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Deleterious effects of a orogastric tube in preterm newborn at neonatal intensive care unit: a case report

Efeitos deletérios ocasionados por sonda orogástrica em recém nascido a pré-termo em uma uti neonatal: relato de caso clínico

Efectos deletéreos por sonda orogástrica en un recién nacido prematuro en una unidad de cuidados intensivos neonatales: reporte de un caso clínico

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Abstract

There are countless causes that lead a baby to be born premature: placental changes (placenta previa and premature detachment), excess amniotic fluid, maternal age (mothers under 18 years of age), maternal infections, primacy, use of alcohol and drugs. The premature baby's trajectory begins with hospitalization, usually for long periods in the Neonatal Intensive Care Unit (NICU), due to pulmonary immaturity and the need for prolonged ventilatory support. Gastric probing by oral or nasal route is an essential procedure in assisting nutrition for newborns up to thirty-four weeks of gestational age, as it does not have fully developed sucking and swallowing reflexes. The literature describes several oral changes present in premature and low birth weight children, highlighting an increase in the incidence of enamel defects, such as hypoplasia and hypomineralization, an increase in the incidence of dental caries, developmental and eruption delay of the primary dentition, dental and palate malformation. The aim was to report the clinical case of a premature infant with chronic use of an orogastric tube (OT) with lesion in the middle region of the upper lip and gum pad. After 24 hours of repositioning the OT, can be observed the lesion regression. Thus, the presence of the dentist in the NICUs, assisting with protocol and diagnostic measures, can minimize deleterious effects on the oral cavity. It should be noted that the training and applicability of dental protocols in NICUs improves safety in the care of the newborn.

Keywords: Infant premature; Pediatric dentistry; Intensive care units, neonatal.

Resumo

Inúmeras são as causas que levam um bebê a nascer prematuro: alterações placentárias (placenta prévia e descolamento prematuro), excesso de líquido amniótico, a idade materna (mães abaixo de 18 anos de idade), infecções maternas, primariedade, uso de álcool e drogas. A trajetória do prematuro inicia-se pela hospitalização, geralmente por longos períodos em Unidade de Terapia Intensiva Neonatal (UTIN), devido à imaturidade pulmonar e necessidade de suporte ventilatório prolongado. A sondagem gástrica via oral ou via nasal, é um procedimento imprescindível no auxílio à nutrição ao recém-nascido com até trinta e quatro semanas de idade gestacional, por não possuir reflexos de sucção e deglutição plenamente desenvolvidos. A literatura descreve diversas alterações orais presentes em crianças prematuras e de baixo peso ao nascer, destacando-se aumento na incidência de defeitos de esmalte, como hipoplasia e hipomineralização, aumento na incidência de cárie dentária, atraso do desenvolvimento e erupção da dentição decídua e malformação dentária e do palato. O objetivo foi relatar o caso clínico de um prematuro com uso crônico de sonda orogástrica (SOG) e que apresentava lesão em região mediana de lábio e rodete gengival superiores. Após 24h de reposicionamento da sonda, pode-se observar regressão da lesão. Assim, a presença do cirurgião-dentista nas UTIN auxiliando em medidas protocolares e diagnósticos, pode minimizar efeitos deletérios na cavidade bucal. Ressaltando-se que o treinamento e aplicabilidade de protocolos odontológicos nas UTINs melhoram a segurança nos atendimentos ao recém-nascido.

Palavras-chave: Recém-nascido prematuro; Odontopediatria; Unidades de terapia intensiva neonatal.

