

Canine Impaction- A Review Article

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Abstract

Impaction refers to a tooth's inability to emerge in the dental arch at the appropriate site. The most common reason for canine impaction is arch-length deficiency. In this overview, the reasons of impaction of the maxillary permanent canines are listed, along with hard tissue blockages, soft tissue diseases, and anomalies of nearby teeth, the classification and the treatment planning. The patient mostly notices when the impacted canine causes unesthetic appearance and a faulty occlusion. Various surgical interventions are also discussed in this review article.

Keywords: Impaction, maxillary permanent canine, faulty occlusion, unesthetic appearance, orthodontics

Introduction

Impaction is defined as the failure in the eruption of teeth even after the completion of growth. Impaction of maxillary canine is second most after the impaction of third molars. One of the most common reason for impaction is the lack of space in the arch. The treatment of canine impaction can be planned accordingly by the cooperation of pedodontist, oral surgeons, periodontist as well as orthodontist.^{1,2} This review article emphasizes on the possible etiologies, prevalence, examination, classification and the treatment of impacted maxillary canines.

Etiology and Prevalence of Impacted Canine

The incidence of maxillary canine impaction is approximately ranging from 0.90% to 2.1% in the population which is quite low and is often more commonly seen in females as compare to male with ratio being 2:1.^{2,3} According to **Moyers**, the path of eruption of maxillary canine is most tortuous as at the age of 3-4 years it is present at a higher position in maxilla.⁴ According to **Bishara et al**, maxillary canine impaction can occur both due to primary or secondary causes.⁵

1. Primary causes involves

- Deciduous tooth trauma
- Prolonged retention of deciduous tooth
- Lack of space in the arch
- Disturbance in eruption sequence
- Ankylosis
- Presence of cleft

2. Secondary causes includes

- Presence of any febrile disease
- Endocrinal disorders
- Vit. D deficit

Sequelae of Eruption

There could be shift in the position and the external resorption in the root of neighboring teeth, formation of dentigerous teeth, deficiency of arch length, internal resorption, pain and the combination of above sequelae.⁶ According to estimates, ectopic maxillary canine eruption causes the resorption of permanent anteriors in 0.7% of children between the ages of 10 and 14 years old.⁷ There should be the proper routine checkup of children during the growing stage.

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Diagnosis of Canine Impaction

Both a clinical and radiographic examination can be used to diagnose canine impaction.

1. Clinical Assessment:

The clinical assessment of canine impaction can be done by proper intraoral examination for following signs: prolonged retention of deciduous canines, delayed eruption of permanent canines, absence of canine bulge after 13-14 years of age, presence of asymmetry in the bulge relative to the contralateral canine bulge, migration or tipping of lateral incisor.² Ericson estimated that 2-5% of canine are not palpable clinically only so clinical examination should always done with the radiographs.^{8,9}

2. Radiographic Examination:

Due to the limitations in clinical examination, radiographic examinations such as panoramic radiographs, lateral cephalogram, periapical radiographs in different angles, occlusal film radiographs can be done for the evaluation of position of impacted canines. To evaluate the position of canine by periapical radiograph, SLOB principle or Clark's rule can be used for image localization. If an object moves in the same direction as the cone on two different periapical radiographs, it has been positioned palatally. On the other hand, buccally inserted objects move in the opposite direction of the cone. CBCT with panoramic radiographs can also be used for exact location of the canine, Due to different cusp tip relations of canine different clinicians predicted different images of canine.¹⁰ As 80% of the time impacted maxillary canine is located palatally it can cause severe root resorption of lateral incisors. So orthodontics and restorative plan should be made accordingly.

Classification of Impacted Canine

There are no standard classifications given in literature for the canine impaction. Most commonly used classifications are as below:

According to Yamamoto et al. in 2003 maxillary canine impaction is classified into seven types on the basis of their angle of long axis angles and the occlusal plane¹⁶:

Type I: Canine is lodged between the first premolar and the lateral incisor

Type II: Crown of the impacted teeth is tipped mesially.

Type III: Crown of the impacted teeth is tipped distally.

