MAVEN eISSN: 2581-4443 | www.idahow.org

REVIEW ARTICLE

Impact of Maxillary Canine Impactions- A Review

Trisha Ghosh[1]

[1]MDS (Orthodontics) Private Practitioner, Apollo Clinic, Howrah, India.

Corresponding Author: Dr. Trisha Ghosh, Private Practitioner, Apollo Clinic, 168, G.T. Road, Howrah-711102, West Bengal, India. Email: trishaghos@gmail.com

Abstract

Impacted canines are a frequent finding among patients during routine examinations. Early recognition, interception and appropriate referral by the practitioner are essential. This ar- ticle reviews its impact on diagnosis and clinical management in an orthodontic and surgi- cal aspect. (2020, Vol. 04; Issue 01: Page 29 - 33)

Keywords: Canine impaction, Cuspids, Eruption, Impacted tooth.

Introduction

The permanent canines are the foundation of a balanced smile and functional occlu- sion (1). Hence canines are also consid- ered as the cornerstones of the dental arch. Impacted canines are those with a delayed eruption time or that are not ex- pected to erupt completely based on clini- cal and radiographic assessment (1-3).

In a review of the literature, Bishara re- ported that incidence of maxillary canine impaction ranges between 1% and 3% of patients (4). After lower third molars, max- illary canines are the most frequently im- pacted teeth (5). This article reviews its im- pact on diagnosis and clinical manage- ment in an orthodontic and surgical as- pect.

Prevalence and Etiology

Impacted permanent maxillary canines occur as 85% palatal and 15% labial (1, 2, 5, 6). Although the exact etiology of pala- tally impacted maxillary canine is un- known; however, two common theories may explain the phenomenon: the guid- ance theory and the genetic theory. The "guidance theory of palatal canine dis- placement" proposes that this anomaly is due to local predisposing causes including congenitally missing lateral incisors, su- pernumerary teeth, odontomas, transpo- sition of teeth and other mechanical deter- minants that all interfere with the path of eruption of the canine (2,7-9). Maxillary canines develop high in the maxilla, are the last teeth to develop and travel a long path before they erupt into the dental arch among all teeth (10). These factors in- crease the risk for mechanical disturb- ances resulting in displacement and thus, impaction.

The second theory for canine impaction is known as —the genetic theory. In this the- ory palatal impaction of canines has been found to be related to congenital absence of teeth, and is suggested to be of the same genetic origin. In addition, there are some factors that are thought to cause canine impaction such as obstacles, abnormal position of tooth bud, dental crowding, long and complicated path of eruption, late eruption date, early loss of deciduous canine, prolonged retention of the decidu- ous teeth, and systemic disease. Palatally impacted maxillary canines are often pre- sent with other dental abnormalities in- cluding tooth size, shape, number, and structure; hypoplastic enamel, infra-oc- cluded primary molars and aplastic sec- ond bicuspids (11-13). If orthodontic treatment is not provided for impacted ca- nine, complications such as root resorp- tion of the neighbouring lateral incisor and first premolar, and development of cyst may occur (14-16). (Fig. 1, 2)

Fig 1: The tooth 22 was extracted to ad- just the displaced tooth 23. The tooth 22 is highly resorbed. [Courtesy: M. Abu- Hussein, N. Watted, E. Hussien, P. Proff, A. Watted. Maxillary Impacted Canines; Clinical Review. International Journal Dental and Medical Sciences Research, 2017; 1(6): 10-26.]

Fig 2: These periapical radiographs show severe lateral root resorption that re- sulted from palatally impacted cuspids that resorbed the adjacent roots. [Cour- tesy: Grace Richardson, Kathy A. Russell. A Review of Impacted Permanent Maxil- lary Cuspids — Diagnosis and Preven- tion. Journal of Canadian Dental Associ- ation, 2000; 66: 497-501].

