

SEQUELAE IN PERMANENT DENTITION AFTER TRAUMA IN PRIMARY DENTITION IN PATIENTS ASSISTED AT HOSPITAL BASE VALDIVIA, CHILE.

Secuelas en dentición permanente por trauma en dentición temporal en pacientes atendidos en el Hospital Base Valdivia, Chile.

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ABSTRACT:

Aim: To determine the type and frequency of sequelae in permanent teeth as a result of traumatic dental injuries in primary teeth in pediatric patients attended to at the Hospital Base Valdivia, between 2007 and 2012.

Material and Methods: A descriptive study was conducted. The medical records of pediatric patients who were affected by traumatic dental injuries in primary teeth and went to the Sub-department of Dentistry of the Hospital Base Valdivia, Chile, were selected according to inclusion and exclusion criteria. The recorded data was: age of the child at the time of the accident, gender, affected primary tooth, type of traumatic dental injuries, and diagnosis of the permanent successor tooth. Descriptive statistics were performed. A chi-square test was used to establish differences between type of traumatic dental injuries and condition of the permanent tooth.

Results: The most frequent diagnosis of traumatic dental injuries in primary dentition was subluxation. The primary tooth with the highest frequency of traumatic dental injuries was the right maxillary central incisor; 58.2% of the permanent successors presented some developmental disturbances. The most frequent sequelae observed in permanent teeth were chronological alterations of the eruption.

Conclusion: There is a high frequency of sequelae in permanent dentition as a result of trauma in primary dentition. The most frequent sequel observed was chronological alteration of the eruption. It is fundamental to inform parents about the possible consequences that could arise and emphasize the importance of attending periodic follow up in order to prevent or minimize possible sequelae in permanent teeth.

KEYWORDS:

Tooth Injury; Tooth fractures; Tooth, Deciduous; Dentition, Permanent; Sequelae; Epidemiology.

RESUMEN:

Objetivo: Determinar el tipo y frecuencia de secuelas en dientes permanentes como consecuencia de lesiones dentales traumáticas en dientes temporales en pacientes pediátricos atendidos en el Hospital Base Valdivia, entre los años 2007 y 2012.

Material y Métodos: Se realizó un estudio descriptivo. Se seleccionaron las historias clínicas, según criterios de inclusión y exclusión, de pacientes pediátricos que sufrieron lesiones dentales traumáticas en dientes temporales y que acudieron al sub-departamento de Odontología del Hospital Base Valdivia, Chile. Los datos registrados fueron: edad en el momento del accidente, sexo, diente temporal afectado, tipo de lesiones dentales traumáticas y diagnóstico del diente sucesor permanente. Se realizó estadística descriptiva. Se utilizó la prueba de chi-cuadrado para establecer diferencias entre el tipo de lesiones dentales traumáticas y el estado del diente permanente.

Resultados: El diagnóstico más frecuente de lesiones dentales traumáticas en dentición temporal fue subluxación. El diente temporal con mayor frecuencia de lesiones dentales traumáticas fue el incisivo central superior derecho. El 58.2% de los dientes sucesores permanentes presentó alguna alteración del desarrollo. Las secuelas más frecuentes observadas fueron alteraciones cronológicas de la erupción.

Conclusión: Existe una alta frecuencia de secuelas en la dentición permanente como consecuencia de traumatismos en la dentición temporal. La secuela más frecuente observada fue la alteración cronológica de la erupción. Es fundamental informar a los padres sobre las posibles consecuencias que podrían surgir y enfatizar la importancia de realizar un seguimiento periódico para prevenir o minimizar posibles secuelas en los dientes permanentes.

PALABRAS CLAVE:

Traumatismos de los dientes; Fracturas de los dientes; Diente primario; Dentición permanente; Secuelas; Epidemiología.

INTRODUCTION.

