

THE PREVALENCE OF IMPACTED PERMANENT MAXILLARY CANINES IN MALTESE SCHOOL CHILDREN: A PILOT STUDY

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A preliminary investigation into the prevalence of ectopic permanent maxillary canines in 468 10-year old school children. A prevalence of 4.4% was found.

The impression of several clinicians is that there may be a higher incidence of ectopic permanent maxillary canines in Maltese school children as compared to school children of other countries. Various epidemiologic studies carried out abroad have quoted the prevalence as 0.92-2.2%^{1,2,3}.

The aetiology of ectopic canines is not clear. A number of causes have been put forward such as the long path of eruption of the maxillary canine,⁴ lack of guidance by the lateral incisor root,⁵ narrow arches, cystic enlargement of the dental follicle⁶ large arches,⁷ and familial tendency⁸. Recently an association was founded between ectopic canines, submerging deciduous molars and ectopically erupting first permanent molars⁹. Females seem to be more at risk than males with a ratio of 3:1¹.

Sequelae of canine impaction may be:¹⁰

- palatal or buccal placement of the tooth,
- loss of space for the tooth by drift of adjacent teeth
- dentigerous cyst formation
- internal resorption
- external root resorption of the impacted tooth
- root resorption of adjacent teeth, this occurs in 0.71% of cases¹¹
- referred pain
- infection, especially with partial eruption

In the majority of cases the deciduous canine is often retained and the ectopic canines remain unerupted and symptomless. Often the patient is not aware of any complication. The deciduous canine usually exfoliates spontaneously years later, leaving a gap which is awkward to replace with a prosthesis for a number of reasons:

- i) The lower canine will often have over-erupted due to progressive attrition of the

retained deciduous canine. This will prevent the passage of, or weaken, removable prosthesis connectors. In the case of a fixed prosthesis, this may necessitate overpreparation of the abutment teeth and is bound to create occlusal problems in lateral excursion. This in turn may lead to involvement of more abutment teeth in an attempt to stabilise the bridge.

- ii) The small size of the deciduous canine crown will make it difficult to fabricate an aesthetically satisfactory replacement. The facing of this tooth may be weak and prone to fracture due to its small size.
- iii) Distally tipped lateral incisors are associated with maxillary canine eruption anomalies. Also the first premolar may be mesiobuccally rotated. The abnormal positions of these teeth may cause problems with preparation and paths of insertion.
- iv) Implant procedures may be hampered by inadequate room for placement between the roots of the adjacent teeth. Care must be taken in the fabrication of the superstructure that occlusal loads are adequately distributed.

Diagnosis of canine impaction is based on clinical and radiographic findings. Kettle⁶ recommended palpation of the buccal surface of the alveolar process just distal to the lateral incisor. A bulge here will indicate the presence of a normally developing canine. This may be present at age 8 but Ericson & Kuroi² have shown that 29% of 10 year olds had non-palpable canines. This figure was reduced to 3% at the age of 14. They recommended radiographic examination of non palpable canines after age 11.

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They also emphasise that somatic maturity, not age, was more important when assessing the need and indications for radiographic examination.

Ericson & Kuroi¹² showed that in cases of ectopically erupting canines, removal of the deciduous canines before age 11 will normalise the eruption of the permanent canines in a large number of cases.

Materials & Method

The preliminary investigation was carried out on school children in their tenth year of age; i.e. those born in 1983. The author accompanied School Dental Officers on routine visits and examined children at random, with no attempt made to match for sex.

The sample size was estimated using Epi Info Version 5 supplied by the WHO for Epidemiology and disease surveillance. A sample size of 84 would be representative at the 99% confidence level.

Three Government Primary Schools in Fgura, Tarxien and Zejtun were visited and a total of 91 children (43 females and 48 males) were examined. All children were in their 10th year, i.e. all were born in 1983. The population of 10 year olds for the three schools was 468.

The examination consisted of an inspection to determine whether the maxillary canines were palpable or not. The state of development of the dentition, missing or unerupted teeth and the size and inclination of the lateral incisor was also noted.

Those children in whom one or both maxillary canines were not palpable and whose lower canines were erupted or about to erupt (indicating advanced or average dental development) were asked to attend St. Luke's Hospital to undergo further examination. This consisted of another attempt to palpate the canines. A radiographic investigation consisting of a panoramic film supplemented by an anterior occlusal was carried out when the canine was still not palpable. Study models were also taken.

Of the 91 children examined, 21 were called to St. Luke's for further examination. Of these only 10 attended the initial appointment. Two eventually were persuaded to attend later in the year.

The following year the 9 children who were

never seen were followed up at their school and re-examined. Of these, two were found to still have non palpable canines. These were again asked to attend St. Luke's Hospital. One did attend. The canine teeth of the remaining seven were all found to be erupting normally.

Canines were deemed to be erupting ectopically if:

- i the crown of the permanent maxillary canine overlapped the root of the lateral incisor on the panoramic radiograph, (\geq sector 2, see Fig. I)
- ii comparison of the films using parallax found them to be palatal to the line of the arch.

