Submerged teeth

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Submersion occurs when a previously erupted tooth becomes embedded in the oral tissues. The purpose of this paper is to examine the distribution, the degree of re-impaction, the rate of congenital absence of the successor buds and the treatment in 28 submerged teeth in 17 patients.
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INTRODUCTION

Submersion occurs when a previously erupted tooth becomes embedded in the oral tissues. Sometimes it is genuinely impacted, however, more often, it has previously been present in the oral cavity. Other terms used in the literature similar to submergence are: secondary retention, half retention, reimpaction, re-inclusion and ankylosis.

A tooth is considered submerged if its intact marginal ridges are more than 0.5mm below the intact marginal ridges of the adjacent normal teeth. Secondary retention relates to a cessation of eruption of a tooth after emergence, without a physical barrier in its path or ectopic position of the tooth. The tooth with secondary retention gradually appears more and more in infra-position, a process which in some cases may lead to it being completely covered with gingiva.

The etiology of this process is still obscure. However, recent histological and SEM studies of the root surfaces of the removed secondary retained teeth have shown that most of these teeth are ankylosed. These ankylosis sites are often of such limited size that they cannot be detected either clinically by changes of the percussion tone, or radiographically. The cause of this ankylosis is uncertain. The only factor, which has been found to operate in a few cases, is a genetic one.

The affected teeth are usually deciduous molars. The secondary retention affects the mandibular second molar most often and the maxillary first molar least often. The incidence of submergence has been determined to be approximately 1.3 %. The purpose of this paper is to examine the distribution, the degree of reimpaction, the rate of congenital absence of the successor buds and the treatment in 28 submerged teeth, referred to 17 patients.

MATERIAL AND METHODS

We analyzed 28 cases of submerged teeth, in 17 orthodontic patients, which were referred for evaluation and treatment. The patients were referred either for surgical exposure of the premolars, the diagnose being delay of eruption, or for evaluation of a possible ankylosed tooth. In all cases, a tooth was considered submerged, if it presented clinical symptomatology of submersion and if it were in at least 1mm-infraocclusion, compared to the normal occlusal level.

With radiographic control established: the grade of submersion, the process of root resorption of the submerged tooth (and of its crown, in case of totally submerged teeth), the presence of the germ of the successor permanent tooth and the grade of development. The submersion was evaluated as: partial, if the tooth was up to 3mm-infraocclusion, as severe, if the submersion was more than 3mm, but the occlusal surface was still visible in the oral cavity, and as total, when the presence of the tooth can only be certified through a radiographic exam.

The therapeutic approach varied from extraction to preservation of the submerged teeth. Extraction was chosen in the cases when the successor tooth was present and eruption was delayed, in the cases when it was responsible or involved in local inflammatory processes, and in the cases when the orthodontic therapy required it (when it obstructed the eruption of the neighboring teeth).

In cases when the permanent successor tooth was missing, and the partially submerged tooth had a good periodontal support and it was not creating space problems, preservation in order to succeed aesthetic prosthetic rehabilitation was recommended.

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Figure 1. A case of bilateral submersion in the upper jaw (arrows).

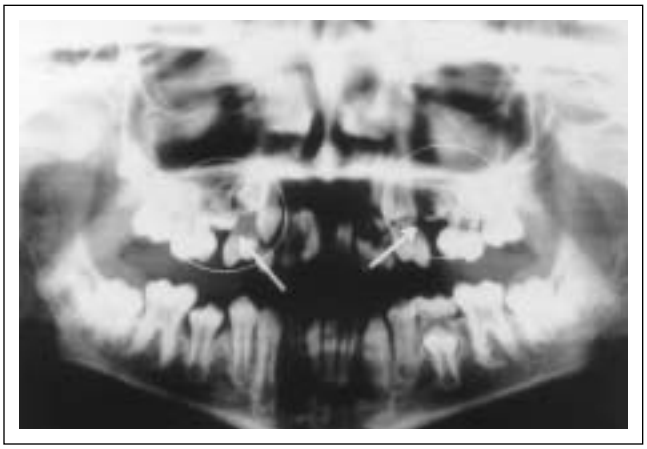

Figure 2. A case of bilateral submersion of the second deciduous molars in both the upper and lower jaws.

