International Journal of Paediatric Dentistry 2006; **16:** 213–217

A case of Coffin–Lowry syndrome with premature exfoliation of primary teeth

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Summary. We present a case of a 5-year-old boy with premature exfoliation of primary teeth. All eight primary incisors had exfoliated by the age of 3 years, and three canines and one primary first molar were subsequently lost when he was 4 years old. None of the exfoliated teeth exhibited caries. The boy also showed characteristic facial changes, tapering of the fingers, and mental and motor retardation. Based on these findings, he was diagnosed as having Coffin–Lowry syndrome. Premature exfoliation of primary teeth in Coffin–Lowry syndrome has been described in a few reports. This manifestation of the disease would be helpful for diagnosis at an early stage as those previous reports suggested.

Introduction

Coffin–Lowry syndrome (CLS; Mendelian Inheritance in Man #303600) is an X-linked hereditary disease where affected individuals exhibit a characteristic facial appearance, various skeletal anomalies, short stature, and mental retardation. CLS was first reported by Coffin *et al*. [1] and Lowry *et al*. [2], independently. Later, Temtamy *et al*. determined that they were describing the same disease [3]. Patients with CLS exhibit a characteristic facial appearance: marked hypertelorism, prominent supraorbital ridge, antimongoloid slant of eyes, a hypoplastic midface, a large nose with broad base, short upturned nostrils, and enlarged protuberant ears [1–8]. Bulbous tapering fingers are also characteristic [5].

Findings in the oral cavity associated with CLS include a large mouth with full and out-turned lips, a high and narrow palate, hypodontia, microdontia, delayed tooth eruption, and a tongue with a deep midline furrow [1–8]. Day *et al*. [9] reported a case of a 2-year-old boy with CLS who exhibited premature loss of teeth and this clinical manifestation, if universal to CLS, would be helpful in diagnosis at an early stage.

It has been demonstrated that CLS is associated with a mutation in a gene located in the Xp22·2 region and encoding PSK2, a growth factor-regulated protein kinase [10–12]. Diagnosis through genetic testing is thus feasible, although not simple, and clinical findings still play an important role in diagnosis.

We report a case of a boy exhibiting premature exfoliation of his primary teeth who was later diagnosed with CLS.

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Case report

A 10-month-old boy was referred by his paediatrician to the dental clinic for oral examination. His mother was concerned about his anterior teeth which had erupted earlier than expected. He had delayed motor function, prominent ears, and thick and out-turned lips, and held his mouth open (Fig. 1). According to his mother, the lower primary central incisors (71, 81) had erupted at 4 months of age, and the upper primary central incisors (51, 61) had erupted at 6 months. There were no abnormal findings of the erupting eight teeth (52, 51, 61, 62, 72, 71, 81, 82) or gingival soft tissue.

Figure 2 shows the appearance of the boy's oral cavity at the age of 5 years and 2 months. All of the anterior teeth (52, 51, 61, 62, 71, 72, 81, 82) had exfoliated one by one by the age of 3 years, and three canines (53, 63, 83) and the upper right primary first molar (54) followed when he was 4 years old. These teeth did not exhibit caries. These teeth showed elongation and root exposure prior to exfoliation. Root resorption progressed rapidly and

