

Early primary tooth loss: prevalence, consequence and treatment

Perda precoce de dentes decíduos: prevalência, consequência e tratamento

Júlia Caldas de Almeida Heilborn¹

Erika Calvano Küchler²

Tatiana Kelly Silva Fidalgo¹

Livia Azeredo Alves Antunes³

Marcelo Castro Costa⁴

1 - Post graduate student, Department of Pediatric Dentistry and Orthodontics, School of Dentistry, Federal University of Rio de Janeiro;

2 - Post graduate student, Biologic Sciences, Fluminense Federal University, Rio de Janeiro;

3 - Associate Professor, Department of Specific Formation, Fluminense Federal University;

4 - Adjunct Professor, Department of Pediatric Dentistry and Orthodontics, School of Dentistry, Federal University of Rio de Janeiro.

Correspondence:

Tatiana Kelly da Silva Fidalgo
Disciplina de Odontopediatria da FO-UFRJ
Caixa Postal: 68066 - Cidade Universitária - CCS
CEP.: 21941-971 - Rio de Janeiro - RJ - Brazil
Email address:
Tatiana_kelly@yahoo.com.br

INTRODUCTION

Primary teeth maintenance is essential for the correct development of the maxillary arch, facial muscles and for establishing normal permanent occlusion. {Inoue, 1983 #1} Early Primary Tooth Loss (EPTL) could result in different alterations in the pediatric patient, such as: dental rotation, extrusion of the antagonist tooth, dental crowding, development of deleterious habits, craniofacial growth disturbances and particularly, impaction of the successor tooth and dental arch length reduction. {Northway, 1980 #2}

The etiology of EPTL is diversified, including dento-facial trauma, periodontal disease and caries. Caries is considered the main cause of premature primary tooth loss. In EPTL cases, child's age and stage of

ABSTRACT

The aim of this study was to perform an epidemiological survey of the prevalence of early primary tooth loss (EPTL) as a result of caries lesion, as well as the consequences and the treatment proposed in a Brazilian population. A study was conducted with a total of 446 dental records containing the panoramic radiograph of children from 5 to 12 years (8.0 years \pm 1.5). For statistic analysis Chi-square test ($p < 0.05$) was used. One hundred twenty-nine children (28.9%) had EPTL, either by premature loss or indication of tooth extraction as a consequence of caries lesions. There was no significant difference between genders ($p = 0.53$) in EPTL. Among the children that presented absence of at least one dental element affected, 52 (96%) had erupted permanent first molar and 20 (37%) presented loss of space and impaction of the successor tooth. Sixty-three children had indication for space maintenance. The prevalence of EPTL, as well as orthodontic treatment was high in this population. These findings suggested that there is an immediate need for educational and preventive programs related to caries.

Keywords: Pediatric dentistry; Orthodontics; Primary teeth

RESUMO

O objetivo deste estudo foi realizar um levantamento epidemiológico sobre a prevalência de perda dentária precoce primária (EPTL), resultante de lesão de cárie, bem como as consequências e o tratamento proposto em uma população brasileira. Um estudo foi realizado com um total de 446 fichas contendo dados concernentes a radiografia panorâmica de crianças de 5 a 12 anos (8,0 anos \pm 1,5). Para análise estatística realizou-se o Qui-quadrado ($p < 0,05$). Cento e vinte e nove crianças (28,9%) apresentaram EPTL, incluindo-se a perda prematura e a indicação de extração dentária como consequência de lesões de cárie. Não houve diferença significativa entre os sexos ($p = 0,53$). Entre as crianças que apresentavam ausência de pelo menos um elemento dental, 52 (96%) apresentavam primeiro molar permanente erupcionado e 20 (37%) apresentaram perda de espaço e impactação do dente sucessor. Sessenta e três crianças tiveram indicação para mantenedor de espaço. A prevalência de EPTL, bem como o tratamento ortodôntico foi elevada nessa população. Estes resultados sugerem que existe uma necessidade imediata de programas educativos e preventivos relacionados à cárie.

