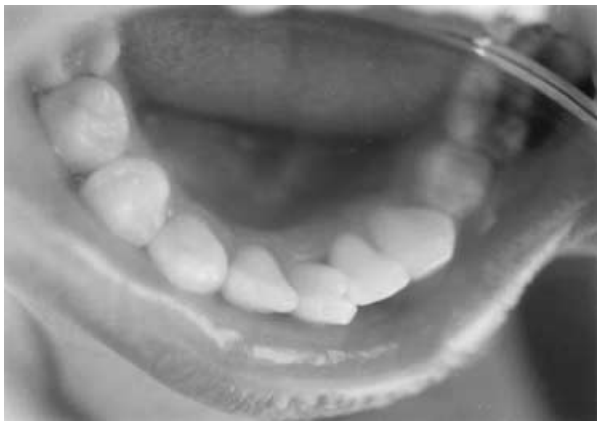

Fig. 1. Incisal mirror view of the subject's mandible showing prominent talon cusp on the right central incisor.

Fig. 2. Lingual view of a cast of the subject's mandible showing talon cusp on the right central incisor, as well as the absence of the left central incisor and right second premolar.

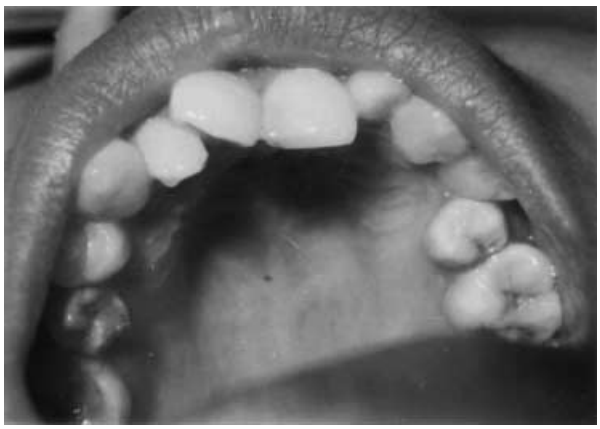

Fig. 3. Incisal view of the subject's maxilla showing the presence of talon cusp on the right lateral incisor and hypoplastic teeth.

Other dental variations included a Class II, Division 2 malocclusion, a deep bite, reverse cross-bite of the upper first premolars, crowding, a hypoplastic maxillary right second premolar and peg-shaped maxillary lateral incisors.

Radiographic examination also revealed the presence of a completely inverted impacted migrating right second premolar in the mandible, complete

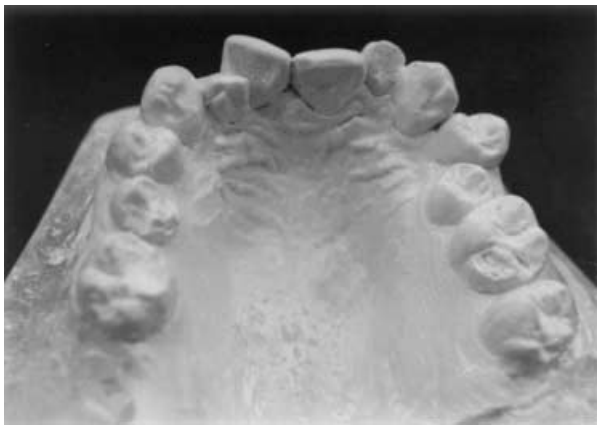

Fig. 4. Palatal view of a cast of the subject's maxilla showing talon cusp on the right lateral incisor, the absence of the right second molar and significant crowding of teeth.

