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Persistence of deciduous molars in subjects with agenesis of the second premolars

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SUMMARY The purpose of the present study was to investigate persistent primary second molars in a group of young people in their late twenties with agenesis of one or two second premolars.

In 1982–83 it was decided, in connection with the orthodontic evaluation of 25 patients, to allow 35 primary molars (one or two in each patient) to remain *in situ*. All patients had mixed dentitions and agenesis of one or two premolars. The primary teeth were generally in good condition, although root resorption and infra-occlusion (compensated by occlusal composite onlays) occurred.

In 1997, 18 of the 25 patients with a total of 26 retained primary molars were re-examined, comprising a clinical examination for exfoliation, extraction, loosening, and ankylosis, and a radiographic examination for root resorption, tooth morphology (crown and root), and alveolar bone contour.

The examination showed that the degree of root resorption was unaltered in 20 of the 26 primary molars. In the permanent dentitions, where these primary molars persisted, there were no morphological deviations. Three of the six remaining primary molars had been extracted and three showed extensive resorption. In three of the 26 primary molars the infra-occlusion had worsened.

The present study shows that persistence of primary second molars in subjects with agenesis of one or two premolars, and normal morphology of the permanent dentition can be an acceptable, semi-permament solution for the patient. Whether this could also be an acceptable long-term solution will be shown by follow-up studies.

Introduction

In subjects with agenesis of one or two premolars, dependent on the occlusion, jaw relationship, and jaw growth, it is not unusual to extract the primary teeth in the region concerned prior to orthodontic treatment. The general view is that the roots of the primary teeth gradually resorb, even in those regions where there are no successional teeth. There are, however, no studies that show whether the primary teeth always resorb and under what conditions the primary teeth may possibly persist, with or without minor root resorption.

An earlier study showed that there is agreement between the tendency to resorption in the primary and permanent dentitions in the same individual. That investigation also showed that root resorption due to orthodontic treatment with fixed appliances occurred in dentitions with minor root and crown abnormality (Kjær, 1995). Another result was that patients with morphological abnormalities in the permanent dentition often had an abnormal pattern of resorption in the primary dentition. Accordingly, individual tendency to resorption occurred in both dentitions and deviant morphology in the permanent dentition was often seen in patients with a tendency to root resorption (Kjær, 1995).

In connection with agenesis of permanent teeth, it is inadvisable to undertake extractions in certain types of malocclusion. This applies, for

instance, to patients with anterior mandibular rotation and deep bite, and also in those with broad jaws and narrow teeth.

The purpose of the present study was to investigate primary molars in a group of young people in their late twenties, where it was decided to allow the deciduous molars to remain *in situ* in regions with agenesis of one or two second premolars during puberty as a semi-permanent solution.

Subjects and methods

In 1982–83 it was decided, in connection with the orthodontic screening of 25 patients, to allow a total of 35 primary second molars (1 or 2 in each patient) to persist. All the patients were at that time in the mixed dentition stage and agenesis of one or two premolars had been diagnosed. The decision was re-evaluated for each of the patients at 16 years of age. At that time, the primary teeth were generally in good condition, although root resorption and infra-occlusion (compensated by occlusal composite onlays) occurred. Dental radiographs of the agenesis region and, in many cases, orthopantomograms were available at the time the decision was taken, before and during puberty, and again at the age of 16 years.

In 1997, all the patients received a written offer of an examination of the agenesis region. Eighteen (nine males and nine females) of the 25 patients were interested in this follow-up examination. These patients had a total of 26 primary second molars, consisting of seven teeth in the maxillae and 19 in the mandibles. The exact distribution by sex is shown in Table 1. Intra-oral radiographs of the agenesis region were taken. Orthopantomograms were taken when indicated, as in cases with ectopic third molars and arrested eruption, or non-erupted third molars. The follow-up examination of the young people in their late twenties comprised a clinical examination for exfoliation, extraction, loosening and ankylosis, as well as a radiographic examination. Intra-oral photographs were taken of all dentitions in occlusion.

Table 1 The distribution of the primary molars by sex and position in the jaws at the follow-up examination.

