# Maxillary premolar resorption by canines: three case reports

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**Summary.** Three unusual cases of maxillary premolar root resorption are reported. Three teenage patients were referred to the orthodontic department for management of ectopic maxillary canines. Radiographic examination revealed unilateral premolar root resorption in all three patients. This represents an unusual finding. Whereas the prevalence of maxillary lateral incisor root resorption secondary to palatally ectopic canines has been reported, the prevalence of premolar root resorption is unknown. This report discusses the findings in the context of the available literature. The postulated aetiology and the need for early diagnosis are highlighted.

# Introduction

Palatal displacement of one or both maxillary canines is reported in 1% to 3% of North European [1] and North American [2] population samples. Eighty per cent of impacted canines are palatal, whereas the remaining 20% are buccal [3]. Palatally displaced canines are more prevalent in females than in males [4]. Missing or diminutive permanent lateral incisors are implicated by some authors in the aetiology of ectopic palatal canines [5]. Computerized tomography has shown, in a study of 107 subjects with palatally ectopic maxillary canines, that 47% of the adjacent maxillary incisors had root resorption, whereas 38% of the subjects had lateral incisor root resorption [6]. These three case reports describe the unusual occurrence of premolar root resorption.

#### **Case reports**

#### Case 1

A 13-year-old male was urgently referred by his general dental practitioner owing to palatal impaction of the permanent maxillary canines (13 and 23) and resorption of the left first premolar. He had a Class II division 2 incisor relationship on a mild

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skeletal II base. The molar relationship on the right was normal and there was a half unit class II on the left. He was in the mixed dentition and the deciduous canines (53 and 63) were present. There was mild crowding (< 3-mm space requirement) in the upper arch, and the lower arch was well aligned. The permanent maxillary canines (13 and 23) were not palpable. The left first premolar was vital and firm. Radiographically the permanent maxillary canines (13 and 23) had enlarged follicles, and the upper left first premolar (24) roots appeared to be resorbed (Fig. 1). After a discussion with the patient and his parents the maxillary primary canines (53 and 63) were extracted to encourage the eruption of the permanent successors and to decompress the enlarged follicles. The resorbed premolar was maintained during fixedappliance treatment, as permanent tooth extractions were not required for relief of the mild crowding.



Fig. 1. Case 1: a dental panoramic radiograph showing enlarged follicles associated with the unerupted permanent maxillary canines and root resorption of the left maxillary first premolar roots.

# Case 2

A 13-year-old female was routinely referred by her general dental practitioner regarding palatal impaction of the left permanent canine. She had a Class II division 1 incisor relationship on a mild skeletal II base with well-aligned upper and lower dental arches. The left primary lateral incisor and canine (62 and 63) were retained, the permanent left lateral incisor was absent and the right lateral incisor was peg shaped. Radiographic examination revealed root resorption of the upper left first premolar roots, and transposition of the upper left canine with the upper first premolar (Fig. 2). The ectopic canine appeared to have a mid root curvature. Extraction of the resorbed first premolar and primary canine was deemed the most appropriate treatment and the patient was referred to a local specialist practitioner for comprehensive fixed-appliance treatment.

# Case 3

A 16-year-old female was urgently referred by an orthodontic specialist practitioner who had noted premolar root resorption following late referral for treatment of an ectopic left maxillary canine. She had a Class I malocclusion on skeletal I base with mild upper arch crowding (< 3-mm space requirement) and moderate lower arch crowding (4–7-mm space requirement). The left maxillary primary canine was retained and the permanent successor was unerupted and buccally palpable. Radiographic examination revealed marked (> 50%) root resorption of the adjacent first premolar (Fig. 3). In addition there appeared to be a mild curvature between the crown and root of the ectopic canine. After discussion with the

# **Fig. 2.** Case 2: a dental panoramic radiograph showing the transposition of the left maxillary canine and first premolar and the pathological root resorption of the left maxillary first premolar.



