Original Article

Scanning Electron Microscopy and Macroscopic Examination of Prematurely Erupted Teeth in Preterm Infants

(premature eruption / primary teeth / preterm infant / macroscopic observation / SEM observation)

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Abstract. Prematurely erupted teeth are rare in full-term neonates and extremely rare in prematurely delivered infants. The aim of this study was to present macroscopic and scanning electron microscopy (SEM) investigations of prematurely erupted primary teeth of preterm very low birthweight (VLBW) and extremely low birthweight (ELBW) infants. Three preterm VLBW and ELBW infants with prematurely erupted lower incisors were examined. The dental examination assessed the type, location, clinical appearance, and degree of mobility of the prematurely erupted teeth. The structural appearance of enamel and dentin of three extracted and longitudinally sectioned prematurely erupted teeth was investigated with scanning electron microscopy (SEM). Lower incisors were rootless with hypermobility. The surface of enamel of the prematurely erupted primary teeth was hypoplastic and hypomineralized and had a typical "honeycomb" appearance in SEM. The aprismatic type of enamel was visible in some regions. The neonatal line separating the layer of prenatal enamel from postnatal enamel was observed. The enamel prisms were interconnected by interprismatic substances, and cross-striations of prisms were visible. Dentin presented a typical tubular character. The dentinal layer near the enamel dentin junction had Y-shaped branching of dentinal tubules. On the pulpal side, dentin had a globular character. The macroscopic and SEM investigations particularly revealed alterations in enamel, while the dentin of neonatal teeth had a nearly normal appearance.

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Abbreviations: DDE – developmental defects of enamel, ELBW – extremely low birthweight, SEM – scanning electron microscopy, VLBW – very low birthweight.

Introduction

The eruption of primary teeth typically begins at six or seven months of age. Primary teeth that erupt prematurely have been generally called congenital teeth, predeciduous teeth, foetal teeth, natal and neonatal teeth (Markou et al. 2012). According to the broadly accepted definition of Massler and Savara (1950), natal teeth are present in the oral cavity at the time of birth, while teeth that erupt during the neonatal period are called neonatal teeth. Hebling et al. (1997) classified conditions connected with premature eruption of primary teeth into four clinical categories: 1. shell-shaped crown poorly fixed to the alveolus by gingival tissue and absence of root; 2. solid crown poorly fixed to the alveolus by gingival tissue and short or no root; 3. eruption of the incisal margin of the crown through gingival tissue; and 4. swelling of gingival tissue with an unerupted but palpable tooth. Approximately 90 % of prematurely erupted teeth in infants are primary teeth, and 10 % are supernumerary teeth (Cunha et al., 2001; Samuel et al., 2018).

Some authors (Toromanovic et al., 2009; Nandikonda and Jairamdas, 2010; Basavanthappa et al., 2011) have suggested that natal and neonatal teeth could be associated with certain syndromes and orofacial clefts.

Previous histological investigations of natal or neonatal teeth have shown that the enamel covering clinical crowns of these teeth is thin and can be absent in some areas (Ruschel et al., 2010; Stamfelj et al., 2010). Scanning electron microscopy (SEM) observation revealed hypomineralization and hypoplasias of enamel with different degrees of severity and honeycomb appearance of prism termination on the enamel surface (Bulu et al., 2019). A typical tubular pattern of dentin was described in some studies (Bigeard et al., 1996; Ruschel et al., 2010; Bulu et al. 2019), while other authors observed irregular branching of dentinal tubules, raised zones of peritubular dentin and Tomes' granular layer (Stamfejl et al., 2010; Maheswari et al., 2012). The observation of pulp revealed an increased number of dilated blood vessels, absence of Weil's basal layer and cell-rich zone (Tay, 1970; Anderson, 1982).

Prematurely erupted teeth are rare in full-term neonates and extremely rare in prematurely delivered infants, because prematurity is mostly connected with an increased risk of delayed primary teeth eruption (Paulsson et al., 2004; Al-Sayagh et al., 2008; Cizmeci et al., 2013; Verma et al., 2013; Bodh et al., 2015; Rocha et al., 2017; Merglova, 2018). Wang et al. (2017) investigated 12,019 infants for natal or neonatal teeth and identified 30 infants with this condition; 16.7 % of these infants were delivered preterm. According to the World Health Organization (2004), a delivery is preterm when it occurs before completing gestational age 37 weeks or the birthweight is below 2,500 g. Premature neonates are classified into one of the three groups: low birthweight < 2,500 g, very low birthweight (VLBW) < 1,500 g, and extremely low birthweight (ELBW) < 1,000 g.

The aim of the current study was to present a macroscopic and scanning electron microscope investigation of prematurely erupted primary teeth from preterm VLBW and ELBW infants.