Palavras-chave: Odontopediatria; Ortodontia; Dentes decíduos

formation of the permanent successor should be evaluated. When loss or extraction of the primary tooth occurs close to the period of physiological exfoliation, the permanent successor erupts prematurely. However, when the loss of the primary tooth occurs before the Nolla Stage 6 (the permanent tooth crown is already completely formed and the root has started forming), bone neoform over the permanent tooth germ and this could result in delayed eruption. {McDonald, 2005 #24; , 2010 #25} In these cases, EPTL may cause in dento-facial alterations in the patient, and an immediate clinical procedure should be the placement of orthodontic space maintenance appliances. {Brothwell, 1997 #3} If this is not done, there is loss of mesio-distal space in the dental arch and in this case, a space recovery appliance is

indicated to enable adequate eruption of the permanent successor. {, 2008 #26}

According to the Brazilian epidemiologic oral health survey of 2003, 59.3% of Brazilian children present dental caries. {Brasil., Ministério da Saúde. Secretaria de Atenção à saúde. Departamento de Atenção Básica. Projeto SB Brasil 2003: Condições de Saúde Bucal da População Brasileira 2002-2003. Brasília: Ministério da Saúde; 2004. p. 11-17, 20-33. #29} This prevalence is higher than the goal established by the World Health Organization, which considers that figures lower than 50% of caries free children indicate poor oral health conditions in the child population. This reflects the current status of a large percentage of the Brazilian population that has unfavorable socioeconomic conditions, difficulty of access to oral health procedures and services, and high sugar consumption. This situation is possibly aggravated even further by the lack of provision to the required maintenance of space, which will lead to malocclusion. {Alamoudi, 1999 #27; Pedersen, 1978 #28; , 2008 #26}

Therefore, the aim of this study was to perform an epidemiological survey of the prevalence of early primary tooth loss as a result of caries lesion, as well as its consequences and the treatment proposed for children in a Brazilian population.

METHODS

To conduct this study, an approval was obtained by the Local Research Ethics Committee. It was in accordance with the Declaration of Helsinki and all procedures were done with the adequate understanding and written consent of the guardians.

A study was carried out on 446 dental records of patients aged 5 to 12 years, of both genders, received dental care at the Continuing Education Clinical Program in Pediatric Dentistry at the Federal University of Rio de Janeiro, Brazil in the years from 2003 to 2008. The inclusion criteria required were dental records consisting of a correctly filled out clinical chart and clearly visible panoramic radiograph. The exclusion criteria were: presence of systemic disorder, missing dental records and supernumerary extraction.

The clinical data analyzed referred to the children's first consultation in the Program, and the radiographic evaluation

was performed under ideal conditions. {Calvano Kuchler, 2008 #4}

The following variables were included in the study: EPTL (early tooth loss and/or extraction indicated) as consequence of caries; type of dentition (primary, mixed and permanent), loss of mesio-distal space, impaction of the permanent successor, indication of space maintenance/or space recovering appliance.

Early primary tooth loss was considered when:

1) Loss of the primary tooth occurred before the Nolla Stage 6 of development of the permanent successor.

2) Loss of the primary tooth in a period prior to the evaluation which resulted in the loss of the dental arch perimeter, with or/without impaction of the permanent tooth.

The extraction indicated was considered when:

1) There was deep caries with contraindication of endodontic treatment due to risk of perforations, physiological or pathological resorption of over 1/3 of the root

2) Extensive caries lesions close to the crypt of the permanent tooth

3) When endodontic treatment was indicated but could not be carry out due to impossibility of performing complete rubber dam isolation due to extensive tooth destruction.

Data analysis included descriptive statistics (frequency distribution) and cross-tabulation in the Program Epi Info 3.3.2 using the Chi-square test with alpha at 0.05.

RESULTS

The Tables 1 shows the frequency of teeth lost per child and extraction indicated. The sample consisted on 446 subjects, 223 boys and 223 girls, with mean age 8.0 ± 1.5 years. The frequency of EPTL, by premature loss, or indicated for extraction evaluated in this study was observed in 129 children (28.9%), of whom 68 were boys and 61 were girls. There were no significant differences between gender and arch (Table 2).

The frequency of premature extracted teeth and those indicated for extraction is shown in Table 1. Of the total number of children, 92.2% ($n = 411$) presented mixed dentition, 4% ($n = 18$) permanent dentition and 3.8% ($n = 17$) primary dentition. Two

children in primary dentition and 127 children in mixed dentition presented EPTL.

Table 1: Frequency of teeth lost per child and extraction indicated per children.

Number of teeth lost per child	Teeth Extracted		Extraction Indicated	
	n	%	n	%
1	35	64.8%	52	52.0%
2	11	20.4%	29	29.0%
3	7	13.0%	11	11.0%
4	0	0.0%	3	3.0%
5	1	1.9%	4	4.0%
6	0	0.0%	1	1.0%
TOTAL	54	100%	100	100%

Table 2: Analyses of EPTL between gender and arch

VARIABLE	P-VALUE
Gender	
Male	0.53*
Female	
Extracted primary teeth per arch	
Maxilla	0.27*
Mandible	
Primary teeth extraction indicated per arch	
Maxilla	<0.001*
Mandible	

*p < 005; Chi-square test.