Traumatic dental injuries (TDI) are injuries to the hard and soft tissues within and around the vicinity of the oral cavity, including the teeth, gingivae, and alveolar bone.¹ TDI occur frequently in early age childhood,^{2,3} especially in children between 2 and 6 years of age.⁴

The increase in violence, school and traffic accidents and the participation of children and adolescents in sporting activities, among other reasons; have increased the prevalence of traumatic events involving the orofacial region in individuals during the developmental period, becoming an emerging public health problem⁵⁻⁷ that requires the implementation of educational and preventive programs based on a comprehensive understanding of the condition which includes social, behavioral, and biological aspects.^{8,9}

In Chile, a high prevalence of TDI has been reported, reaching values of 37.9% in the population between 1 and 15 years old.¹⁰ The world prevalence

of TDI to primary teeth is 22.7%, ranging from 14.2% in the European region to 26.5% in the American region and 27% in the Southeast Asia region.¹¹

After a traumatic injury to primary teeth, it is essential to consider the possible risks of sequelae in successor teeth. The developmental disturbances of the permanent teeth related to trauma to their predecessors have a prevalence that ranges from 12% to 74%.^{2,5,7,12,13}

This can be explained by two mechanisms: firstly, a direct injury to the germ of the permanent tooth due to the impact of the apex of the root of the primary tooth, and secondly, an indirect injury due to pulp necrosis of the primary tooth with the consequent periapical infection.¹⁴ The most frequent sequelae described in the literature are enamel discoloration, enamel hypoplasia, crown or root dilacerations, tooth-germ sequestration, partial or total interruption of root formation, and

eruption disturbances^{2,5,7,13-15} among others. The objective of this study was to determine the type and frequency of sequelae in permanent teeth as a result of TDIs in primary teeth in pediatric patients attended to at the Hospital Base Valdivia, between 2007 and 2012.

MATERIALS AND METHODS.

A descriptive cross-sectional study was carried out. A total of 205 records of children with traumatic dental injuries referred to the Sub-department of Dentistry of Hospital Base Valdivia, Chile, between January 2007 and December 2012, were reviewed.

This study was approved by the Scientific Ethical Committee of Valdivia's Health Service and the management of the Hospital Base Valdivia.

Inclusion criteria was: clinical records of children with primary dentition who suffered TDI with follow up until the complete eruption of permanent successor, according to patients' chronological age,

with at least one clinical and radiographic check up after its eruption.

The exclusion criteria was: clinical records with incomplete data, cases in which check ups were not performed or with a lack of follow up through the eruption of the permanent successor, where the trauma only affected soft tissues, instances where the trauma occurred near the period of exfoliation of the primary tooth, a period that begins approximately at 6 years of age,^{16,17} and cases in which check ups were performed before the eruption age of the permanent tooth, according to the criteria of the American Dental Association.¹⁷

A total of 67 dental records met the inclusion criteria of the study. The data collected for this study was: age at the time of trauma (years), gender (male, female), affected primary tooth, type of TDI according to the terminology recommended by the International Association of Dental Traumatology (IADT),¹⁸ and the presence (or not) of sequelae in permanent teeth.

Figure 1. Distribution of the number of affected primary teeth in relation to the different types of traumatic dental injuries (TDI).

