

# ORTHODONTIC MANAGEMENT OF IMPACTED CANINE-A REVIEW

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## **ABSTRACT:**

*Canine plays an important role in esthetics, being corner tooth of mouth and function deserves special attention, therefore its impaction to be properly diagnosed and managed is essential. The dental professions has always had interest towards resolving this malocclusion. The orthodontists and surgeons have played an important rule and are proved successful in treating them. This article reviews prevalence, classification diagnosis, and treatment modalities in the management of impacted maxillary canines*

**KEYWORDS:** *Impacted canine, Orthodontic management, Impaction*

## **1 INTRODUCTION:**

The word IMPACTUS from Latin origin means pushed against. Archer (1975) defines an impacted tooth is one which is completely or partially unerupted and is positioned against another tooth or bone or soft tissue so that its further eruption is unlikely. According to Shafer, Hine, and Levy, “ Impacted teeth are those which are prevented from erupting by some physical barrier in the eruption path Or When the crown remains at some distance from the alveolar crest after its scheduled eruption time because of an insufficient room or an ectopic eruption pattern.”

## **2 ERUPTION OF CANINE:**

According to Broadbent, (AO 1941) Canine develops at 4 – 5 months of age between the roots of the deciduous 1 st molar. canine begins to calcify around 12 months of age. and Calcification takes far above the roots of deciduous molar, allowing the development of the first premolar between the deciduous molar roots. At this stage, the permanent canine is located immediately above both the

erupting first premolar and the erupted first deciduous molar. As the deciduous teeth erupt towards the occlusal plane, the permanent incisor and canine crypts migrate forward in the jaws. The positional changes between 8 and 10 years of age need careful observation for the detection of potential impaction during this stage of development the canine normally migrates buccally from a position lingual to the root apex of the deciduous precursor; however, some canines do not make the transition from the palatal to the buccal side of the dental arch and remain palatally unerupted. With a sufficient increase in the size of the subnasal area, the maxillary canine normally moves downward, forward, and laterally away from the root of the lateral incisor. Between 8 and 12 years of age, the 'ugly duckling' stage, there is insufficient space at the apical base to permit the axis of the lateral incisor to shift into the more erect alignment of young adulthood until the 13. In the final phase of the eruption, canines drive their way between the lateral incisors and first premolars, forcing these teeth to become more upright. This complicated eruption pattern is an important factor in canine impaction.

### **3. FACTORS GOVERNING ERUPTION OF CANINE:**

Four factors govern the eruption of permanent canines into normal position

1. Position of tooth bud in the bony crypt
2. Path of eruption
3. Shape and position of lateral incisors
4. Amount of space available for canines in the arch

Reason for canine impaction:

Becker Concept:

Becker (1984) hypothesized two processes in the palatal impaction of the maxillary canine: Absence of initial early guidance from an anomalous lateral incisor, and later failure of buccal movement of the canine at an unspecified age {9 years}.

### **4. MOYER'S CONCEPT: SUMMARIZED BY BISHARA**

A)Primary cause:

- 1)Trauma to deciduous tooth bud
- 2)Rate of Resorption of deciduous tooth
- 3)availability of space in the arch
- 4)Disturbance in tooth Eruption Sequence
- 5)Rotation of tooth buds
- 6)Canine Erupt in Cleft is in Person with Cleft Area
- 7)Premature root Closure

B)Secondary cause:

- i. Abnormal muscle pressure
- ii. Febrile diseases
- iii.Endocrine disturbances
- iv.Vitamin D deficiencies

MC Bridge Concept

Canine formed at high in the anterior wall at the antrum, below the floor of the orbit, long tortuous path of eruption.

Vonder Heydt Concept

The total arch length of permanent teeth is initially established very early in life at the time of the eruption of first permanent molars.. Reason for the eruption of canine labially in arch length deficient.

Guidance Theory ----Miller

Normal Eruption: Canine usually have a more mesial development path, which is guided downwards apparently along the distal and aspect of the lateral incisor roots.

First stage Impaction: If there is a loss of guidance due to missing lateral incisors or late-developing laterals, the canine will have a mesial and palatal path of eruption. In this event there is no vertical movement of canine into the alveolar process, results in more horizontal impaction.

First stage impaction and secondary correction: Once it reaches the palatal alveolar process, the canine is redirected to a more favorable path of eruption.

Second stage Impaction: Self-correction is prevented by, late-developing lateral incisors (peg laterals) which reflect the tooth further palatally

Some times extraction of the deciduous canines leads to spontaneous eruption of permanent canine

## 5. LABIAL CANINE IMPACTION

Arch length deficiency,

1.Canine will have contact with the crown or root at lateral incisors, first premolar, and deciduous canine.

2.Canine is surrounded anteriorly wall of the maxillary sinus, and nasal cavity.

So it is impossible for canine to jump in to or behind a tooth or penetrating to nasal cavity or sinus.

## 6. PALATAL CANINE IMPACTION

Canine can be palatally positioned if extra space available in maxillary bone space due to

1 . Base of the maxillary bone is grown excessively

2. Agencies of lateral incisors

3. Peg shaped lateral incisors

4 . Stimulated eruption of lateral incisors or 1st premolars.

