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Orogastric Tube and Development of the Palate in Preterm Infants at the National Maternal Perinatal Institute.

Américo Munayco Magallanes[1], María Cortez Marino[2], Maryjose Lapa Meza[3]
[1](Professor at the Faculty of Dentistry/ Federico Villareal National University, Lima-Perú)
[2](Professor at the Faculty of Dentistry/ Federico Villareal National University, Lima-Perú)
[3](student of the faculty of dentistry / Federico Villareal National University, Lima-Perú)

Abstract:
Background*: Preterm infants i.e. those born before the end of 37 gestational weeks constitute between 6 and 10% of births in the West, which is why they are more exposed to serious medical problems during the neonatal period that can alter the development of oral tissues, especially the modification of the palate. Preterm infants also have limited development to the suction response and usually have to be fed through an orogastric tube (SOG). The orofacial region plays an important role in the development of the neonate. During the early stages of oral cavity development, the bony structures of the palate are malleable and the pressure of any object causes the shape of the palate to be easily shaped, affecting feeding intake, breathing, dental development, facial appearance, aesthetics, and psychosocial development, among others.*
Materials and Methods*: This study was conducted at the National Maternal Perinatal Institute (INMP) in the city of Lima, Peru and had a retrospective, cross-sectional and comparative design. For the recording of the development of the palate, individual acrylic buckets were used for neonates born preterm, using silicone by condensation of high viscosity, obtaining models of gyping of Orthodontic material that were transferred to Multishort Spiral Tomography (TEM) making transverse, longitudinal and depth records in groups that used and did not use orogastric probe (SOG). The other variables were recorded using the clinical history of each neonate.*
Results*: In preterm infants born who did not use an orogastric tube, it was observed that they had the same average palate development according to type of delivery (p>0.05). However; the average palate development was higher (0.2818 mm) in those who used an orogastric tube and had dystocic delivery (p=0.001). The development of the palate according to time of use of orogastric tube (greater and less than 10 days) was not statistically significant (p>0.05). However; the width of the palate was greater with probe use less than 10 days (X=26.6429) representing statistical significance (p=0.025). Preterm male infants were found to use SOG the most (p>0.05). And, the mean palate development and gestational age was higher in those who did not use SOG, but was not statistically significant (p>0.05). It was observed that those who did not use SOG had higher birth weight, but without statistical significance (p>0.05). And, the head circumference was greater (32.7500 mm) in those who did not use SOG being statistically significant (p=0.016).*
Conclusion: *It was evidenced that in preterm infants born who used an orogastric tube and had dystocic delivery, the development of the palate was greater. According to sog use time (greater and less than 10 days), sex, gestational age and birth weight, palate development was not significant. The head circumference was higher in those who did not use SOG.*
Key Word*: Neonate; pre-term; palatal index; orogastric tube.*

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I. Introduction

The orofacial region plays an important role in the development of the newborn. During the early stages of the development of the oral cavity, the bony structures of the palate are malleable and the pressure of any object causes the shape of the palate to mold easily, affecting food intake, respiration, dental development, facial appearance, aesthetics, psychosocial development, among others[1]. Preterm birth is associated with various risk factors, such as; High or low age of the mother, Low economic level, Drugs, alcohol, diabetes, multiple pregnancies, among others [2,3]. which cause the newborn to suffer the effects of a period of shorter prenatal development and insufficient development of their organs[4]. As a result, premature babies are more exposed to serious medical problems during the neonatal period that can alter the development of oral tissues, especially changes in the palate[5]. Enteral feeding tubes are used in pediatric patients to administer food, fluids, or

medications[6]. Prematurity occurs before 37 weeks of gestation and with a birth weight less than 2500 g[7]. By week 34, healthy fetuses are generally able to suck and swallow enough to support nutritional needs orally if they are born early or prematurely[8]. however, neonates between 26 and 32 weeks of gestation do not present a marked sucking reflex or coordinated swallowing[6], and generally must be fed through an orogastric tube[9]. Scientific evidence has contributed to variables such as; gestational age, birth weight and intubation may be associated with changes in the palate such as; shape, asymmetry, posterior narrowing, greater anterior inclination, greater depth and incidence of the palatine groove[10]. This means that these babies will need systematic follow-up throughout childhood to evaluate possible malocclusions that occur during this period[1,11].