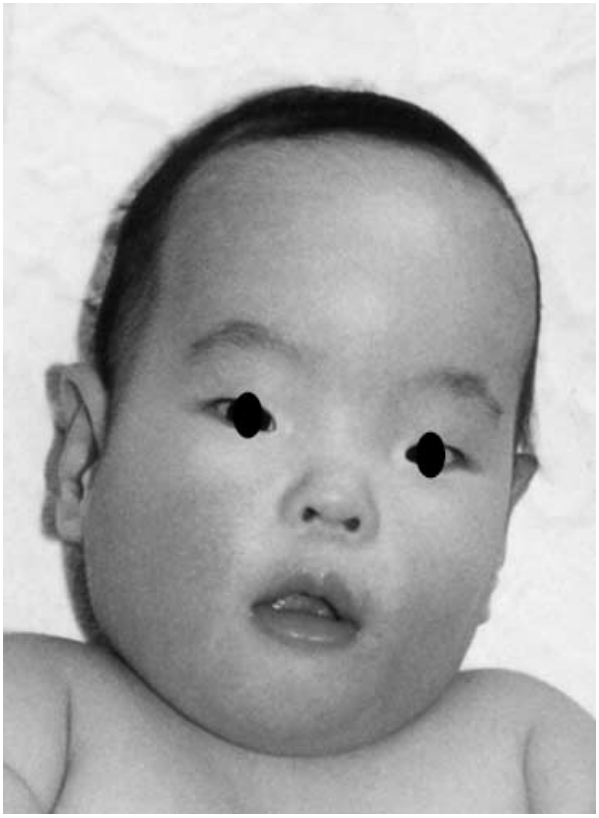

Fig. 1. Facial photograph at the age of 10 months.

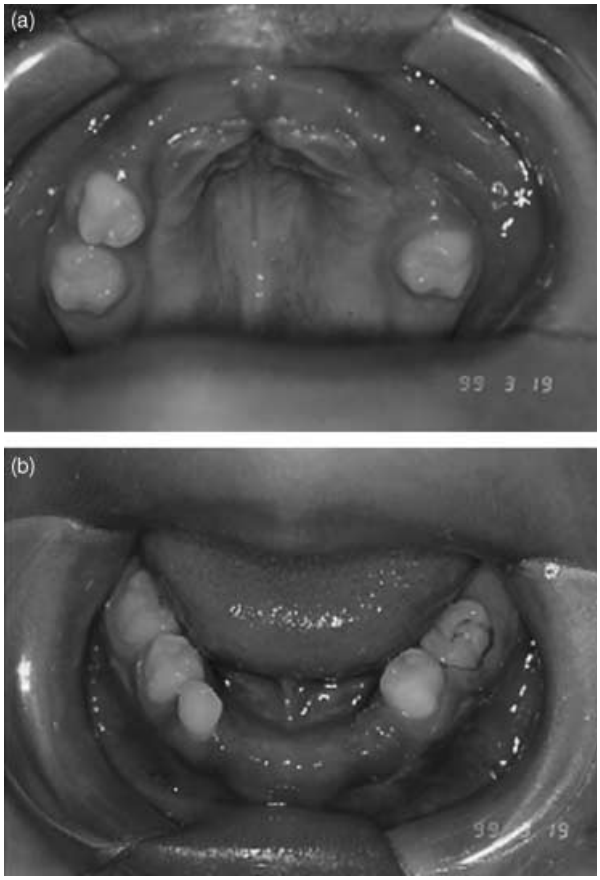

Fig. 2. Oral photographs at the age of 5 years and 2 months.

these teeth exfoliated. Only seven primary molars and one primary canine remained at the time of examination. Facial photograph showed an antimongoloid slant of the eyes, hypertelorism, a hypoplastic midface, enlarged protuberant ears, upturned nostrils, a large nose with a broad base, thick and out-turned lips, and a pouting open mouth (Fig. 3). Tapering fingers were also apparent (Fig. 4). Blood analysis revealed that alkaline phosphatase and calcium levels were within the normal range. Based on these clinical findings, he was diagnosed with CLS.

At the age of 8 years and 2 months, only three primary molars (55, 75, 85) remained. Eleven permanent teeth (11, 21, 31, 41, 32, 42, 33, 43, 26, 36, 46) erupted at normal timing, but the upper right permanent first molar (16) had not erupted at the age of eight. The upper permanent central incisors exhibited increased mobility and some gingival inflammation (Fig. 5). All of developing permanent teeth, except the four third molars, were visible via panoramic radiography. Radiographs also showed that the permanent upper central incisors had short roots (Fig. 6a), and horizontal alveolar bone loss was observed around the lower incisors (Fig. 6b). The permanent lateral incisors were peg-shaped and exhibited delayed formation. The size of each primary and permanent tooth crown was measured and the findings are presented in Table 1. All deciduous and permanent teeth were smaller than would be expected for a normal Japanese boy [13].