Diagnosis

Early detection of the impacted tooth may reduce treatment time, complexity, com- plications and cost. Ideally, patients should be examined by the age of 8 or 9 years to determine whether the canine is displaced from a normal position in the al- veolus and assess the potential for impac- tion (14). Investigations for impacted ca- nines should be carried out clinically and radiographically. Clinical assessment will involve visual inspection and palpation. Visual inspection include lack of a canine bulge in the buccal sulcus by the age of 10 years, over retained primary cuspids, de- layed eruption of their permanent succes- sor and asymmetry in the exfoliation and eruption of the right and left canines (14). Clinical signs of retained primary cuspids beyond the age of 13 years that have no significant mobility strongly indicate dis- placement and impaction of permanent canines (14, 17). An exaggerated distally tipped incisor, rotated lateral incisor, ret- roclined lateral incisors and in severe cases, the central incisor crown may be- come malpositioned (14, 18).

Palpation of the buccal and lingual mu- cosa, using the index fingers of both hands simultaneously, is recommended to assess the position of the erupting maxil- lary canines (9). Palpation of canine bulge shows an obvious palpable bilateral asym- metry in patients older than 10 years (1, 12, 19).

Radiographs are critical for determining the position of impacted canines and their relation to adjacent teeth, assessing the health of the neighbouring roots while de- termining the prognosis and best mode of treatment (20). Radiographic evaluation includes panoramic view (OPG), lateral cephalogram, IOPA x-rays with parallax technique (horizontal/vertical) and occlu- sal view. Specialized views include CT and CBCT (21-23).

Management

Impacted canine often requires a multidis- ciplinary treatment involving oral sur- geons and orthodontists. Various clini- cians working on the case must have good communication to provide optimal care for the patient (4, 12, 13).

1. Interceptive Treatment

Selective extraction of the deciduous ca- nines as early as 8 or 9 years of age has been suggested by Williams, as an inter- ceptive approach to canine impaction in Class I uncrowded cases. Ericson and Ku- rol suggested that removal of the decidu- ous canine before the age of 11 years will normalize the position of the ectopically erupting permanent canines in 91% of the cases if the canine crown is distal to the midline of the lateral incisor. On the other hand, the success rate is only 64% if the canine crown is mesial to the midline of the lateral incisor (4, 10).

Baccetti et al did a randomized clinical trial in 2008 and concluded that the ex- traction of primary canine is an effective way to normalize the eruption of maxillary canine by two times the possibility than in untreated controls. The use of cervical- pull headgear in addition to extraction sig- nificantly increased the rate of successful eruption of the permanent canine by up to three times more than in the untreated controls. It can be concluded that the ex- traction of deciduous canine before the age of 11 years is still an accepted inter- ceptive approach to prevent canine impac- tion (23).

2. Alternative Treatment options

i. Auto transplantation of the ca- nine (20, 21).

ii. Extraction of the impacted ca- nine and movement of a first premolar in its position.

iii. Extraction of the canine and posterior segmental osteotomy to move the buccal segment mesially to close the resid- ual space.

iv. Prosthetic replacement of the ca- nine (not convenient for juvenile patients).

v. Surgical exposure of the canine and orthodontic treatment to bring the tooth into the line of occlusion (most de- sirable approach) (4).

3. Management of palatally impacted ca- nine

The most commonly used methods are:

i. Surgical exposure, allowing natu- ral eruption to occur.

ii. Surgical exposure with the placement of an auxiliary. Orthodontic forces are sub- sequently applied to the attachment to move the impacted tooth.

4. Management of labially impacted ca- nine

Management of labially impacted canines involves a stepwise procedure, as follows: (Fig 3)

i. Surgical exposure

ii. Placement of orthodontic attach- ment

iii. Traction force application (23).

Fig.3: Retraction of labially impacted ca- nine. [Courtesy: Yadav R, Shrestha BK : Maxillary Impacted Canines: A Clinical Review. Orthodontic Journal of Nepal, 2013; 3(1): 63-68].

Three techniques have been proposed by Kokich for uncovering a labially une- rupted maxillary canine (gingivectomy, apically positioned flap, and closed erup- tion technique). He also suggested evalua- tion of four criteria to determine the cor- rect method for uncovering the tooth so the outcome achieves the optimum perio- dontal health. These criteria include the distance between the canine cusp and the mucogingival junction; the labiolingual position; the mesiodistal position; and the amount of gingiva in the area of the im- pacted canine (24).

i. Surgical exposure:

