

Department of Dental and Maxillofacial Radiology, Medical University of Lublin
Department of Medical Radiology, Medical University of Lublin

T. KATARZYNA RÓŻYŁO, MAGDALENA JURKIEWICZ-MAZUREK,
INGRID RÓŻYŁO-KALINOWSKA, ANDRZEJ DRELICH

*Early detection of potential impaction of permanent maxillary
canines caused by resorption disorders of deciduous canines*

In the normal process of teeth eruption the emergence of permanent teeth in dental arch is preceded by resorption of its deciduous counterpart. The resorption of root of a deciduous tooth begins 2-4 years before the physiological exchange of dentition. This process usually starts at the root apex, as this part of the root is located most closely to the crown of the permanent tooth bud. The resorption is stimulated by the developing tooth bud that is moving towards the alveolar ridge (5). From time to time resorption does not occur or it is insufficient. It can be caused by incorrect position of permanent tooth bud. Such unresorbed or only partially resorbed deciduous tooth often causes impaction or delayed eruption of its permanent counterpart (1, 4, 7). The origin of this anomaly is mechanical obstacle in the way of eruption of a permanent tooth caused by its milk equivalent (3).

The aim of the paper was early evaluation of resorption of deciduous maxillary canines and a trial at prediction of impaction or delayed eruption of their permanent counterparts as well as evaluation of the possibility of their eruption in proper position in the dental arch. It was also attempted to determine the age at which it is necessary to survey children in order to discover disturbances in the process of physiological eruption of maxillary deciduous canines.

MATERIAL AND METHODS

There were examined digital intraoral radiograms of 43 patients at the age from 8 (the beginning of physiological resorption of teeth) to 11 years (the commencement of appearance of the permanent canine crown in the dental arch), mean 9 and 1.44/12. There were examined 19 boys and 24 girls. All the radiograms were taken by means of the Digora Soredex digital radiography system using the bisecting angle technique. All the digital radiographic images were registered on a 3 x 4 cm plate covered with a layer of storage phosphor on which a latent image of studied structures appears during the exposition (10). The latent image is read by a special scanner and then presented on a computer screen within several seconds from exposition. The X-ray is stored in the form of graphic file on a hard disc, so it can be used in future as a reference image in observation of the process of resorption

of a canine (10).

In the studied material there was observed the presence and the degree of resorption of deciduous maxillary canines. On this basis an attempt was made to evaluate whether a canine could be a mechanical obstacle in the way of an erupting permanent tooth.

RESULTS

Lack of any signs of resorption was found in 26 people (11 girls and 15 boys), at the age from 7 years and 9 months to 10 years and 8 months (mean 8 years and 8.6 months) (Fig. 1). Partially resorbed canine was present in 9 examined children (5 boys and 4 girls) at the age from 8 years and 7 months to 10.5 years (mean 9 years and 6.6 months) (Fig. 2-4). Lack of deciduous canine due to its physiological resorption was determined in 8 persons (3 boys and 5 girls), aged from 9 years and 2 months to 11 years and 2 months (mean 10 years and 8 months).



Fig. 1. An example of unresorbed deciduous canine in a 10-year-old girl, which is a mechanical obstacle in the way of erupting permanent tooth



Fig. 2. Partial resorption of a root of a deciduous canine in a 10-year-old female patient



Fig. 3. Totally resorbed root of a primary canine in a patient aged 10. The crown of the deciduous tooth is present in the oral cavity and the permanent canine is still not in its proper position in the dental arch



Fig. 4. Totally resorbed root of a deciduous canine in an 11-year-old boy. The crown of the deciduous tooth is visible in the oral cavity while the incisal tubercle of the permanent canine is located on the level of the cemento-enamel junction of the lateral incisor

In the group of 19 boys the lack of resorption of primary canine was found in 58%, partial resorption – in 26%, while in 16% of boys deciduous maxillary canines were no longer found due to eruption of permanent teeth. No significant differences in the process of resorption were observed in the group of girls.

Also the age of the examined children was taken into account. Among all the studied 8-year-old children no signs of resorption were detected. Among thirteen 9-year-olds no resorption was found in 7 children, while partial resorption occurred in three children and erupted permanent canine appeared in three girls. In nine 10-year-old children lack of resorption concerned 2 girls and one boy, while in 3 cases the resorption was partial and in 3 other – total. As far as the 11-year-old patients are concerned, in all cases permanent maxillary canines were already present. The results are presented in Figure 5.

