

Chapter 8 Prevalence of ectopic eruption and intercanine distance in children aged 6 to 12 years. Cycle 2019-2020

Capítulo 8 Prevalencia de erupción ectópica y distancia intercanina en niños de 6 a 12 años. Ciclo 2019-2020

MARTÍNEZ-ORTIZ, Rosa María†*, TAVIZON-GARCÍA, Jesús Andrés, CARLOS-SÁNCHEZ, María Dolores and CORDERO-CELIBEE, Monserrat

Universidad Autónoma de Zacatecas, Unidad Académica de Odontología. México.

ID 1st Author: *Rosa María, Martínez Ortiz* / **ORC ID:** 0000-0001-7811-169X

ID 1st Co-author: *Jesús Andrés, Tavizón-García* / **ORC ID:** 0000-0003-2417-2571

ID 2nd Co-author: *María Dolores, Carlos-Sánchez* / **ORC ID:** 0000-0001-8012-270X

ID 3rd Co-author: *Monserrat, Cordero-Celibee*

DOI: 10.35429/H.2021.13.100.106

R. Martínez, J. Tavizon, M. Carlos and M. Cordero

* rosamartinez@uaz.edu.com

A. Marroquín, J. Olivares, M. Cruz, L. Cruz. (Coord.) CIERMMI Women in Science TXIII Medicine and Health Sciences. Handbooks-©ECORFAN-México, Querétaro, 2021.

Abstract

The development of permanent teeth and their eruption is of utmost clinical importance, it is also useful in anthropology, demography, forensic medicine and paleontology studies. When the eruption sequence and the mechanisms are not adequate, it causes an ectopic eruption that must be detected in time in order to avoid damage to the occlusion that affects the aesthetics, function, self-esteem and quality of life of the child. Objective: To identify the prevalence of ectopic eruption and intercanine distance in children aged 6 to 12 years. Methodology: An epidemiological, cross-sectional, descriptive study was carried out in order to clinically detect this eruption anomaly. The selection of the sample was 77 children who met the selection criteria, during the 2019-2020 school year. In a rural primary school in a municipality of Zacatecas, the intercanine distance measurements were subsequently carried out with the help of a Vernier, after calibration and informed consent, the information was processed through the statistical program SPSS V 24 and Excel. Results: The prevalence of ectopic eruption was 22%, the female gender the most frequent age was 7 years. The average upper intercanine distance was 26.76mm * - and in the lower jaw it was 33.4mm + _: the tooth that presented the most frequent ectopic eruption was No. 22, the least frequent was 32 and 15. It was observed a decrease in the intercanine distance 26.7mm. In children with multiple ectopic eruption, the intercanine distance decreased, the lower lateral incisors were detected between the teeth with the highest prevalence of ectopic eruption. Conclusions: It is necessary to intervene in the early stages in order to avoid the installation of malocclusion and costly, long and more difficult orthodontic treatments. Prevention is better than cure.

Ectopic eruption, Intercanine distance, Children

Resumen

El Desarrollo de los dientes permanentes y su erupción es de suma importancia clínica, además es útil en los estudios de antropología, demografía, medicina forense y paleontología. Cuando la secuencia de erupción y los mecanismos no son adecuados ocasiona una erupción ectópica que se debe detectar a tiempo con la finalidad de evitar daños en la oclusión que afecten la estética, función, la autoestima y la calidad de vida del niño. Objetivo: Identificar cuál es la prevalencia de erupción ectópica y distancia intercanina en niños de 6 a 12 años. Metodología: Se realizó un estudio epidemiológico, transversal, descriptivo con la finalidad, detectar clínicamente esta anomalía de erupción. La selección de la muestra fue 77 niños que cumplían con los criterios de selección, durante el ciclo escolar 2019-2020. En una escuela rural primaria de un municipio de Zacatecas, posteriormente se realizó las mediciones la distancia intercanina con la ayuda de un Vernier, previa calibración y consentimiento informado, se procesó la información a través del programa estadístico SPSS V 24 y Excel. Resultados: La prevalencia de erupción ectópica fue 22%, el género femenino la edad más frecuente fue el de 7 años. El promedio de distancia intercanina superior fue de 26.76mm*- y en el maxilar inferior fue de 33.4mm+_: el diente que presentó más frecuente la erupción ectópica fue el No. 22, el de menor frecuencia el 32 y el 15. Se observó disminución en la distancia intercanina 26.7mm. En niños con erupción ectópica múltiple la distancia intercanina disminuyó, se detectaron entre los dientes con mayor prevalencia de erupción ectópica los dientes incisivos laterales inferiores. Conclusiones: Es necesario intervenir en etapas tempranas con la finalidad de evitar la instalación de maloclusión y tratamientos ortodóncicos costosos, largos y más difíciles. Prevenir es mejor que curar.