Material and Methods

This study is a part of a long-term research project performed at the Department of Dentistry and Neonatology, University Hospital and Faculty of Medicine in Pilsen, Charles University in Prague, Czech Republic. Approximately 3,500 births occur every year in the Obstetric Department of the University Hospital in Pilsen, Czech Republic. Three premature neonates with neonatal teeth were examined during the period of 2014–2016 (Merglova, 2018). Personal data, including gender, gestational age, birthweight, mode of delivery, general health status, and presence of genetic syndromes, were obtained from hospital records. The gestational age was estimated from the pregnant woman's last ultrasonography. The lower central incisor erupted at mean gestational age 33 weeks + 6 days (mean chronological age 5.3 weeks). The dental examination of the neonates was performed at the Department of Neonatology of the University Hospital and Medical Faculty in Pilsen, Charles University, Czech Republic. The neonates were examined using a sterile dental mirror and artificial light. The dental examination included the type, location, clinical appearance according to Hebling et al. (1997), presence of developmental defects of enamel (DDE), and degree of mobility of the erupted teeth. The quality of enamel was classified according to the Modified DDE index (Federation Dentaire Internationale Working Group 1992). Qualitative changes in enamel translucency without loss of enamel surface were categorized as demarcated or diffuse opacities (hypomineralization). Hypoplasia of enamel is a defect affecting the enamel surface, presenting reduction in enamel thickness, and can manifest itself in the form of pits, grooves or other quantitative surface losses. The teeth were extracted due to their hypermobility. The characteristics of the infants and the extracted prematurely erupted teeth are listed in Table 1.

Scanning electron microscopy

The extracted neonatal teeth (three lower incisors) of three premature infants were collected and stored in alcohol. The regions of investigation were located in the buccal part of the clinical crowns (Fig. 1). All three teeth were oriented in resin and partially sectioned longitudinally in a buccolingual direction and then fractured (Fig. 2). To prepare a sample for scanning electronic microscopy (SEM), the sample has also to be cleaned ultrasonically and fixed with ethanol (70%, 95% and 100%). For SEM, a dry specimen is usually mounted on a specimen holder using electrically conductive double-sided adhesive tape and sputter coated with a very thin layer of pure gold (15–20 nanomillimetres) before examination.

All samples were analysed using a SEM-JSM 6300 Scanning Microscope operated at 12–15 kV (the Czech Academy of Sciences, Ceske Budejovice, Czech Republic).

Results

Macroscopic observation

The prematurely erupted teeth had a solid crown poorly fixed to the alveolus by gingival tissue (Fig. 3). The extracted teeth had incomplete development and

Table 1. Characteristics of neonates (Merglova, 2018)

case No	gender	gestational age (wks)	birthweight (g)	time of eruption (chronological age, wks)	time of eruption (gestational age, wks)	localization	classification	treatment
1	female	32 + 2	1890	6	38 + 2	71	2	extraction
2	male	24 + 6	620	6	30 + 6	81	2	extraction
3	female	28 + 4	1190	4	32 + 4	81	2	extraction

wks – weeks, g – gram

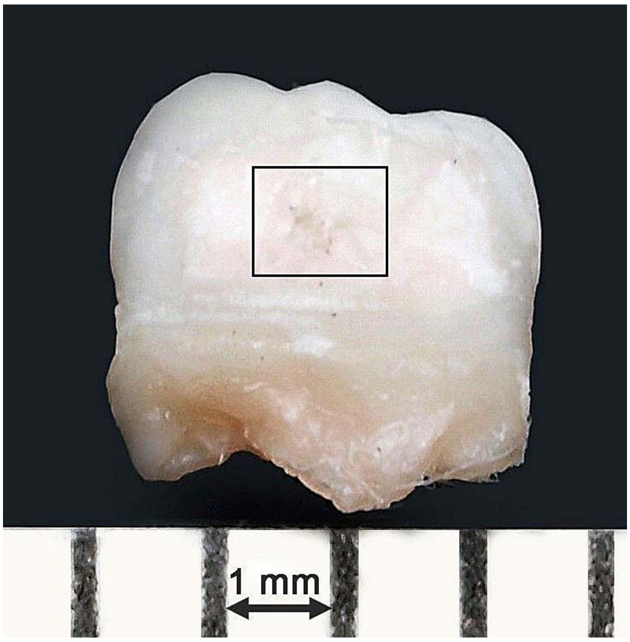

Fig. 1. Macrophotography of a rootless neonatal tooth in localization 81, case 2. The square marks location for the SEM images.