Resumen

Son innumerables las causas que llevan un bebé a nacer prematuro: cambios placentarios (placenta previa y desprendimiento prematuro), exceso de líquido amniótico, edad materna (madres menores de 18 años), infecciones maternas, primacía, uso de alcohol y drogas. La trayectoria del prematuro comienza con la hospitalización, generalmente por largos períodos en la Unidad de Cuidados Intensivos Neonatales (UCIN), debido a inmadurez pulmonar y necesidad de soporte ventilatorio prolongado. El sondaje gástrico por vía oral o nasal es un procedimiento esencial para ayudar la nutrición de los recién nacidos hasta las treinta y cuatro semanas de edad gestacional, ya que no tienen reflejos de succión y deglución completamente desarrollados. La literatura describe varios cambios orales presentes en niños prematuros y de bajo peso al nacer, destacando un aumento en la incidencia de defectos del esmalte, como

hipoplasia y hipomineralización, aumento en la incidencia de caries dental, retraso en el desarrollo y erupción de la dentición temporal, malformación dental y paladar. El objetivo fue reportar el caso clínico de un bebé prematuro con uso crónico de tubo orogástrico (TO) que presentaba una lesión en la región media del labio superior y rueda gingival. Después de 24 horas de reposicionar la sonda, se observó la regresión de la lesión. La presencia del dentista en las UCIN, ayudando con protocolo y medidas de diagnóstico, puede minimizar los efectos deletéreos en la cavidad bucal. La formación y aplicabilidad de los protocolos dentales en las UCIN mejora la seguridad en el cuidado de los recién nacidos.

Palabras clave: Recien nacido prematuro; Odontología pediatrica; Unidades de cuidado intensivo neonatal.

1. Introduction

The concept of prematurity was officially instituted in 1935 by the American Academy of Pediatrics. A newborn who weighed less than 2,500 grams at birth, regardless of gestational age, would be considered premature, including all live births (those with a heartbeat or respiratory movement). In 1950, the World Health Organization (WHO) classified newborns weighing 2,500 grams or less as premature, and when weight could not be measured, gestational age less than 37 weeks would be considered. In 1977, WHO published new recommendations, classifying as premature only those born before 37 weeks or 259 full days of gestation, without assessing their weight. It was also recommended to register all those born weighing more than 500 grams. It is classified as extreme prematurity when it occurs below 28 weeks, early between 28 and 31 weeks, moderate between 32 and 33 weeks, and late between 34 and 36 weeks of gestation. This definition remains today (Goldenberg et al., 2012; Been et al., 2014; Marchman et al., 2018; Legge, Shein & Callander, 2019).

Countless are the causes that lead a baby to be born premature, placental changes (placenta previa and premature detachment), excess amniotic fluid, maternal age (higher incidence in young mothers, below 18 years of age), maternal infections, use of alcohol and drugs, and the etiology is mostly unknown. Among the infections that can affect pregnant women, the potential association between maternal periodontal disease, preterm birth and low birth weight are widely known. In addition, general immaturity can lead to dysfunction in any organ or body system, and the newborn may suffer impairment or complications during its development (Stocks & Sonnappa, 2013; Lipner & Huron, 2018; Rocha et al., 2018).

Preterm newborn (PN), especially those of medium low weight (MLW) or extremely low weight (ELW), due to the immaturity of their organs and systems, has a high morbidity to respiratory diseases (respiratory distress syndrome), hematological diseases (anemia of prematurity and hyperbilirubinemia), metabolic (hypoglycemia, hypocalcemia), among others, which directly affect your health and growth (Been et al., 2014; Rocha et al., 2018; Gráf et al., 2020).

PNs affected by Respiratory Discomfort Syndrome (RDS) have inadequate production of pulmonary surfactant, which is an essential hormone against the collapse of the alveoli due to the difference in intra-alveolar pressure, which occurs due to pulmonary immaturity. Extreme premature male preterm infants with less than 28 weeks of gestation, children of diabetic mothers and those who suffered asphyxiation at birth, are more likely to develop RDS. The surfactant is released after 30 to 32 weeks of gestation, and therefore premature infants born before 30 weeks of gestation are likely to develop RDS. It is the main etiology of the disease due to insufficient development and, in many cases, it can be caused by a genetic problem in lung development (Nouraeyan, Lambrinakos-Raymond, Leone & Sant'Anna, 2014; Rocha et al., 2018; Viraraghavan et al., 2018).

