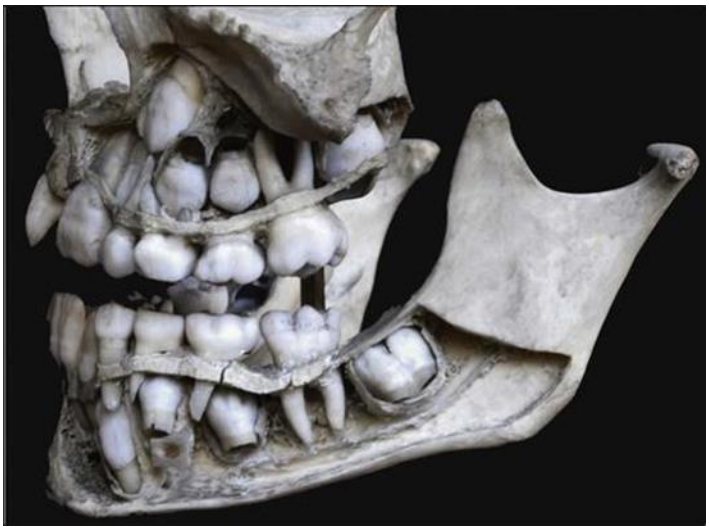
TREATMENT OF ABERANT/ ANOMALOUS CANINE

The development of the upper canine starts around 4 to 5 months of age, high in the maxilla. Crown calcification is complete around 6 to 7 years of age. The permanent canine then migrates forwards and downwards to lie buccal and mesial to the apex of the deciduous canine before erupting down the distal aspect of the root of the upper lateral incisor. Pressure from the unerupted canine on the root of the lateral incisor, leads to flaring of the incisor crowns (ugly duckling stage), which resolves as the canine erupts. In normal development the upper canines should be palpable in the labial sulcus by age 10 years.



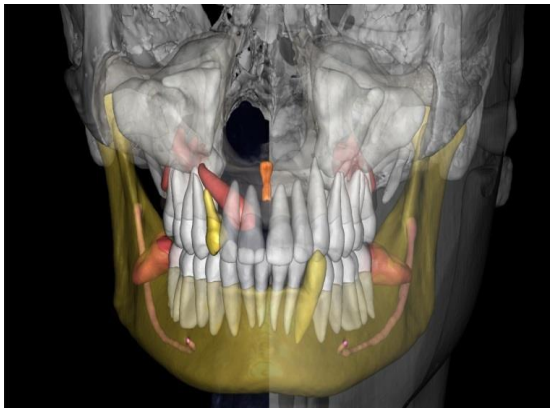
PREVALENCE OF COMMON CANINE PROBLEMS:

In Caucasian population, the prevalence of common canine problems is:

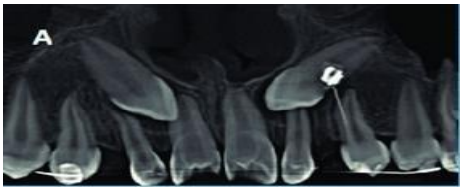
- congenital absence of upper canines (0.3%) and lower canines (0.1%)
- impaction of upper canines (1-2%) and lower canines (0.35%)
- resorption of upper incisors due to impacted canine (0.7% of 10-13 year olds)
- transposition of upper canines (0.33%)

CLASSIFICATION OF CANINE DISPLACEMENT

Canine displacement is generally classified into buccal or palatal (lingual displacement). More rarely, canines can be found lying horizontally above the apices of the teeth of the upper arch or displaced high adjacent to the nose.