Erupción ectópica, Distancia intercanina, Niños

8.1 Introduction

Ectopic eruption is defined as a congenital anomaly in the situation or position of an organ, it is very common to observe permanent dentition with dental organs outside the dental arch, but rarely the reason is sought. Ectopic eruption of a tooth within the oral cavity is common but elsewhere it is rare. Ectopic teeth at the level of the maxillary sinus infraorbital region are a rare entity. Ectopic eruption may be associated with developmental disturbances, pathologic processes or iatrogenic. The etiology of an ectopic tooth is not always known. (Moreno Garcia C. Serrano Gil H., 2007) Etiology (causal factors)

The incidence of ectopic eruption is 15.70%, its timely diagnosis is essential to plan a timely and effective treatment and thus avoid damage to the occlusion and costly orthodontic treatments. Arid, J, (2019). The teeth that have a predilection for erupting ectopically are the permanent third molars, followed by the maxillary canines and first molars constituting 0.8 to 2.8%. Mercuri reports 65.8% incidence in females and 33.2% males. Nikiforuk, (2018). Marañón-Vásquez GA, (2019). A study was conducted at the Catholic University of Cuenca Ecuador, 2018-2019. In 300 panoramic radiographs of children 6 to 9 years of age attended. The greater ectopic eruption presents a greater tendency in children 6 years of age. (Heraz C, J, 2020). A clinical case is reported of a male patient aged 11 years, with ectopic eruption of a central incisor, with coronary anomaly and root dilaceration. The presence of a supernumerary tooth above the ectopic central incisor was observed. (Muiño, et al 2018).

This eruption disorder presents a multifactorial etiology; Larger than normal size of all primary and permanent teeth. Larger than normal size of first and permanent molars and deciduous second molars. Smaller than normal size of the maxilla. Incorrect balance between growth and eruption forces if growth of the maxilla in the region of the tuberosity, which is what provides space for the development and positioning of the permanent molars, does not occur before or during the eruption of the permanent molars, the eruption force will be directed mesially, being blocked by the roots of the second primary molar. Growth may occur in the distal maxilla at a later date, but if the eruption force of the previously deviated first permanent molar is very intense, it will be blocked despite the space available.

This will occur in the majority of cases in which the concavity that has produced the resorption on the distal aspect of the deciduous second molar is large. However, if the force of the mesial direction of eruption is of low intensity, it can happen that the bone growth manages to counteract this force and thus, the first permanent molar corrects its position and erupts in its correct position, constituting a reversible ectopic eruption. Abnormal eruption angle of the first permanent molar, so that in comparison with a normal eruption, the forward movement of the crown of the first permanent molar is much greater than the downward movement. (Gallegos López L. G.) .

8.1.1 Mechanism of dental eruption

There are several theories on the development of tooth eruption; 4 eruption mechanisms which include the formation and growth of the root part of the tooth, bone growth, vascular and hydrostatic pressure of the connective part of the tooth (Gallardo, Mourelle, & García, 2016). It has been mentioned that the emergence of the tooth will not only depend on the action of the periodontal ligament since this is implicit but not the main one, it will be accompanied by hydrostatic pressure of the tissues, accompanied by the action of fibroblasts (Berkowitz & Holland, 2016). Three fundamental parts should be known during this mechanism: the present space granted by the follicle at the time of eruption, the pressure exerted by the apical root membrane thanks to its innervation, and the adaptation of the periodontal ligament to such eruptive process. In spite of this, the conclusions of all the transactional studies carried out in humans show that this mechanism has not been fully understood, so many authors over time have proposed different variables involved in the mechanism, among which we have: As explained by Marks and Schroeder in their 1996 article entitled "tooth eruption: theories and facts" in which they refer to variables such as speed, three-dimensional position of the piece and root length.