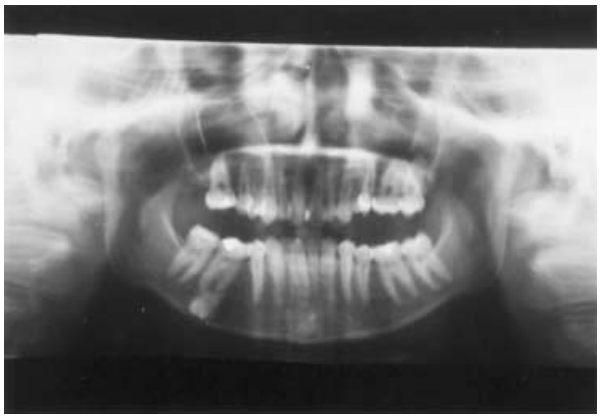

Fig. 5. Panoramic radiograph showing the presence of an inverted migrating impacted mandibular right second premolar on the lower border of the subject's mandible, as well as the absence of the lower left central incisor, the maxillary right second permanent molar, and all the third molars of the maxilla and mandible. Talon cusp is well defined in the mandibular right central incisor.

agenesis of all the maxillary and mandibular third molars, and agenesis of the maxillary right second permanent molar and mandibular left central incisor (Fig. 5). An intraoral peri-apical radiograph of lower incisor region revealed a typical inverted, V-shaped radiopaque structure superimposed over the image of the right central and lateral incisor crowns with the point of the 'V' towards the incisal edge. The cusp was demarcated by two distinct white lines converging from the cervical area of the affected tooth towards the incisal edge. The extension of pulp could be traced radiographically to the middle of the cusp (Fig. 6).

The main objective of management includes orthodontic control of crowding, and correction of malocclusion with fixed orthodontic therapy, selective grinding of talon cusp and surgical extraction of the impacted lower left mandibular premolar. These objectives were explained in detail in the treatment plan, but the patient and parent declined treatment.

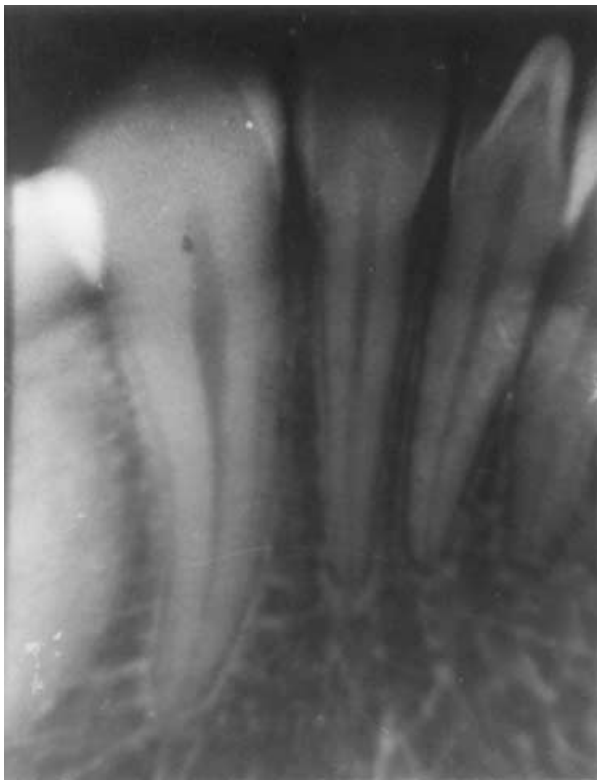

Fig. 6. Intraoral radiograph of the subject's mandibular central incisor region showing talon cusp with pulp horn extended to the middle of the cusp.

Discussion

The combination of mandibular incisor talon cusp, a relatively rare odontogenic anomaly, along with an inverted impacted migrating lower premolar, and hypodontia of the maxillary and mandibular permanent teeth makes this case an interesting one, particularly since the condition was not associated with any known abnormal systemic developmental syndrome. Chawla *et al*. [6] used a wide criteria for categorization of an accessory cusp as talon cusp, and defined talon cusp as a demarcated projection of one millimetre or more present on the lingual surface of anterior teeth. Talon cusp has been reported as a rare and uncommon condition, and the name refers to an accessory, cusp-like structure that varies considerably in size, ranging from an enlarged