II. Material and Methods

This retrospective comparative study was carried out on in preterm infants born hospitalized in the Intermediate III and IV area of the Department of Neonatology of the National Maternal Perinatal Institute, Lima-Peru. A total 28 preterm infants born (both male and females).

Study Design: observational retrospective study

Study Location: this study was conducted at the National Maternal Perinatal Institute in the intermediate area III and IV of the Department of Neonatology.

Subjects & selection method: The study population was selected from preterm newborn patients hospitalized in the Intermediate III and IV area of the National Maternal Perinatal Institute who used and did not use an orogastric tube. Neonatal patients were divided into two groups.

preterm newborns:

Group A (N=20 neonates) -used orogastric tube;

Group B (N=8 neonates) -did not use orogastric tube.

Inclusion criteria:

• Case group: (neonates with the use of orogastric tube)
- Preterm neonates born at the National Maternal Perinatal Institute (INMP)
- That they are able to receive orogastric tube.

• Control Group: (neonates without the use of orogastric tube)
- Neonates born preterm, who are stable in general health.

Exclusion criteria:

- Neonates with syndromes, neuromuscular disorders, cerebral palsy or congenital malformations, twins or twins
- Neonates that have facial dysmorphology and / or cleft palate.

Procedure methodology

After signing the informed consent of the parents, each selected newborn was registered in a file containing name, gender, gestational age in weeks, chronological age in days. Growth indicators weight, height and head circumference. And, time of use of orogastric tube.

To determine the development of the palate, high viscosity condensation silicone printing (Zetaplus, Putty-Zhermack) was used using individual acrylic buckets specially made for each preterm infant considering; semi-seated position of the neonate, selection and testing of sterile individual bucket, dosing, preparation and placement in a bucket, printing by applying light pressure to the palate, waiting two to three minutes and removing the bucket from the mouth. Anatomical points of the palate were made by visual inspection[12]: Point A (midpoint on the anterior crest of the alveolar pad). Point B (deepest point of the midline of the palate). Distance B-E (Depth of the Palate). Distance C-D (Palate Width). The dimensions of the palate were used the index of the palate in spiral tomography equipment Multishorten of 16 lines General Electric model light speed with spatial resolution of 0.0625 mm.

Statistical analysis

SPSS version 25 (SPSS Inc., Chicago, IL) was used for data analysis. Student's t-test was used to determine the significance of mean differences in palate development between two continuous variables and the chi-square test for qualitative variable was used.

III. Result

In Table 1, we observed that the development of the palate in neonates born preterm without the use of an orogastric tube is the same in the types of eutocic and dystocic delivery (X=0.2725), indicating that it is not statistically significant ($p>0.05$). However; the average width and depth of the palate is greater in eutocic births, but does not represent statistical significance ($p>0.05$).

Table 1: Development of the palate in neonates born preterm without the use of an orogastric tube, according to the type of delivery.

	EUTOCIC			DYSTOCIC			*Sig.
	N	$\bar{X}$	DS	N	$\bar{X}$	DS	
LENGTH	4	12,800	1,1747	4	13,200	1,0360	0,628
WIDTH	4	27,725	2,5695	4	26,500	0,2582	0,379
DEPTH	4	7,500	0,9416	4	7,150	0,7234	0,577
PALATAL INDEX	4	0,2725	0,02872	4	0,2725	0,0275	1,000

