IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

CANINE IMPACTION

Dr.Abhinav Pachoriya, Dr. Rakesh Thukral, Dr. Amit Gupta, Dr. Shubham Agrawal, Dr. Jaya Singh

ABSTRACT: The impaction of maxillary canines is a clinical problem. Localized, systemic or genetic factors can cause canine impaction. The canine impact has a lot of possible repercussions. Clinical and radiographic examinations play an important role in identifying and locating the affected canines. The treatment of impacted maxillary canines usually requires an interdisciplinary approach to treatment. Treatment options include no treatment, interseptive approach, extraction, autotransplantation and surgical exposure and orthodontic alignment of the impacted canine. Early diagnosis and intervention are the most desirable treatment approaches. Surgery and orthodontic alignment should be considered in the absence of prevention. The surgical treatment techniques and orthodontic considerations depend on the location of the impacted canine in the dental arch.

Keywords: Canine impaction, obstruction, orthodontic treatment, coil spring, disimpaction.

I. INTRODUCTION:

Impaction refers to total or partial lack of eruption of a tooth well after the normal age of eruption. An impacted tooth is defined as a tooth that fails to erupt after the normal development pattern is complete. An impacted tooth may result due to variety of reasons such as inadequate space, some physical barrier like bone, mucosa, retained deciduous tooth, supernumerary tooth etc. in the eruption path or lack of eruptive force. Normally tooth erupts when root length reaches three fourth of its final length. Maxillary canines are the most common impacted tooth, following the third molar teeth. In maxillary canine impaction, palatal canine impaction is more common than buccal canine impaction. Disturbances in the eruption of permanent maxillary canines are common because they develop deep within the maxilla and have the longest path to travel compared with any other tooth in the oral cavity. Canines play a vital role in facial appearance, dental esthetics, arch development and functional occlusion. As a result, orthodontists have acknowledged the significance of retaining impacted maxillary canines and have proposed various techniques to effectively and efficiently recover these teeth.These teeth often pose challenges in treatment planning, surgical care and orthodontic management. Favourable treatment outcome relies on patient compliance; proper and earlier age of diagnosis; level, inclination and depth of impaction; proportion of root development; type of surgical exposure and orthodontic mechanics employed. All these parameters play an important role when managing impacted teeth to achieve a good alignment in the arch, good gingival level and achieve good integrity of periodontium.

The methods and techniques of resolution of impaction are numerous and their selection depends on individual case.

ETIOLOGY:

The causes of impacted canines can be classified into 4 distinct groupings: local hard tissue obstruction, local pathology, disturbance of the normal development of the incisors, and hereditary or genetic factors.

- Localised
- Systemic
- Genetic
-

Local Pathology

- Tooth size-arch length discrepancies
- Failure of the primary canine root to resorb
- Prolonged retention or early loss of primary canine
- Ankylosis of permanent canine
- Cyst or neoplasm
- The absence of maxillary lateral incisor
- Variation in timing of lateral incisor root formation
- Iatrogenic factors Idiopathic factors

Systemic

- Endocrine deficiencies
- Febrile diseases
- Irradiation

Genetics

- Heredity
- Malposed tooth germ
- Presence of alveolar cleft

Bishara et al7 summarized moyer's theory that impacted canine is caused by

1. Primary causes (Localised):
   (a) Tooth size-arch length discrepancies.
   (b) Prolonged retention or early loss of deciduous canine.
   (c) Abnormal position of the tooth bud (rotation of tooth buds).
   (d) Trauma to the deciduous tooth bud.
   (e) Disturbances in the tooth eruption sequence.
   (f) Presence of an alveolar cleft.
   (g) Ankylosis
   (h) Cystic or neoplastic formation
   (i) Dilaceration of the root
   (j) Premature root closure
   (k) Iatrogenic
   (l) Idiopathic
2. Secondary (Generalised)
   (a) Abnormal muscle pressure
   (b) Febrile diseases
   (c) Endocrine disturbances
   (d) Vitamin D deficiency
   (e) Irradiation.

The most common causes for canine impactions are usually localized and are the result of any one, or combination of the following factors:

(a) Tooth size-arch length discrepancies,
(b) Prolonged retention or early loss of the deciduous canine,
(c) Abnormal position of the tooth bud,
(d) The presence of an alveolar cleft,
(e) Ankylosis,
(f) Cystic or neoplastic formation,
(g) Dilaceration of the root,
(h) Iatrogenic origin, and
(i) Idiopathic condition with no apparent cause.

Sequelae of Impaction

Shafer et al suggested that the following sequelae might be associated with canine impaction:

- Labial or lingual malpositioning of the impacted tooth.
- Migration of the neighbouring teeth and loss of arch length.
- Internal resorption
- Dentigerous cyst formation
- External root resorption of the impacted as well as neighbouring teeth.
- Infection particularly with partial eruption
- Reffered pain
- Combinations of the above sequelae. (or) no untoward effects.