## 7. DIAGNOSIS

CINICAL EVALUATION:

The first step in the diagnosis of an impacted canine involves clinically examining the patient. The following features are to be viewed:

1. Prolonged retention of deciduous canine

2. Delayed eruption of permanent canine

3. Presence of palatal bulge

4. Absence of labial canine bulge

5.Delayed eruption, persistent of distal tipping, migration of lateral incisors

## 8. RADIOGRAPHIC EVALUATION:

INTRA-ORAL RADIOGRAPH:

1) IOPA:

The first, simplest and most informative X-ray film is the periapical view. Advantages of IOPA include analyzing the following detail

1)Root development, pattern, and integrity

2)Crown resorption

3)Root resorption of the adjacent tooth

4)Minimum of surrounding tissue is exposed which increasing accuracy and resolution.

5)minimal radiation exposure

The disadvantage of IOPA includes,

1) Periapical film is a two-dimensional representation which gives no information regarding buccal lingual plane

2) Overlapping structures cannot be differentiated as to which is lingual and which buccal.

2) Tube shift technique or Clarke technique (PARALLAX METHOD)

This is based on the binocular principle where two periapical views of the same object are taken at different angles will depict the position of the tooth in a buccolingual position.

Procedure: The first film was taken in one angulation. The second film is placed in an identical position but the X-ray tube is shifted mesially or distally around the arch, but held at the same angle at the horizontal plane and directed at the mesially or distally adjacent tooth

a. If the object is moved in the same direction, it is lingually positioned.

b. If the object moves in the opposite direction, it is buccally located.

Disadvantage: In cases when the canine is highly placed, and periapical film shows no superimposition of canine with the roots of the erupted tooth or when superimposition is only in the periapical region the result may be misleading.

### 3) BUCCAL OBJECT RULE TECHNIQUE

If the vertical angulation of the cone is changed approximately 200 in two successive films. The result will buccal will move in the direction opposite to the source of radiation. The lingual object will move in the same direction as the source of radiation.

### 4) OCCLUSAL RADIOGRAPH(TRUE OCCLUSAL OR VERTEX OCCLUSAL)

In this view, the central ray of the X-ray beam runs parallel to the long axis of central incisors. Exposure is done through the vertex i.e 110° to the occlusal plane.when the radiograph is viewed the anteriors are seen as small tiny concentric circles. If the impacted tooth is not parallel to the neighboring tooth, depend on the angulation of the long axis of the tooth it will be elliptical or oblique in cross-section.if the tooth is horizontal its full length will be seen. buccolingual posterior of the impacted canine can be seen, bonded the image of the impacted canine not superimposed or other teeth.

## 9. EXTRAORAL RADIOGRAPH

Lateral cephalograms: This represents a true lateral view of the skull which defines the anteroposterior i.e mesiodistal position and vertical position of the tooth.

PosteroAnterior view: This represents the vertical position of the tooth. The buccolingual tilt of the tooth is also clearly visible. This view also shows whether the root apex is in line with the arch and how far the crown is deflected in the palatal direction.

Using all this information, it is easy to build up a three-dimensional picture of the exact position and angulation of the impacted tooth and to define the type of tooth movement to bring the tooth into alignment.

### CT Scanning:

Charles and Frank in 2003, showed all the above-mentioned methods are 2 dimensional, so it is difficult to appreciate the position of canine.so a 3-dimensional image like CT should be used. CT Scanning is a method in which a clear radiograph is taken at graduated depth in any part of the human body. By viewing serial radiograph slices of the maxilla, the relationship of the impacted tooth to adjacent teeth in all three planes of space can be accurately assessed. The disadvantage of the diagnostic method includes its cost and exposure.

With regard to the radiographic examination, care should always be taken to reduce the radiation exposure as much as possible, meaning only relevant radiographs needed to a particular patient should be taken considering his/her degree or difficulty of impaction.

## COMPLICATION OF UNTREATED IMPACTED CANINE

### 1) Crown Resorption:

With age reduced enamel epithelium surrounding the completed crown will degenerate and its integrity will be lost. This leads to direct contact of bine and connective tissue with the crown and osteolytic activity will lead to resorption of enamel and its replacement by bone, a process called Replacement Resorption. This is seen especially in adult patients who left untreated 2-3 decades of age.

### 2) Labial or lingual malposition of the impacted tooth

### 3 ) Migration of neighboring teeth and loss of arch length

### 4) Internal resorption of the impacted tooth

### 5) Cyst formation {Dentigerous cyst}

Trauma or carious lesion of deciduous canine will cause periapical pathology which may lead to the direct interconnection between apical pathology and the Follicular sac surrounding the impacted canine, the follicular sac enlarges more than 2-3mm, it represents cystic changes. Dentigerous cyst

originates after the crown of the tooth completely formed by the accumulation of fluid between the reduced enamel epithelium and the tooth crown. The dentigerous cyst may enlarge at the expenses of the maxillary bone and displace canine higher in the maxilla. A potential complication of the dentigerous cyst was a)ameloblastoma b)Epidermoid Carcinoma c)MucoEpidermoid carcinoma

6) Resorption of Lateral incisor root:

This progress of undesirable phenomenon depends on the eruptive movement of the impacted canine  
If the impacted tooth is removed or redirected the resorption process usually ceases.