AETIOLOGY OF CANINE DISPLACEMENT



Possible causative factors of canine displacement include:

- Displacement of the crypt. This is the probable aetiology behind severe displacements.
- Long path of eruption.
- Short-rooted or absent upper lateral incisor.
  Patients with absent or short-rooted lateral incisors are more likely to have palatally displaced canines due to the lack of guidance during eruption. Therefore, it is important to follow up canine eruption in patients with missing or peg-shaped lateral incisors.
- Crowding. As the upper canine is the last tooth anterior to the molar to erupt, it usually has insufficient space to erupt in crowded arches. In normal development the canine lies buccal to the arch and in the presence of crowding will be deflected buccally. On the other hand, most of palatal displacements have sufficient space for eruption.
- Retention of the deciduous canine. This usually results in mild displacement of

the permanent tooth buccally. However, if the permanent canine itself is displaced, normal resorption of the deciduous canine will not occur. In this situation the retained deciduous tooth is an indicator, rather than the cause, of displacement .

- Genetic factors. The evidence to support inheritance of palatal displacement of the upper canine includes:

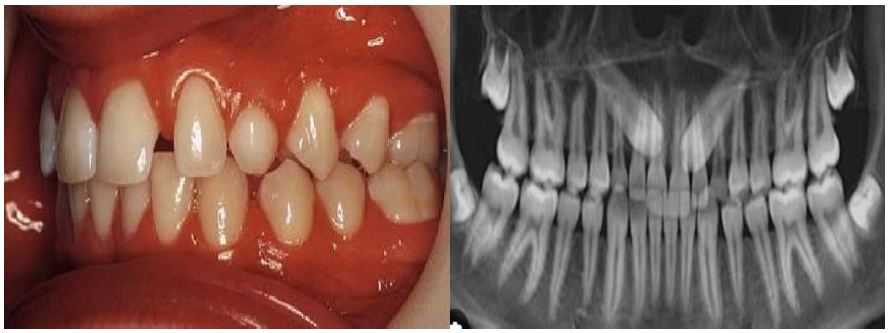
a) greater prevalence in Caucasians

b) affects females more commonly than males

c) familial occurrence

d) 8% of the cases are bilateral

e) occurs in association with other dental anomalies.



INTERCEPTION OF DISPLACED CANINES

Because management of ectopic canines is difficult and early detection of an abnormal eruption path gives the opportunity for interceptive measures, it is essential to routinely palpate for unerupted canines when examining any child aged 10 years and older.

Canines, which are palpable in the normal developmental position, which is buccal and slightly distal to the upper lateral incisor root, have a good prognosis for eruption. Clinically, if a definite hollow and/or asymmetry is found on palpation, OPG examination may show asymmetry in the position and development of the canines. If a palatally displaced canine is detected in the mixed dentition, extraction of the deciduous canine may improve the unerupted canine position.

ASSESSING UPPER CANINE POSITION

The position of an unerupted canine should initially be assessed clinically, followed by radiographic examination if displacement is suspected.

Clinically: by palpation (in the buccal sulcus and palatally) and by the inclination of the lateral incisor.

Radiographically: The radiographic assessment of a displaced canine should include:

- locate the position of canine crown and root apex relative to adjacent teeth and the arch.
- the prognosis of adjacent teeth and deciduous canine, if present
- the presence of resorption, particularly of the adjacent central and/or lateral incisors

The views commonly used for assessing ectopic canines include the following:

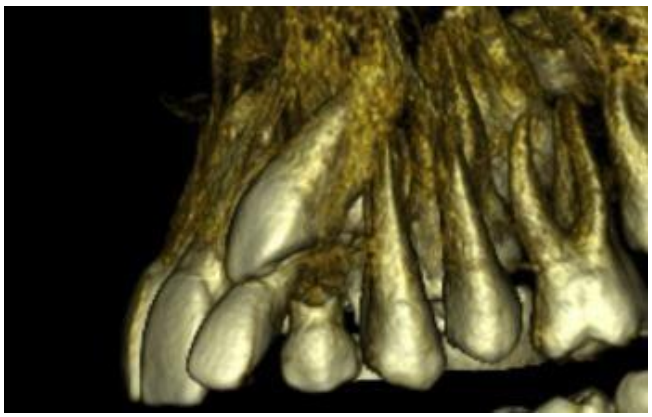
1- Orthopantomogram (OPG). This film gives a good overall assessment of the development of the dentition and canine position. However, it shows the canine to be further away from the midline and more vertical than reality, i.e. more favourably positioned for alignment. This view should be supplemented with an intra- oral view. Also, a unilateral palatally displaced canine will appear enlarged compared to the contralateral canine.