Neonatal RDS is defined as a respiratory failure that occurs after birth or shortly after (2 to 4 days) increasing its severity over the first two days of life. Clinically, RDS is defined as tachypnea (breath greater than 60 cycles per minute), moaning, intercostal or subcostal circulation and cyanosis. The diagnosis can be confirmed by chest radiography (appearance of “ground glass”) and the presence of an air bronchogram. If not treated effectively, this condition can be fatal due to the progressive onset of hypoxia and respiratory failure. When surfactant is used prophylactically and ventilation with CPAP (continuous positive airway pressure) RDS becomes difficult to define. The definition used by the Vermont Oxford Neonatal Network requires that children have a PaO2 < 50 mmHg in room air, central cyanosis in room air or need supplemental oxygen to maintain a PaO2 > 50 mmHg, associated with classic images on chest radiography (Valeri, Gaspardo, Martinez & Linhares, 2018; Viraraghavan et al., 2018; Popowicz, Kwiecień-Jaguś, Olszewska & Mędrzycka-Dąbrowska, 2020).

The premature infant's trajectory begins with hospitalization, often for long periods in the neonatal intensive care unit (NICU) (Casiano et al., 2020), considering pulmonary immaturity due to the lack of a skilled respiratory system, the need for prolonged ventilatory support makes these individuals exposed to harmful stimulus in a completely different environment from intrauterine (Leal et al., 2010; Padovani et al., 2012; Acikgoz et al., 2015).

Mechanical ventilation is used as the main strategy for the management of patients with acute and chronic respiratory failure. With its institution, complications associated with orotracheal intubation are known, such as: ulceration or edema of the mucosa, hemorrhage, stenosis, pneumonia or sinusitis associated with invasive ventilation (Been et al.,2014; Primozic, Farcnik, Ovsenik & Primozic, 2014; Postiaux, Maffei, Villiot-Danger & Dubus, 2018).

According to the clinical condition and maturity, the PN has limitations that prevent oral feeding immediately after birth. These limitations are linked to the instability of its respiratory, circulatory, thermoregulatory functions and, also, linked to the gastrointestinal system, which are related to the immaturity of the swallowing and sucking reflex and to the enzymatic and functional immaturity of the stomach and intestine. In most cases, premature infants start enteral feeding, by an orogastric tube (OT), or even parenterally. Gastric probing by oral or nasal route is an essential procedure in assisting nutrition to PN up to approximately thirty-four weeks of gestational age, due to the lack of fully developed sucking and swallowing reflexes (Lopes et al., 2019).

The presence of the tube in the oral cavity and the resulting forces caused by these tubes can inhibit the normal growth of the palate and also change the morphology of the gum pads. The longer the intubation time (over than 30 days), the greater the prevalence of oral defects. Therefore, it is recommended to use an intra-oral palatal stabilizer to fix the cannulas in newborns who will be intubated orally for more than 24 hours, as the abnormalities begin to develop 12 hours after the procedure. Among the various oral disorders and alterations present in premature and low birth weight children, it can be found in the literature an increase in the incidence of enamel defects, such as hypoplasia and hypomineralization, an increase in the incidence of tooth decay, delayed development and eruption of primary dentition, dental and palate malformation (Davenport, 2010; Merglova, Koberova-Ivancakova, Broukal & Dort, 2014; Zaidi, Thayath, Singh & Sinha, 2015).

There are several ways to diagnose perinatal hypoxia. Among them, the Apgar score, which aims to quickly check the newborn's clinical status and identify those who need assistance, to assess the risks and prevent sequels of a likely asphyxia. It consists of five parameters closely related to perinatal hypoxia: heart rate, breathing, muscle tone, reflex irritability and skin color of the newborn. On a scale of 0 to 10 if its value is less than seven, fetal hypoxia will be diagnosed (Simon, Hashimi & Bragg, 2020).

In order to minimize the deleterious effects in the hospital environment, the inpatient must be monitored and dentists have a fundamental role in the evaluation of oral health, reinforcing the idea that these evaluations are essential for general health care and inpatient

care as a whole (Blum et al. 2017). The incorporation of the dental surgeon in the multiprofessional team can contribute to the holistic view that must be offered to the hospitalized patient in order to provide their well-being and dignity, preventing infections, reducing the length of hospital stay and the use of medications. Bearing in mind that oral problems interfere in the individual's general health, as well as systemic alterations can manifest in the oral cavity (Davenport, 2010; Blum et al. 2017; Blum, Silva, Baeder & Della Bona, 2018; Christian, Polzon & Welak, 2018).