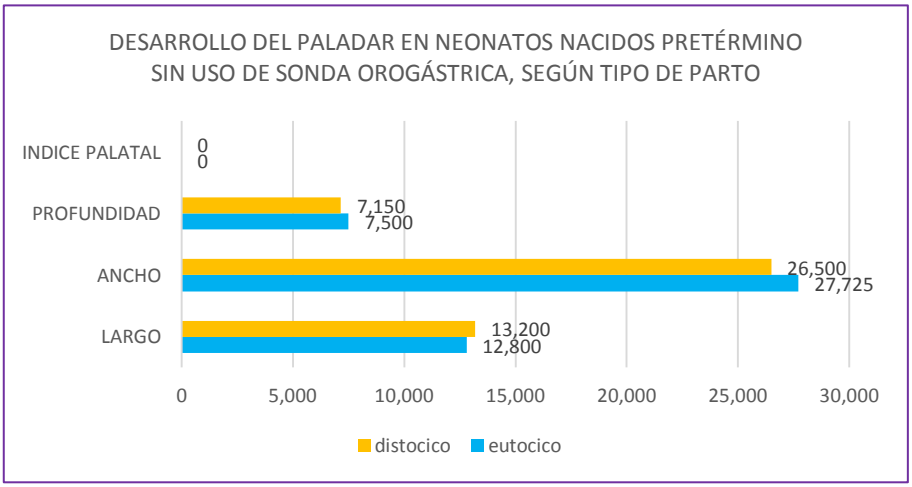


Table 2. Shows that the development of the palate in neonates born preterm who had the use of an orogastric tube was greater in those born of dystocic delivery (X=0.2818) being statistically significant (p=0.001). However; the averages of the length and width of the palate was not statistically significant (p>0.005).

Table 2: Development of the palate in neonates born preterm with the use of orogastric tube, according to type of delivery.

	EUTOCIC			DYSTOCIC			*Sig.
	N	$\bar{X}$	DS	N	$\bar{X}$	DS	
LENGTH	9	12,6778	1,01585	11	12,8727	1,07153	0,684
WIDTH	9	26,7444	2,26887	11	25,4091	1,58395	0,139
DEPTH	9	6,1444	0,70730	11	7,1455	0,43901	**0,001**
PALATAL INDEX	9	0,2322	0,02991	11	0,2818	0,02316	**0,001**

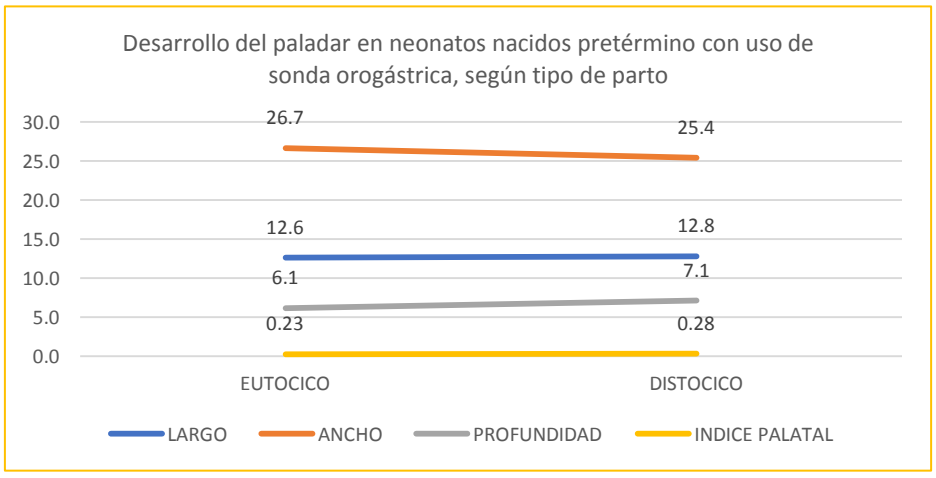


Table 3: It is observed that the average development of the palate in neonates born preterm according to period

of use of orogastric tube greater than 10 days (X=0.2667) and less than 10 days (X=0.2564) was not statistically significant (p>0.05). However; the width of the palate is greater in neonates with tube use less than 10 days (X=26.6429) representing statistical significance (p=0.025).

Table 3: Development of the palate in neonates born preterm according to period of use of orogastric tube greater and less than 10 days.

		LONGER THAN 10 DAYS.			**LESS THAN 10 DAYS.**			***Sig.**
		N	$\bar{X}$	DS	N	$\bar{X}$	DS	
PALATE DEVELOPMENT	LENGTH	6	12,7333	1,13255	14	12,8071	1,01864	0,887
	WIDTH	6	24,5333	0,83586	14	26,6429	2,01751	**0,025**
	DEPTH	6	6,5500	0,64420	14	6,7571	0,81497	0,589
	PALATAL INDEX	6	0,2667	0,02251	14	0,2564	0,04088	0,575