The boy was instructed on appropriate oral hygiene measures and applied fluoride every 3 months. To date, he has not experienced dental caries. Also, scaling measures were instituted regularly, but it was not sufficient to prevent alveolar bone loss around lower incisors. Early on in treatment, when the boy was 3 years old, we had attempted to fit a removable space-maintaining appliance. It could not be used effectively, however, following exfoliation of the primary teeth.

Discussion

The facial and skeletal findings in this 5-year-old boy supported a diagnosis of CLS, the characteristics

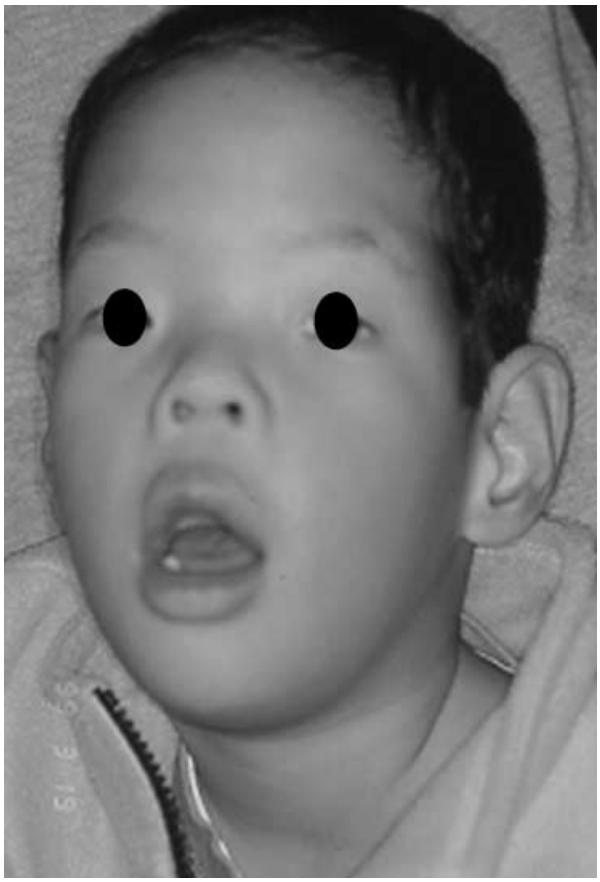

Fig. 3. Facial photograph at the age of 5 years and 2 months.

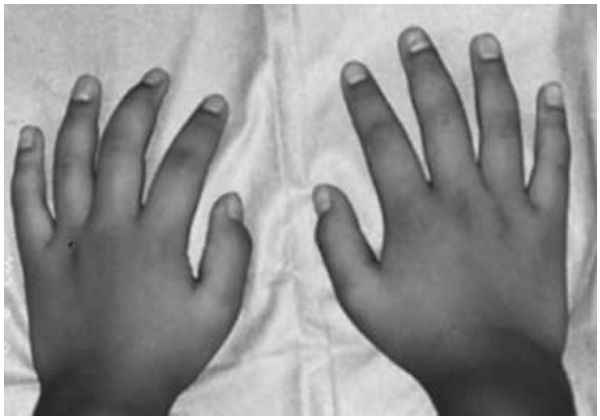

Fig. 4. Hands and fingers showing tapering.

of which have been previously described [1–9,14,15]. These findings were not distinct during infancy, creating difficulties in diagnosis at a young age, and distinguishing from Williams syndrome [4]. With increasing age, however, they did become more marked.

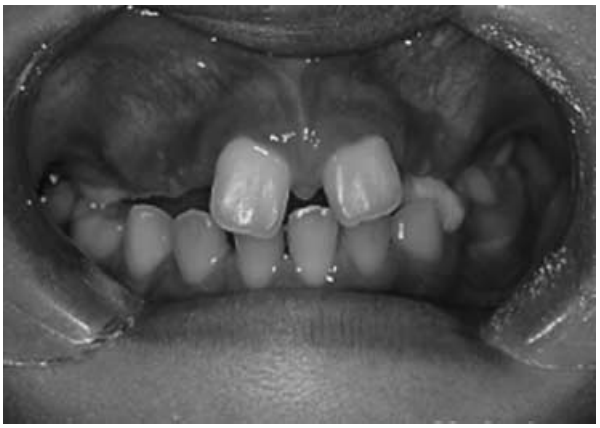

Fig. 5. Oral photograph at the age of 8 years and 2 months.