	Right	Left
Maxilla	4 (2 male; 2 female)	3 (1 male; 2 female)
Mandible	5 (3 male; 2 female)	14 (7 male; 7 female)

The radiographs were evaluated for resorption and also for crown-root morphology, such as invaginations, peg-shaped teeth, short and slender root forms, and taurodontism. Comparisons were made with radiographs taken before and in connection with the 16-year examination. As these radiographs were taken for diagnostics and treatment planning, a standardized exposure technique was not used for the intraoral radiographs. The comparisons were made independently by the two authors. Finally, the occlusal conditions of the persistent primary teeth were checked.

Results

Clinical examination

Three primary molars had been extracted because of caries. No primary molar had exfoliated, none were loose, and all those in infra-occlusion were ankylosed. Three primary molars had slightly more advanced infra-occlusion.

The persistent primary molars fulfilled their function as space-maintainers. No neighbouring teeth were severely tilted. None of the antagonists were notably elongated.

Radiographic examination

The degree of root resorption was seemingly unchanged in 23 of the 26 primary molars (Figures 1 and 2). Only three primary molars had become further resorbed.

In all the dentitions in which the degree of resorption was unchanged, there were long permanent roots and there was no sign of morphological deviations in the permanent dentition, such as taurodontia, invagination, or short or slender roots.

In three primary molars infra-occlusion had progressed. One of these patients had a taurodontic permanent molar. In this group of patients, only three individuals exhibited crown/

