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# Orthodontic Management of Impacted canine: Team Approach

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## Abstract

Orthodontic management of impacted canine need multidisciplinary approach, which should be provided by teams of specialists. After the third molar, the canine is the most frequently impacted tooth. Canine is most important tooth for achieving good canine guided occlusion. There are different diagnostics tool to assess the position and angluation of canine. Usually the following disciplines participate in such teams: maxillofacial radiologist, orthodontist, oral surgeon or periodontist. Team work is essential to produce successful patient outcome. This article focuses on different treatment alternative to manage impacted canine. Surgical exposure of canine is needed by oral surgeon or periodontist to place orthodontic attachment to canine by orthodontist. There is different flap technique to expose the impacted tooth. The major aim of Orthodontic treatment is protect the soft and hard tissue around the canine.

## Introduction

An Impacted or unerupted canines tooth is usually easy to diagnose, but the skill and expertise of the team approach of Orthodontist and Oral surgeon are needed to bring it to proper position. According to Shafer, Hine and Levy, Impacted teeth are those which are prevented from erupting by some physical barrier in the eruption path. After the third molar, the canine is the most frequently impacted tooth[1]. Maxillary canine are 10 times more commonly impacted than their mandibular canine. Among maxillary canine impaction, more than three-fourth are palataly impacted compared to labial placement[2]. Unilateral impaction is more common than bilateral. Maxillary canine impaction is more frequent in girls and commonly associated with peg-shaped or missing lateral incisors[3].

This article focuses attention on early detection of impacted canines with special emphasis on orthodontic management and guided eruption of canine to create canine guided occlusion.

## Diagnosis and Early Detection

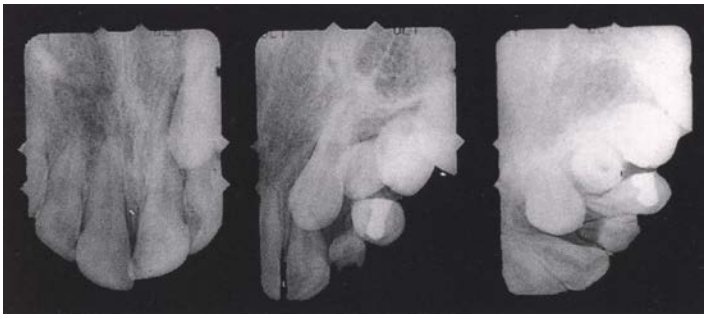
Early detection of possible canine's impaction can be made in patients as young as 9 to 10 years of age. Digital palpation of the buccal sulcus above the primary canine root, which can reveal the position of the permanent canine. When the canine bulge cannot be identified by digital palpation, eruption disturbance of the permanent canine should be suspected and confirmed radio-graphically at the age of 10 to 11 years[5,6]. During the clinical examination, the permanent lateral incisors should be carefully checked. Their abnormal position or angulation could indicate a mesially deflected canine. This has the potential to become impacted [7]. The proper localization of the Impacted tooth plays a crucial role in

determining the feasibility of as well as the proper access for the surgical approach and the proper direction for the application of orthodontic force.

Figure 1: IOPA of Impacted Canine

To determine the canine position periapical radiograph using Clark's rule was taken. Two periapical radiographs are taken of the canine in the same horizontal Plane with the radiographic cone at different angulations. The movement of the canine on the films is assessed relative to near object. When the canine moves in the same direction as the cone, it is located lingually or palatal. When the canine moves in the opposite direction of the cone, it is positioned buccally. Taking a vertex occlusal view radiograph with the X-ray beam should be directed along the long axis of central incisor.

Figure 2: Tube shift techinique or Clarke technique



Extra Oral Films: Frontal and lateral cephalograms and Orthopantomagraph radiograph for determining the position of the impacted canine, particularly its relationship to other facial structures like maxillary sinus or floor of the nose. CBCT and CT are nonroutine, expensive method for three dimensional diagnosis of ectopic maxillary canine. The transverse orientation of the image can detect the labio-lingual position of the impacted canine, which could not be otherwise detected by radiograph.

**Evaluations of position of canine**

1. The most medial position of the crown is identified and the severity of the overlap is assessed. Canines placed mesial to lateral incisor, distal to premolar have less success rate.
2. The inclination or angulations of the long axis of the canine greater than $40^0$ shows poor prognosis.
3. The vertical height measured in millimetres from the canine tip to the occlusal plane. Distance more than 15mm suggest poor prognosis.

**Treatment Alternatives**

Surgical exposure of the canine and orthodontic treatment to bring the tooth into the line of occlusion. Extraction of the canine and movement of a first premolar in its position. Less common treatment plans are auto transplantation of the canine or prosthetic replacement.

**Management of the palatally impacted canine**

After proper clinical and radiological assessment, favourable placed canine are surgically exposed to bring it to the line of occlusion[8,9]. Two of the most commonly used methods are (a) Surgical exposure to allow natural eruption. (b) Surgical exposure with placement of an auxiliary attachment. Orthodontic forces are subsequently applied to the attachment to move the Impacted tooth. Surgical exposure are created by oral surgeon or peridontist and auxiliary can be either directly bonded to enamel or indirectly attached to a cemented band. Two approaches are generally recommended with regards to the timing of placing the attachment.