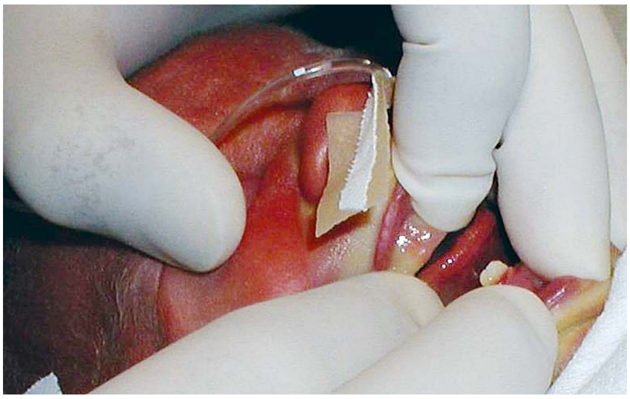

Fig. 3. Clinical photography of a preterm child delivered with ELBW. Neonatal tooth in localization 81 (case 2).

were rootless. The crown size and the form of neonatal teeth resembled those of primary lower incisors. Macroscopically, the enamel of the extracted neonatal teeth was partially hypoplastic and some areas were with opacities (hypomineralizations). The longitudinal sections of the neonatal teeth revealed large pulp chambers (Fig. 2).

SEM observation

Scanning electron microscopy examination of the neonatal teeth demonstrated that the investigated buccal parts of the clinical crowns were covered with enamel characterized by diverse appearance with holes and grooves. The enamel surface was porous with atypical honeycomb appearance. The areas of aprismatic enamel were visible (Fig. 4). The regions of enamel hypoplasia

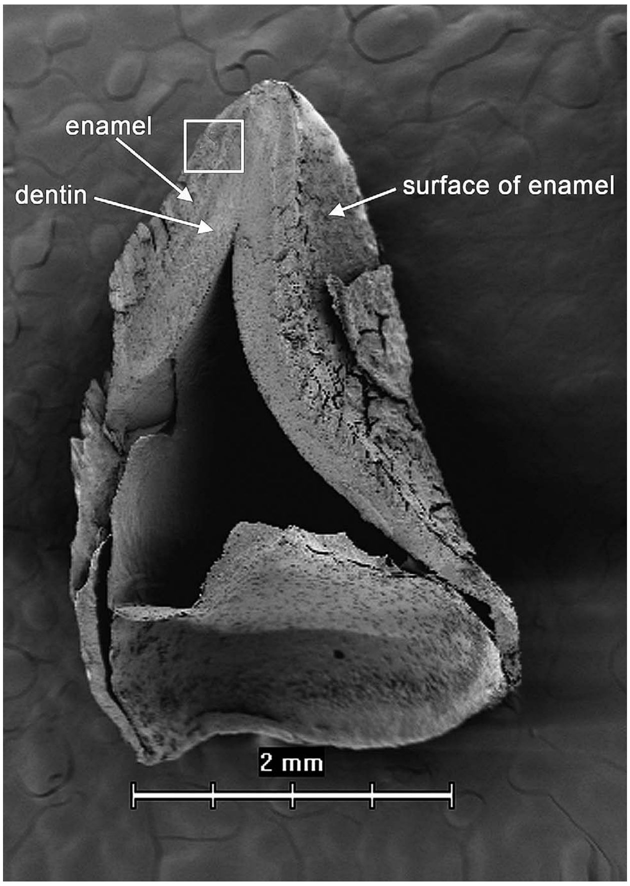

Fig. 2. Microphotography of a rootless neonatal tooth. The tooth was partially sectioned longitudinally in a buccolingual direction and then fractured (neonatal tooth in localization 81, case 2). The square marks location for the SEM images of the surface of enamel (Fig. 4) and the neonatal line (Fig. 5a, b).

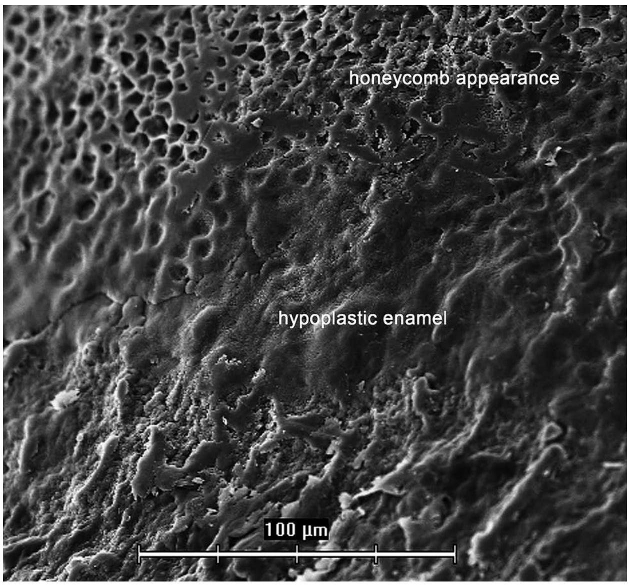

Fig. 4. SEM image of the porous enamel surface with typical honeycomb appearance and with areas of hypoplastic enamel. The honeycomb pattern of enamel showing impressions caused by Tomes' processes (neonatal tooth in localization 81, case 2).