Common oral manifestations of CLS include thick lips, a pouting open mouth, hypodontia, reduced crown form, a tongue with a deep midline furrow, and a narrow palate [5–8]. In the current case, neither hypodontia nor a tongue with a deep midline furrow was present. It has been reported that 80% of affected males have absent lower permanent incisors or reduced crown form of lower permanent incisors [7]. Early exfoliation of primary teeth, as apparent in this case, has been reported in only a few cases previously [9,14]. This may be because in other cases, reports were made after the mixed dentition stage, and thus the exfoliation timing of deciduous teeth could not be determined [6–8].

Hartsfield *et al*. reported a case of a boy aged 4 years and 10 months with premature exfoliation of six primary incisors (51, 61, 71, 72, 81, 82) [14], whereas Day *et al*. reported that eight deciduous incisors were absent in a 3-year 10-month-old with CLS [9]. They proposed that early exfoliation of deciduous teeth could be an important finding for early diagnosis. In the current case, early exfoliation of deciduous teeth because of hypophosphatasia needed to be excluded. Alkaline phosphatase levels were within the normal range and there were no other clinical findings to support a diagnosis of hypophosphatasia.

In the case described by Day *et al*., exfoliation of the upper right primary central incisor was not accompanied by root resorption. A thin acellular or sparsely cellular cementum was, however, observed with little evidence of fibre insertion into cementum [9]. Since in the current case, tooth exfoliation occurred after complete root resorption, histological examination of cementum was not possible. The