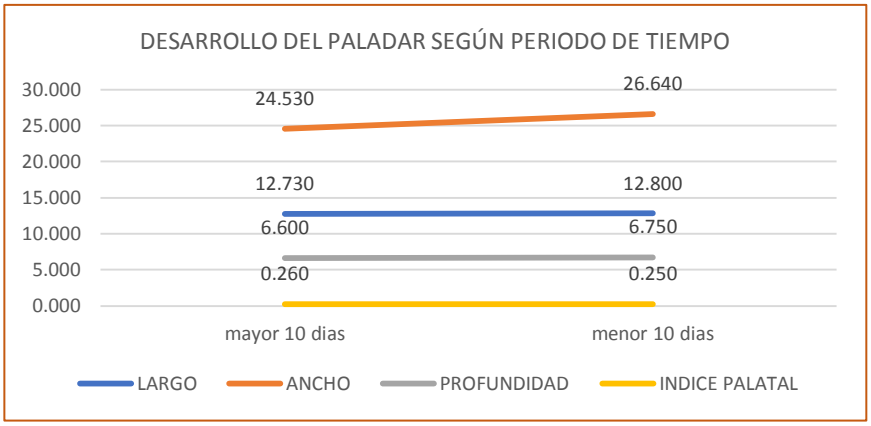


Table 4 It is observed that the averages of palate development and gestational age are higher in neonates born preterm who did not use orogastric tube (SOG). However; does not represent statistical significance (p>0.05). Regarding sex, males were the ones who used SOG the most (39.3%) and females did not use mostly SOG (17.9%), but it was not statistically significant (p>0.05).

		USE OF SOG			**NO USE OF SOG**			***Sig.**
		N	$\bar{X}$	**DS**	**N**	$\bar{X}$	**DS**	
PALATE DEVELOPMENT	LENGTH	20	12,7850	1,02407	8	13,0000	1,04745	0,622
	WIDTH	20	26,0100	1,98810	8	27,1125	1,81300	0,187
	DEPTH	20	6,6950	0,75705	8	7,3250	0,79955	0,061
	PALATAL INDEX	20	0,2595	0,03605	8	0,2725	0,02605	0,364
GESTATIONAL AGE		20	34.00	1,589	8	34.13	1,126	0,841
		N	**%**		**N**	**%**		****Sig**
SEX	MALE	11	39,3%		3	10,7%		0.403
	FEMALE	9	32,1%		5	17,9%		

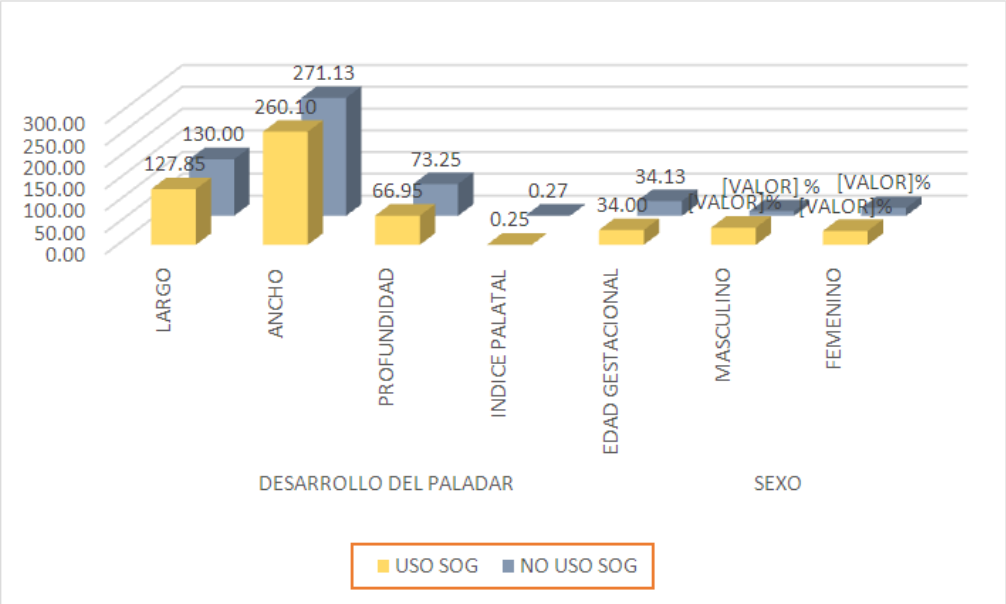
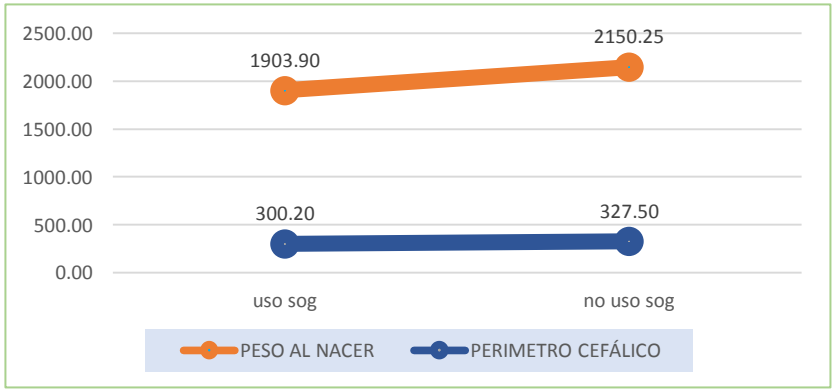