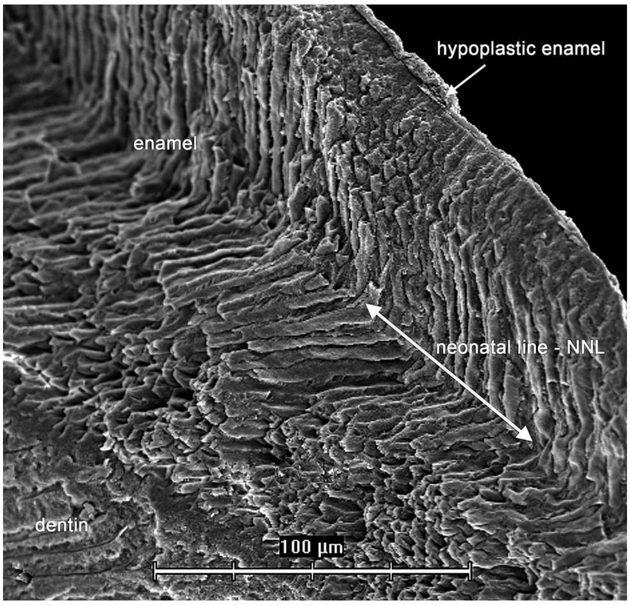

Fig. 5. SEM image of a longitudinal section of enamel showing a region of aprismatic enamel and hypoplasia with irregular surface and depressions (arrow) and enamel prisms in both thickness turning direction at the neonatal line (arrows). The direction of the prisms in prenatal and postnatal enamel differs (neonatal tooth in localization 81, case 2).

were distinguished by irregular surfaces and depressions (Fig. 4).

The neonatal line separating the layer of prenatal enamel from postnatal enamel was observed in some specimens as discrete structure (Fig. 5). This neonatal line was composed of irregular enamel prisms with disordered arrangement (Fig. 6).

The enamel prisms were interconnected by small amounts of interprismatic substances. In some regions, the enamel prisms were partially absent (Fig. 6). Cross-striations were visible as lines traversing the enamel prisms at right angles to their long axes (Fig. 7). The enamel-dentin junction was characterized by various types of prisms. The course of the prisms was vertical to the enamel-dentin junction. Interprismatic substances without enamel prisms were visible in some areas (Fig. 7). In some specimens, small bowl-like depressions in dentin were present with embedded enamel prisms (Fig. 7).

The mantle dentin (the outer layer) of the neonatal teeth presented a typical tubular pattern. In the specimens, dentinal tubules with peritubular dentin and less mineralized intertubular dentin were present. The dentin had a raised zone of peritubular dentin, and in many areas, their lumen appeared to be partially or completely occluded (Figs. 8, 9). Some dentinal tubules were extended into the enamel. Dentin near the enamel-dentin junction had a visible Y-shaped branching of dentinal tubules (Fig. 10). On the pulpal side of the dentin, dentinal tubules with residues of odontoblasts and calcospherites were present. This layer of dentin had a globular character (Fig. 11).

Discussion

Primary teeth have a long prenatal and postnatal developmental period. The primary incisors start developing at approximately 6–7 intrauterine weeks and continue for a few months after birth. The onset of the

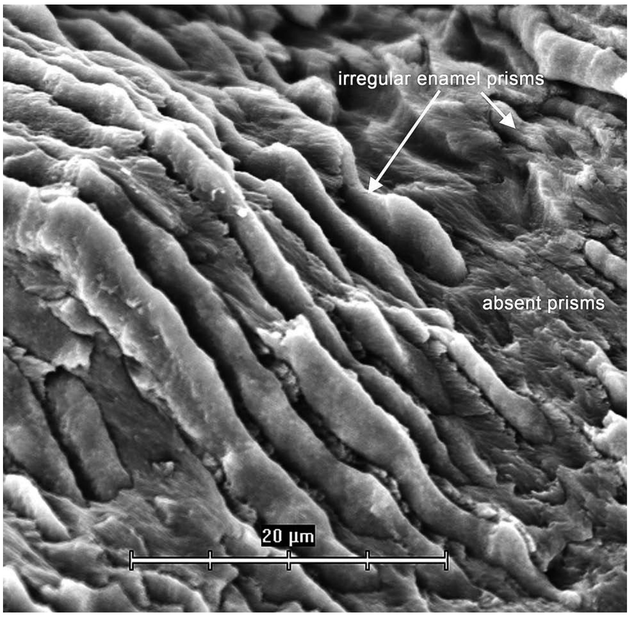

Fig. 6. SEM image of neonatal line in high magnification (neonatal tooth in localization 81, case 3). The neonatal line is composed of irregular enamel prisms with disordered arrangement. The enamel prisms are partially absent.