RESULTS

From the 28 cases, 26 concerned deciduous teeth and only 2 were permanent molars (maxillary), which also carried amalgam fillings (Table 1). From 17 patients, 9 were male and 8 female, aged 9 to 27. Isolated submerged teeth were present in 10 of the 17 patients, while the other cases presented two or more simultaneously submerged teeth.

Analytically, in two of the cases, all the four second deciduous molars were totally submerged, in three of the cases symmetric bilateral submersion was present in the upper jaw and two of the cases presented unilateral bimaxillary submergence. Localization of the submerged teeth was uniform, 14 in the lower and 14 in the upper jaw. From these teeth, 12 were deciduous.

The phenomenon of congenital absence of the successor tooth was not related to the number of the submerged teeth. From the submerged teeth, 10 were first deciduous molars, and the rest (16) were second deciduous molars (approximately 62%). Congenital absence of the successor tooth (Table 2) was observed in 14 of the submerged teeth (approximately 54%). The percentage of absence of the successor tooth was up to 30% in the cases of submerged first deciduous molars (this meaning that in every one of three cases the bud of the permanent tooth was missing), while in the cases of second deciduous molars this percentage was more than double, up to 63%.

Total submersion (Table 3) was observed in 10 teeth (approximately 34%) and from these, eight were upper and only two were lower teeth (in patient No. 14, who presented quadruple submersion). From the totally submerged teeth, nine were deciduous molars (90%) and only one was a permanent upper molar. The distribution of severe submersion was almost equal in the two jaws, while partial submersion was more common in the lower jaw. From the described 11 cases, eight were lower and three were upper teeth.

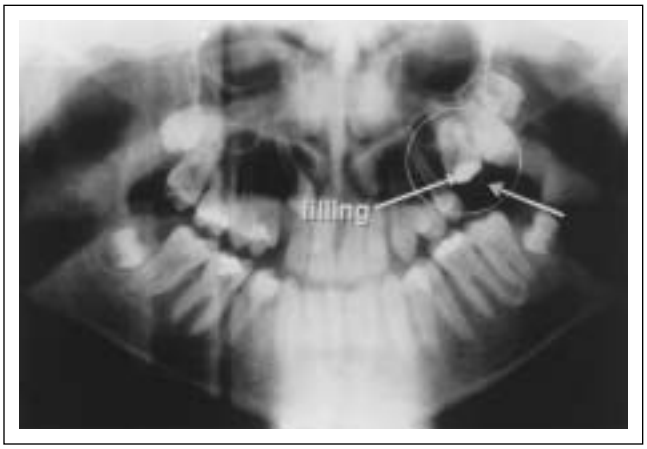

Figure 3. A case of submersion of the left maxillary first molar, where the amalgam filling can be observed.

Extraction was very laborious, and it was performed in all the cases of totally submerged teeth, which were all presenting ankylosis and carious lesions of the crown. From the rest of 18 cases, 9 were extracted either because the sucessor tooth was present (6 teeth), and the eruption was delayed, or because they were responsible for local inflammatory processes (3 teeth) and the removal had a positive effect upon the orthodontic therapy. In the case of 9 teeth with congenital absence of the successor tooth, 4 with severe and 5 with partial submersion, their preservation was proposed and their aesthetic prosthetic rehabilitation was attempted.