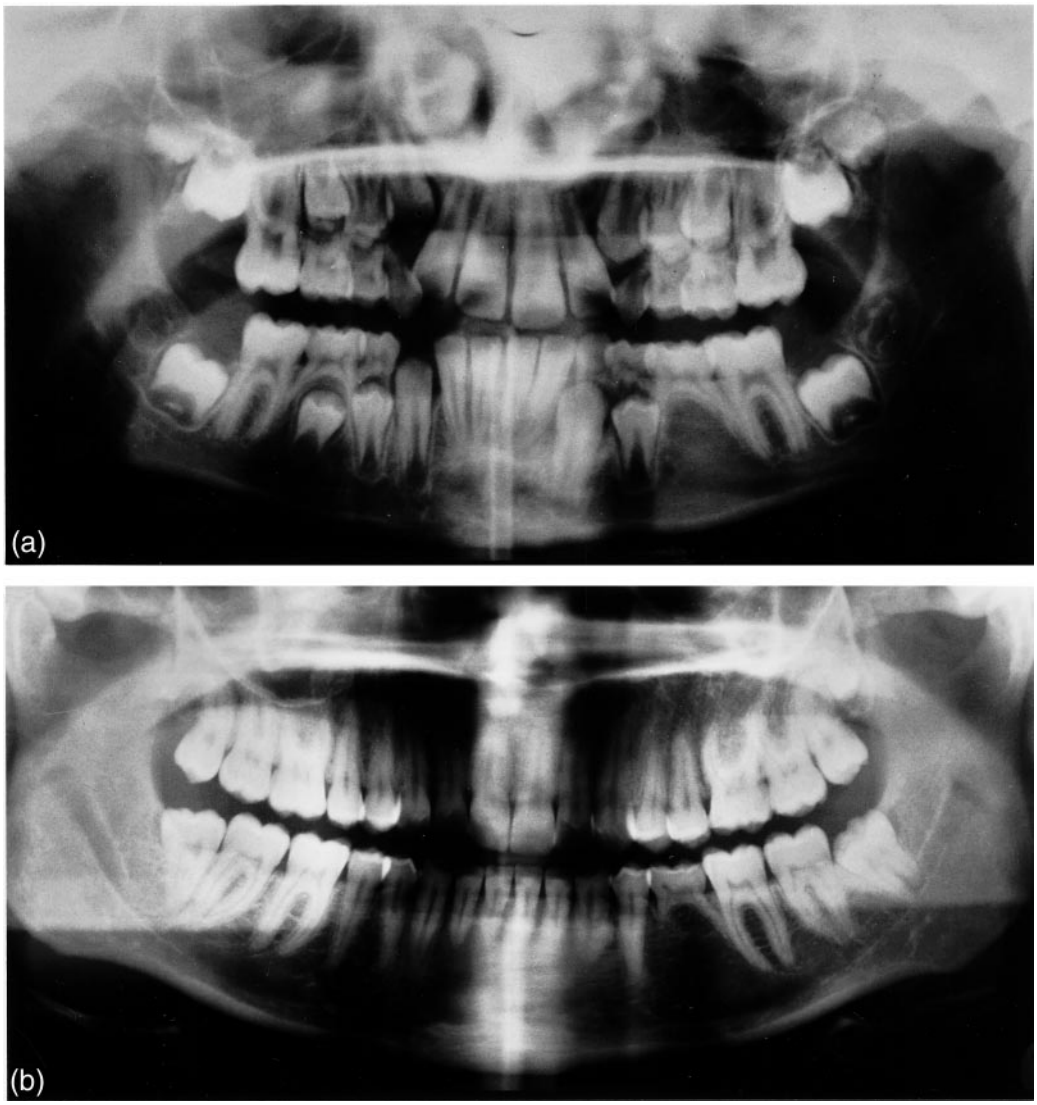

Figure 1 Two orthopantomograms of the same female patient (a) 8 years 5 months, and (b) 26 years 10 months. (a) At the early mixed dentition stage before puberty agenesis of the lower left second premolar was diagnosed. After orthodontic evaluation of the occlusion it was decided to allow the deciduous molar in the agenesis region to persist as a semi-permanent solution. Minor resorption of the medial root of the deciduous molar was observed. (b) Eighteen years after the first orthopantomogram (a), the root length of the deciduous molar seems to be unchanged. The permanent dentition appears without malformations and with long roots.

root anomaly (taurodontic teeth and two invaginations). The infra-occlusion had progressed in these dentitions.

The present study showed that a considerable number of primary molars persisted unaltered up to 15 years after the normal exfoliation time. In all subjects there was agenesis of the permanent tooth in the region and the morphology of the permanent dentition was normal.

Discussion

In permanent dentitions, which are exposed to root resorption during orthodontic treatment