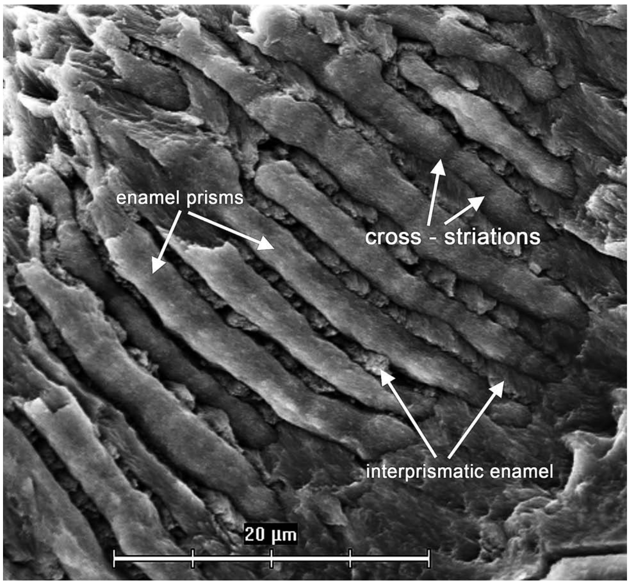

Fig. 7. SEM image of enamel near the enamel-dentin junction sectioned longitudinally in high magnification (neonatal tooth in localization 81, case 2). The enamel prisms are joined together by calcified interprismatic enamel (arrows). SEM image of enamel showing cross-striations (arrows).

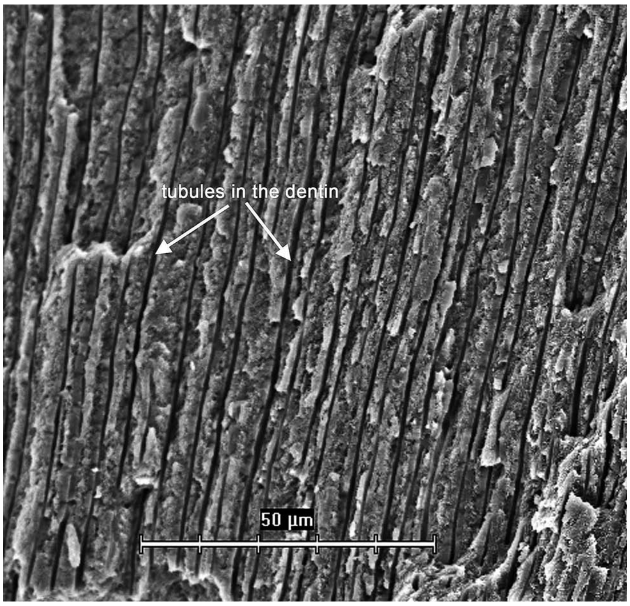

Fig. 8. SEM image of longitudinally sectioned dentin with dentinal tubules (neonatal tooth in localization 71, case 1).

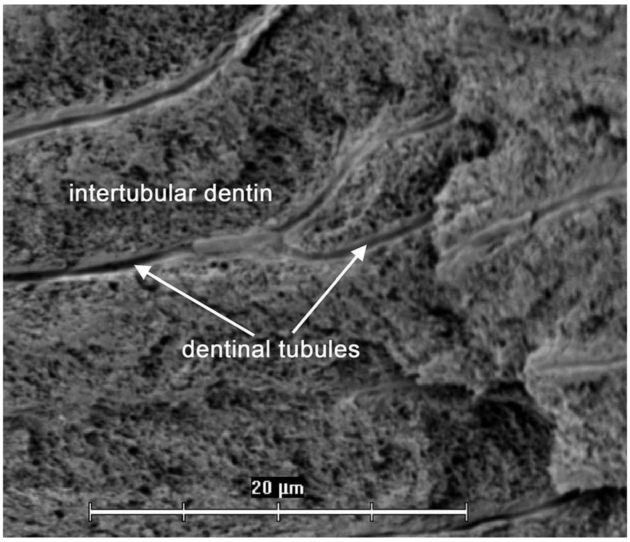

Fig. 10. SEM image of a longitudinal section of dentin near the enamel-dentin junction showing Y-shaped branching of dentinal tubules (arrows), (neonatal tooth in localization 71, case 1).

calcification process in primary teeth starts at 14 intrauterine weeks and continues during the first year of life (Avery and Chiego, 2006). It has been shown that the primary incisors have only initial mineralization at full-term birth (Avery and Chiego, 2006). Under normal conditions, the lower primary first incisors erupt at gestational age 40 + 30 weeks (chronological age 6–7 months). In the current study, the lower primary incisors erupted at mean gestational age 33 + 6 weeks (mean chronological age 5.3 weeks). It is evident that the time essential for development and the time of eruption of primary incisors was significantly shortened. The current macroscopic and SEM examination of prematurely erupted teeth of preterm neonates revealed deficiently mineralized and hypoplastic enamel covering all clinical crowns. The examined teeth in this study showed

