

Dental observations of low birth weight infants

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Abstract

The purpose of this study was to investigate the incidence and location of tooth developmental disorders (mainly enamel hypoplasia and discolored teeth) which are often seen in premature babies.

The subjects were 52 infants from two to five years of age with complete deciduous dentition (32 AFD and 20 SFD babies). Enamel hypoplasia was seen in 26.9% and discolored teeth in 1.9%. The incidences showed no significant differences between the AFD and SFD groups. Incidences were high in babies in the uterus for 30 to 34 weeks and weighing less than 2,100g. on delivery. Enamel hypoplasia was found in both the posterior and anterior areas in 80.0% and only in the anterior area in 20.0%. Discoloration was distributed throughout the dentition. Hematological findings in subjects with dental abnormalities included low serum Ca values and high total bilirubin values.

Introduction

Enamel hypoplasia and discolored teeth are found in the teeth of premature babies, especially in their primary teeth.¹ Possible causes include nutritional and metabolic disorders, hypoxia during delivery or prolonged neonatal jaundice. Although there are numerous clinical reports concerning abnormal morphology and incomplete development of the primary teeth, very few basic research works concerning the teeth of premature babies have been reported.

The purpose of this clinical investigation is to study the morphologic pattern and possible etiologic factors of enamel hypoplasia and discolored teeth in relation to systemic disease.

Methods and Materials

A total of 52 babies including 32 AFD (appropriate-for-dates infant) and 20 SFD (small-for-dates infant)

were selected for this study. Their mean birth weight and gestation were 1,612g. (ranged 885 to 2,420g.) and 32 weeks (ranged 22 to 44 weeks) respectively. The patients ranged in age from two to five years.

Dental analysis: The dental examination consisted of: (1) a gross examination with dental explorer and mouth mirror. A detailed record was made for the exact position and extent of the enamel hypoplasia. Macroscopic observation was made for discolored teeth; (2) Intra-oral roentgenograms, these were taken on each patient. The roentgenograms made it possible to study the incidence and nature of the hypoplastic defects; and (3) Plaster models. These were reserved for permanent record and were used for more detailed studies of the defects.

Medical analysis: for the analysis of the data, the hospital records in the department of neonatology were examined. Information obtained from these records, included the course of pregnancy and delivery, hematological tests (serum P values, serum Ca values, total bilirubin values) weight of the infant at birth and the clinical course during the neonatal period.

Results

1. Prevalence of enamel hypoplasia and discolored teeth.

As shown in Figure 1, there was enamel hypoplasia in 14 out of 52 (26.9%) and discolored teeth in one (1.9%) of the 52 subjects. Enamel hypoplasia was seen in 11 of the 32 AFD babies (34.4%) and enamel hypoplasia or discolored teeth were seen in four of the 20 SFD babies (20.0%).

There were no significant differences in the incidence of enamel hypoplasia and discolored teeth between the two groups. The incidence in subjects less than 34 weeks in the uterus was 12 out of 29 cases (41.4%), and three out of 23 (13.0%) in those in the uterus for more than 34 weeks. This was a significant

difference, with the incidence much higher for those less than 34 weeks in the uterus. There were also high incidences in babies weighing less than 2,100g. on delivery.

2. Relation between location of enamel hypoplasia and discolored teeth and maternal history.

The enamel hypoplasia observed was found in both the anterior and posterior areas in 12 out of 15 subjects (80.0%), while it was limited to the anterior area in three (20.0%). Enamel hypoplasia was most apt to occur in the A and B locations, followed by the D, A, D and B locations in that order. The lowest rate of incidence of enamel hypoplasia was in the C location. Discolored teeth were found equally in all locations (Table 1).

The items noted most prominently during pregnancy in the mothers were nutritional disorders and toxemia of pregnancy (Table 2).

3. Hematological tests and neonatal diseases.

The total bilirubin values tended to be somewhat higher than normal. The serum Ca values were low in most cases, but the serum P values were generally within the normal ranges. Among the neonatal diseases, six subjects had hyperbilirubinemia (40.0%), five respiratory distress (33.3%) and four hypokalemia (26.7%) (Table 3).

Discussion

The appearance and growth of the tooth germ of the primary teeth starts when the fetus is about six

Table 1. Prevalance of Enamel Hypoplasia and Discolored Teeth.