The aim of this study was to report the clinical case of a newborn admitted to the NICU of the Regional Hospital of Ferraz de Vasconcelos Dr. Osiris Florindo Coelho in the city of São Paulo. The patient was examined by the Hospital Dentistry team, with a lip and upper gum pad lesion diagnosed due to prolonged use of the orotracheal tube, which after repositioning the artifact, there was a significant improvement in the lesion after 24 hours.

2. Methodology

This study consists of an unprecedented case report of upper gum pad depression promoted by the pressure generated by the immobilization of the orogastric tube. The study was submitted for approval by the Research Ethics Committee of Cruzeiro do Sul University (Unicsul) and was approved under protocol CAAE: 40947420.3.0000.8447.

A term of free, informed consent was signed by the parents of participating patient, in accordance with the norms of Resolution 466/2012 of the Brazilian National Health Council of the Ministry of Health, published in Diário Oficial da União (similar to US Federal Register) no. 301, on June 13th, 2013.

3. Case Report

Patient, born at the Regional Hospital of Ferraz de Vasconcelos Dr. Osiris Florindo Coelho in perinatal time, with 32 weeks of gestation (moderate prematurity) and medium low weight, ingested a large amount of meconium, presented cyanotic and did not cry at birth; obtained Apgar score of 3/6 and 8 respectively, was submitted to air and tracheal aspiration and then submitted to mechanical ventilation. With a diagnostic hypothesis of “Meconium aspiration syndrome” and “respiratory deficiency”, the newborn was transferred to the NICU for monitoring and care, where was fasting at first, and was submitted to ventilation (jet steam at 3.5% O2) for 10 days and left the support (Figure 1).

Figure 1. Ventilation system (jet steam at 3,5% O_2).

Source: Own authorship.

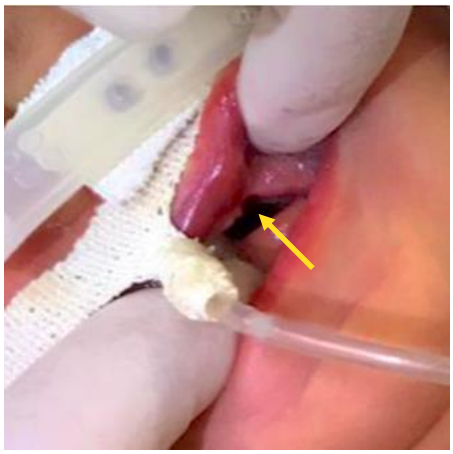
As medication, dexamethasone was used to control inflammation and maturation of pneumocytes, were also administered ampicillin and gentamicin to control outbreaks of infection due to immunological immaturity. Other supporting drugs were used for sedation such as dopamine, dobutamine, midazolan, fentanyl and to improve the alveolar tone of the surfactant were also administered ranitidine and bromopride. For feeding, OT was stabilized with bandage on the upper lip and cheek region (Figure 2).

Figure 2. OT stabilized with bandage.

Source: Own authorship.

The depression of the upper gum pad was observed 5 days after the stabilization of the OT. Suggesting that time of stabilization of the OT was determinant for the development of the upper gum pad alteration as shown in Figure 3.

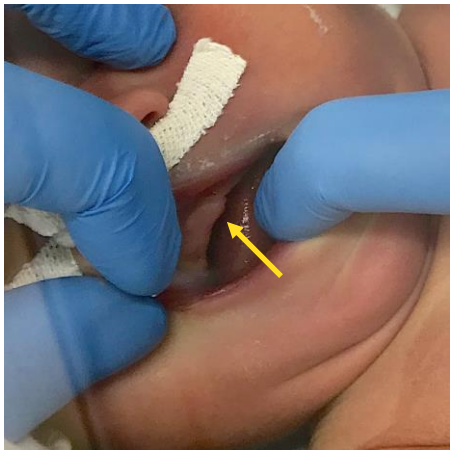
Figure 3. Depression of the upper gum pad (arrow).