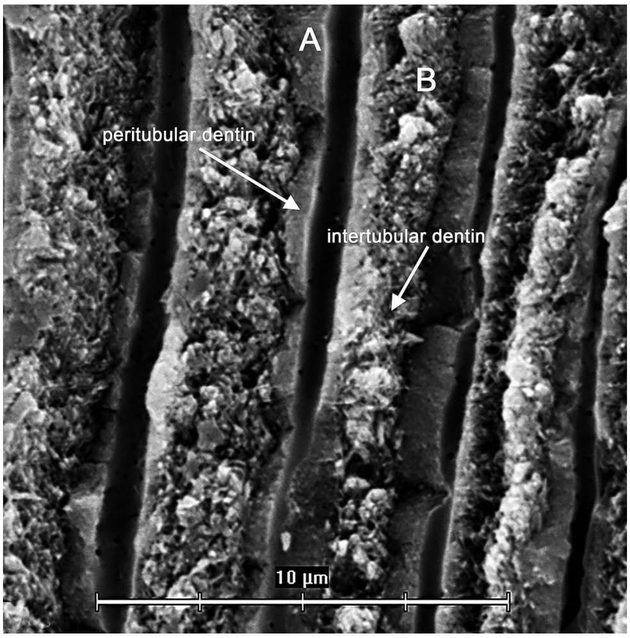

Fig. 9. SEM image of dentinal tubules in high magnification (neonatal tooth in localization 71, case 1). Peritubular dentin (arrow) is more mineralized than intertubular dentin (arrow).

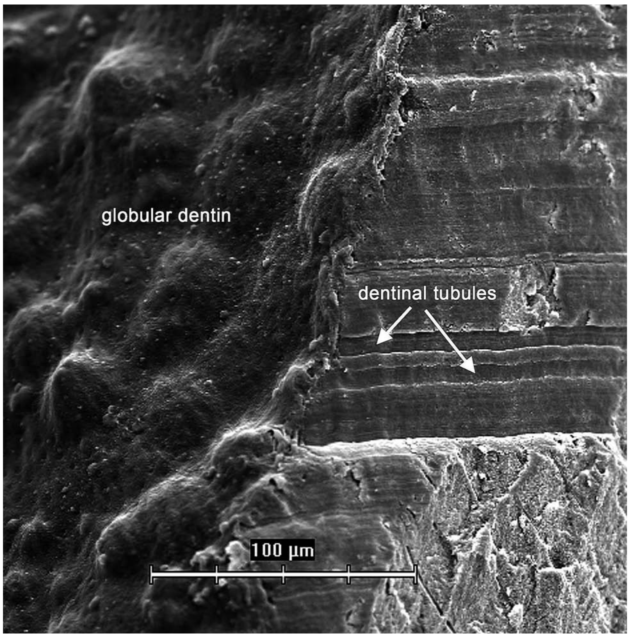

Fig. 11. SEM image of globular dentin on the pulpal side with calcospherites. The calcospherites are hemispheric in shape with dentinal tubules passing through (neonatal tooth in localization 81, case 3).

premature eruption and premature enamel mineralization.

Previous SEM observations of natal and neonatal teeth have shown that the enamel of these teeth is hypoplastic, reduced in thickness and hypomineralized (Jasmin and Clerqeau-Guerithault, 1991; Stamfelj et al., 2010). These findings are consequences of prematurely arrested amelogenesis. Amelogenesis occurs in two stages – matrix formation and initial mineralization – followed by a maturation phase. The initial enamel mineralization of the primary mandibular central incisors is completed before birth, and its maturation is definitive at approximately 2.5 months postnatally (Avery and Chiego, 2006). The enamel of neonatal teeth of premature neonates is therefore extremely immature. The honeycomb appearance in the SEM investigation is typical of this immature enamel due to the impressions of the Tomes' processes of ameloblasts (Ruschel et al., 2010). In contrast, in some specimens, a visible aprismatic layer of enamel was observed. The aprismatic enamel layer occurs as a result of the absence of Tomes' processes from ameloblasts in the first and final stages of enamel depositions. The nonprismatic enamel layer creates an outer 20–100 μm of enamel on newly erupted primary teeth (Berkowitz et al., 2009). In aprismatic enamel, enamel crystallites are all aligned at right angles to the surface and parallel to each other. The surface layer is more highly mineralized than the rest of the enamel because of the absence of prism boundaries, where more organic material is located (Berkowitz et al., 2009). The thickness of aprismatic enamel is variable. A very thin layer of aprismatic enamel has also been reported to be present in the first enamel formed at the enamel-dentin junction (Stamfelj et al., 2010).