CLASSIFICATION

Classification of impacted maxillary canine by Archer 1975

Archer classified impacted canines based on their position in the panoramic radiographs into 5 groups,

Class I: palatally placed maxillary canines

- Horizontal

- Vertical
- Semi-vertical

Class II: labially placed maxillary canines

- Horizontal

- Vertical
- Semi-vertical

Class III: involving both buccal and palatal bones
Class IV: impacted in the alveolar process between incisors and first premolar
Class V: impacted in the edentulous maxilla·

Classification by Ghoneima A et al. 2014

They categorized maxillary canine impactions into ten different groups (Types A to J) according to their positions and locations·

Type A: canine is in a mesioangular position behind the central incisor root
Type B: canine is in vertical position behind the lateral incisor
Types C and D: canine is in vertical position either between the lateral incisor and 1st premolar or between the 1st and 2nd premolars
Type E: canines were in mesioangular direction lying between the anterior-inferior wall of the maxillary sinus and the basilar part of the nasal cavity
Types F: canine is in horizontal position either near to the inferior wall of maxillary sinus with the crown positioned distally or between the lateral incisor and 1st premolar
Type G: canines were impacted vertically with their roots inside the maxillary sinus
Type H: canine is in horizontal position either near to the inferior wall of maxillary sinus with the crown positioned distally or between the lateral incisor and 1st premolar
Type I: canine is impacted completely inside the maxillary sinus
Type J: canine is palatally positioned.

MANAGEMENT OF IMPACTION

Interceptive treatment

Preventive modalities should be performed in cases that have a strong possibility of canine impaction. This entails the elimination of obstacles to the path of eruption and provision of sufficient room for eruption of underlying canines.As such, extraction of the deciduous canine followed by space maintenance to allow the permanent canine to erupt naturally is advocated. In this treatment, the patient should be between 10 and 13 years, and there should be no over-crowding of teeth in arches. Principles of mechanotherapy

Appliance selection

The appliance selected for the treatment of cases with impacted canines should have the capability to level and rotate all the teeth with controlled crown and root movements to open adequate space to accommodate the impacted tooth. This stage requires the use of fine leveling and aligning archwires.

Preparation of anchorage unit

With the initial alignment achieved and no further movement of individual erupted teeth needed, these teeth are transformed into a composite and rigid anchorage unit, this is done by substituting the flexible archwires with a heavier wire.

Space regaining for impacted tooth

Space for the impacted tooth should be created before surgical exposure by closure of existing incisor spacing, improving the arch form or by extraction of teeth. Space for the impacted tooth can be maintained by vertical stops bent in arch wire, stainless steel hollow tubing, coil spring, and tissue guards.

Surgical exposure

Surgical intervention without orthodontic treatment

Exposure only

A superficially placed tooth, palpable beneath the bulging gum, is an obvious candidate. This type of tooth may be seen in the maxillary canine area, but also in the mandibular premolar area and the maxillary central incisor area, usually where very early extraction of the deciduous predecessor was performed while the immature permanent tooth bud was still deep in the bone and unready for eruption.

Healing occurred, the gum closed over and the permanent teeth were unable to penetrate the thickened

mucosa. Removing the fibrous mucosal covering or incising and resuturing it to leave the incisal edges exposed will generally lead to a fairly rapid eruption of the soft tissue impacted tooth, particularly in the maxillary incisor area. The more the tooth bulges the soft tissue, the less likely is a reburial of the tooth in healing soft tissue and the faster is the eruption.

Exposure with pack

A less superficial tooth requires a more radical exposure procedure and may need a pack to prevent the tissues from re-healing over the tooth. While it may be rewarded with spontaneous eruption, this will take longer and with a compromised periodontal result.

Exposure with pressure pack

Mesial impaction of a mandibular second permanent molar beneath the distal bulbosity of the first permanent molar is analogous to the more common mesial impaction of a third molar beneath the distal of the second. In either case, and in its mildest form, it is a condition that may sometimes respond to surgical intervention and packing only. This involves exposure of the occlusal surface of the tooth and the deliberate wedging of the pack in the area between the two teeth and leaving it there for 2–3 weeks

Surgical intervention with orthodontic treatment

a) Gingivectomy (Window approach)
b) Closed eruption technique
c) Apically positioned flap or open eruption

Surgical intervention of impacted mandibular canine

When the crown of an unerupted mandibular canine is inclined more than 30 degrees to the median sagittal plane, orthodontic treatment may be necessary to correct the inclination. To uncover a bonding surface on the crowns; an apically and laterally retracted flap must be created without damaging the periodontal integrity of the adjacent lateral incisor.