Source: Own authorship.

After the dental team diagnosis, the periodic change in the positioning of the OT was determined in conjunction with the multidisciplinary team (nursing and physiotherapy) every 24 hours. Subsequently, stabilization of the upper gum pad was observed after 4 days without the presence of depression (Figure 4).

Figure 4. Upper gum pad without the presence of depression (arrow).



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Source: Own authorship.

4. Discussion

A premature or preterm newborn is defined as birth that occurs at less than 37 full weeks of gestation (Goldenberg et al., 2012; Been et al., 2014; Marchman et al., 2018; Legge et al., 2019). Studies agree that prematurity is a major cause of perinatal morbidity and mortality in both developed and developing countries (Been et al., 2014; Zaidi et al., 2015; Legge et al., 2019). Just as prematurity can negatively influence the child's growth, changes in the development and positioning of teeth in preterm infants can occur. This work reveals processes of depression in the gum pad which can cause deleterious effects caused by OT when kept in the same position for a long time.

Most of the times PN and MLW require a prolonged period of hospitalization (Cassiano et al., 2020), being subjected to devices, such as orotracheal cannula, OT, and procedures, such as laryngoscopy, venous access, among others for the effectiveness of treatment such as ventilatory support, enteral and parenteral nutrition, administration of antibiotics and pharmacological therapies (steroids, surfactants and antibiotics), (Postiaux et al., 2018; Legge et al., 2019). The lower the gestational age and birth weight, the greater the tendency to use these procedures and interventions (Primozic et al., 2014).

In the incisal edges and occlusal surfaces of the teeth there is no alveolar bone, and this absence of bone support between the gum pad and the tooth is susceptible to trauma in the oral cavity, for example, at birth or in the neonatal period, which can have serious consequences (Primozic et al., 2014). What was observed in this report is that the prolonged fixed positioning of the OT provided an important alteration in the gum pad.

Despite the scarce studies, the literature presents a lack of studies on oral alterations caused by orotracheal intubations and OT at NICU. These studies demonstrate the association of oral alterations identified in childhood, encouraging the replacement of orotracheal intubation by the use of positive ventilatory support, as a prevention to the development of oral malformations (Angelos, Smith, Jorgenson & Sweeney, 1989; Kopra & Davis, 1991; Fadavi, Adeni, Dziedzic, Punwani & Vidyasagar, 1992; Carlisle, Kamlin, Owen, Davis & Morley, 2010; Enomoto et al., 2017). However, this is the first report of an oral alteration caused by an OT identified in the newborn in his first days of life during his stay at NICU.

Considering the value of oral health in preventing complications for ICU patients, it is important to implement oral health protocols in these units (Blum et al. 2017; Blum et al., 2018). The work of dentistry in conjunction with the multidisciplinary team used protocol measures to modify and alternate the position of the OT, which provided the PN with the

stabilization and physiological correction of the gum pad, determining less possibility of oral iatrogenies.

The procedures performed at the hospital level therefore require multidisciplinary team work. The inclusion of the dental team in the hospital environment, in this clinical case, was of fundamental importance in the diagnosis of gum pad alteration and in the determination of protocol measures joint with the physiotherapy team to daily modify the OT positioning, since there is still no protocol validated by pediatric institutions that can be used in cases like the one reported in this study (Blum et al., 2017; Blum et al., 2018). The responsibility for these procedures is shared between doctors, dentists and the entire assistant team.

Oral health and care contribute to the general health of patients in the intensive care unit, but the ICU staff may find it difficult to provide this type of care, mainly due to the lack of training and adequate protocols. The lack of a well-established oral health care protocol and training programs leads the multidisciplinary team to an inability to face oral health problems. The presence of a professional in dentistry (dental surgeon) to evaluate oral health issues in patients in the Intensive Care Unit could minimize such problems (Blum et al. 2017; Blum et al., 2018).

In this case report, it is clear the importance of the team to carry out the OT modification protocol, minimizing possible future dental problems. As well as, it is also important to monitor the child's development, in order to identify possible oral malformations that may originate as a result of the upper gum pad alteration.