In 1992, the book "Essentials of oral histology and embryology" suggests a factor totally different from the others, the pressure exerted by the pulp, vascularization and especially the cells that participate in the formation of the bone tissue around the tooth. Bath-Balogh and Fehrenbach in their book in 2006 refer to the presence of a temporal ligament, contractile collagen and hormonal signs. Koch and Paulsen in 2009 add genetic and local factors, especially the population and its development. Berkowitz suggests the presence of two systems involved in the mechanism, the hydrostatic pressure at the vascular level around the tooth and the activity of periodontal fibroblasts.

However, there is no proven theory with sufficient experimental evidence that can explain in detail the origin of the eruption force, since, in order to do so, a study should be carried out at the molecular level separating the piece from the membrane and the bone. (Kj, s. f.) Another of the theories proposed by Dr. Cobas mentions the participation of the periodontal ligament in the eruption mechanism, calling it a "hammock" in charge of extending from side to side of the dental piece and exerting impulsion movements to produce dental eruption, in turn agreeing with Berkowitz with the vascular theory. (MADURO J. S.G. (20219).

8.2 Description of the Method

8.2.1 Analysis based on demand curve regression

It is a transactional, descriptive, observational study, in a convenience sample according to the inclusion criteria 77 children from 6 to 12 years of age from an elementary school in Milpillas and Gutiérrez Municipalities of the State of Zacatecas. an intraoral exploration was performed, occlusion and intercanine distance were assessed. Prior informed consent of the parents was obtained. A univariate and logistic regression analysis was performed with the SPSS V. 24. Excel V. 2016 statistical package. The students were clinically examined according to the safety standards as per the OMS: Mouth cover, diagnostic package. Vernier, millimeter ruler. Research instrument, gloves, Abatelenguas. In order to carry out this study, formal communication was established with the directors of the elementary schools, by means of an official letter. Attendance lists were requested for groups from 1st to 6th grade and all were invited to participate in order to include them in the study. Subsequently, talks were held with parents in which the objective of the study was explained.

