Selective Reduction of Talon Cusps- A Case Series

Rona Leith* /Anne C O'Connell**

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/42/1/1/1751481/1053-4628-42_1_1.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022

Talon cusps associated with permanent incisors are a rare occurrence but can cause numerous complications. When treatment is indicated options include radical or selective reduction of the accessory cusp, but there is no standard protocol for management. ***Study design:*** *Patients referred to the Dublin Dental University Hospital for treatment of talon cusps were identified, contacted and consent obtained. Clinical notes, photographs and radiographs were retrospectively reviewed.* ***Results:*** *Eleven patients with 14 talon cusps were identified. The age ranged from 8-15 with a mean of 11 years. Four teeth had radical talon cusp reduction carried out and 10 teeth underwent selective reduction. Follow up ranged from 3-66 months. Technical information from these cases was used to devise a protocol for selective reduction.* ***Conclusions:*** *Selective reduction is a valuable technique for managing talon cusps. It is a conservative approach which can be employed before an incisor has reached maturity and is acceptable in young children.*

Key words: talon, cusp, permanent incisor children.

INTRODUCTION

A talon cusp is a cusp like structure that protrudes from the palatal surface of a maxillary or mandibular incisor[1]. It is composed of normal enamel and dentin and may contain pulp tissue[1,2,3]. Talon cusps vary in shape, size and relationship to the incisal edge depending on their projected extension. Davis & Brock[4] proposed that a talon cusp must extend at least half the distance from the cemento-enamel junction to the incisal edge. Hattab et al.[2] further classified talon cusps according to the cusp formation and extension; type I is a "true talon", a morphologically well-delineated cusp projects at least half way from the cemento-enamel junction to the incisal edge (Figure 1). Type II is a "semi-talon", where the additional cusp extends less than half way from the cemento-enamel junction to the incisal edge. Type III is a "trace-talon", an enlarged and prominent cingulum.

Talon cusps are rare[1,5] but when present, they can cause numerous clinical problems. Compromised aesthetics, caries, pulpal necrosis, accidental cusp fracture, soft tissue irritation, occlusal interference, displacement of the talon tooth, attrition, apical periodontitis or periodontal problems from excessive occlusal forces have all been reported in relation to this uncommon dental anomaly[1,2,5,6,7,8]. Talon cusps are predominantly located on the palatal surface of maxillary permanent incisors[2] and occurrence on a mandibular incisor is very rare. Many case reports to date have identified bilateral occurrence of talon cusps and an association with other dental anomalies thus supporting a genetic aetiology and suggesting it may not be an isolated entity.[5,3,9]

Early intervention is warranted where the talon cusp is causing aesthetic and functional problems to minimise complications. This must be weighed up with the risk of devitalising an incisor, especially if immature. Management options depend on the patient's presenting complaint, the clinical findings and the level of cooperation. Preoperative photographs, radiographs and vitality tests are imperative before any treatment commences. Type II and III talon cusps often require no treatment other than preventive advice and fissure sealing of the developmental groove to reduce caries risk[1,10]. However, type I talon cusps often require surgical intervention once fully erupted to improve aesthetics and facilitate alignment. There are two basic treatment approaches: radical removal of the talon cusp in one visit or conservative selective reduction over a number of visits. There is no standard protocol for managing talon cusps and as a result it was decided to retrospectively report on the cases with type I talon cusps that had been treated in the Dublin Dental University Hospital over the last number of years. The present study aimed to describe the various clinical presentations of talon cusps in the permanent dentition and to retrospectively identify the types of treatment carried out and their outcomes.

From the Department of Public and Child Dental Health, Dublin Dental University Hospital, University of Dublin, Trinity College, Dublin 2, Ireland.
* Rona Leith, BA, B.Dent Sc., D.Ch.Dent, Assistant Professor.
**Anne C O'Connell, BA B.Dent Sc., MS, Associate Professor.

Send all correspondence to:
Rona Leith
Department of Public and Child Dental Health, Dublin Dental University Hospital, University of Dublin, Trinity College, Dublin 2, Ireland.
E-mail: rona.leith@dental.tcd.ie

Clinical Cases

Following ethical approval from the School of Dental Science Research Ethics Committee, Trinity College Dublin, patients were identified and letters sent explaining the nature of the study and asking for participation. If consent was returned, clinical records, photographs and radiographs were retrospectively examined from those children aged 7-15 years who had been referred for treatment of talon cusps. Specific data was collected as detailed in Table 1. Assessment of pulp vitality at follow up was based on documented clinical findings, radiographic findings and reported results of sensibility testing.