2- Periapical. This view is useful for assessing the prognosis of a retained deciduous canine and for detecting resorption.

3- Upper anterior occlusal. Taken at 70-75° to use vertical parallax with OPG radiograph.

4- Lateral cephalometric. For accurate localization this view should be combined with an anteroposterior view.

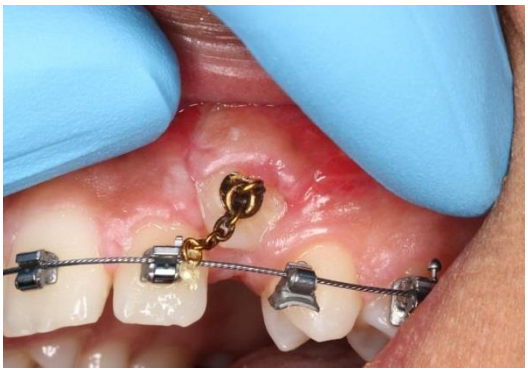
5- Cone beam computerized tomography (CBCT). Due to the increased radiographic dose, CBCT is restricted to those ectopic canines where accurate localization is not possible with conventional views and/or root resorption of adjacent teeth is suspected.



MANAGEMENT OF BUCCAL DISPLACEMENT

Buccal displacement is usually associated with crowding, and therefore relief of crowding prior to eruption of the canine will usually effect some spontaneous improvement. Buccal displacements are more likely to erupt than palatal displacements because of the thinner buccal mucosa and bone.

More rarely a buccally displaced canine tooth does not erupt or its eruption is so delayed that treatment for other aspects of the malocclusion is compromised. In these situations, exposure of the impacted tooth may be indicated. To ensure an adequate width of attached gingiva either an apically repositioned or, preferably, a replaced flap should be used. In the latter case, in order to be able to apply traction to align the canine, an attachment can be bonded to the tooth at the time of surgery, and a gold chain or a stainless steel ligature can be apply traction.



In severely crowded cases where the upper lateral incisor and first premolar are in contact and no additional space exists to accommodate the wider canine tooth, extraction of the canine itself may be indicated. In some patients the canine is so severely displaced that a good result is unlikely, necessitating removal of the canine tooth and the use of fixed appliances to close any residual spacing.

MANAGEMENT OF PALATAL DISPLACEMENT

A) Surgical removal of canine: This option can be considered under the following conditions:

1-The retained deciduous canine has an acceptable appearance and the patient is happy with the aesthetics and/or reluctant to do more complicated treatment. However, the primary canine will be lost eventually and a prosthetic replacement required.

2- The upper arch is very crowded and the upper first premolar is adjacent to the upper lateral incisor with acceptable aesthetics.

3-The canine is severely displaced. Any residual spacing can be closed orthodontically or by prosthetic replacement.

B) Surgical exposure and orthodontic alignment: Indications are as follows:

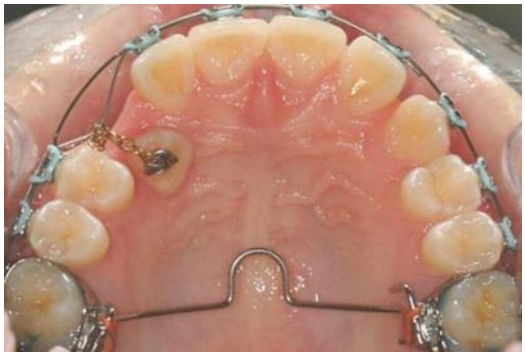
- well-motivated patient
- well-cared-for dentition
- favourable canine position
- space available (or can be created)