	E	D	C	B	A
Maxilla	5(1)	10(1)	4(1)	12(1)	12(1)
Mandible	4(1)	8(1)	5(1)	8(1)	9(1)
Total	9(2)	18(2)	9(2)	20(2)	21(2)

	A	B	C	D	E
Maxilla	12(1)	12(1)	4(1)	10(1)	6(1)
Mandible	9(1)	8(1)	6(1)	9(1)	5(1)
Total	21(2)	20(2)	10(2)	19(2)	11(2)

() Discolored Teeth

weeks gestational age and continues through the proliferation, histodifferentiation, morphodifferentiation, apposition and calcification stages. There are various effects on the teeth due to such factors as; nutritional disorders or hypoxia in the mother during calcification, apparent death as a complication during delivery, systemic metabolic disorders in the babies after delivery, and the use of certain types of antibiotics.²⁻⁶

Typical abnormality was limited to one third of the cutting margin of each tooth in almost all cases, and there were wave-like abnormalities of enamel formation. In our cases, there were no significant differences in the incidence of enamel hypoplasia between the AFD and SFD babies. This agreed with the results of Grahnen et al. who found that there was a significant

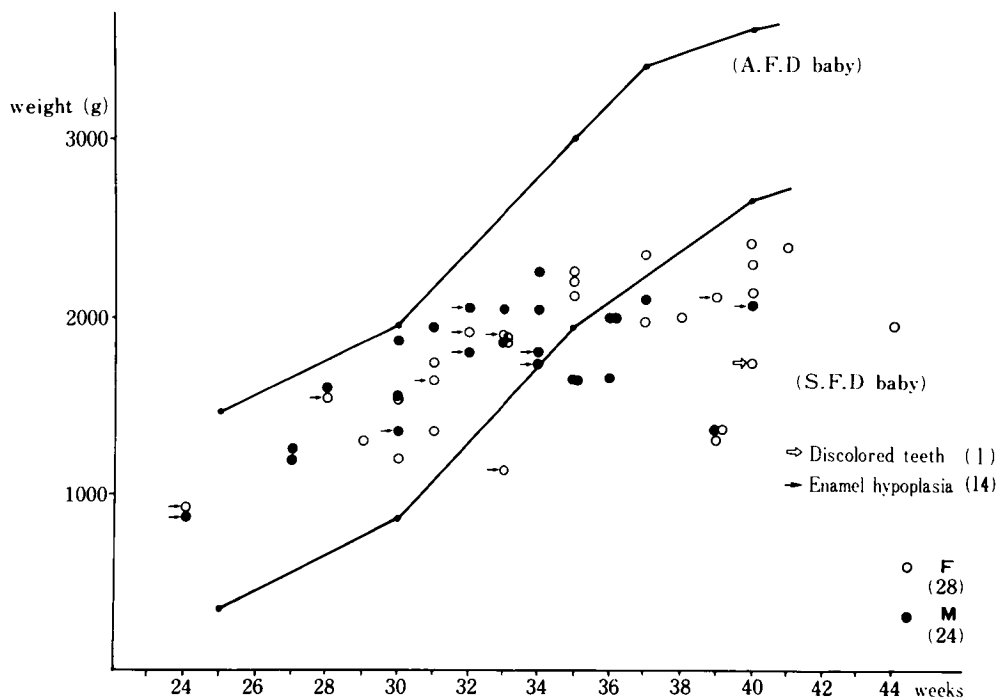


Figure 1. Intrauterine period and birth weight.

Table 2. Location of Enamel Hypoplasia and Discolored Teeth and Maternal History.

Case	Intrauterine periods (W)	Body weight at birth	Location	Course of pregnancy
1. (M)	24	885	ED BA AB DE ED BA AB DE	toxemia of pregnancy
2. (F)	24	930	BA AB BA AB	
3. (F)	33	1130	BA AB CD	nutritional disturbance (4-5M)
4. (F)	30	1350	D BA AB D D BA AB D	nutritional disturbance (2-4M)
5. (M)	31	1350	D BA AB D D BA AB D	breech-presentation (asphyxia)
6. (F)	28	1550	D BA AB D A A	
7. (F)†	40	1740	EDCBA ABCDE EDCBA ABCDE	toxemia of pregnancy, anemia
8. (F)	31	1750	BA AB BA AB	threatened abortion (3-4M)
9. (M)	34	1750	EDCBA ABCDE EDCBA ABCDE	nutritional disturbance (4-6M)
10. (M)	32	1800	CB BC C C	nutritional disturbance (4-6M)
11. (M)	34	1800	D BA AB DE DC CDE	nutritional disturbance (4-6M)
12. (F)	32	1920	EDCBA ABCDE EDCBA ABCDE	threatened abortion (3-4M)
13. (M)	32	2050	D BA AB D D BA AB D	anemia (3-8M), nutritional disturbance (4-6M)
14. (F)	40	2070	EDC CDE C C	toxemia of pregnancy
15. (F)	39	2110	ED A A DE ED DE	nutritional disturbance (4-10M), toxemia of pregnancy

†Discolored Teeth

difference in enamel hypoplasia between intrauterine nutritional deficiency and normal groups.⁶

Two thirds of Ca and P contents in the whole body of the fetus are accumulated during the latter three months of pregnancy. Therefore, premature babies have missed these accumulations. In spite of the fact that rapid growths, especially accumulations of Ca and P in the skeletal system, are required of premature babies, Ca deposition in the bone is low, and the shorter the fetal period, the worse is the bony mineralization during several months after birth. For this reason, compared with mature infants, the premature babies show thin subcutaneous corticalis in radiograms and high serum Aλ-P biochemically. If birth coincides with the calcification period of enamel, there is sufficient possibility of causing disturbance in this site.