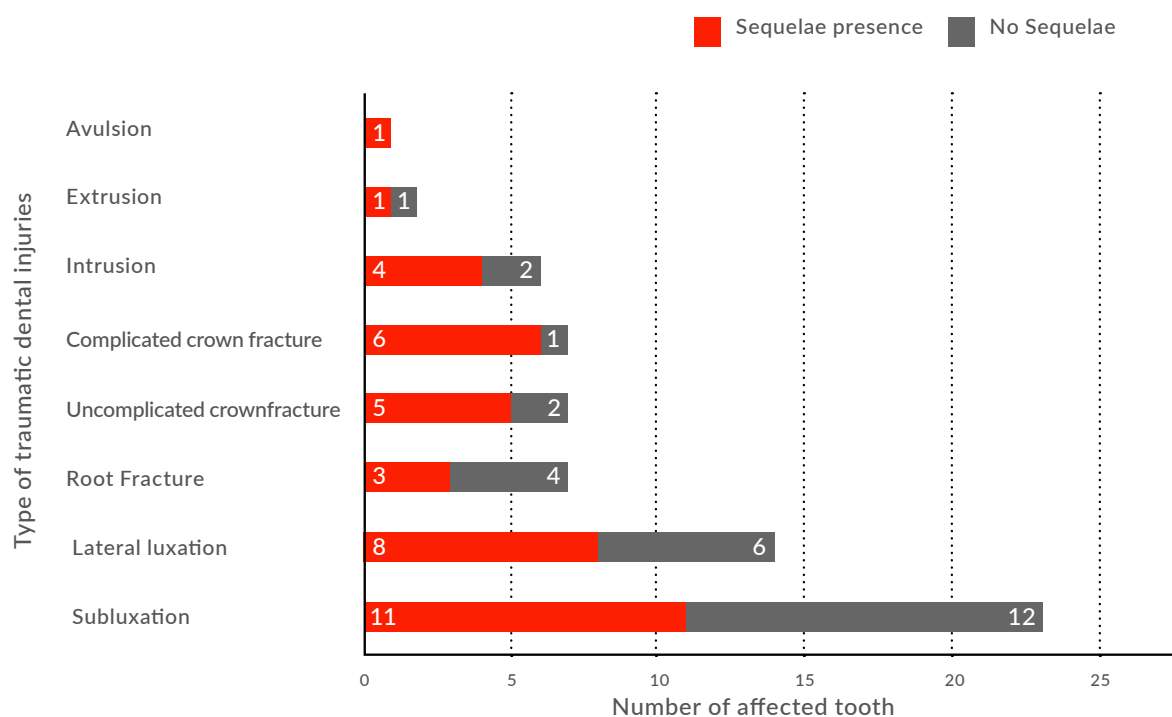


Table 1. Distribution of the number of affected primary teeth in relation to the different types of traumatic dental injuries (TDI).

TYPE OF TDI	N	%
Subluxation	23	34.33
Lateral luxation	14	20.90
Complicated crown fracture	7	10.45
Uncomplicated crown fracture	7	10.45
Root fracture	7	10.45
Intrusion	6	8.96
Extrusion	2	2.99
Avulsion	1	1.49
Total	67	100

Table 2. Distribution of primary teeth affected by traumatic dental injuries.

TOOTH*	N	%
5.1	38	56.72
6.1	21	31.34
6.2	2	2.99
8.1	2	2.99
5.5	1	1.49
6.4	1	1.49
7.1	1	1.49
8.2	1	1.49
Total	67	100

Asterisk (*): According to World Dental Federation's nomenclature.

Table 3. Prevalence of type of sequelae in permanent successors.

TYPE OF SEQUELAE	N	%
No sequelae	28	41.79
Chronological alteration of the eruption	18	26.87
Dental malpositions	13	19.40
Enamel hypomineralization	4	5.97
Enamel hypoplasia	4	5.97
Total	67	100

The sequelae in permanent dentition included in this study were: hypomineralization of enamel, hypoplasia of enamel, dental malposition and chronological alteration in the eruption. To assess the existence of any chronological alteration of eruption, a comparison was made with the contralateral tooth.¹⁶ In cases where the same patient presented more than one tooth affected by TDI, the most severe TDI was considered according to the IADT criteria.

The variable sequel was dichotomized as "yes" to any type of sequel described before, and "no" for the sequelae free tooth. The data was recorded in Microsoft Excel 2016 (Microsoft, USA) and was analyzed using the free access program R studio version 3.4.1. Measures of central tendency and dispersion were calculated. To establish significant differences between the diagnosis of trauma in the temporary tooth and sequelae in the permanent tooth, the chisquare test was used, establishing a significance level of $p < 0.05$.

RESULTS.

Out of the 67 selected clinical records, 43 (64%) were male and 24 (36%) were female. The average age was 3.4 (± 2.3) years, 3.23 (± 2.14) years for male patients and for female patients, 3.62 (± 2.48) years. The most frequent diagnosis of TDI in primary dentition was subluxation (34.33%), followed by lateral luxation (20.9%), complicated crown fracture (10.45%) and uncomplicated crown fracture (10.45%) (Table 1).

On the other hand, the primary tooth with the highest frequency of TDI was the right maxillary central incisor (56.72%), followed by left maxillary central incisor (31.34%), (Table 2).

