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The management of the palatally ectopic maxillary canine: 2004

Introduction

The maxillary canine is second only to the mandibular third molar in its frequency of impaction. The prevalence is about 1.5% and the canine becomes ectopic more often palatally than buccally with over double the frequency.[1] Management of this condition often faces general dental practitioners and orthodontic specialists. Mismanagement and failures in diagnosis may be costly in terms of clinical time (both for the practitioner and patient) and in litigation (if damage occurs to adjacent teeth and proceeds unchecked).

The aetiology of the palatal canine ectopia remains unclear but is likely to be polygenic[2] and multifactorial.[3] There is evidence of palatally ectopic canines occuring more often among family members and may be linked[4] with absent or anomalous (in size or morphology) lateral incisors,[5] an absence of crowding, and late developing dentitions.[6] The majority of normally erupting maxillary canines should be palpable in the buccal sulcus by ten to eleven years of age.[7] Those maxillary canines erupting after approximately 12.3 years in girls and 13.1 in boys may be considered late.[8]

Sequelae of canine ectopia

The main risk appears to be root resorption of adjacent teeth, usually incisors. It has been estimated that 0.6-0.8% of children in the 10-13 year old age group have permanent incisors resorbed, as a result of canine ectopia.[1] However, using CT scanning, root resorption has been detected in up to 48% of incisors adjacent to ectopic maxillary canines.[9] It has been suggested that root resorption of incisors by palatally ectopic canines rarely starts after 14 years of age[10] and it occurs most frequently between 11 and 12 years.[11]

Other possible sequelae of canine ectopia are coronal resorption (which is most likely to occur in adults) with quoted frequencies of up to 14%[12] and cystic change with a frequency of 9.5% in one study[13] but is generally thought to be low.[14]

DIAGNOSIS AND MANAGEMENT

1. History and Examination

Practitioners should become suspicious of the possibility of canine ectopia if the canine is not palpable in the buccal sulcus by the age of 10-11 years of age or if palpation indicates an asymmetrical eruption pattern. The patient with an ectopic maxillary canine must undergo a comprehensive assessment of the malocclusion including accurate localisation of the ectopic canine.

1.1 Radiographic examination[15,16,17]

Radiographic procedures prior to the age of 10-11 years are usually of little benefit in terms of the knowledge gained.[1,7]

The examination usually involves taking two radiographs and the use of the principle of horizontal or vertical[18] parallax.

Horizontal Parallax

1. Anterior Occlusal and Periapical

   or

2. Two Periapicals

Vertical Parallax

1. Anterior Occlusal (70-75°) and OPT

   or

2. Periapical and OPT

Recent research has shown that the horizontal parallax techniques are more reliable than vertical parallax techniques in localising the unerupted tooth.[19]

2. Treatment

Radiographic examination should be carried out initially to confirm the position of the unerupted canine. Patient and parent counselling on the various treatment options is essential.

2.1 Interceptive treatment by extraction of the deciduous canine[20,21]

- The patient should be aged between 10-13 years.
- The need to space maintain requires consideration.
- Better results are achieved in the absence of crowding.
- If radiographic examination reveals no improvement in the ectopic canine's position 12 months after extraction of the deciduous canine, alternative treatment should be considered.

This is a grade B recommendation based on level II data.

2.2 Surgical exposure[22] and orthodontic alignment

- The patient should be willing to wear fixed orthodontic appliances.
- The patient should be well motivated and have good dental health.
- The patient is considered to be unsuitable for interceptive extraction of the deciduous canine.
- The degree of malposition of the ectopic canine should not be too great to preclude orthodontic alignment.

This is a grade C recommendation based on level IV studies

2.3 Surgical removal of the palatally ectopic permanent canine

- This treatment option should be considered if the patient declines active treatment and/or is happy with their dental appearance.
- Surgical removal of the ectopic canine should be considered if there is radiographic evidence of *early* root resorption of the adjacent incisor teeth (but exposure and alignment of the ectopic canine is usually indicated in cases where *severe* root resorption of an incisor tooth has occurred necessitating the extraction of the incisor).
- The best results are achieved if there is good contact between the lateral incisor and first premolar or the patient is willing to undergo orthodontic treatment to substitute the first premolar for the canine.