cingulum to a well-delineated anomalous cusp extending to at least half of the crown height, and usually occurring on the occlusal or lingual surfaces [8,13]. Davis and Brook [14] stated that talon cusp may represent the extreme of a continuous variation progressing from a normal cingulum to an enlarged cingulum, then to a small accessory cusp, and then to a cusp with a talon shape. Jowharji *et al*. [15] suggested an alternative definition of a talon cusp to indicate possible projection from either the lingual or facial surface of a tooth, and that it should extend for at least half the distance from the cemento-enamel junction to the incisal edge in order to distinguish talon cusps from small tubercles or a raised cingulum based on the reported occurrence on the labial surface of the maxillary central incisor. Occurrences of talon cusp on the labial surface of a mandibular central incisor [16], and both labial and palatal talon cusps on the same tooth have been reported [17].

The exact aetiology of the condition is still unresolved, but is believed to be a combination of genetic and environmental factors. The complex process of dental development appears to be multifactorial, primarily polygenetic and to have some environmental influences. Talon cusp occurs during the morpho-differentition stage of tooth development. Hattab *et al*. [7] suggested that the anomaly might occur as a result of out-folding of the enamel organ or hyper-productivity of the dental lamina. Sicher and Bhasker [18] suggested that disturbances during morpho-differentition (e.g. altered endocrine function) might affect the shape and size of the tooth without impairing the function of ameloblasts or odontoblasts.

The association of talon cusp with other somatic and odontogenic anomalies reported in the literature includes peg-shaped lateral incisors, unerupted canines and mesiodens [13]; supernumerary teeth, megadont and dens evaginatus [14]; complex odontoma and impaction [19]; and hypodontia [20]. The association of talon cusp with syndromes includes Mohr syndrome (orofacial digital syndrome, type II) [21], Sturge–Weber syndrome (Encephalotrigeminal Angiomatosis) [22], Rubinstein–Taybi syndrome [23], Incontinentia Pigmenti Achromians [24] and Ellis–van Creveld syndrome [25].

The morphological character of talon cusps reported in the literature varies widely. Some cusps are quite sharp and spiked, whereas others are teat-like with rounded and smooth tips [7]. Other investigators have described them as a markedly enlarged or exaggerated cingula on the maxillary incisors [21], and horn-like, conical or pyramidal [22]. Hattab *et al*. [7] classified these anomalous cusps into three types based on the degree of cusp formation and extension:

1 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.

2 Semi-talon – an additional cusp of one millimetre or more, but extending less than half the distance from the cemento-enamel junction to the incisal edge. It may blend with the palatal surface or stand away from the rest of the crown.

3 Trace talon – an enlarged or prominent cingula in any of its variants (i.e. conical, bifid or tubercle-like) originating from the cervical third of the root.

According to this classification, the talon cusps described in this paper were classified as follows:

- The anomalous cusp on the subject's mandibular central incisor prominently projected from the lingual aspect and extended from the cemento-enamel junction to the incisal edge, i.e. it is a type 1 talon cusp.
- The other anomalous accessory cusp on the maxillary lateral incisor extended half the distance from the cemento-enamel junction to the incisal edge, i.e. it is a type 2 semi-talon.

The second important aspect reported in this case is the congenital absence of permanent teeth or hypodontia. Absence of either primary or permanent teeth may also occur as an isolated anomaly, or in association with other craniofacial abnormalities. Hegde and Kumar [20] reported a case of talon cusp on the mandibular left permanent central incisor, and the congenital absence of an adjacent mandibular right permanent central incisor only. In the case described in this paper, there is congenital absence of a number of permanent teeth, which is a rare phenomenon. Hypodontia is a component of a number of uncommon but well-documented genetic disorders such as ectodermal dysplasia [26].

In this case, anomalies occurred together with an impacted inverted migrating premolar. It cannot be easily explained why this tooth became completely inverted, impacted and migrated to the lower border of the mandible. The cause of impaction may be the position of the tooth germ in an abnormal position from the developmental stage itself. In such cases, eruptive forces would tend to drive the tooth deeper.

Root closure might be completed in the inverted position after migration to the lower border of the mandible. Inverted impaction of the mandibular premolar has been reported previously [27,28].