Out of the 67 permanent successors, 39 (58.2%) presented some developmental disturbances and 28 (41.79%) had no sequelae. The most frequent sequel observed in permanent teeth were the chronological alteration of the eruption (26.87%), followed by dental malpositions (19.40%), enamel hypomineralization (5.97%) and enamel hypoplasia (5.97%), (Table 3).

No statistically significant differences were found when comparing the diagnosis of TDI in primary dentition and sequelae in permanent tooth ($p > 0.05$), (Figure 1).

DISCUSSION.

The aim of this study was to determine the type and frequency of sequelae in permanent teeth based on the results of TDI in primary teeth in pediatric patients attended to at the Hospital Base Valdivia, between 2007 and 2012.

The prevalence of TDI was higher in males which coincides with other studies.^{2,3,6,13,14} This could be attributed to a greater participation of boys in sports or higher risk activities, in addition to being more energetic and active than girls.¹⁹ However, in a recent study it was revealed that boys and girls were equally affected by TDI. Their justification is that currently lifestyles have changed, boys and girls carry out the same activities and thus are exposed to the same risk factors.²⁰

The temporary teeth most affected by TDI were the upper central incisors followed by the upper lateral incisors. These results are consistent with other studies which also mention that the primary maxillary central incisors were the most affected teeth by TDI.^{3,5,6,14} The reason behind this could be that upper central incisors are the most prominent teeth in the oral cavity and the first teeth to come into contact during falls or collisions. There are other predisposing factors such as anterior open bite, incompetent lip coverage, and increased overjet that also increase the risk of TDI in upper central incisors.²¹ The most frequent TDI was subluxation.

This could be explained by the fact that the surrounding bone in the temporary dentition is less dense and mineralized, and the tooth is more likely to be displaced than fractured.²² Other studies have also pointed out subluxation as the most common TDI, reporting different prevalence 32.7% - 65.0%.^{3,5,6,13} In this study, a high prevalence of sequelae in the permanent teeth was found.

On the other hand, there are some reports where this frequency is much lower, with values between

7.9% and 24.6%.^{3,5,6,13,14}

The sequel with the highest frequency was chronological alteration of the eruption, which differs to what has been stated in other studies,^{2,3,5,6,13} where enamel abnormalities, such as hypoplasias and enamel discoloration changes, were the most common.

Within the limitations of our study, as indicated in other studies^{3,14} the follow up during the time between TDI in a primary tooth and the eruption of the permanent tooth is difficult because it is a lengthy period, which is why a large part of the clinical records analyzed for this study were excluded.

It should also be mentioned that parents show greater initial concern due to the anxiety of the moment of the trauma, which decreases over time and makes it difficult to motivate them to come back for the following check ups. We suggest future studies with a wider sample size and with a control group to verify whether other etiologic factors, such as molar-incisor hypomineralization, enamel hypoplasia, imperfect amelogenesis, and fluorosis, are associated with permanent teeth malformations.¹⁵

It is important to implement educational programs to prevent TDI and to provide the knowledge to patients, families and communities about the importance of immediate TDI treatment, even if there are no bleeding lesions or tooth displacement.

CONCLUSION.

There is a high frequency of sequelae in permanent dentition as a result of trauma in primary dentition. The most frequent sequel observed was chronological alteration of the eruption.

Thus, it is fundamental to inform parents about the possible consequences associated to TDI and emphasize the importance of attending periodic follow up in order to prevent or minimize possible sequelae in permanent teeth.

Conflict of interests:

The authors declare no conflict of interests.

Ethics approval:

Approved by Scientific Ethics Committee of the Servicio de Salud Valdivia, according to resolution folio number 256 granted in Valdivia on the 7th of June 2017.

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Authors' contributions:

Hernández-Carrera M: Conceptualization of the study, methodological procedures for data collection, interpretation of results and writing of the manuscript.

Hernández-Chávez M: Conceptualization of the study, methodological procedures for data collection, interpretation of results.

Jara-Reyes L: Data analysis and critical review of manuscript's content

Vilches-Blanco N: Conceptualization of the study, methodological procedures for data collection, interpretation of results and writing of the manuscript.

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