Purvis et al. reported that enamel hypoplasia was observed in 63 out of 112 babies with a history of tetany during the neonatal period (56.0%).⁷ In our cases, blood tests on 15 babies with enamel hypoplasia or discolored teeth showed serum P values generally within the normal range, while the serum Ca values tended to be lower in cases of enamel hypoplasia. Total bilirubin values averaged 9.81 ± 3.00 mg/dl, which was significantly higher than the value of 5.02 ± 0.71 mg/dl in subjects with normal teeth.

With respect to the relation between enamel hypoplasia and hypoxia, Via et al. reported that enamel hypoplasia appeared in the newborn when mother rats had hypoxia during the latter part of the period of gestation.⁸ Clinically, Grahnen et al. found that there was a high incidence of enamel hypoplasia in cases of apparent death during delivery.⁹

Table 3. Hematological Tests and Neonatal Diseases.

Case	Total Bilirubin(mg/dl) ^a	Ca(mg/dl) ^b	P(mg/dl) ^c	Neonatal Diseases
1. (M)	12.15	4.9	6.1	anemia, hypokalemia, rickets
2. (F)	7.34	5.4	6.9	anemia, hypokalemia, rickets
3. (F)	11.10	9.1	5.5	hyperbilirubinemia, respiratory distress
4. (F)	12.15	9.0	6.7	hyperbilirubinemia
5. (M)	8.41	7.5	9.0	respiratory distress
6. (F)	12.19	8.8	7.0	hyperbilirubinemia
7. (F)†	4.00	8.8	4.0	down syndrom, tetralogy of Fallot
8. (F)	10.80	6.0	6.1	hyperbilirubinemia, respiratory distress
9. (M)	8.57	5.4	8.0	hypokalemia, respiratory distress
10. (M)	17.70	6.8	5.5	hyperbilirubinemia
11. (M)	8.04	4.9	8.5	hypokalemia
12. (F)	3.89	6.6	6.0	aspiration pneumonia
13. (M)	9.54	7.5	7.9	respiratory distress
14. (F)	8.41	9.4	3.2	hypoparathyrodism
15. (F)	12.53	10.1	5.9	hyperbilirubinemia

†Discolored Teeth Normal range values: ^aTotal bilirubin, 3.5-8.0 mg/dl; ^bCa, 9.4 ± 0.8 mg/dl; ^cP, 6.8 ± 0.6 mg/dl.

Enamel hypoplasia was also observed in the one case of apparent death among our 52 subjects. Discolored teeth appeared in the form of yellow bands on all teeth.

According to previous reports, discolored teeth generally show a close correlation with such factors as prematurity and prolonged icterus during the neonatal period. However, there is no consensus concerning the cause of this.

There have been no noteworthy data obtained from consultations with the mothers concerning the drugs used by them during pregnancy. Also, there was not always agreement with respect to the correlation between the mother's past medical history and the location of abnormalities in cases of enamel hypoplasia and discolored teeth.

Conclusion

Dental observations were performed on 52 infants, from two to five years of age with complete deciduous dentition, who had been cared for as premature babies in the Neonatal Department of the Kobe Children's Hospital.

1. Among the 52 babies, 32 were AFD and 20 SFD. The number of weeks in the uterus ranged from 22 to 44 and the body weight at birth was a minimum of 885g. and a maximum of 2,420g.
2. Enamel hypoplasia and discolored teeth showed high incidences in those less than 34 weeks in the uterus and weighing less than 2,100g. on delivery. The incidence of enamel hypoplasia was 14 out of 52 subjects (26.9%) and that of discolored teeth

was one (1.9%). There were no significant differences in the incidences between the AFD and SFD babies.

3. Enamel hypoplasia was located in both the anterior and posterior areas in 12 out of 52 cases (80.0%) and only in the anterior area in three cases (20.0%). Discolored teeth were found in only one of the 52 cases. Discoloration was distributed throughout the dentition.
4. In hematological tests, the serum Ca values were low in most cases, but the serum P values were generally within the normal ranges. Total bilirubin values were high in cases where abnormalities were observed in the teeth.

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