Fig. 3. Case 3: a dental panoramic radiograph showing the pathological root resorption of the maxillary left first premolar associated with the ectopic left maxillary permanent canine.

patient and her parents the following treatment plan was undertaken:

- 1 extraction of upper right second premolar, upper left primary canine and first premolar and lower second premolars (15; 63, 24; 35; 45);
- 2 closed surgical exposure of maxillary left canine with gold bonded attachment; and
- **3** upper and lower fixed appliances.

# Discussion

Impacted permanent maxillary canines occur in 1-3% of the population [1,2]. The detected incidence of permanent incisor resorption depends on the imaging technique used, varying from 6% with standard intraoral radiography [3] to 48% with computerized tomography [6]; however, the resorption of permanent premolars has only been reported in the literature once previously [7].

There are a number of theories postulated for the aetiology of ectopic canines. From its initial position between the roots of the first primary molar in the first year post partum, at age 3-4 years, the crown of the permanent maxillary canine lies vertically above the first premolar germ. The permanent canine then migrates down and forwards to lie buccal and mesial to the deciduous canine root apex before erupting adjacent to the distal aspect of the lateral incisor. The normal path of eruption extends over 22 mm [8]. This distance allows for disruptions to normal eruption to occur; however, there are two principal theories for maxillary canine impaction. Becker's guidance theory proposed that missing or diminutive permanent lateral incisors lead to inadequate guidance for normal canine eruption [5]. The

genetic theory postulates a polygenetic pattern of inheritance for eruption [9]. A number of case reports have hypothesized that premolar root deviations may produce canine impactions [10] or that canine impactions may cause premolar root deviations [11]; however, there is scant evidence for these latter suggestions. There was no radiographic evidence of premolar root deviations in the three cases reported here, whereas two ectopic canines were noted to have mild root curvatures; however, the significance of this latter finding is questionable.

# Conclusion

These reports highlight the importance of identifying the location of displaced canines between ages 9-11 years if they are not palpable bucally. The root status of premolar teeth, in addition to incisors, should be checked in the presence of ectopic canine teeth. Late referral complicates treatment and comprehensive orthodontic treatment may be complex.

**Résumé.** Trois cas inhabituels de résorption radiculaire de prémolaire sont décrits. Trois adolescents ont été adressés au département d'orthodontie pour prise en charge des canines maxillaires. L'examen radiographique a révélé une résorption unilatérale de racine de prémolaire chez ces eux. Ce phénomène est inhabituel. Alors que la prévalence de la résorption des incisives maxillaires latérales secondaire à une ectopie palatine des canines est connue, celle des prémolaires ne l'est pas. Cet article discute ces données dans le contexte de la littérature disponible, en insistant sur l'étiologie possible et sur le besoin d'un diagnostic précoce.

Zusammenfassung. Drei ungewöhnliche Fälle von Wurzelresorption von OK-Prämolaren werden vorgestellt. Drei Patienten im Teenager-Alter wurden zur kieferorthopädischen Behandlung überwiesen, um OK-Eckzähne einzustellen. Die Röntgenuntersuchung ergab einseitige Wurzelresorption bei allen drei Patienten. Dies erscheint ungewöhnlich. Zwar liegen Angaben vor zur Prävalenz von Resorptionen an seitlichen Schneidezähnen, bedingt durch OK-Eckzähne, die Prävalenz von Resorptionen an Prämolaren ist jedoch unbekannt. Die vermutete Entstehung und die Notwendigkeit einer frühen Diagnose werden herausgestellt.

**Resumen.** Se informa de tres casos poco frecuentes de reabsorción radicular del premolar superior. Tres pacientes adolescentes fueron referidos al departamento de ortodoncia para el tratamiento de caninos superiores. El examen radiográfico reveló reabsorción radicular unilateral del premolar en los tres pacientes. Esto representa un hallazgo poco frecuente. Mientras que se ha informado de la prevalencia de reabsorción radicular del incisivo lateral superior secundario a caninos palatinos ectópicos, la prevalencia de reabsorción radicular del premolar es desconocida. Este informe discute los hallazgos en el contexto de la literatura disponible. Se subraya la etiología postulada y la necesidad de un diagnóstico temprano.

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