Results

The severity of the impaction was assessed according to Ericson and Kuroi¹². (Fig. I).

Three girls and one boy were found to have palatally erupting canines. There seemed to be a predilection for the right side in unilateral cases. (Fig. II)

The percentage of children exhibiting ectopic eruption of the canine teeth was 4.4%. This is far higher than any previously reported in the literature.

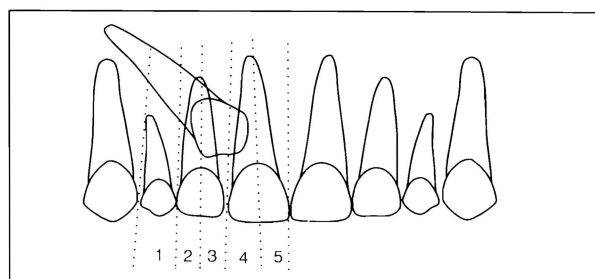


Figure I - The degree of deflection of the canine from the normal path of eruption in the horizontal plane is measured by the sector the crown tip lies in.

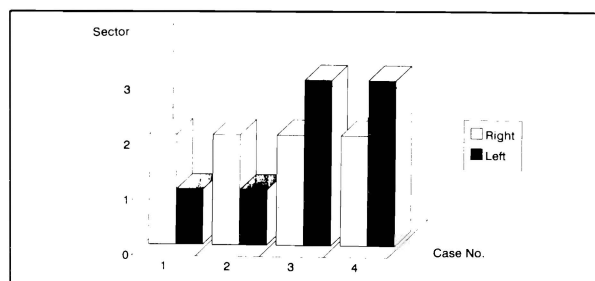


Figure II - Teeth in sector 1 are erupting normally. Those in sector 2 and above are ectopic.

Discussion

The number of non palpable canines at age 10 was 23%, a figure that compares well with Ericson and Kuroi's 29%. They state that the reason for 'misdiagnosing' non palpable canines was that the canine was still very high up in the arch. If this were the case here the teeth would not be erupted one year later. The most plausible reason is that they were erupting palatal to the line of the arch. That they erupted normally probably shows that a palatal path of eruption (called a palatal tendency by Ericson & Kuroi) does not necessarily mean that ectopic eruption is inevitable.

The aetiology of ectopic canines is obscure and is beyond the scope of this paper. However, although it has been associated with the presence of peg laterals¹³ this was not found to be the case here. In the one case where a peg lateral was found to be present, the canines were erupting normally. In no instance were submerging deciduous molars or impacted first permanent molars noted in conjunction with ectopic canines.

Ericson & Kuroi² also noted distal or buccal tipping of the lateral incisors associated with eruption disturbances. One case (Case D) showed some distal and buccal tilting of the laterals.

Three females and one male were affected. This supports the results of previous studies in that the condition seems to be more prevalent in females. No cases of resorption were noted to date. These children have had their deciduous canines extracted as recommended by Ericson & Kuroi¹² and are being kept under clinical and radiographic review.

One possible theory postulated for the impression of the high incidence of ectopic canines locally was lack of early diagnosis and interceptive treatment by GDP's. The findings do not support this view as the children are too young for one to expect the GDP's (or anyone else) to have already spotted the anomaly and have taken interceptive measures. However, the high percentage of ectopic canines makes it imperative that local GDP's be aware of the possibility of canine impaction and should know the correct diagnostic and interceptive procedures to follow:

- The canines should be palpable as bulges in the buccal sulcus just ahead of the root eminence of the deciduous canine by age 10 if the child is of average somatic and dental development.
- If this is not so then two radiographs per tooth should be taken with a definite tube shift between them. Two periapicals work very well. There is no advantage in using extraoral films for this purpose alone. The position of the unerupted tooth is assessed by the relative movement of its image on the two films, according to the parallax principle. The acronym SLOB is very useful here, i.e. if it has moved in the Same direction as the tube shift it is Lingual (or palatal), if in the Opposite direction, it is Buccal.
- If the tooth is erupting palatally, the deciduous canines may be removed in an attempt to normalise its eruption. The earlier this is done, the more chance there is of success.
- Further radiographs should be taken every 4 months to monitor its position until it erupts. Should no improvement be visible after a year, then little more can be expected. The choices are then whether to (i) expose and bond the tooth, bringing it into the arch orthodontically, (ii) remove the canine and treat the result on its merits, (iii) leave in situ and keep under radiographic review.

Conclusion

The incidence of ectopic canines (4.4%) in a sample of Maltese school children seems to be rather higher than the reported average of 1-2%. This seems to support the general clinical impression. It must, however, be borne in mind that this is only a pilot study. The sample is small, not mathematically randomised and may not be representative of the population as a whole. Further investigation is required in the form of a National survey which:

- Will include samples from all schools chosen at random
- May be better carried out on a higher age group (e.g. 13 years), in view of the high number of teeth, not palpable initially, which subsequently erupted normally
- Will not use extraoral films. Standardised intraoral films are much easier to interpret, may be used for comparative purposes and are cheaper.

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