Attachments For canine:

a) Ligature wire. ---- Johnston

Poor control over the direction of extrusion

Poor control over the type of tooth movement

Risk of external root resorption near CEJ

Risk of alveolar crestal bone loss and loss of attachment epithelium

b) Bands----- Vonder heydt

Requires Extensive bone removal

c) cast canine caps---- Lewis,Dewel

Requires extensive crown preparation

d) Perforation of canine tips----- Fournier

Chances for nonvitality of the tooth

Needs restoration of the tooth at the end of treatment

e)Jacoby,Nielson -----Direct Bonding

Easy to perform

More reliable method

Methodology of Approach:

Guiding tooth to oral environment

Auxiliary springs for canine movement:

1) Ballista Spring (Jacoby 1979)<sup>6</sup>

It is made of rectangular wires. It proceeds forward until it is more opposite to canine space and bent vertically downwards and terminate into a small loop. With slight finger pressure, spring is it is tied to the pigtail ligature, by this it provides an extrusive force for the canine to erupt. If the impacted tooth is resistant to movement or if the distance for the tooth to move is more it will lead to lingual molar root torque leads to loss of anchorage. To overcome this feature TPA is advised

2) Active palatal arch (Becker1978)<sup>7</sup>

It consists of a fine 0.020-inch removable palatal arch wire carrying an omega loop on each side. The end of the wire is doubled for Frictionless fit in lingual sheath. It is activated by elevating downward activated palatal archwire and hooking the pigtail ligature around it.

3) Light Auxiliary Labial Arch (Kornhauser1996)<sup>8</sup>

It is made up of 0.014 inches round SS wire with vertical loops in the area of impacted canine on both sides. This loop has a small helix. This is tied with the basal archwire in piggyback fashion.If the basal archwire is not used it will lead to extrusion of the adjacent tooth and cause alteration of the occlusal plane.

4) Mandibular removable appliance (Orton1996)<sup>9</sup>

It consists of clasps through which elastic is applied from clasp to the pigtail ligature wire. This provides the necessary extrusive force for the eruption of the canine

For all the above-mentioned methods the position of the attachment is immaterial and bonding is done on the most convenient surface available because no adverse rotation of tooth will occur while it is moving vertically downwards.

### GUIDELINES FOR THE MANAGEMENT OF IMPACTED CANINE<sup>3</sup>:

#### (A) INTERCEPTIVE TREATMENT:

When the patient is not aged above 12 years and there is also absence of crowding, interceptive measure of extracting the deciduous canine in a mildly impacted canine may pave the way for the eruption of permanent canine. When there is no eruption of permanent canine even after 12 months then intervention can be planned. Clinically palpating the canine annually above the age of 8 years will give prediction of how the permanent will erupt

#### (B) SURGICAL REMOVAL OF THE PALATALLY PLACED ECTOPIC CANINE:

Surgical removal of the impacted canine might be an option when there is a good contact between the lateral and the first premolars or at least in cases in which this can be achieved by orthodontic tooth movement. When premolar is planned as a substitute for canine the placement of buccal root torque and grinding of palatal cusp will give a better esthetic appearance<sup>4</sup>  
Surgical extraction might be planned when the tooth is severely displaced in the alveolar bone or its presence is causing a root resorption on its overlying tooth

#### (C) SURGICAL EXPOSURE AND ORTHODONTIC ALIGNMENT:

When the patient is motivated to wear a fixed appliance and the degree of impaction is not very complicated, exposing the canine and bringing it into alignment can be planned. As the age of the patient increases the success rate of the treatment might deteriorate.  
While comparing the closed vs open technique for surgical exposure, there is currently no evidence suggesting which is better over the other with regards to patient health, economics, aesthetics and dental health<sup>5</sup>

#### (D) TRANSPLANTATION:

Rarely the ectopically placed canine can be transplanted in the necessary position when other treatment modalities have failed. But care should be taken to avoid ankylosis and root resorption. Root canal treatment should be done following transplantation in order to improve the success of treatment.

#### (E) LEAVE AND OBSERVE:

When there is a good contact between the laterals and the premolars, when the adjacent tooth near the impacted tooth does not show any signs of resorption and when canines are very highly placed being a challenge to the orthodontist: leave and observe "can be followed. Special care to avoid root resorption in adjacent teeth and formation of cysts should be checked.

Final call on what treatment option can be followed completely depends upon the clinical situation and patients' motivation

### 10. CONCLUSION:

Management of the impacted canine is one of the greatest challenges for an orthodontist. The success of the treatment depends upon patient cooperation, Age of patient, Proper diagnosis, Level of canine impaction, Inclination, and Depth of impaction, Amount of root formation, Type of exposure of tooth, Amount of bone removal, Type of attachment, Orthodontic traction. All these parameters

play an important role when managing impacted canines to achieve good canine alignment in the arch with canine guided occlusion, Gingival level, and Integrity of periodontium

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