There was a 92% response rate yielding data from 11 patients with a total of 14 type I talon cusps. The age ranged from 8-15 with a mean of 11 years. The sample consisted of slightly more females than males (Table 1). The vast majority of talon cusps were located on maxillary central (64%) and lateral (29%) incisors with only one case involving a lower central incisor. 27% of cases were bilateral and when seen, always involved the maxillary central incisors. The vast majority (82%) of the children with talon cusps had an additional dental anomaly detected, with macrodontia most commonly encountered. Other associated anomalies included odontomes, infraocclusion, short root anomaly, and hyopodontia. These supplementary defects were independent of the talon tooth in over half of cases.

Poor appearance was the chief complaint documented, with many of the teeth involved exhibiting rotations, drifting and uneven incisal edges. Other manifestations of talon cusps included wear faceting and heavy occlusal contacts. Ten talon teeth were managed by selective tooth reduction while 4 underwent radical talon cusp reduction. All cases were managed by specialist paediatric dentists or residents.

Our protocol for selective reduction (Table 2) involved sequential grinding of the cusp in order to expose dentin. Approximately 2mm of reduction per session was achieved using a diamond bur in a high speed hand piece with water coolant. An example of one of the cases is depicted in Figures 1-4. Six out of eight reduction cases were completed without the need for local anaesthesia. The choice to use local anaesthesia was determined mainly by operator preference and not reported sensitivity. In most cases, fluoride varnish (containing 5% sodium fluoride) was applied after each reduction and the patient was advised to use desensitizing toothpaste post-operatively. Dentin bonding was not applied in any of the cases. Selective reduction was completed over intervals of 6-8 weeks and most took 3 visits to achieve acceptable reduction (Table 1). There was no documented pulpal exposure in any of the teeth that underwent selective reduction. Following selective reduction, all teeth were documented as vital at review with varying follow up periods ranging from 3-66 months. Both cases that had a short 3 month follow up were older patients who had selective reduction carried out in teeth with a closed apex. In 4 teeth radical cusp reduction was performed. In all cases either general anaesthesia or inhalational sedation was required to manage behaviour or because additional anomalies related to the talon tooth complicated treatment. Our protocol for radical reduction involved complete removal of the talon cusp with a diamond bur in a high speed hand piece in one session using local anaesthesia resulting in a planned pulp exposure. Following pulp therapy, the coronal aspect of the tooth was sealed with composite resin. One of our teeth received a direct pulp cap and remained vital 4 years later. Three other teeth had a partial pulpotomy procedure carried out and of these two teeth subsequently lost vitality. The cases where radical cusp reduction was employed were followed up for 18, 47 and 72 months respectively, perhaps a reflection of the complexity of their treatment need.

DISCUSSION

Talon cusps are rare therefore the numbers involved in this study are low. All those that were examined were type I talon cusps; this is not unusual given that the more severe talon cusps tend to be the ones requiring referral to specialist care. In our patient group, talon cusps were found more commonly on maxillary central rather than lateral incisors, a finding that was in agreement with some authors,[1,3] but opposite to others[2,5,6]. We found that 27% of talon cusps presented bilaterally, a figure comparable to a study by Hattab *et al*.[2]

In our patient group, we identified three cases (4 teeth) where radical reduction was chosen. Some were cases where either treatment type could have been undertaken but radical was chosen based on operator preference and experience. Behaviour management also influenced some treatment decisions; if general anaesthesia was planned for other reasons then radical reduction would more likely be undertaken. We also had cases where radical treatment was chosen because selective reduction was considered unsuitable due to the extent of the anomaly. For example, in one case the talon cusp was extremely large and was separated from the palatal surface along its entire length (Figures 5-7), thus eliminating selective reduction as a treatment option.

While radical removal has the advantage of complete reduction of the talon cusp in one visit, it may be more difficult for the child to tolerate the procedure as local anaesthesia is required. Additionally, radical reduction usually results in pulpal exposure[1] that can jeopardise pulpal vitality. A pulp cap or vital pulpotomy procedure is then recommended in order to maintain pulpal vitality and allow continued root development of an immature root. The literature describes cases where tooth vitality was maintained following radical talon cusp removal and pulpotomy using calcium hydroxide or mineral trioxide aggregate,[11,12] but two out of three teeth that received pulpotomies in our study ultimately lost vitality and required root canal treatment.