The SEM evaluation revealed enamel with incremental lines of enamel formation and prism cross-striation. This finding is in agreement with Farsi and Ahmed (2014). In the enamel of the prematurely erupted teeth from preterm neonates, a neonatal line was visible. The neonatal line is formed in all primary teeth and first permanent molars at birth and is described as a hypomineralized structure seen as a step-like rupture in the enamel matrix (Sabel et al., 2008). The neonatal line represents a growth pause in the enamel and is seen as a biological mark of live birth (Janardhanan et al., 2011). According to Sabel et al. (2008), the neonatal line is an optical phenomenon produced due to alterations in the dimension, direction and degree of mineralization of enamel prisms caused by biological stress imposed by the sudden change from intrauterine to extrauterine life. The position of neonatal line correlates with gestational age (Skinner and Dupras, 1993). Noren (1983) found the localization of neonatal line closer to the enamel-dentin junction in the primary teeth of children delivered preterm than that in full-term children. The enamel formed prior to the neonatal line and enamel-dentin junction is called prenatal enamel. Postnatal enamel represents the enamel between the neonatal line and the surface. The rate of postnatal enamel formation varied between 2.5 and 4.5 μm/day (Birch and Dean, 2009). Usually, 6–10 days of postnatal life are necessary to form prenatal enamel. Prenatal enamel appears to have a more homogenous structure compared with postnatally formed enamel. In the current study, the neonatal line was noticed in the teeth that erupted 42 days after extremely premature birth.

The dentin-enamel junction represents a unique interface between two very different mineralized substances – one originating from the ectoderm and the other from the ectomesenchyme. There was typical Y-shaped branching of dentinal tubules. The dentin tissue of the prematurely erupted teeth presented a typical tubular pattern. Some investigators have observed similar findings (Anegundi et al., 2002; Ruschel et al., 2010). Farsi and Ahmed (2014) observed normal dentin structure in natal and neonatal teeth, with some opened dentinal tubules showing remnants of odontoblastic processes. The dentin layer on the pulpal side had a high amount of interglobular dentin. This finding is in agreement with the observations of Brandt et al. (1983). In non-prematurely erupted teeth, this dentinal layer separates the mantle and circumpulpal dentin. In the present specimens, circumpulpal dentin was not developed. Interglobular dentin is formed as a result of the initial rapid mineralization of dentin. Initially, dentin is mineralized by the fusion of numerous calcospherites that represent spherical foci of hydroxyapatite. This type of mineralization is often called globular mineralization. The matrix between the fusing calcospherites is often hypomineralized. These areas are called interglobular dentin. Increased amounts of interglobular dentin can be formed because of vitamin D deficiency, which is typical of preterm infants (Avery and Chiego, 2006).

Conclusion

Premature eruption of primary teeth is an extremely rare situation in prematurely delivered neonates. This study revealed some interesting macroscopic and SEM findings. The enamel was hypoplastic and in parts had a honeycomb appearance, the dentinal tubules near the dentin-enamel junction had Y-shaped branching, interglobular dentin was noticed together with the absence of circumpulpal dentin.

References

Al-Sayagh, G. Dh., Quasim, A. A., Al-Rawi, B. A. (2008) The effect of premature birth on the primary dentition. *Al-Rafidain Dent. J.* **8**, 18-22.

Anderson, R. A. (1982) Natal and neonatal teeth. Histologic investigation of two black females. *ASDC J. Dent. Child.* **49**, 300-303.

Anegundi, R. T., Sudha, P., Kaveri, H., Sadanand, K. (2002) Natal and neonatal teeth: a report of four cases. *J. Indian Soc. Pedod. Prev. Dent.* **20**, 86-92.

Avery, J. K., Chiego, D. J. (2006) *Essentials of Oral Histology and Embryology. A Clinical Approach.* Mosby Elsevier, St. Louis, MO.

Basavanthappa, N. N., Kagathur, U., Basavanthappa, R. N., Suryaprakash, S. T. (2011) Natal and neonatal teeth: a retrospective study of 15 cases. *Eur. J. Dent.* **5,** 168-172.

Berkowitz B. K. B., Holland G. R., Moxham B. J. (2009). *Oral Anatomy, Histology and Embryology.* 4th edition, Elsevier Limited. 398 p.

Bigeard L., Hemmerle J., Sommermater J. I. (1996) Clinical and ultrastructural study of natal tooth enamel and dentin assessment. *ASDC J. Dent. Child.* **63**, 23-31.

Birch, W., Dean C. (2009) Rates of enamel formation in human deciduous dentition. *Front. Oral Biol*. **13**, 116-120.

Bodh, M, Jain, M, Dutta, S, Namdev, R, Kumar, A. (2015) Preterm birth complications on oro-dental structures: an updated review. *J. Oral Health Comm. Dent.* **9**, 85-89.

Brandt S. K., Shapiro S. D., Kittle P. E. (1983). Immature primary molar in the newborn. *Pediatr. Dent*. **5,** 210-213.

Bulut, G., Bulut, H., Ortac, R. (2019) A comprehensive survey of natal and neonatal teeth in newborns. *Niger J. Clin. Paed.* **22**, 1489-1494.

Cizmeci, M. N., Kanboruglu, M. K., Uzun, F. K., Tatli, M. M. (2013) Neonatal tooth in a preterm infant. *Eur. J. Pediatr.* **172**, 279.