1. Lewis preferred a two-step approach. First the canine is surgically uncovered and the area is packed with a surgical dressing to avoid the filling of tissues around

the tooth. After wound healing, within 3 to 8 weeks, the pack is removed and an attachment is placed on the Impacted tooth.

2. One-Step approach: the attachment is placed on the tooth at the time of surgical exposure. The tissues over the attachment should be excised, and a periodontal pack should be placed. The pack will minimize patient discomfort and prevent the granulation tissues from covering the attachment before the clinician is ready to apply traction forces to the impacted tooth. The approach is particularly recommended for palatal impacted tooth.

**Management of buccally Impacted canines**

Labial impaction of the maxillary canine is less frequent than palatal impaction and is often caused by insufficient arch length. Fournier et al suggested that buccally impacted tooth with a favourable vertical position might be treated initially by surgical exposure without application of traction force[10]. In younger patients the tooth erupt on its own after surgical exposure whereas in older patients traction is always indicated[11].

**Surgical Exposure**

Various techniques are practiced to uncover labially impacted canine. The most common methods are Excisional gingivectomy- in this procedure first radical bone is removed to expose the crown to remove all bony obstacles and provide an easier path for tooth movement. McDonald and Yap evaluate that the more bone is removed initially, greater the bone loss after orthodontic treatment. The disadvantage of excisional gingivectomy is it bring about increased loss of attached gingiva and excessive gingival recession.

Apically positioned flap- the apically positioned flap allows for greater movement of the marginal tissue. The procedure is indicated even in teeth located beyond the vestibular depth. The advantage of this procedure is it prevents marginal bone loss and gingival recession.

Closed eruption technique- it involves elevating a flap, placing an attachment on the impacted tooth returning the flap to its original location. The orthodontic traction force is applied 1 week after creating a normal direction of tooth eruption.

**Methods of orthodontic attachment**

Different methods of attachment to the impacted tooth have been suggested.

1. Wire Lasso- The Use of Circumferential dead soft, ligature wire (lasso) as an attachment . this method is not recommended as too much bone has to be removed around the tooth circumference.

2. Orthodontic attachment- use of bondable mesh, bracket or lingual button with ligature chain to the bonded attachment.

3. Multiple eyelet chain

4. Magnets in attractive mode.

Methods of applying Traction

**Extrusion of Palatally Impacted Canine**

Palatally Impacted Canine should be moved to more favourable position before moving them labially for incorporation into the arch. Ligate the Kobayashi hook to the canine bracket before bonding the bracket. Place a rectangular stabilizing wire in the arch. Crimp the extraoral hook, angulated labial and gingival onto the rectangular rigid arch wire opposite to the canine to be extruded. Ligate booth the hooks with round elastic.


Multiple Eyelet chain for Impacted teeth-usually after surgical exposure of an impacted canine, the surrounding soft tissue often covers the tooth and bracket of the extent that second surgical procedure is required to re-expose the tooth. Using an explorer and haemostat, bend multiple eyelets into a length of 0.012" ligature wire. Thread power chain through an available eyelet and tie it to the arch wire. Reactivate the power chain by threading it through and appropriate eyelet, depending on tooth eruption and soft tissue coverage.


The 'Ballista Spring' system[12] for impacted teeth-Ballista spring is designed by Harry Jacoby.


It is designed by 0.014,0.016 or 0.018 inch round wire. Distal end of spring passes through both headgear and edgewise vestibular tubes of the first or second molar. The last part of the spring(mesial end) is bent down vertically and ends in a loop shape to which a ligature elastomeric thread can be attached. When the vertical portion of the spring is raised toward the impacted tooth, the horizontal part accumulates the energy into the twisted metal. When the vertical portion of the spring is raised toward the impacted tooth, the horizontal part accumulates the energy into the twisted metal. When the vertical section is resealed, it bumbs down like a Ballista (Roman Missile).

Tunnel Traction of Infraosseous impacted maxillary canines: Deep infraosseous canine associated with persistant deciduous teeth may be successfully and safely treated by repositioned flap and tunnel traction toward the center of the alveolar ridge. The deciduous canine is then removed. Cortical bone is removed with a low speed bur to provide access to the crown. A ligature wire chain of rings approximately 1.5mm in diameter is prepared with 0.011" ligature wire which is passed through the osseous tunnel and fixed as close as possible to the cusp of the impacted canine by means of attaching device. The flap is then repositioned and sutured.

**Surgical Extraction of Canine**

Extraction of canine can be considered if the long term prognosis is not favarouble after orthodontic treatment. Various condition considered for extraction are Ankylosed canine, external and internal root resorption, dilacerated root or if any severe pathologic changes like cyst, infection.

**Conclusion**

The management of the impacted canine is one of the greatest challenge for orthodontist. 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 exposure of tooth, amount of bone removable, type of attachment, orthodontic traction. Good team work between radiologist, orthodontist, oral surgeon and periodontist is needed for successful result. All these parameter plays important role when managing impacted canines to achieve good canine alignment in the arch with canine guided occlusion, Gingival level, and integrity of periodontium. Good retention either fiberotomy or bonded fixed retainer is required post treatment.

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