Whether orthodontic alignment is feasible or not depends upon the three- dimensional position of the unerupted canine:

- Height: highly positioned canines have poorer prognosis and more restricted access for surgical exposure.
- Anteroposterior position: the nearer the canine crown is to the midline, the more difficult alignment will be.
- Position of the apex: the further away the canine apex is from normal, the poorer the prognosis for successful alignment.
- Inclination: more horizontal canines need for greater traction.

If these factors are favourable, the usual sequence of treatment is as follows:

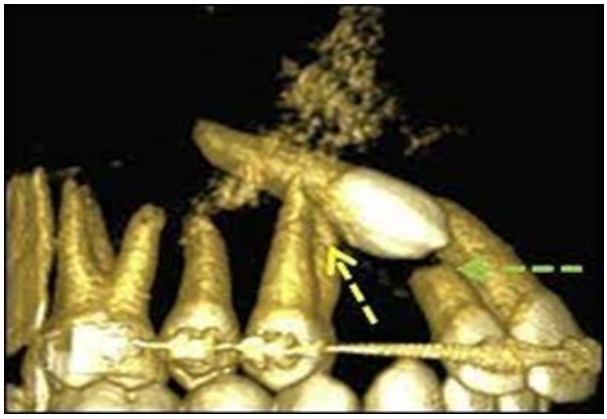
- ✓ Make space available (permanent extractions should be delayed until after the canine has been exposed and traction successfully started).
- ✓ (Arrange exposure and allow the tooth to erupt for 2 to 3 months.
- ✓ With deeply buried canines, an attachment plus a gold chain can be bonded to the tooth at the time of exposure or 2 days after pack removal.
- ✓ Start traction using either a removable or fixed appliance. To complete alignment a fixed appliance is necessary, as movement of the root apex buccally is required to complete positioning of the canine into a functional relationship with the lower arch.



RESORPTION

Unerupted and impacted canines can cause resorption of adjacent lateral incisor roots and may sometimes progress to cause resorption of the central incisor. CBCT has shown that ⅔ of upper lateral incisors associated with ectopic canines showed signs of resorption. This sequela is more common in females than males. Sometimes an immediate intervention is essential, as resorption often proceeds at a rapid rate.

Extraction of the canine may be necessary to halt the resorption. However, if the resorption is severe it may be wiser to extract the affected incisor(s), thus allowing the canine to erupt.



TRANSPLANTATION

Transplantation should be carried out when the canine root is ⅔ to ¾ of its final length; unfortunately, by the time most ectopic canines are diagnosed root development is almost complete. If transplantation is to be attempted, it must be possible to remove the canine intact and there must be space available to accommodate the canine within the arch and occlusion. The transplanted canine should be positioned out of occlusion and splinted with a sectional archwire for 6 weeks. The main causes of failure of transplanted canines are:

- Replacement resorption occurs when the root surface is damaged during the surgical procedure.
- Ankylosis is promoted by rigid splinting of the transplanted tooth, which encourages healing by bony rather than fibrous union.
- Inflammatory resorption follows death of the pulpal tissues, and therefore the vitality of the transplanted tooth must be carefully monitored.

TRANSPOSITION: Transposition is the interchange in the position of two teeth. This anomaly is rare but almost always affects the canine tooth. It affects

males and females equally and is more common in the maxilla. It usually involves:

1- the upper canine and first premolar

2- the upper canine and lateral incisor

3- the lower canine and lateral incisor

Management depends upon: whether the transposition is complete (i.e. the apices of the affected teeth are transposed) or partial; the malocclusion; the presence or absence of crowding. Possible treatment options include; acceptance (particularly if transposition is complete); extraction of the most displaced tooth if the arch is crowded; orthodontic alignment.