Dentofacial abnormalities such as mandibular retrognathia, crowding, congenital absence of teeth, tooth impaction and the presence of talon cusps need to be diagnosed early to prevent severe malocclusion, and multidisciplinary consultation is important, as is the early diagnosis and management of these basic abnormalities. In the present case, the occurrence of severe orthodontic problems along with a number of dental anomalies was diagnosed late but there was insufficient parental cooperation for acceptance of dental treatment even after the treatment plan was carefully explained.

Résumé. L'évagination cingulaire est une anomalie dentaire rare correspondant à une cuspide accessoire au niveau cingulaire ou de la jonction amélocémentaire des dents antérieures maxillaires ou mandibulaires, dans les deux dentures. Cet article décrit un cas rare d'évagination affectant l'incisive centrale mandibulaire droite et l'incisive latérale maxillaire droite conjointement à d'autres anomalies: seconde prémolaire mandibulaire droite impactée et inversée en évolution; agénésie des troisièmes molaires maxillaires et mandibulaires, de la deuxième molaire permanente maxillaire droite et de l'incisive centrale permanente mandibulaire gauche; encombrement sévère; supraclusie marquée; des dents hypoplasiques; inversé d'articulé bilatéral dans la région prémolaire; mandibule rétrognathe. La présence concomitante d'un tel nombre d'anomalies est rare.

Zussamenfassung. Talon Cusp (wörtlich: Klauenhöcker) ist eine seltene Zahnanomalie von Oberkiefer oder Unterkiefer Schneidezähnen im Milch- oder Wechselgebiss bestehend aus einen überzähligen Höcker in der Cingulumregion oder der Schmelz-Zementgrenze entspringend. Dieser Artikel berichtet einen seltenen Fall eines Talon Cusp eines mittleren Unterkiefer-Schneidezahns in Verbindung mit einem Talon Cusp eines seitlichen Oberkiefer-Schneidezahnes sowie weiteren dentalen Besonderheiten wie einem invertiert impaktierten zweiten Unterkiefer-Prämolaren, komplettes Fehlen der Weisheitszähne, Engstand, tiefer Biss, hypoplastische Zähnebeidseitiger Kreuzbiss in der Prämolarenregion und Retrognathie des Unterkiefers. Die Kombination all dieser Anomalien ist selten.

Resumen. La cúspide en garra es una anomalía dental común referida a una cúspide accesoria proyectada desde el área del cíngulo o de la unión amelocementaria de los dientes anteriores superiores o inferiores, tanto en la dentición temporal como permanente. Este artículo informa de un caso raro de cúspide en garra que afecta al incisivo central inferior derecho y al incisivo lateral superior derecho junto con otras anomalías dentales viz. Segundo premolar inferior derecho desplazado impactado e invertido, agenesia completa de terceros molares superiores e inferiores, segundo molar permanente superior derecho e incisivo central permanente inferior izquierdo, apiñamiento severo, mordida profunda, dientes hipoplásicos, mordida cruzada bilateral en la región del premolar y mandíbula retrognática. Es rara la presencia de tal cantidad de anomalías dentales juntas.