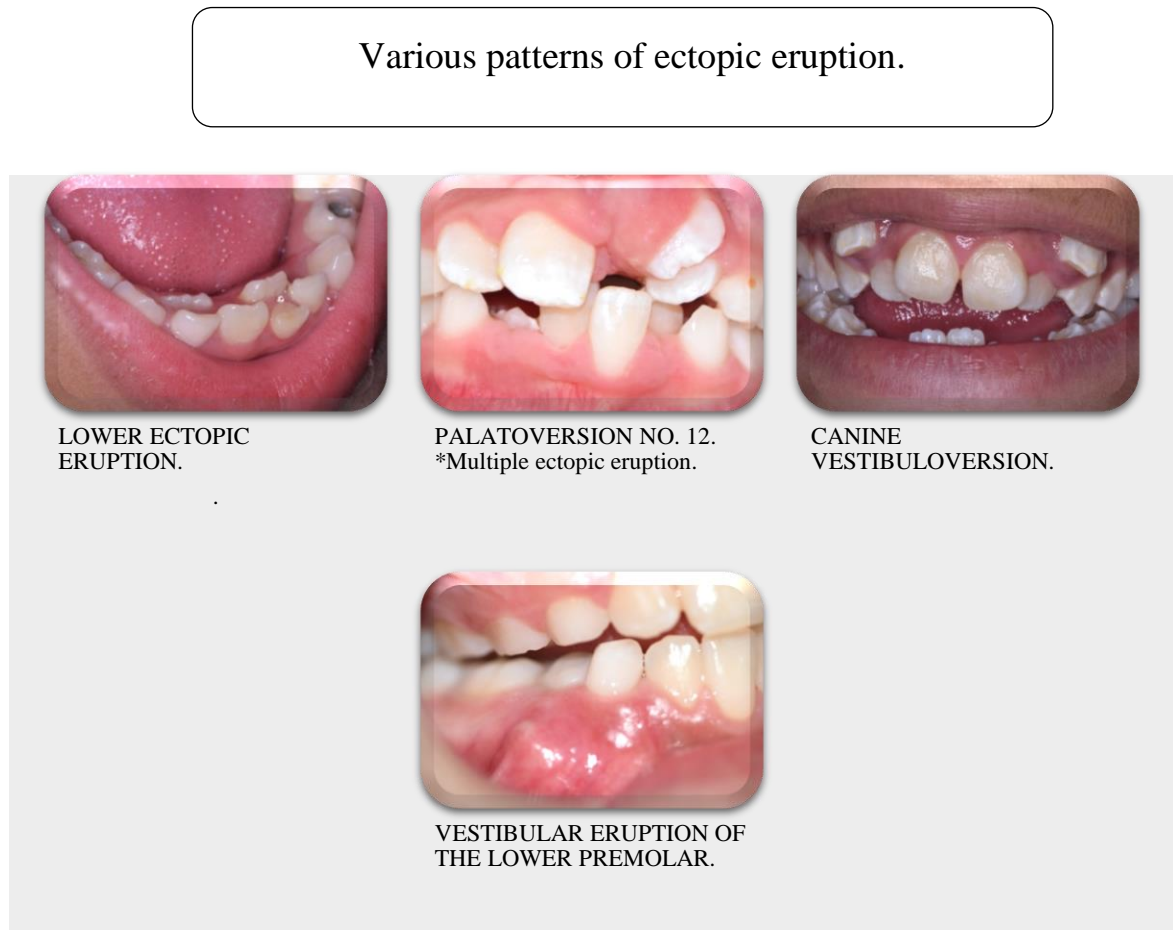
With the help of the millimeter ruler to determine the space there is and if it is likely that due to lack of space there could be an ectopic eruption. An average measurement of between 20 to 38 mm was found. Depending on the age. The following tables show the results obtained from the research: Prevalence by gender male with 49% and Female with 51%. Prevalence of ectopic eruption 22%. Average age of 8 years.

8.3 Results

Table 8.1 Teeth in ectopic eruption

Teeth in Ectopic Eruption					
		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	11,21,31,41	1	1.3	1.3	1.3
	12, 22	1	1.3	1.3	2.5
	12,22,32,42	1	1.3	1.3	3.8
	13, 23	1	1.3	1.3	5.1
	15	1	1.3	1.3	6.3
	15,13,23	1	1.3	1.3	7.6
	21	1	1.3	1.3	8.9
	22	1	1.3	1.3	10.1
	31	1	1.3	1.3	11.4
	31,41	2	2.5	2.5	13.9
	32	2	2.5	2.5	16.5
	32, 42	1	1.3	1.3	17.7
	33	1	1.3	1.3	19.0
	41	1	1.3	1.3	20.3
	42	1	1.3	1.3	21.5
	42, 43	1	1.3	1.3	22.8
		1	1.3	1.3	24.1
		1	1.3	1.3	25.3

Source: Own elaboration with the results of the research conducted

Figure 1 Different eruption patterns found.

Source: Children examined during the research conducted

Table 8.2 Intercanal distance in children with ectopic eruption

Inter-annual distance Superior					
		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid		7	8.9	8.9	8.9
	28	1	1.3	1.3	10.1
	31	1	1.3	1.3	11.4
	32	4	5.1	5.1	16.5
	33	9	11.4	11.4	27.8
	34	11	13.9	13.9	41.8
	35	20	25.3	25.3	67.1
	36	6	7.6	7.6	74.7
	37	2	2.5	2.5	77.2
	38	12	15.2	15.2	92.4
	39	2	2.5	2.5	94.9
	40	2	2.5	2.5	97.5
	42	1	1.3	1.3	98.7
	S	1	1.3	1.3	100.0

Source: Own authorship of children reviewed in the research

8.4. Discussion

The normal pattern of dental eruption is variable in the permanent dentition, with greater changes being observed in the chronology than in the sequence. Ectopic eruption of the upper permanent canine is frequently observed due to the persistence of the temporary second molar, since the adequate use of the drift space (or Nance free space) and the adequate mesialization of the molar depend on it. An alteration facilitates the loss of the length of the arch, producing a malocclusion, according to Fux-Noy, Avia (2019).