It is recommended that the surgical proce- dure designed to expose impacted canine through alveolar mucosa should simulta- neously provide a band of attached gingi- val to the exposed tooth. Otherwise, im- proper soft-tissue management may lead to mucogingival recession and loss of alve- olar bone. Before a labially impacted ca- nine is exposed, consideration should be given to create the sufficient space to allow the canine to be moved in the area (4). Closed eruption technique is the preferred method of uncovering labially impacted tooth. It involves elevating a flap, placing an attachment on the impacted tooth and returning the flap to its original location. If the tooth is displaced near the nasal spine; pedicle flap is reflected, orthodontic attachment is placed and the flap is re- turned to its original position for complete closure. The orthodontic traction force is applied one week after creating a normal direction of tooth eruption.

ii. Placement of orthodontic attachment

- Polycarbonate crowns cemented onto the exposed crown.
- Wire lasso (Fig 4A)
- Drilling hole at canine tip and pass- ing ligature through the hole then traction force is applied.
- Orthodontic attachment of bonda- ble mesh, bracket or lingual button with ligature chain or to the bonded attachment (Fig 4B).
- Multiple eyelet chain.
- Magnets in attractive mode. (23)

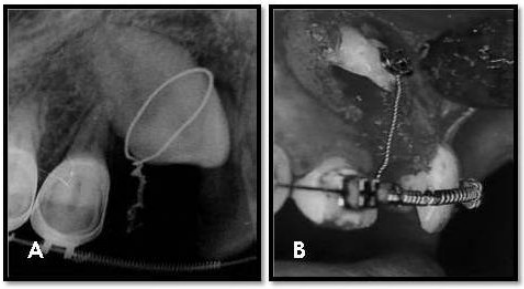

Fig 4: A. Wire lasso. B. Bondable bracket with ligature. [Source: Yadav R, Shrestha BK : Maxillary Impacted Canines: A Clini- cal Review. Orthodontic Journal of Nepal, Vol. 3, No. 1, June 2013 63-68].

iii. Traction force application
Following considerations are recom- mended:

- Use of light force to move impacted tooth; no more than 2 ounces (60 grams)
- Availability or creation of sufficient space in the arch for impacted tooth.
- Maintenance of the space either by continuous tying of the teeth or placement of a passive open coiled spring on the arch wire.
- Provision by the arch wire of suffi- cient stiffness (e.g. 0.018 x 0.022) to resist deformation by the forces applied to it as the canine is ex- truded (4).

When to extract an impacted ca- nine?

Surgical extraction is indicated in the fol- lowing situations:
a) The existence of infection, cyst, or tu- mor related to the impacted canine.
b) If it causes periodontal disturbance of the adjacent teeth.
c) Presence of neuralgic symptoms.
d) It is ankylosed and cannot be trans- planted.
e) Root resorption affecting the adjacent teeth.
f) If the root of impacted canine is severely dilacerated.
g) Severe impaction of canine tooth.
h) Patient's unwillingness to orthodontic treatment (1, 4, 11, 20).

Retention

In a study, Backer et al evaluated the post-treatment results of impacted canines. They observed an increased incidence of rotations and spacings on the impacted side in 17.4% of the cases, whereas on the control side the incidence was only 8.7%. The control side had ideal alignment twice as compared to the impacted side. To pre- vent rotational relapse, circumferential supracrestal fiberotomy or a bonded fixed retainer is required on completion of the treatment and sometimes even before the appliances are removed. Clark suggested that after the alignment of palatally im- pacted canines, lingual drift can be pre- vented by removal of a half-moon shaped wedge of tissue from the lingual aspect of the canine (23).

Conclusion

The incidence of maxillary canine impac- tion is significant and relatively frequent clinical presentation in dentistry. Practi- tioners should be aware of early recogni- tion and interceptive treatment. If signs of ectopic eruptions are detected early every effort should be made to prevent impac- tion and its consequences.

Early intervention can eliminate the need for surgical intervention and complex or- thodontic treatment otherwise surgical ex- posure and orthodontic correction is the most preferable treatment. In such cases, early recognition and appropriate referral for orthodontic treatment are essential. Extraction of the impacted canine should be last resort.

In conclusion, the management of im- pacted canines requires a multidiscipli- nary approach as it plays a vital role in es- thetics and function.