Type IV/V: The canine's long axis is horizontal.

Type VI: The canine's crown faces the orbital fossae.

Type VII: The canine's long axis is horizontal, and the crown is positioned buccally with the surrounding teeth.

According to **Ghoneima A et al. in 2014**, maxillary canine impactions are categorized into ten different types on the basis of their position and type¹⁷:

Type A: Mesioangular position of canine behind the root of central incisor.

Type B: Vertical position of canine behind lateral incisor.

Type C and D: Between the first premolar and the second premolar, or between the first premolar and the lateral incisor, the canine is in a vertical position.

Type F and H: The canine is in a horizontal position, either close to the inferior wall of the maxillary sinus or between the first premolar and the lateral incisor.

Type E: Mesioangular direction of canine between antero-inferior wall of maxillary sinus and basilar part of nasal cavity.

Type G: Canine roots are located inside the maxillary sinus and are affected vertically.

Type J: Palatally positioned canine.

Type I: Canine is completely impacted in maxillary sinus.

Treatment Planning of Impacted Canines And Classification

1. Class I Impacted Maxillary Canine

Maxillary canine is located palatally. Gingivectomy is recommended as surgical approach for this category of maxillary canine impaction followed by fixed appliance immediately after exposure is done for the spontaneous eruption of canine.¹¹ But according to **Ferguson and Parvizi**¹², only the excision of overlying gingival tissue is not enough for the spontaneous eruption of canine. A second incision is also required and immediate application of orthodontic connector should also be considered.

2. Class II Impacted Maxillary Canine

Canine is present at the center of the alveolar ridge or labial to the alveolar ridge. A repositioned flap is used for the treatment with closed approach as it has less post-operative discomfort as compare to gingivectomy.¹³ To expose the canine, a complete mucoperiosteal flap is raised. After follicular debridement of the region, fixed attachments, including chains, are bonded to the exposed canine.

3. Class III Impacted Maxillary Canine

Maxillary canine is located labial to the adjacent lateral incisor. Apical positioned flap is recommended for this. A partial thickness flap with atleast 2mm of coronal gingiva is raised, two mesial and distal vertical incisions are given for apical positioning of flap.¹⁴ This will cause the exposure of the canine and then visualization by orthodontist is done for further treatment planning accordingly to decrease the potential damage to the lateral incisors by orthodontic forces.¹⁴

The primary advantage of using this technique is that it increases the width of keratinized gingiva. But it also causes post-operative gingival recession and orthodontic relapse.¹⁵

Orthodontic Consideration

The prognosis of orthodontic movement of canine depends on the distance on canine from neighboring tooth, the type of impaction and the ankylosis. As horizontally impacted canines and ankylotic canines has the poor prognosis and its better to extract these tooth.¹⁸

1. Fixed Vs Removable Appliances

Fixed appliance are more preferred over removable appliance due the need for cooperation of patient for limited amount of movement by use of removable appliances. **McDonald et al.**¹⁹ and **Fournier et al.**²⁰ suggested using Hawley-type appliances to transfer anchoring requirements to the palatal vault and the alveolar ridge. Such appliances may be useful for those with many missing teeth when fixed appliances are not recommended.

2. Method of Applying Traction

Rubber bands, mousetrap loops bent into the arch wire, and light wire springs soldered to a hefty labial or palatal base wire are some of the methods used to move the canine into the proper alignment. However, the orthodontist now has more control over the strength and direction of the force because to the development of novel orthodontic materials like elastic threads and elastomeric chains. The initial force should be given in such a way as to shift the canine away from the neighboring tooth's roots. Following considerations are recommended: (a) light forces, less than 60 grams of, are used to move the impacted tooth, (b) the impacted tooth already has enough room in the arch, (c) the space is maintained by either continuing to bind the teeth mesial and distal to the canine or by inserting a close-coiled spring on the arch wire and, (d) the arch wire has enough stiffness to resist deformation.

