



Talon cusp: clinical features, diagnosis and orthodontic consideration in management.

Sanu OO, Isiekwe MC.

Department of Child Dental Health, College of Medicine, University of Lagos,
PMB. 12003, Idi-Araba, Lagos. Nigeria.

Correspondence: Sanu OO

E-mail: yemisanu@yahoo.com

Abstract

Talon cusp is a rare odontogenic anomaly of tooth shape comprising of accessory cusp-like structure often present on the palatal surface of maxillary or mandibular incisor. This developmental anomaly causes clinical problems including unsightly dental appearance, occlusal interference, and displacement of the affected tooth, irritation of the tongue, caries and malocclusion. Few cases have been reported in this environment. Management of the talon cusp varies according to the circumstances of the individual case and should be as conservative as possible. This report presents a case of a 15-year-old Nigerian girl with talon cusp on the maxillary left central incisor. The talon cusp was managed conservatively and orthodontic treatment was concurrently carried out. It is concluded that when talon cusp occur in association with an occlusal anomaly, careful evaluation of the patient is crucial for successful orthodontic treatment.

Keywords: talon cusp, clinical features, diagnosis, orthodontic management.

Introduction

A talon cusp is a supernumerary crown structure composed of normal enamel and dentine, and a varying amount of pulp tissue⁽¹⁾. This odontogenic anomaly was first described in the literature in 1892 in a female patient and was referred to as a "process of horn-like shape, curving from the base downward to the cutting edge" on the lingual surface of an upper left central incisor⁽²⁾, since then various descriptions have been given to the anomaly in the dental literature⁽³⁻¹⁵⁾. Typically, the shape of this extra cusp generally resembles that of an eagle's talon but it could also present as pyramidal, conical or teat-like^(3, 5, 8). Though most commonly seen on the palatal or occlusal surfaces⁽¹⁾, there have been previous reports of talon cusps on the facial or labial surface of maxillary permanent teeth^(10, 13).

One report describes two talon cusps on the same tooth, one on the labial and the other on the palatal surface⁽¹³⁾. The anomaly varies widely in shape, size, structure, location, site of origin, length and form^(3, 8, 16). The tip of the crown may stand away from the rest of the crown thus increasing its labiolingual width, and also the probability of occlusal interference. It may also be in close apposition to the lingual surface of the tooth where the cusp blends smoothly with the rest of the tooth. A deep developmental groove may be prominent and be potential stagnation area in location where it joins the sloping lingual surface of the incisors. Susceptibility to dental caries is very high with a high risk of pulpal involvement necessitating endodontic treatment and other restorative treatment⁽⁷⁾. The tip of the crown does not always coincide with the midline of the long axis of the tooth with deviation occurring towards the mesial aspect⁽⁸⁾.

The prevalence of talon cusp varies considerably among

populations ranging from 0.06% to approximately 8%⁽¹⁷⁾. Lack of precise criteria to classify an accessory cusp as a "talon" as well as ethnic variation have contributed to the extensive variations in prevalence⁽¹⁸⁾. The permanent dentition is affected more frequently than the primary dentition^(8, 18-20). A review of the literature shows that 75% of the cases exhibited talon cusp in the permanent dentition and 25% of cases in the primary dentition^(14, 16). The anomaly is more commonly found in males than in females⁽¹⁴⁾. However, Meon reported no sex predilection in the occurrence⁽²¹⁾. Talon cusp shows a predilection for the maxilla over the mandible⁽⁸⁾. The maxillary lateral incisors are the teeth most frequently involved (55%) followed by the central incisors (36%) and the canines (9%)^(14, 18). Reports in the mandible are uncommon^(6, 7, 15).