Table no 5 Regarding birth weight, those who did not use an orogastric tube had a higher average, but it does not represent statistical significance (p>0.05). In relation to the head circumference, those who did not use an orogastric tube had a higher average (32.7500 mm) being statistically significant (p=0.016).

Table 5: Birth weight and head circumference in neonates with and without the use of an orogastric tube.

	USE OF SOG			NO USE OF SOG			*Sig.
	N	$\bar{X}$	DS	N	$\bar{X}$	DS	
BIRTH WEIGHT	20	1903,90	399,939	8	2150,25	376,341	0,147
HEAD CIRCUMFERENCE	20	30,0200	1,75757	8	32,7500	3,94606	**0,016**



IV. Discussion

The study of the influence of the use of the orogastric tube on oral tissues especially changes on the palate have not been frequently reported. This study used multishort spiral tomography to assess palate development in preterm infants born with and without the use of orogastric tube (SOG). In relation to the effect of the use of SOG on the development of the palate, this study showed that the group that did not use SOG the development of the palate was the same (0.27 mm) regardless of the type of delivery (eutocic/dystocic); while those who used SOG the development of the palate was greater especially those born dystopic (0.28 mm). These results are similar to that reported by[10] finding that intubated infants present greater development of the oral structure, it also relatively coincides with that reported by Procter, M.1998[12] with an average of 0.29 mm. And, this is due to the mechanical trauma that SOG exerts on the oral tissues since the early development of the oral cavity makes the spongy bone of the palate malleable and pressures of any object can modify the shape of the oral tissues.

Therefore, the palate is susceptible to pressures such as oral intubation, everything as a whole can modify its basic functions such as: suction, swallowing and breathing[9].

In addition, we found greater development of the width of the palate in neonates born preterms who used SOG less than 10 days (26.64 mm) compared to greater than 10 days (24.53 mm) having an average of 25.58 mm differing from what was reported by Munayco. 2020[13]. PERU. who found an average of 26.40 mm. This difference is due to the study's failure to evaluate the use of SOG. It is common to use orogastric and nasogastric feeding tubes to feed preterm infants, as long as the suction reflex that occurs at approximately 36 weeks of gestation is not observed; but, some infants require tube feeding even after this period[1]. And, it is where it is important to highlight the characteristics of the development of the palate related to gestational age.

Procter, M.1998[12] reported in his study that neonates with the same corrected gestational age less than 40 weeks, the depth of the palate was not greater than in preterm neonates. These results are consistent with what was reported in our study, where we found that the development of the palate increases as gestational age increases regardless of the use or non-use of SOG, but that it is not statistically significant. We have to consider that neonates with greater gestational age have more developed palates, that is, gestation has no effect on the depth/width ratio or palatal index[1].

V. Conclusion

It is concluded that preterm infants born who used an orogastric tube and had dystocic delivery had greater palate development. According to sog use time (greater and less than 10 days), sex, gestational age and birth weight, palate development was not significant. The head circumference was higher in those who did not use SOG.

Also, because the development of the palate changes in the presence of the use of orogastric tube, previous studies on these variables should be interpreted with reservation, and that future studies should have postnatal controls. We do not claim that the use of SOG induces the development of the palate, but it could do so with less severity than previously thought.

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