Among the children that presented extracted primary teeth, 38 teeth were in the maxillary arch and 45 in the mandibular arch. Extraction was indicated for 181 primary teeth, of which 68 were maxillary and 113 were mandibular teeth.

Among the children that presented absence of at least one dental element 20 (37%) presented loss of space and impaction of the successor tooth. All children in whom the permanent first molar had not erupted yet presented loss of space and dental impaction.

Twenty-nine children (6.5%) presented premature extraction of at least one primary tooth, 75 (16.9%) children presented at least one primary tooth indicated for extraction, and 25 (5.6%) presented the both mentioned conditions.

The frequency of appliances indicated is shown in Table 3. The most indicated appliance was the lingual arch.

Table 3: Frequency of the Types of Appliances Indicated

Type of appliance	n	%
Band - loop	46	30.1%
Palatine Arch	25	16.3%
Lingual Arch	63	41.2%
Space Recover	19	12.4%
TOTAL	153	100%

DISCUSSION

In spite of the reduction in the global caries rates, advances in prevention, and oral health promotion measures, early primary tooth loss continues to affect many children. In the present study, the prevalence of EPTL was high (28.9%), however it corroborates with the range presented by other studies that varied from 4.3% to 42.6%.{Alamoudi, 1999 #5; Karaikos, 2005 #6; Ronnerman, 1965 #7; Cavalcanti, 2008 #32} This wide variation results from the differences in the studied populations. The prevalence found in this study refers to a sample of children who sought ambulatory care at the Pediatric Dentistry Department of a Public Health Institution. Therefore may be expected that these children present more dental treatment needs than the general population.

Some studies indicate that girls are more affected by caries than boys. This could be due to early tooth eruption,{Madlena, 2008 #10; Antunes, 2003 #8; Lukacs, 2006 #9} or to hormonal and genetic differences between the genders.{Northway, 1980 #2} Considering that caries is the main cause of EPTL, it was expected that a higher prevalence of premature tooth loss would occur in girls in this study. Nevertheless, distribution by gender showed no significant differences corroborating with the findings of Cavalcanti et al.{Cavalcanti, 2008 #32}

Caries lesions in the mandibular arch were more commonly observed.{Ronnerman, 1977 #11; Menezes, 2003 #34} Therefore, in the current study, it was expected that there would be a higher prevalence of EPTL in the mandible than in the maxilla, as occurred in other studies described in the literature.{Helm, 1970 #12} This result can be considered unfavorable, because premature tooth loss and the development of malocclusion are more critical in the mandibular arch than in the maxillary arch. It has been indicated that after the premature loss of primary

molars, there was greater loss of space in the mandible than the maxilla. {Tunison, 2008 #16; Owen, 1971 #14; Pedersen, 1978 #15; Lin, 1998 #13} When the primary tooth loss occurs before the permanent first molar erupts, there is a greater possibility of mesio-distal space loss occurring in the dental arch than if the loss were to occur after eruption of the element in question. {Bittencourt I, 2010 #33; McDonald, 2005 #24} The results found in our study agree with this affirmation.

Our results showed that 26.7% of children presented orthodontic indication for space maintenance or recovery. This result is higher than the Onyeaso et al, {Onyeaso, 2004 #17} in which only 5.3% of children were indicated for preventive or interceptive orthodontic treatment due to EPTL.

The orthodontic space maintenance appliances commonly used are the lingual arch, palatine arch, and Nance's arch. {McDonald, 2005 #24; , 2008 #26} Of the total number of children with indications for orthodontic appliance placement, bilateral maintenance appliances (lingual arch or palatine arch) were indicated in 57.5% of cases. Nevertheless, some authors argue that bilateral appliances have more chance of failing and less longevity when compared with unilateral appliances, {Moore, 2006 #19; Tulunoglu, 2005 #21; Qudeimat, 1998 #18} and point out the lingual arch as the space maintenance appliance with the greater frequency of failures, and consequently, less longevity. These authors also reported that there were no significant differences between fixed and removable appliances.

CONCLUSION

The prevalence of EPTL was high and the majority of children with EPTL were in mixed dentition, resulting in impaction of the successor tooth. The treatment of choice was orthodontic appliances for space maintenance or recovery. Thus, the continuous and meticulous systematic follow up after extraction and the placement of orthodontic appliance is extremely important in order to monitor space and permanent successor eruption and to prevent malocclusion.

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