5. Conclusion

The presence of the dentist in the NICUs assisting with protocol and diagnostic measures can minimize deleterious effects on the oral cavity. After 24 hours of changing the position of the probe, regression of the lesion can be observed. The training and applicability of dental protocols in NICUs improves the safety of PN care.

References

Angelos, G. M., Smith, D. R., Jorgenson, R., & Sweeney, E. A. (1989). Oral complications associated with neonatal oral tracheal intubation: a critical review. *Pediatric dentistry*, 11(2), 133–140.

Been, J. V., Lugtenberg, M. J., Smets, E., van Schayck, C. P., Kramer, B. W., Mommers, M., & Sheikh, A. (2014). Preterm birth and childhood wheezing disorders: a systematic review and meta-analysis. *PLoS medicine*, 11(1), e1001596.

Blum, D. F. C., Munaretto, J., Baeder, F. M., Gomez, J., Castro, C. P. P., & Bona, Á. D. (2017). Influência da presença de profissionais em odontologia e protocolos para assistência à saúde bucal na equipe de enfermagem da unidade de terapia intensiva. Estudo de levantamento. *Revista Brasileira de Terapia Intensiva*, 29(3), 391-393.

Blum, D. F. C., Silva, J. A. S. D., Baeder, F. M., & Della Bona, Á. (2018). A atuação da Odontologia em unidades de terapia intensiva no Brasil. *Revista Brasileira de Terapia Intensiva*, 30(3), 327-332.

Carlisle, H. R., Kamlin, C. O., Owen, L. S., Davis, P. G., & Morley, C. J. (2010). Oral continuous positive airway pressure (CPAP) following nasal injury in a preterm infant. *Archives of disease in childhood. Fetal and neonatal edition*, 95(2), F142–F143. https://doi.org/10.1136/adc.2009.170084

Cassiano, V. A., Sousa, C. P. da C., Ribeiro, F. da S., Alves, K. da S. B., Pereira, M. T. L., Câmara, G. B. (2020). Epidemiological profile of newborn premature infants admitted to a Neonatal Intensive Care Unit. *Research, Society and Development*, 9(8), e301985467.

Christian, V. J., Polzin, E., & Welak, S. (2018). Nutrition Management of Necrotizing Enterocolitis. Nutrition in clinical practice: official publication of the American Society for Parenteral and Enteral Nutrition, 33(4), 476–482.

Davenport, E. S. (2010). Preterm low birthweight and the role of oral bacteria. *Journal of oral microbiology*, 2(5779): 1-8.

Enomoto, M., Sezaki, H., Muranishi, R., Sato, Y., Kikuchi, S., Katayama, Y., Takei, A., Ikegami, H., Sakuma, M., & Minami, H. (2017). Acquired palatal groove and delayed oral feeding in preterm infants. *Pediatrics international: official journal of the Japan Pediatric Society*, 59(2), 171–175. https://doi.org/10.1111/ped.13113

Fadavi, S., Adeni, S., Dziedzic, K., Punwani, I., & Vidyasagar, D. (1992). The oral effects of orotracheal intubation in prematurely born preschoolers. *ASDC journal of dentistry for children*, 59(6), 420–424.

Goldenberg, R. L., Gravett, M. G., Iams, J., Papageorghiou, A. T., Waller, S. A., Kramer, M., Culhane, J., Barros, F., Conde-Agudelo, A., Bhutta, Z. A., Knight, H. E., & Villar, J. (2012). The preterm birth syndrome: issues to consider in creating a classification system. *American journal of obstetrics and gynecology*, 206(2), 113–118.

Gráf, R., Kalmár, M., Harnos, A., Boross, G., & Nagy, A. (2020). Reading and spelling skills of prematurely born children in light of the underlying cognitive factors. *Cognitive processing*, 10.1007/s10339-020-01001-6. Advance online publication.

Kopra, D. E., & Davis, E. L. (1991). Prevalence of oral defects among neonatally intubated 3- to 5- and 7- to 10-year old children. *Pediatric dentistry*, 13(6), 349–355.