This is a grade C recommendation based on level IV studies

2.4 Transplantation[23,24,25,26]

- This treatment option should be considered if the patient is unwilling to wear orthodontic appliances or the degree of malposition is too great for orthodontic alignment to be practical.
- Transplantation would not normally be considered unless interceptive extraction of the deciduous canine has failed or is considered to be inappropriate.
- There should be adequate space available for the canine and sufficient alveolar bone to accept the transplanted tooth.
- The prognosis should be good for the canine tooth to be transplanted with no evidence of ankylosis. The best results are achieved if the ectopic canine can be removed atraumatically.

This is a grade B recommendation based on level II data.

2.5 No active treatment/leave and observe

- The patient does not want treatment or is happy with their dental appearance.
- There should be no evidence of root resorption of adjacent teeth or other pathology.
- Ideally there should be good contact between the lateral incisor and first premolar or the deciduous canine should have a good prognosis.
- Severely displaced palatally ectopic canines with no evidence of pathology may be left in-situ, particularly if the canine is remote from the dentition. If the ectopic canine is left in-situ radiographic monitoring is recommended to check for cystic change or root resorption.

This is a grade C recommendation based on level IV studies

EXPLANATORY NOTES

Treatment planning for patients with palatally ectopic maxillary canines is not straightforward due to the large number of patient factors and orthodontic considerations which must be taken into account. It is strongly recommended that less experienced practitioners seek the opinion of an orthodontic specialist prior to initiating any of the above treatment options.

Section 2.1

Inspection and palpation in the canine region is recommended annually from the age of eight years.[7] It is hoped that early diagnosis and treatment of ectopic canine eruption will reduce the possible need for surgical intervention at a later stage. An initial study found that 78% of palatally ectopic canines reverted to a normal path of eruption following the extraction of the primary canine.[20] A more recent study found the success rate to be slightly lower (62%).[21] Nonetheless, if successful, the interceptive extraction of the adjacent deciduous canine can be a very cost-effective and simple method of correcting canine ectopia.

Section 2.2

Much of the evidence supporting surgical exposure and orthodontic alignment as a treatment approach is derived from case studies. However, clinical experience has shown that surgical exposure and orthodontic alignment of a palatally ectopic canine can be a highly successful treatment approach. As with all orthodontic treatment the cooperation and motivation of the patient is paramount. The general dental health should be good since the treatment time is often prolonged. When comparing open versus closed exposure techniques, there is no evidence to show that subsequent periodontal health is better with either one, although repeat surgery is more common with the latter.[22] It is generally agreed that the optimal time for surgical exposure and orthodontic alignment is during adolescence.[27,28,29]

Section 2.3

Surgical removal of the ectopic canine is most often considered when dental aesthetics are acceptable with good contact between the lateral incisor and the first premolar. It is also considered when the canine is severely malpositioned and not amenable to alignment and transplantation is not being considered in cases where there is pathological change and/or its retention would impede orthodontic tooth movement. If necessary, fixed orthodontic appliances can be used to bring the first premolar forward to simulate a canine tooth: mesiopalatal rotation of the premolar, and/or grinding of the palatal cusp, can also help to improve aesthetics. Clinical experience would indicate that there is a large variation in the life-expectancy of retained deciduous canines.

Section 2.4

Transplantation is sometimes considered for grossly displaced ectopic maxillary canines or when prolonged orthodontic treatment is unacceptable to the patient. Early studies revealed disappointing long-term results when this approach was adopted with a high frequency of root resorption occurring. More recent studies using a meticulous atraumatic surgical technique and stabilisation of the transplanted tooth with a sectional archwire for six weeks have reported better results.[26] *However, the long-term (> 5 years) prognosis of transplanted palatally ectopic canines has yet to be evaluated, although for other teeth it can be as high as 90%.*[24,25]

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