The anomaly can occur as an isolated finding or in association with other dental anomalies such as peg-shaped lateral incisor, agenesis or impacted canines, mesiodens, complex odontomes, megadont, dens evaginatus of posterior teeth, shovel-shaped incisors, dens invaginatus, exaggerated Carabelli cusp, accentuated marginal ridges on the central incisor^(3, 8, 12, 14, 16, 18). Associated occlusal anomalies reported are palatal displacement of the central incisor, displacement of the occluding mandibular incisor tooth lingually resulting in a mid-line shift, reduced overbite and crossbite^(12, 14, 16, 22, 23). The talon cusp has not been reported as an integral part of any specific syndrome, although it appears to be more prevalent in patients with Sturge-Weber syndrome (encephalotrigeminal angiomas), Mohr syndrome (oral-facial-digital syndrome, type II), Rubinstein-Taybi syndrome, Ellis-van Creveld syndrome, incontinentia pigmenti achromians (IPA), a rare disease which involves the skin, hair, eyes, central system and musculoskeletal system^(11, 12, 18, 19, 24). Incontinentia pigmenti achromians (IPA)

has also been associated with other dental anomalies such as multiple dental cusps in both primary and permanent incisors⁽¹³⁾.

The aetiology of talon cusp is not well understood and the exact mechanism unknown^(5,11,12,17). It however appears to have both genetic and environmental components^(11,12,18). It may be due to mal-interaction between ecto- and mesoderm of epithelia bulgings present on premaxillary region at the time of complex odontogenesis, hence they are said to originate during the morpho-differentiation stage of tooth development and may occur as a result of outward folding of inner enamel epithelia cells and transient focal hyperplasia of the peripheral cells of mesenchymal dental papilla⁽¹⁴⁾. It was postulated by some authors that sporadic occurrences probably are induced by trauma or other localized insults affecting the tooth germ⁽¹⁵⁾. Radiologically, talon cusp is visible as a radiopaque structure. However, the exact radiographic appearance depends to a large extent on the size and configuration of the cusp as well as the angulation used to take the radiograph^(8,12). It is important to differentiate between the talon cusp and supernumerary radiographically prior to eruption. When erupted or partially erupted, talon cusp can mimic a supernumerary tooth, and awareness of this presentation avoids unnecessary surgical intervention^(3,5,8,10,25).

Clinically, talon cusp may provide a substantial diagnostic treatment planning and procedural challenge⁽²⁵⁾. Early diagnosis and management are important to avoid complications. There may be a number of problems to the patient; which include problems of aesthetic, caries control and occlusal accommodation and problems in diagnosis and clinical management to the dentist⁽¹²⁾. Modalities of treatment vary. Critical appraisal of the anomaly will dictate the correct management. The purpose of this report is to present the clinical features, diagnosis and orthodontic management of a talon cusp on the maxillary left central incisor in a 15 year old Nigerian girl.

Case Report

A 15-year-old Nigerian girl presented at the dental clinic complaining of a large, unsightly maxillary left central incisor, with a projection on the palatal surface, which was causing some irritation to the tongue and affecting her speech. These problems, the father admitted occurred and were observed as soon as the two central incisors were fully erupted. An earlier orthodontic treatment had been carried out when the patient was younger but the father claimed there was minimal improvement in the aesthetic appearance, which later relapsed. The father was quite aware of the anomaly and wanted to know if a permanent treatment could be carried out.

The patient was the third of three siblings. No other member of the family was affected by similar dental anomalies. At the time of presentation, the patient appeared healthy and of normal physical development for her age. There was no reported history of orofacial trauma. Intra-oral examination revealed normal soft tissues. The occlusion was a Class I molar relationship. All the permanent teeth were erupted except the third molars in all the four quadrants. The maxillary central incisors were rotated distolabially with minimal anterior spacing in the

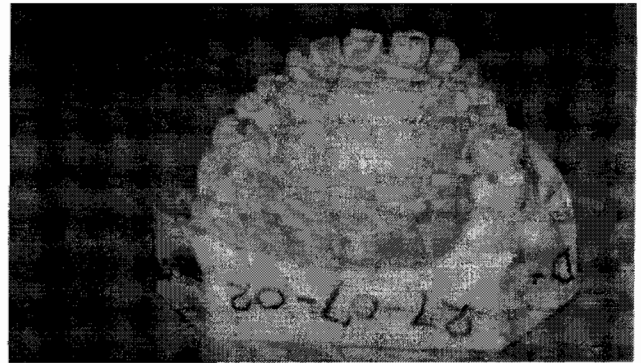


Figure 1 An upper stone model showing talon cusp on the left central incisor.



Figure 2 Upper fixed orthodontic appliance in place. Note rotation of maxillary right and left central incisors and premature contact with mandibular left central and lateral incisors in occlusion.

upper anterior segment (Figure 1). The rotation was more marked on the maxillary left central incisor.