References

1 Mitchell WH. Case report. *Dental Cosmos* 1892; **34**: 1036.
2 Mellor JK, Ripa IW. Talon cusp: a clinically significant anomaly. *Oral Surgery, Oral Medicine and Oral Pathology* 1970; **29**: 225–228.
3 Shulze C. Developmental abnormalities of the teeth and jaws. In: Gorlin RJ, Goldman HM (eds). *Thoma's Oral Pathology*, 6th edn. St Louis, MO: C. V. Mosby Co., 1970: 96–97.
4 Danker E, Harari D, Rotstein I. Dens evaginatus of anterior teeth: literature review and radiographic survey of 15 000 teeth. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics* 1996; **81**: 472–476.
5 Sedano HO, Freyre IC, Garza de La Garza ML *et al*. Clinical orodental abnormalities in Mexican children. *Oral Surgery, Oral Medicine and Oral Pathology* 1989; **68**: 300–311.
6 Chawla HS, Tewari A, Gopalakrishnan NS. Talon cusp: a prevalence study. *Journal of the Indian Society for Pedodontics and Preventive Dentistry* 1983; **1**: 28–34.
7 Hattab FN, Yassin OM, al-Nimri KS. Talon cusp in permanent dentition associated with other dental anomalies: review of literature and reports of seven cases. *Journal of Dentistry for Children* 1996; **63**: 368–376.
8 Shafer WG, Hine MK, Levy BM. *A Textbook of Oral Pathology*, 4th edn. Philadelphia, PA: W. B. Saunders, 1983.
9 Thoma KH. *Oral Pathology*, 6th edn. St Louis, MO: C. V. Mosby Co., 1970.
10 Scarel RM, Trevilatto PC, Di Hipohto O Jr, Camargo LE, Line SR. Absence of mutations in the homeodomain of the MSX1 gene in patients with hypodontia. *American Journal of Medicine Genetics* 2000; **92**: 346–349.
11 Vastardis H. The genetics of human tooth agenesis: new discoveries for understanding dental anomalies. *American Journal of Orthodontics and Dentofacial Orthopedics* 2000; **117**: 650–656.
12 Hodges SJ, Harley KE. Witkop tooth and nail syndrome: report of two cases in a family. *International Journal of Paediatric Dentistry* 1999; **9**: 207–211.

13 Mader CL. Talon cusp. *Journal of American Dental Association* 1981; **103**: 244–246.
14 Davis PJ, Brook AH. The presentation of talon cusp: diagnosis, clinical features, associations, and possible aetiology. *British Dental Journal* 1985; **59**: 84–88.
15 Jowharji N, Noonan RG, Tylka JA. An unusual case of dental anomaly: a facial talon cusp. *Journal of Dentistry for Children* 1992; **59**: 156–158.
16 McNamara T, Haeussler AM, Keane J. Facial talon cusps. *International Journal of Pediatric Dentistry* 1997; **7**: 259–262.
17 Abbott PV. Labial and palatal 'talon cusp' on the same tooth. A case report. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics* 1998; **85**: 726–730.
18 Sicher S, Bhasker SN, Orban S. *Oral Histology and Embryology*, 7th edn. St Louis, MO: C. V. Mosby Co., 1972.
19 Natkin E, Pitts DL, Worthington P. A case of talon cusp associated with other odontogenic abnormalities. *Journal of Endodontics* 1983; **9**: 491–495.
20 Hegde S, Kumar BR. Mandibular talon cusps report of two cases. *International Journal of Pediatric Dentistry* 1999; **9**: 303–306.
21 Goldstein E, Medine JL. Mohr syndrome or oral-facial digital II: report of two cases. *Journal of the American Dental Association* 1974; **89**: 377–382.
22 Chen RJ, Chen HS. Talon cusp in primary dentition. *Oral Surgery, Oral Medicine and Oral Pathology* 1986; **62**: 67–72.
23 Gardner DG, Girgis SS. Talon cusp: a dental anomaly in the Rubinstein–Tabyi syndrome. *Oral Surgery* 1979; **47**: 519–521.
24 Tsutsumi T, Oguchi H. Labial talon cusp in a child with incontinentia pigmenti achromians: case report. *Pediatric Dentistry* 1991; **13**: 236–237.
25 Hattab FN, Yassim OM, Sasa IS. Oral manifestations of Ellis–van Creveld Syndrome: report of two siblings with unusual dental anomalies. *Journal of Clinical Pediatric Dentistry* 1998; **22**: 159–165.
26 Ohno K, Ohmori I. Anodontia with hypohydrotic ectodermal dysplasia in a young female: a case report. *Pediatric Dentistry* 2000; **22**: 49–52.
27 Mody RN. A completely inverted impacted mandibular second premolar (a case report). *Journal of Indian Dental Association* 1983; **55**: 273–274.
28 Mori SI, Kitamura K, Ohmori T. Inverted tooth eruption: report of a case. *Oral Surgery* 1979; **47**: 389–390.