3. Premolar Vs Canine Extraction

The position of the impacted canine, how it interacts with the roots of the teeth next to it, and the ability of the dentist who exposes and moves the tooth all affect the likelihood of a good outcome. If the overall orthodontic treatment plan calls for premolar extractions, they should be postponed until the canine is surgically exposed and orthodontic forces are applied.²¹ This is done to see if the impacted tooth can be moved before extracting a feasible replacement. In some cases, premolars are extracted before any movement of canine. Permanent canines are crucial for a functioning occlusion and a beautiful smile, according to the majority of physicians. Therefore, if at all feasible, it is best to avoid extracting the canines.

It is necessary to lengthen the posterior segment and finish the case with a Class II molar relationship on the affected side if it is decided to treat the mandibular arch without extraction and close the canine space with orthodontics. Such a treatment strategy is only practical if the first premolar is left in place until the prognosis of the impacted canine is definitely established. The physician must take into account the tooth size differential, interferences in the lingual cusp, and the challenges associated with treating unilateral mechanics in these situations.

Conclusion

Impacted canines can affect the esthetics and functional abilities of a person. The treatment plan should be made by the general dentist, orthodontist and oral surgeons according after the proper assessment of the impacted tooth by clinical and radiographic means. There should be less post-operative discomfort for the patient with stable result. The underlying cause for the reason behind the impaction should be correctly diagnosed.

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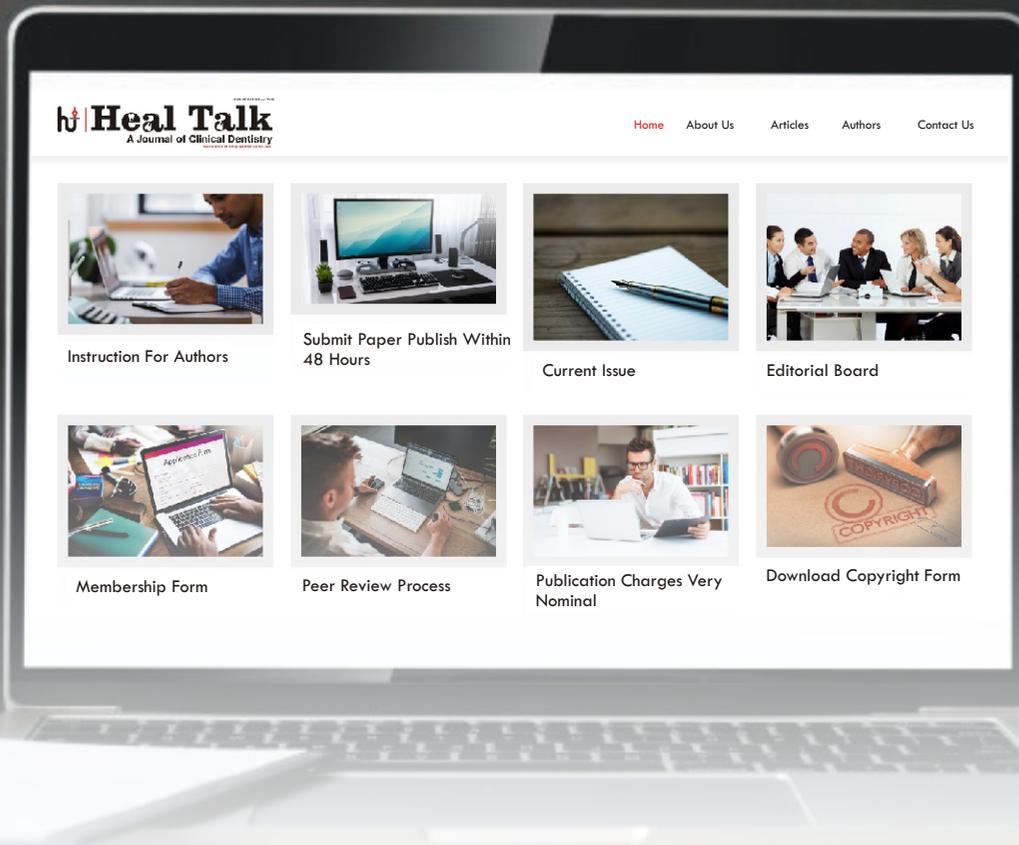


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