DISCUSSION

The secondary retention of a tooth is a rare phenomenon, due to disturbances of the physiological process of eruption. The presence of abrasion facets, carious attack of the crown or even fillings, indicates that these teeth have previously been erupted. The submersion may result in mild or severe infraocclusion, or

Table 1. Distribution of 28 submerged teeth in 17 patients

Patient no.	Age	Sex		Deciduous molars		Permanent 1st molar	
				Maxilla	Mandible	Maxilla	Total
1	10	M		+	+		2
2	19	M				+	1
3	9	M		+	+		2
4	13	M		++			2
5	18		F			+	1
6	21		F		++		2
7	9		F		+		1
8	11	M			+		1
9	10		F	++			2
10	14	M		+			1
11	27		F	+			1
12	12	M			+		1
13	11	M			+		1
14	12		F	++	++		4
15	10		F		+		1
16	20	M		++	++		4
17	14		F		+		1
Total		*9*	*8*	*12*	*14*	*2*	28

Table 2. Congenital absence of tooth buds of successor premolars in 26 submerged deciduous molars

Patient no.	1st deciduous molar		2nd deciduous molar	
	Bud present	Bud absent	Bud present	Bud absent
1			++	
3	+		+	
4	++			
6				++
7	+			
8			+	
9	++			
10			+	
11	+			
12		+		
13				+
14				++++
15				+
16		++		++
17				+
Total	*7*	*3*	*5*	*11*

Table 3. The degree of reimpaction of 28 submerged teeth

	Mandible			Maxilla		
	Partial	Severe	Total	Partial	Severe	Total
Deciduous tooth	8	4	2	3	2	7
Permanent tooth					1	1
Total	*8*	*4*	*2*	*3*	*3*	*8*

in absolute reimpaction with incomplete development of the alveolar process. Total reimpaction is considered a very rare phenomenon and there are very few presented cases in the international literature. Even rarer is total reimpaction in case of permanent teeth. In the material we present, total reimpaction was observed in 10 cases, from which 9 were deciduous teeth and only one was a permanent first upper molar. The phenomenon of reimpaction was observed in 2 permanent upper molars, both of them presenting amalgam fillings.

Suggested factors possibly involved in submersion of deciduous teeth are: ankylosis, congenitally missing permanent teeth, defects in the periodontal membrane, trauma, injuries of the periodontal ligament, precocious eruption of the first permanent molar, defective eruptive force or a combination of these factors.

From all the cited factors, ankylosis seems to be involved in the majority of cases, or at least it is a coexisting factor, and that is why it is considered synonymous with the description of submersion.

The term "submergence" has been used to describe the same phenomenon, but since it does not accurately describe the loss of occlusal height, most authors have preferred the term "ankylosis". Ankylosis was observed not only in totally submerged teeth, but also in all the other cases in which the therapeutical approach was extraction.

The most commonly applied therapeutical approach in case of submersion is extraction, which can be avoided only when the presence of the tooth is necessary (especially in case of partial submersion). It can be regarded as a temporary solution in case of congenital absence of the successor tooth, and only when it does not disturb the orthodontic therapy. In these cases, immediate prosthetic rehabilitation (aesthetic "rebuilding" of the crown) can be a temporary aesthetic and functional solution, only when the roots of the tooth have the necessary length and offer satisfactory periodontal support.

In research that has been conducted upon this subject, no significant statistical difference has been observed between the congenital absence of the bud of the successor tooth in cases of normal dentitions and dentitions presenting submerged teeth.

In the material presented, congenital absence of the successor tooth was observed in 52% of the total cases. This percentage was significantly bigger in case of submersion of the second deciduous molar, close to 70%, compared to the cases of submersion of the first deciduous molar, where it was close to 30%.

The most commonly affected teeth are the primary mandibular second molars. The incidence is twice as common in the mandible as in the maxilla. In the material that we researched, the number of submerged teeth was equally distributed in the two jaws. The submersion of the second deciduous molar was slightly more common than that of the first deciduous molar.

CONCLUSION

In the past, submerged deciduous molars have been regarded as a source of disturbance of the normal development of the permanent dentition. Today, the process of submerging of the deciduous molars is not considered to delay the development of permanent successors and the submerged teeth should not be extracted unnecessarily.

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