The maxillary left central incisor exhibited a pronounced, well-defined supernumerary accessory cusp on the palatal aspect extending from the cemento-enamel junction to within approximately 1 mm of the incisal edge. The talon cusp was pyramidal in shape and located more to the distal half of the palatal surface of the crown, with the mesial surface of the cusp attached to the crown. The palatal cusp measured 7mm in length (incisocervically), 5.5mm in width (mesiodistally) and 6mm in thickness (labiolingually). Non-carious grooves were present at the junction of the talon cusp and the palatal surface of the tooth (Figure 1), and also laterally. The tooth appeared normal. A periapical radiograph showed a V-shaped radiopaque structure superimposed on the image of the affected crown, with the point of the "V" toward the incisal edge. The talon cusp was outlined by two distinct white lines converging from the cervical area of the affected tooth towards the incisal edge. A pulp chamber was radiographically visible extending into the cusp. Based upon clinical and radiographic findings, a diagnosis of talon cusp on the maxillary left central incisor was made.

It was decided to carry out conservative management by gradual and periodic reduction of the talon cusp to eliminate the source of tongue irritation. The patient was seen at a 6-8 week recall schedule and a small portion was ground off each time the patient was seen and this was followed by topical application of fluoride after each

grinding procedure.

Concurrently, an upper fixed orthodontic appliance therapy was commenced using 0.022 x 0.028 inch Roth prescription pre-adjusted fixed appliances to execute the alignment and space closure (Figure 2). Initial alignment was carried out using 0.014 inch nickel titanium wire, followed by routine arch wire mechanisms on 0.022 x 0.028 inch slot dimensions progressing up to 0.019 x 0.025 inch rectangular stainless steel to complete alignment, levelling and space closure. After five sessions, the talon cusp was essentially reduced without exposing the pulp or compromising the vitality of the tooth (Figure 3). Orthodontic movement progressed satisfactorily and the patient was debonded at the conclusion of treatment.

Upper removable retention appliance with Adam's clasps on first molar teeth with labial bow was fitted on debond and prescribed full time for the first 3 months followed by a further 6 months night wear only. Total active treatment time was 16 months. Treatment resulted in marked improvement in shape and position of the maxillary central incisors as well as enhancement of appearance (Figure 4).

Discussion

Talon cusp is an odontogenic anomaly of tooth shape that represents the extreme of continuous variation progressing from an enlarged cingulum (trace talon) through a small accessory cusp (semi talon) to a talon cusp^(14,18). Small talon cusps are usually asymptomatic and need no treatment. However, large talon cusps usually cause clinical problems including poor aesthetics, occlusal interference, displacement of the affected tooth, irritation of the tongue during speech and mastication, carious lesions in the developmental grooves that delineate the cusp, pulpal necrosis, periapical pathosis, attrition of the opposing tooth and periodontal problems due to excessive occlusal forces^(3,5,8,14). The patient in this report had some of these problems. The accessory palatal cusp was not aesthetically pleasant. Of particular note in this patient was the presenting malocclusion arising from displacement of the maxillary central incisors with rotation. This was found to be more marked on the left central incisor and was of concern both to the patient and parent. Malocclusion may be created due to the presence of talon cusp⁽⁴⁾. Orthodontic correction can then be undertaken when required⁽²⁶⁾. In this report, orthodontic treatment was carried out concurrently.

Talon cusps of the maxillary incisors usually extend to, and even beyond the incisal edge and thus compromise the aesthetic appearance of the dentition^(3,5,6). Such was the presentation in this case. The patient became very conscious of the unaesthetic appearance and sought orthodontic treatment earlier. Due to inappropriate management of the talon cusp earlier on, a relapse occurred. Occlusal interference should be corrected by reduction of the tip of the talon cusp and endodontic treatment if such reduction results in pulpal exposure^(4,6). In some cases, complete reduction of the cusp is required if the occlusal interference is severe⁽¹³⁾ and it interferes with centric occlusion. The treatment procedure described in this report offers a method to remove a talon cusp from a tooth without exposing the underlying pulp tissue.