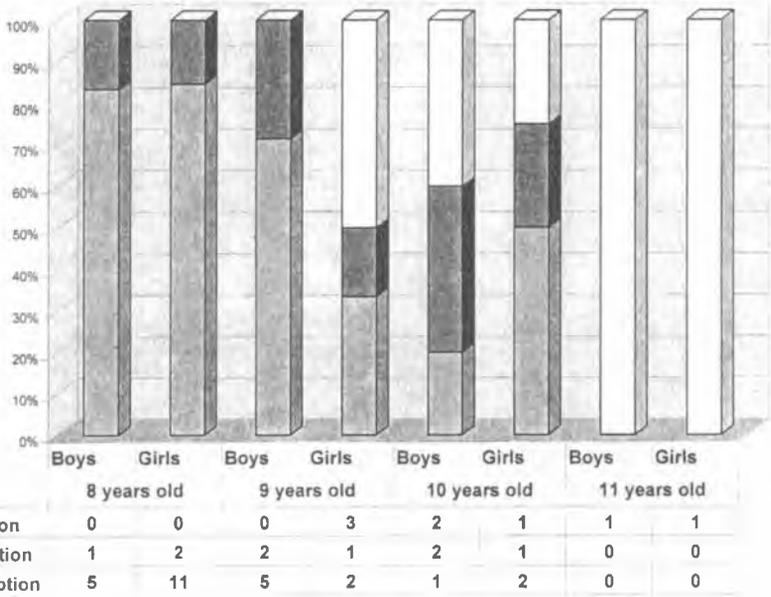


Fig. 5. State of resorption of deciduous maxillary canines in age and sex groups

DISCUSSION

A permanent maxillary canine begins its intraosseous route towards its proper position in the dental arch in the age of 8 or 9 years. In this period begins also resorption of its deciduous counterpart. In normal conditions the eruption of maxillary canines starts at the age of 11 or 12 years. In preliminary stages the process of resorption can be detected only by means of radiograms (8). As upper permanent canines often get impacted and since such retained tooth can be a cause of many pathological conditions, it is essential to diagnose difficulties in eruption without delay. Surgical and orthodontic treatment of retained teeth consisting of surgical exposure followed by application of traction is a long, expensive and often risky process as after the end of treatment there always exists a possibility of relapse (4, 9). That is the reason why early detection of factors being an obstacle for eruption of upper canines and their proper alignment in the dental arch (6).

One of such factors is the persistent deciduous canine. Lack of resorption of roots of primary teeth is a potential mechanical obstacle in eruption of their permanent counterparts. The resorption of primary maxillary canines begins in the eighth year of life but in this period its visualization on radiograms is still problematic or even impossible (2, 8). On the basis of the presented studies it can be concluded that on

the X-rays this process can be well observed at the age of 9 or 10 years. Therefore, it is suggested to take intraoral radiograms of the region of maxillary canine at this age in order to evaluate possible lack of resorption and to begin the treatment in time. As such examinations are carried out in children it is proposed to use digital imaging systems in order to reduce the dose of ionizing radiation. Moreover, the time of examination is diminished as the chemical processing of a film is eliminated. Although on the basis of a single radiogram it is not possible to well determine the localization of a permanent unerupted canine, such image allows detailed evaluation of a root of its deciduous predecessor.

CONCLUSIONS

1. Examinations proved the usefulness of digital radiography in evaluation of resorption of maxillary deciduous canines.

2. It was found that although physiological resorption of a deciduous upper canine begins in the eighth year of life, it is radiologically evident on radiograms taken at the age of 9 or 10 years.

3. Intraoral radiograms of the region of maxillary canines taken at the age of 9-10 years allows prediction of difficulties or delays in eruption of permanent teeth as well as the possibilities of their eruption in the proper position in the dental arch.

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SUMMARY

Maxillary canine impaction is an often-encountered dental anomaly as after the third molar it is the maxillary canine that is the most frequently impacted tooth. One of many factors causing impaction of maxillary canines is the presence of the persistent primary canine. The aim of the study was early evaluation of resorption of deciduous maxillary canines and an attempt at prediction of impaction or delayed eruption of their permanent counterparts as well as the possibility of their eruption in proper position in the dental arch. There were examined digital intraoral radiograms of 43 patients at the age from 8 to 11 years (44% boys, 56% girls). All the radiograms were taken using the Digora Soredex digital radiography system. There was observed the presence and degree of resorption of deciduous maxillary canines according to age and sex. It was evaluated whether a deciduous canine might be a mechanical obstacle for erupting the permanent tooth. It was concluded that although physiological resorption of deciduous maxillary canine begins at the age of 8, it is radiologically evident on intraoral digital X-rays taken at the age of 9-10 years. So the best time to assess a patient for potential resorption of primary canine and possibilities of eruption of its equivalent in proper position in dental arch is between the 9th and 10th year of age.

Wczesne rozpoznawanie potencjalnego zatrzymania kłów szczęki spowodowanego zaburzeniami resorpcji kłów mlecznych

Zatrzymane górne kły są często spotykane, ponieważ to właśnie te zęby najczęściej ulegają zatrzymaniu po trzecich trzonowcach. Jednym z licznych czynników wpływających na zatrzymanie jest przetrwanie kła mleczny. Celem badań była wczesna ocena stanu resorpcji mlecznych kłów szczęki oraz prognozowanie zatrzymania lub opóźnionego wyrzynania kłów stałych, jak również możliwości wyrżnięcia się kła stałego w prawidłowej pozycji w łuku. Badano 43 osoby w wieku od 8 roku życia do 11 roku życia (44% chłopcy, 56% dziewczęta). Każdemu z pacjentów wykonano zdjęcia wewnątrzustne metodą radiografii cyfrowej przy użyciu systemu Digora Soredex. Obserwowano obecność i stopień resorpcji mlecznego kła i próbowano ocenić, czy będzie on mógł stanowić mechaniczną przeszkodę na drodze wyrzynania się kła stałego. Analizowano stopień resorpcji kła mlecznego w zależności od wieku i płci. Nie stwierdzono istotnych odmienności w resorpcji związanych z płcią, natomiast duże różnice występowały w poszczególnych grupach wiekowych. Stwierdzono, że chociaż fizjologiczna resorpcja mlecznego kła rozpoczyna się już w 8 roku życia, jest ona uchwytna radiologicznie dopiero na zdjęciach wykonywanych w 9-10 roku życia. Wykonywanie cyfrowych badań rentgenowskich w tym przedziale wiekowym pozwala na prognozowanie zatrzymania lub opóźnienia wyrzynania kłów stałych i możliwości jego wyrżnięcia się w prawidłowej pozycji w łuku.