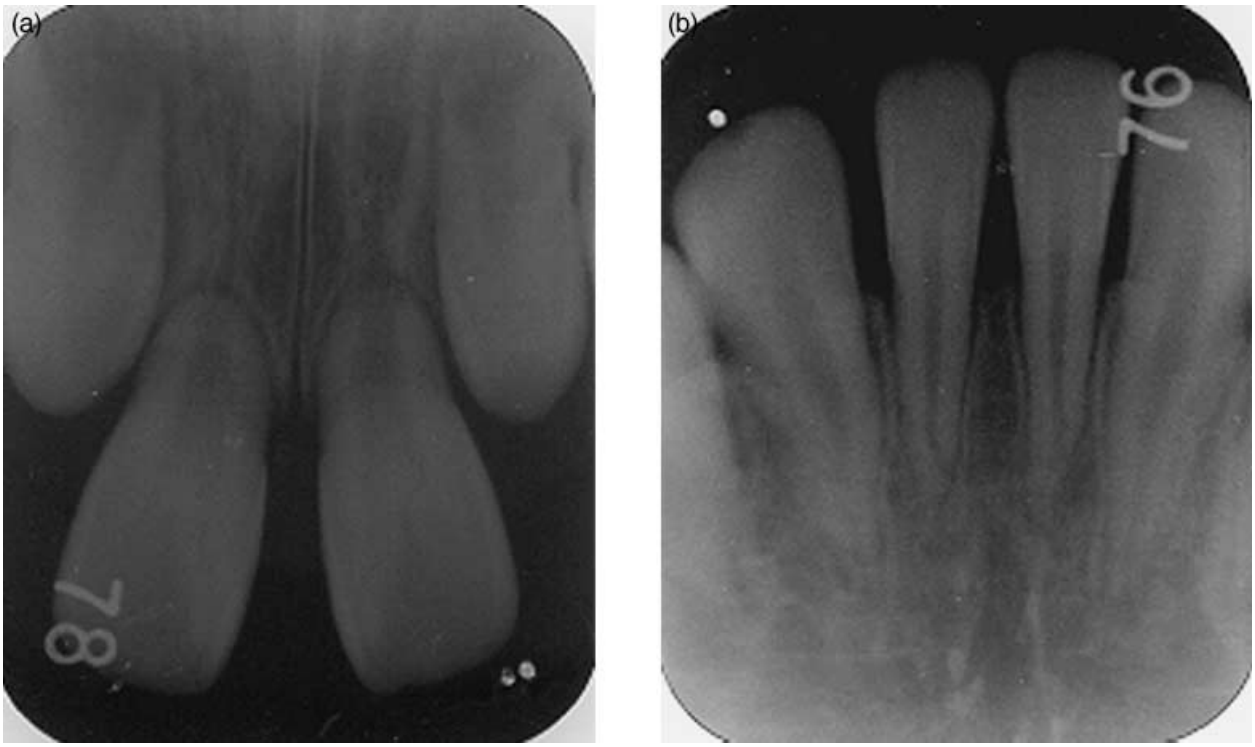

Fig. 6. Dental radiographs of upper (a) and lower (b) incisors at the age of 8 years and 2 months.

Table 1. Tooth crown size of the patient.

	Mesiodistal width			Buccolingual width		
	Patient		Mean (SD) of	Patient		Mean (SD) of
	Right	Left	Japanese boys*	Left	Right	Japanese boy*
Deciduous teeth:						
Upper second molar	8·7		9·35 (0·51)	8·1		10·13 (0·50)
Lower first molar	7·5	7·5	8·25 (0·56)	5·7	5·9	7·68 (0·61)
Lower second molar	9·4	9·1	10·36 (0·55)	7·1	7·3	9·31 (0·48)
Permanent teeth:						
Upper central incisor	7·1	7·1	8·68 (0·52)	4·8	4·9	7·27 (0·62)
Upper first molar	9·5		10·64 (0·68)	9·7		11·51 (0·66)
Lower central incisor	5·1	5·1	5·57 (0·38)	5·7	5·7	6·17 (0·54)
Lower lateral incisor	5·7	5·5	6·17 (0·42)	6·1	5·8	6·53 (0·51)
Lower canine	6·3	6·4	7·20 (0·47)	6·6	6·0	7·70 (0·63)
Lower first molar	10·4	9·7	11·52 (0·66)	9·1	7·9	11·10 (0·61)

*The mean value of normal Japanese boys by Ishida [13].

mechanism for early exfoliation of teeth may differ between these two cases. It was thought that early exfoliation of primary teeth in the current case was led by early resorption of the tooth roots rather than periodontal attachment loss.

In the current case, the permanent upper central incisors exhibited increased mobility with slight gingival inflammation. Kawakami *et al*. have reported a case of a 12-year-old boy with CLS who exhibited root resorption of the upper permanent central incisors and horizontal alveolar bone loss around the lower permanent central incisors [15]. It has been reported that early loss of permanent teeth caused by periodontal disease is also observed in CLS [4,7,8,9], and it is possible that a metabolic abnormality in collagen is associated with this early loss of teeth [16]. In the current case, it will be important to provide appropriate periodontal management in the

future, particularly around the permanent central incisors.

In conclusion, we have reported a case of Coffin–Lowry syndrome, where premature exfoliation of primary teeth, reduced size of primary and permanent teeth, short-rooted upper permanent central incisors, and alveolar bone resorption around the lower permanent incisors were apparent. Premature exfoliation of primary teeth may help in diagnosis of CLS at an early stage. As a result, paediatric dentists and physicians should recognize that premature loss of primary teeth could be a manifestation of CLS, as well as hypophosphatasis or Papillon Lefevre syndrome.

The patient's parent gave written informed consent for publication of this case.

What this case report adds

- This paper describes a case of a boy exhibiting premature exfoliation of primary teeth who was later diagnosed with Coffin-Lowry syndrome.

Why this paper is important for paediatric dentists

- Premature exfoliation of primary teeth may help in diagnosis of Coffin-Lowry syndrome at an early stage.
- Paediatric dentists should recognize that premature loss of primary teeth could be a manifestation of Coffin-Lowry syndrome.

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