Legge, N. A., Shein, D., & Callander, I. (2019). Methods of surfactant administration and early ventilation in neonatal intensive care units in New South Wales and the Australian Capital Territory. *Journal of neonatal-perinatal medicine*, 12(3), 255–263.

Lipner, H. S., & Huron, R. F. (2018). Developmental and Interprofessional Care of the Preterm Infant: Neonatal Intensive Care Unit Through High-Risk Infant Follow-up. *Pediatric clinics of North America*, 65(1), 135–141.

Lopes, L. S., Silva, G. D., Alves, A. M. A., Reis, A. T., Silva, G. R. G., & Silvino, Z. R. (2019). Gastric tube insertion in preterm infants: prevalence analysis of measurement techniques. *Rev enferm UERJ*, 27, e38515.

Marchman, V. A., Loi, E. C., Adams, K. A., Ashland, M., Fernald, A., & Feldman, H. M. (2018). Speed of Language Comprehension at 18 Months Old Predicts School-Relevant Outcomes at 54 Months Old in Children Born Preterm. *Journal of developmental and behavioral pediatrics: JDBP*, 39(3), 246–253.

Merglova, V., Koberova-Ivancakova, R., Broukal, Z., & Dort, J. (2014). The presence of cariogenic and periodontal pathogens in the oral cavity of one-year-old infants delivered pre-term with very low birthweights: a case control study. *BMC oral health*, 14,109, 1-8.

Nouraeyan, N., Lambrinakos-Raymond, A., Leone, M., & Sant'Anna, G. (2014). Surfactant administration in neonates: A review of delivery methods. *Canadian journal of respiratory therapy: CJRT = Revue canadienne de la therapie respiratoire: RCTR*, 50(3), 91–95.

Popowicz, H., Kwiecień-Jaguś, K., Olszewska, J., & Mędrzycka-Dąbrowska, W. A. (2020). Pain Scales in Neonates Receiving Mechanical Ventilation in Neonatal Intensive Care Units - Systematic Review. *Journal of pain research*, 13, 1883–1897.

Postiaux, G., Maffei, P., Villiot-Danger, J. C., & Dubus, J. C. (2018). Respiratory physiotherapy in acute viral bronchiolitis in the newborn. Pro/con arguments. *Revue des maladies respiratoires*, 35(4), 403–415.

Primozic, J., Farcnik, F., Ovsenik, M., & Primozic, J. (2014). A controlled study of the functional and morphological characteristics of malocclusion in prematurely born subjects with low birth weight. *European journal of orthodontics*, 36(1), 114–120.

Rocha, G., Soares, P., Gonçalves, A., Silva, A. I., Almeida, D., Figueiredo, S., Pissarra, S., Costa, S., Soares, H., Flôr-de-Lima, F., & Guimarães, H. (2018). Respiratory Care for the Ventilated Neonate. *Canadian respiratory journal*, 2018, 7472964.

Simon, L. V., Hashmi, M. F., & Bragg, B. N. (2020). APGAR Score. In *StatPearls*. StatPearls Publishing.

Stocks, J., & Sonnappa, S. (2013). Early life influences on the development of chronic obstructive pulmonary disease. *Therapeutic advances in respiratory disease*, 7(3), 161–173.

Valeri, B. O., Gaspardo, C. M., Martinez, F. E., & Linhares, M. (2018). Effectiveness of Sucrose Used Routinely for Pain Relief and Neonatal Clinical Risk in Preterm Infants: A Nonrandomized Study. *The Clinical journal of pain*, 34(8), 713–722.

Viraraghavan, V. R., Nangia, S., Prathik, B. H., Madarkar, B. S., Rani, D., & Saili, A. (2018). Yield of meconium in non-vigorous neonates undergoing endotracheal suctioning and profile of all neonates born through meconium-stained amniotic fluid: a prospective observational study. *Paediatrics and international child health*, 38(4), 266–270.

Zaidi, I., Thayath, M. N., Singh, S., & Sinha, A. (2015). Preterm Birth: A Primary Etiological Factor for Delayed Oral Growth and Development. *International journal of clinical pediatric dentistry*, 8(3), 215–219.

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