The chronological development of the upper canine is associated with the permanent upper second premolar, although it has a slightly higher fraction with respect to the Nolla stages. The second premolar erupts first before the canine and a high percentage of the population presents a sequence according to the norm: first premolar, second premolar, upper canine. The main alteration in the normal eruption sequence in the support area is the prolonged presence of the temporary second molar.

Currently there are several sequences of eruption of the lateral sectors in the upper arch, the most common being the sequence of first premolar, second premolar, canine. This eruption sequence often results in the presence of elevated canines, which, being the last to erupt, lack space, making it difficult for them to be located properly.

After the third molars, the canines are the teeth that present the greatest number of anomalies in their eruption, since they collect all the space problems that may exist in the dental arch. (González Lema Daniel). Ectopic eruption in centrals and laterals there are no epidemiological studies, only clinical cases that document and propose treatments. (Ismail M, 2020).

8.5 Acknowledgments

To the educational authorities as well as to the children examined for allowing us to examine them during school hours, in addition to the parents who signed the informed consent form.

8.6 Conclusions

Knowing the eruption sequence and the eruption mechanism of the teeth is fundamental to achieve an adequate diagnosis of ectopic eruption. It is necessary to increase the size of the sample in several schools once the pertinent sanitary conditions are met, to use panoramic radiographs in order to know the eruption patterns in posterior teeth, to channel with the orthodontist for rapid and timely intervention and thus avoid skeletal malocclusion in children.

8.7 References

- Ciftci V, Uguz HN, Ozcan M. (2019). Laser-assisted management of ectopic eruption of permanent incisors. *Niger J. Clin Pract.* 22:276-80.
- Hsiao CC, Boynton JR. (2016). Etiology, Classification and Management of Ectopic Eruption of Permanent First Molars. *The Journal of the Michigan Dental Association.* Jan;98(1):26-30.
- Mubeen S, Seehra J. Failure of Eruption of First Permanent Molar Teeth: A Diagnostic Challenge. (2018). *Journal of Orthodontics*;45(2):129-134. doi:10.1080/14653125.2018.1462902.
- Fux-noy, Avia (2019). Distal Migration and Ectopic Eruption of the Mandibular First Premolar: A Case Report. *Journal of Clinical Pediatric Dentistry*, 43(5), 364–366. doi:10.17796/1053-4625-43.5.12.
- Ismail, M.Q., Lauridsen, E., Andreasen, (2020). O. *et al.* Ectopic eruption of the second premolar: an analysis of four different treatment approaches. *Eur Arch Paediatr Dent* 21,119–127. <https://doi.org/10.1007/s40368-019-00459-z>.
- Marañón-Vásquez GA, Matsumoto MAN, Feres MFN, Ferreira JTL, Consolaro A, Romano FL. (2019). Early Treatment of Failure of Eruption of a Permanent Molar. *J Dent Child (Chic)*. 15;86(3):150-153. PMID: 31645256.
- Arid, J, Xavier, TA, da Silva, RAB, et al. RANKL (2019) .is associated with persistent primary teeth and delayed permanent tooth emergence. *Int J Paediatr Dent.* 29: 294– 300. <https://doi.org/10.1111/ipd.12467>.
- Heraz Chávez, Jessica, Magaly Jiménez Romero, Luz Dominga Mamani Cahuata, y Sively Mercado Mamani. (2020). Erupción ectópica de los primeros molares permanentes del maxilar superior.
- Moncayo Mero, J. P. (2020-10). Recuperado a partir de <http://repositorio.ug.edu.ec/handle/redug/49750>

Maduro Jácome, S. G... (2021-03). *Tesis*. Recuperado a partir de <http://repositorio.ug.edu.ec/handle/redug/52070>.