References

1. Grace R, Kathy A R. A review of im- pacted permanent maxillary cuspids—di- agnosis and prevention. J Can Dent As- soc, 2000; 66: 497-501.
2. Thilander B, Jakobsson S. Local factors in impaction of maxillary canines. Acta Odontologica Scandinavica, 1968; 26(2): 145-168.
3. Gaikwad A. Endodontic treatment of mandibular canine with two canals–a case report. Int J Dent Clin, 2011; 3(1): 118-119.
4. Bishara SE. Impacted maxillary ca- nines: a review. Am J Orthod Dentofac Or- thop, 1992; 101(2): 159-171.
5. Shah RM, Boyd MA, Vakil TF. Stud- ies of permanent tooth anomalies in 7,886 Canadian individuals. I: Impacted teeth. Dent J, 1978; 44(6): 262–264.
6. Baccetti T, Leonardi M, Armi P. A randomized clinical study of two intercep- tive approaches to palatally displaced ca- nine. Eur J Orthod, 2008; 30: 381–385.
7. Hitchin AD. The impacted maxillary canine. Br Dent J, 1956; 100: 1-14.
8. Baccetti T. A controlled study of as- sociated dental anomalies. Angle Orthod, 1998; 68: 267-274.
9. Brin I, Becker A, Shalhav M. Posi- tion of the maxillary permanent canine in relation to anomalous or missing lateral incisors: a population study. Eur J Or- thod, 1986; 8: 12-16.
10. Ericson S, Kurol J. Longitudinal study and analysis of clinical supervision of maxillary canine eruption. Community Dent Oral Epidemiol, 1986; 14: 172-176.
11. Abu-Hussein M, Watted N, Proff P, Watted A. Clinical Management of Bilat- eral Impacted Maxillary Canines. SRL Dentistry, 2017; 1(1): 001-007.
12. Jacoby H. The etiology of maxillary canine impactions. Am J Orthod, 1983; 84: 125-132.
13. Becker A, editor. The orthodontic treatment of impacted teeth. 2 nd ed. Ab- ingdon, Oxon, England: Informa Healthcare; 2007: 1-228.
14. ShapiraY, Kuftinec MM. Early diag- nosis and interception of potential maxil- lary canine impaction. J Am Dent Assoc, 1998; 129: 1450-1454.
15. Chaushu S, Bongart M, Aksoy A, Ben-Bassat Y, Becker A. Buccal ectopia of maxillary canines with no crowding. Am J Orthod Dentofac Orthop, 2009; 136: 218-223.
16. Watted N, Hussein E, Proff P, Do- dan A, Muhamad A H. Surgery of Labially Impacted Canine & Orthodontic Manage- ment – A Case Report. Open J Dentistry Oral Med, 2017; 5: 1-6.
17. Power SM, Short MB. An investiga- tion into the response of palatally dis- placed canines to the removal of decidu- ous canines and an assessment of factors contributing to favourable eruption. Br J Orthod, 1993; 20:217- 223.
18. Jacobs SG. Reducing the inci- dences of palatally impacted maxillary ca- nines by extraction of deciduous canines: a useful preventive/interceptive orthodon- tic procedure. Case reports. Aust Dent J, 1992; 37: 6-11.
19. Leonardi M, Armi P, Franchi L, Bac- cetti T. Two interceptive approaches to palatally displaced canines: a prospective longitudinal study. Angle Orthod, 2004; 75: 581-586.
20. Caminiti MF, Sandor GK, Giambat- tistini C, Tompson B. Outcomes of the surgical exposure, bonding, and eruption of 82 impacted maxillary canines. J Can Dent Assoc, 1998; 64: 572-574.
21. Alqerban A, Jacobs R, Fieuws S, Willems G. Comparison of two cone beam computed tomographic systems versus panoramic imaging for localization of im- pacted maxillary canines and detection of root resorption. Eur J Orthod, 2011; 33: 93-102.
22. Peck S, Peck L, Kataja M. Site-spec- ificity of tooth maxillary agenesis in sub- jects with canine malpositions. Angle Or- thod, 1996; 66: 473-476.
23. Yadav R, Shrestha BK. Maxillary Impacted Canines: A Clinical Review. Or- thod J Nepal, 2013; 3(1): 63-68.
24. Abu-Hussein M, Watted N, Hussien E, Proff P, Watted A. Maxillary Impacted Canines; Clinical Review. Int J Dent Med Sci Res, 2017; 1(6): 10-26.