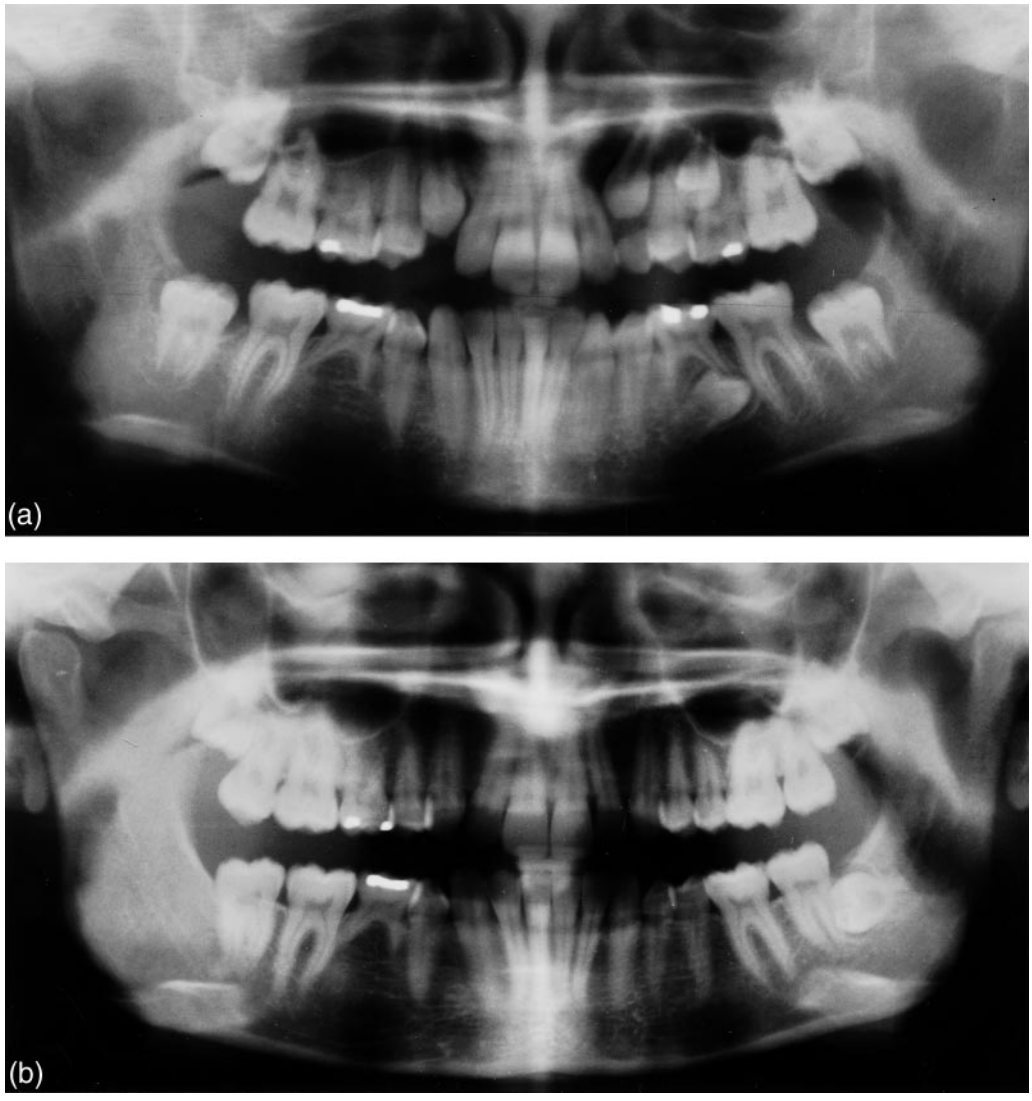

Figure 2 Two orthopantomograms of the same female patient (a) 12 years 4 months and (b) 26 years 6 months. (a) At the mixed dentition stage before puberty, agenesis of the lower and upper right second premolar was diagnosed, and ectopic eruption of the lower left second premolar. After orthodontic evaluation of the occlusion it was decided to allow the second deciduous molars on the right side to remain *in situ* as a semi-permanent solution. The roots of the deciduous molars appeared normal and without resorption. (b) Fourteen years after the first orthopantomogram (a), the roots of the deciduous molars and the occlusal level of the molars seem to be unchanged. The permanent dentition appears without malformations and with long roots.

with fixed appliances, several different morphological anomalies are seen (Kjær, 1995).

In the group of patients investigated, the permanent dentitions presented long, normally separated roots. It might be assumed that these patients also had long roots on primary molars and that this may be one reason why the orthodontist suggested persistence as the semi-permanent solution.

The fact that impaction of primary teeth occurs with agenesis of permanent teeth is well-documented (Kurol and Thilander, 1984). It has

also been observed that the rate of resorption of the roots of primary teeth diminishes with age (Kurol and Thilander, 1984; Rune and Sarnäs, 1984; Ravn, 1993). However, these observations have not been followed up during adulthood. One reason is that the primary teeth, as part of a normal treatment plan, have been extracted before adulthood (Kurol and Thilander, 1984).

A study such as the present one is possible because of the organization of the Danish public dental health care service, where young people up to the age of 16 or 18 years receive free dental treatment, including orthodontic treatment. Thereafter, the patients are transferred to dentists in private practice.

It was expected that only very few of the young patients had received permanent restorations in the agenesis regions, due to financial circumstances. What was not expected, however, was that, in the majority of cases, the primary teeth persisted virtually unaltered from the age of 16 years.

The usual orthodontic treatment plan, in subjects with agenesis of one or two second premolars, is the extraction of the primary teeth in the agenesis regions, followed by orthodontic treatment. Therefore, only in those where growth and spatial conditions prohibit such treatment, does the question arise of allowing primary teeth to remain *in situ*. The intra-oral radiographs that were taken when diagnosing agenesis and determining the treatment plan, used conventional exposure techniques. If a follow-up study of the root conditions had been planned at that time, a standardized exposure technique would have been employed.

It is important that this group of patients is followed in another 10 years in order to obtain a better understanding of the individual tendency to root resorption. It will also be important to study the tendency to root resorption in primary teeth in patients with multiple agenesis of permanent teeth and where primary teeth persist because orthodontic therapy during puberty does not constitute adequate treatment.

Conclusions

The present study shows that persistence of primary second molars in subjects with agenesis of one or two second premolars, and a permanent dentition without morphological deviations is an acceptable, semi-permanent solution for the patient. Whether this could also be an acceptable long-term solution will be shown by follow-up studies.

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