Talon cusps also present diagnostic and treatment difficulties. This is more so in unerupted tooth where the

anomalous cusp can radiologically be mistaken for a supernumerary tooth or compound odontomas, leading to unnecessary surgical intervention⁽¹⁴⁾. This diagnostic problem is significant especially because approximately 90% of all supernumeraries occur in the maxilla with half of these in the incisor region⁽²⁷⁾. Careful clinical judgment and review of whether the cusp contains or is devoid of a pulp horn must be carried out. However, radiographic tracing of the pulpal configuration inside the talon cusp is often difficult because the cusp is superimposed over the affected tooth crown. Histological examinations of extracted talon teeth have also failed to show the presence of a pulp horn in the talon cusp^(9,28).

Due to differing reports, several forms of treatment have been advocated for the management of talon cusps. These should be as conservative as possible⁽²⁹⁾, and include gradual and periodic reduction of the cusp with fluoride applied as a desensitizing agent; total removal and restoration of the resultant defect, single appointment reduction with or without pulp therapy, partial reduction with composite camouflage, sealant for developmental

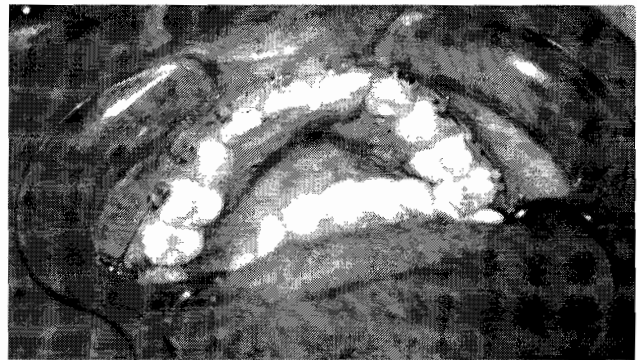


Figure 3 Intraoral view of the patient during orthodontic treatment showing marked reduction of the talon cusp on the maxillary left central incisor.

grooves; prophylactic odontotomy; preparation of the groove between the cusp and the tooth to receive a filling in order to prevent caries in this area^(3, 6, 10-13, 25). Orthodontic correction can then be undertaken when required⁽²⁶⁾. Pitts and Hall⁽²⁶⁾ removed 3mm of the anomalous cusp in one visit, without pulp exposure. Some other authors reported reducing 1.0mm to 1.5mm of talon cusp in one appointment without exposing the pulp^(14,18,20). In this present reported case, the author reduced about 1.0mm of the talon cusp every 6 to 8 weeks using a high speed water-cooled sharp diamond bur without anesthesia to determine the patient's pain response. Topical fluoride was subsequently applied as a desensitizing agent. The rationale of this procedure was that by gradual grinding of the cusp, the pulp would be stimulated to form reparative dentine adjoining the grinding area. As this procedure continued, the underlying pulp tissue would be obliterated⁽²⁵⁾.

Complete reduction of the cusp is probably the most common approach, but it requires some form of pulp therapy, for example, root canal treatment or vital pulpotomy techniques such as partial pulpotomy⁽¹³⁾. Partial pulpotomy has a high success rate⁽³⁰⁾ comparable to root



Figure 4 Final occlusion after reduction of talon cusp and at the completion of orthodontic treatment. Note the marked improvement in shape and position of the maxillary central incisors.

canal treatment, although size of the exposure is not related to the success rates of partial pulpotomy⁽³⁰⁾. It has been postulated that this procedure is one of the most reliable forms of vital tooth treatment when exposure is encountered.

The orthodontic treatment was carried out concurrently in this patient in order to align the rotated maxillary central incisors, returning them to nonrotated positions. Ferraz et al⁽³¹⁾ reported that the orthodontist must carefully evaluate patients with dens evaginatus (talon cusp), because movement can change the patient's bite, making an occlusal adjustment necessary that can lead to dentin-pulp complex exposure⁽³²⁾.

Conclusion

This case showed that talon cusp occurred in association with an occlusal anomaly. The "talon tooth" was markedly rotated, causing premature contact with the mandibular opposing teeth. However, careful evaluation of the patient is very crucial for successful orthodontic treatment. It is important that the orthodontist be well prepared to carefully plan treatment of talon cusp, to avoid future problems. It is concluded that when Talon cusp occur in association with an occlusal anomaly; careful evaluation of the patient is crucial for successful orthodontic treatment.

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