DISCUSSION:

Impacted canines are the common challenge faced by clinicians in routine practice. Successful and untroubled management of canine impaction depends on proper diagnosis and treatment planning and comprehension of mechanism of impaction, which depends on detailed knowledge of the development and eruption paths and patterns of the teeth. Usually management of impacted tooth requires the collaborative efforts of the orthodontist, periodontist and oral surgeon. But early recognition and keen understanding of impaction sometimes is sufficient to correct or check the development of malocclusion by interceptive treatment alone. When dealing with unerupted teeth clinician must carefully plan the flap and bring attached fibrous mucosa in contact with the operated tooth. Generally palatally impacted tooth is surrounded by attached mucosa, and on contrary the vestibular impacted tooth, or the lower lingually impacted tooth may be drawn through the loose gingival mucosa, and the final result could be a good orthodontic alignment with poor periodontal mucosal attachment. Careful selection of surgical and orthodontic techniques is essential for the successful alignment of impacted canines. Disimpaction of canine enhances esthetics as well as function. Early diagnosis and interception of impacted canines results in a predictable and successful esthetic and functional outcomes when there is proper coordination and collaboration between the patient, the general dentist, and the dental specialist. The incidence of mandibular canines impaction ranges between 0.92 and 5.1 per cent, while that of transmigration ranges from 0.1 to 0.31 per cent.Permanent maxillary canines are the second most frequently impacted teeth; the prevalence of their impaction is 1 general population.Impaction may be related to the biological mechanisms involved in the bone remodelling that is needed for eruption and that is regulated by the dental follicle. Improved understanding of these regulatory pathways would give insights into the factors responsible for tooth impaction.Transmigration is a commonly occurring phenomenon among impacted mandibular canines. Horizontal angulation and basal vertical location are likely indicators. Several dental anomalies are associated with mandibular canine impaction and, to a lesser degree, transmigration.When starting comprehensive orthodontic treatment, it is important to first distalize the canine away from the incisor root before pulling in out into the dental arch. Depending on the position of the canine, the optimal type of surgical exposure (closed or open) can be selected. Proper treatment plan to

manage the IMC is essential for esthetic and functional patient requirements. Impacted teeth present a great concern in the orthodontic field because of their potential to complicate orthodontic treatments.

CONCLUSION:

The management of impacted canines is important in terms of esthetics and function. Clinicians must formulate treatment plans that are in the best interest of the patient and they must be knowledgeable about the variety of treatment options. When patients are evaluated and treated properly, clinicians can reduce the frequency of ectopic eruption and subsequent impaction of the maxillary canine.

REFERENCES:

1. Kalra V. The K-9 spring for alignment of impacted canines. J Clin Orthod., 2000;34:606-10.
2. Begg PR. and Kesling PC. Orthodontic appliances, in Begg orthodontic theory and technique, 3rd ed., W.B Saunders Co, Philadelphia, 1977; p.94.
3. Bowman JS. and Carano A. The monkey hook: anauxillary for impacted, rotated, and displaced teeth. J ClinOrthod., . 2002; 36: 375-78.
4. Bowman JS, Carano A. The Kilroy Spring for impactedteeth. J Clin Orthod., 2003;37:683-88.
5. Frank, C.A.: Treatment options for impacted teeth, J. Am. Dent. Assoc. 2000;131:623-632.
6. Schubert M.. A new technique for forced eruption of impacted teeth. J Clin Orthod., XLII 2008:175-79.
7. Arun A V, Shetty K S. The magnetic canine disimpaction appliance (MCDA). APOS Trends Orthod. 2011,1:55.
8. Vibhuti PKJ. 2011. Versatile auxillary orthodontic spring for orthodontic correction of impacted teeth. J of Ind OrthSoc., 45:40-47.
9. Aziz Rizvi SO, Nayak A, Pattabiraman V. 2015. A modified dis-impaction spring for impacted canines. APOS Trends Orthod., 5:83-6.
10. Domenico Dalessandri, Simone Parrini, Rachele Rubiano, Diletta Gallone, Marco Migliorati, Impacted and transmigrant mandibular canines incidence, aetiology, and treatment: a systematic review, European Journal of Orthodontics, Volume 39, Issue 2, 1 April 2017, Pages 161–169
11. Ranjan, Abhishek & Raghunath, N & Shivalinga, B. (2019). CANINE DISIMPACTION SPRINGS THROUGH THE AGES. International Journal of Current Research. 8. 15-21.
12. Uribe P, Ransjö M, Westerlund A. Clinical predictors of maxillary canine impaction: a novel approach using multivariate analysis. Eur J Orthod. 2017;39(2):153-160.
13. Bertl, M.H., Frey, C., Bertl, K. et al. Impacted and transmigrated mandibular canines: an analysis of 3D radiographic imaging data. Clin Oral Invest 22, 2389–2399 (2018)
14. Bjerklin, Krister. (2020). Orthodontic management of impacted maxillary canines. APOS Trends in Orthodontics. 10. 64-71. 10.25259/APOS_41_2020.
15. Mohammad, Ruba. (2021). Orthodontic Evaluation of Impacted Maxillary Canine by Panoramic Radiograph-A Literature Review. Journal of Research in Medical and Dental Science. 9. 220-227.