Cunha, R. F., Boer, F. A. C., Torriani, D. D., Frossard, W. T. G (2001) Natal and neonatal teeth: review of the literature. *Pediatr. Dent.* **23**, 158-162.

Farsi, D. J., Ahmed, M. M. (2014) Natal and neonatal teeth. *Saudi Med. J.* **35**, 499-503.

Federation Dentaire Internationale Working Group (1992) A review of developmental defects of the enamel dental index (DDE index). Commission on Oral Health, Research & Epidemiology. *Int. Dent. J.* **42**, 411-426.

Hebling, J., Zuanon, A. C. C., Vianna, D. R. (1997) Dente natal – a case of natal teeth. *Odontol. Clin.***7**, 37-40.

Janardhanan, M., Umadethan, B., Biniraj, K. R., Vino Kumar, R. B., Rakesh, S. (2011) Neonatal line as a linear evidence of live birth. Estimation of postnatal survival of a new born from primary tooth germ. *J. Forensic Dent. Sci.* **3**, 8-13.

Jasmin, J. R., Clerqeau-Guerithault, S. (1991) A scanning electron microscopic study of the enamel of neonatal teeth. *J. Biol. Buccale* **19**, 309-314.

Macheswari, N. U., Kumar, B. P., Kumaran, S. T. (2012) "Early baby teeth". Folklore and facts. *Pharm. Bioallied Sci.* **4**, S329-333.

Markou, I., Kana, A., Arhakis, A. (2012) Natal and neonatal teeth: a review of the literature. *Balk. J. Stom.* **16**, 132-140.

Massler, M., Savara, B. S. (1950) Natal and neonatal teeth: a review of 24 cases reported in the literature. *J. Pediatr.* **36**, 349-359.

Merglova, V. (2018) Nonsyndromic extremely premature eruption of teeth in preterm neonates – report of three cases and review of the literature. *Case Reports in Perinatal Medicine*, 20180006, ISSN (Online) 2192-8959, DOI://doi.org/10.1515/crpm – 2018 – 0005.

Nandikonda, S., Jairamdas, N. D. K. (2010) Natal teeth with cleft palate: a case report. *Int. J. Contemp. Dent.* **1**, 124-126.

Noren J. G. (1983). Enamel structure in deciduous teeth from low-birth-weight infants. *Acta Odontol. Scand.* **41**, 355-362.

Paulsson, L., Bondemark, L., Söderfeidt, B. (2004) A systematic review of the consequences of premature birth on palatal morphology, dental occlusion, tooth-crown dimensions, and tooth maturity and eruption. *Angle Orthod.* **4**, 269-279.

Rocha, J. G., Sarmento, L. C., Gomes, A. M. M., do Valle, M. A. S., Dadalto, E. C. V. (2017) Natal tooth in preterm newborn: a case report. *Rev. Gaúch. Odontol.* **65**(2), http://dx.doi.org/10.1590/1981-86372017000200010335

Ruschel, H. C., Spiguel, H. H., Piccinini, D. D., Ferreira, S. H., Feldeus, E. G. (2010) Natal primary molar: clinical and histological aspects. *J. Oral Sci.* **52**, 313-317.

Sabel, N., Johansson, C., Künisch, J., Robertson, A., Steiniger, F., Norén, J. G., Klinberg, G., Nietzsche, S. (2008) Neonatal lines in the enamel of primary teeth – a morphological and scanning electron microscopic investigation. *Arch. Oral Biol.***10**, 954-963.

Samuel, S. S., Ross, B. J., Rebekah, G., Koshy, S. (2018) Natal and neonatal teeth: a tertiary care experience. *Contemp. Clin. Dent.* **9**, 218-222.

Skinner, M., Dupras, T. (1993) Variation in birth timing and location of the neonatal line in human enamel. *J. Forensic Sci.* **38**, 1383-1390.

Stamfelj, J., Cvetko, E, Gaspersic, D. (2010) Size, ultrastructure, and microhardness of natal teeth with agenesis of permanent successors. *Ann. Anat.* **192**, 220-226.

Tay W. M. (1970) Natal canine and molar in an infant. Report of a case. *Oral Surg. Oral Med. Oral Pathol.* **29**, 598-602.

Toromanovic, A., Tahirovic, H. (2009) Congenital hypothyroidism associated with neonatal tooth, Pierre-Robin syndrome and congenital heart defect. *J. Pediatr. Endocrinol. Metab.* **22**, 881-882.

Verma, K. G., Verma, P., Singh, N., Sachdeva, S. K. (2013) Natal tooth in a seven months premature male child. A rare case report. *Arch. Int. Surg.* **3**, 182-184.

Wang, Ch., Lin, Y. T., Lin, Y. T. J. (2017) A survey of natal and neonatal teeth in newborn infants. *J. Formos. Med. Assoc.* **116**, 193-196.

World Health Organization (2004) *International Classification of Diseases and Related Health Problems.* 10th revision. World Health Organization, Geneva.