Eight of our cases of type I talon cusps (10 teeth) were managed using selective reduction, and the significance of this method was also recognised by Bansal *et al*[8]. In all our cases pulp vitality was predictably maintained at follow up periods ranging from 3-66 months. The major advantage of this minimally invasive technique is that it can be utilized before an incisor has reached maturity and it is an easy treatment for the child to tolerate as local anaesthesia is not a requirement. A number of our cases had this procedure effectively carried out at 8 or 9 years of age. The exact technique is not well described in the literature so we have proposed a step by step protocol (Table 2) for this conservative approach.

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/42/1/1/1751481/1053-4628-42_1_1.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022

Table 1: Results

Age	Gender	Tooth affected	Other anomaly	Reduction chosen	Number of visits	Follow up (months)	Tooth vital at follow up
15	Male	22	Yes	Selective	2	3	Yes
12	Male	11	No	Selective	4	17	Yes
		21		Selective	4		Yes
9	Female	11	Yes	Selective	3	20	Yes
13	Male	11	Yes	Selective	2	7	Yes
		21		Selective	2		Yes
13	Male	22	Yes	Selective	3	10	Yes
8	Female	11	Yes	Selective	3	5	Yes
14	Female	12	Yes	Selective	3	3	Yes
9	Female	31	Yes	Selective	2	66	Yes
8	Female	11	Yes	Radical	1 (pulpotomy)	72	No
		21		Radical	1 (pulpotomy)		Yes
11	Male	22	No	Radical	1 (pulpotomy)	18	No
9	Female	21	Yes	Radical	1(direct pulp cap)	47	Yes

Table 2: Protocol for selective reduction of talon cusps

Preoperative photographs, radiographs, sensibility testing and check occlusion.
Determine the extent of tooth reduction required to normalise appearance, stabilise occlusion or allow alignment.
Be prepared to manage an iatrogenic pulp exposure.
No LA (unless severe sensitivity).
Use a flame / rugby ball shaped diamond bur in a high speed hand piece with water coolant.
Remove up to 2mm tooth structure to expose dentin on tip and long axis of talon cusp.
Stop reduction when sensitivity develops.
Apply fluoride varnish and advise use of desensitizing toothpaste post-operatively.
Do not apply bonding agent.
Carry out sensibility testing at each visit and continue reduction at 6-8 week intervals until adequate reduction achieved.
Once desired reduction is achieved seal the exposed dentinal tubules.
Follow up clinically and radiographically for minimum of 1 year.

Figure 1: Pre-operative radiograph of selective reduction case; teeth 11 and 21

Figure 2: Selective reduction case pre-operatively; teeth 11 and 21.

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/42/1/1/1751481/1053-4628-42_1_1.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022

Figure 3: Selective reduction case following some cusp reduction; teeth 11 and 21.

Figure 4: Selective reduction case post-operatively; teeth 11 and 21.

Selective reduction- when less is more

Selective tooth reduction aims to promote deposition of reparative dentin for pulp protection and allows for gradual reduction of talon size while maintaining pulp vitality. Following mild injuries, the odontoblasts beneath the site of the injury react and secrete reparative dentin[13]. The average rate of reparative dentin is deposited at 1.49 µm *per* day,[14] it is deposited rapidly during the first six weeks and then the rate decreases. As a result, selective reduction needs to be carried out gradually[10] to allow mineralisation. This is also the reason bonding is not recommended after reduction as it would diminish the stimulus for new dentin formation. Postoperative sensitivity can be prevented or managed using a desensitizing agent[8,15]. It has been suggested that the talon cusp should be reduced along its side to promote dentin formation since most of the odontoblasts lie along the length of the cusp rather than at the tip[15]. The newly formed dentin is thicker at 8 rather than 5 weeks[8] so many reports including our cases recommend a time interval of 6-8 weeks between reductions[2,5,6,7,8,15]. There are conflicting reports of how much tooth structure can be removed in single visit in order to avoid pulpal exposure; some authors have suggested a single reduction of 3mm without causing an exposure[16] while most limit it to 1-1.5mm[2,6]. The development of sensitivity can act as a gauge to determine the amount of tooth structure that can be safely removed thus treatment without local anaesthesia is preferable.

Figure 5: : Pre-operative view of radical reduction case; tooth 21.

Figure 6: Radical reduction case post-operatively; tooth 21 anterior view.

Figure 7: . reduction case post-operatively; tooth 21 palatal view

Excessive reduction or iatrogenic pulp exposure may irreversibly damage the pulp and result in loss of vitality, so the patient should be fore-warned of this possibility and the operator needs to be ready to manage exposure of the pulp during treatment.

Reduction is complete once the talon cusp is reduced to an acceptable aesthetic and functional level. The number of visits required to achieve this is different for every case depending on the anatomy of the talon cusp and on the occlusion. Our findings indicated that most cases needed 3 sequential visits to complete cusp reduction while other similar case reports required 6 consecutive visits[8]. Some authors recommend placing a thin layer of composite on the palatal surface following completion of talon cusp reduction to cover the exposed dentin,[7,8,15] although this was not performed

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/42/1/1/1751481/1053-4628-42_1_1.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022

in our cases. Any theoretical increase in caries risk following tooth reduction should be managed by simple preventive methods. Continued monitoring of tooth vitality should ideally take place for a period of at least a year after selective reduction is complete, especially in an immature incisor.

CONCLUSION

This collection of fourteen type I talon cusps is significant because these are rare crown anomalies and management is complicated in young patients. While the limited numbers and varied follow up prevents any direct comparison between radical and selective reduction, our findings indicate that many type I talon cusps can be successfully managed using selective reduction. While radical reduction is preferable in certain cases, selective reduction is a valuable technique which is simple to carry out and can be employed before an incisor has reached maturity.

REFERENCES

1. Mellor JK, Ripa LW. Talon cusp: a clinically significant anomaly. Oral Surg Oral Med Oral Pathol. Feb;29(2):225-8. 1970.
2. 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. ASDC J Dent Child. Sep-Oct;63(5):368-76. 1996.
3. Hattab FN. Double talon cusps on supernumerary tooth fused to maxillary central incisor: Review of literature and report of case. J Clin Exp Dent. Oct 1;6(4):e400-7. 2014.
4. Davis PJ, Brook AH. The presentation of talon cusp: diagnosis, clinical features, associations and possible aetiology. Br Dent J. Feb 8;160(3):84-8. 1986.
5. Hattab FN, Yassin OM, al-Nimri KS. Talon cusp—clinical significance and management: case reports. Quintessence Int. Feb;26(2):115-20. 1995.
6. Al-Omari MA, Hattab FN, Darwazeh AM, Dummer PM. Clinical problems associated with unusual cases of talon cusp. Int Endod J. May;32(3):183-90. 1999.
7. Segura-Egea JJ, Jiménez-Rubio A, Velasco-Ortega E, Ríos-Santos JV.Talon cusp causing occlusal trauma and acute apical periodontitis: report of a case. Dent Traumatol. Feb;19(1):55-9. 2003.
8. Bansal AV, Choudhary P, Kulkamrni VK, Bansal A, Shashikiran ND. Talon cusps: conservative management. J Clin Pediatr Dent. Summer;35(4):345-8. 2011.
9. Cho SY, Ki Y, Chu V, Lee CK. An audit of concomitant dental anomalies with maxillary talon cusps in a group of children from Hong Kong. Prim Dent Care. Oct;15(4):153-6. 2008.
10. Keane J, O'Sullivan R, Field D, Crowley N, Windle M, Namara CM. Talon cusps: a review. J Ir Dent Assoc. 43(3):86-8. 1997.
11. Pledger DM, Roberts GJ. Talon cusp: report of a case. Br Dent J. Sep 9;167(5):171-3. 1989.
12. Kumar V, Chawla A, Logani A, Shah N. Mineral trioxide aggregate pulpotomy: An ideal treatment option for management of talon cusp. Contemp Clin Dent. Oct;3(4):491-3. 2012.
13. Smith AJ, Murray PE, Lumley PJ. Preserving the vital pulp in operative dentistry: I. A biological approach. Dent Update. Mar;29(2):64-9. 2002.
14. Stanley HR, White CL, McCray L. The rate of tertiary (reparative) dentin formation in the human tooth. Oral Surg Oral Med Oral Pathol. Feb;21(2):180-9. 1966.
15. Sharma P, Arora A, Valiathan A, Urala A, Acharya SR. Gradual grinding of a talon cusp during orthodontic treatment. J Clin Orthod. Feb;46(2):111-4. 2012.
16. Pitts DL, Hall SH. Talon-cusp management: orthodontic-endodontic considerations. ASDC J Dent Child. Sep-Oct;50(5):364-8. 1983.

Downloaded from http://meridian.allenpress.com/jcpd/article-pdf/42/1/1/1751481/1053-4628-42_1_1.pdf by Bharati Vidyapeeth Dental College & Hospital user on 25 June 2022