

Oral Manifestations of Schimmelpenning Syndrome: Case Report and Review of Literature

A Murakami, *_{DDS}, F Skovby, **_{MD, Dr Med}, J O Andreasen, ***_{DDS, Odont Dr hc}, M M Cohen Jr, ****_{DMD, PhD},
B L Jensen, †_{DDS, PhD, Dr Odont}, S Kreiborg, ‡_{DDS, PhD, Dr Odont}

Abstract

Schimmelpenning syndrome (SS) is characterised by specific skin manifestations, skeletal defects, and central nervous system abnormalities. Here, the SS is briefly reviewed, and the oral and dental manifestations are described in a patient whose medical findings were previously published and included severe hypophosphatemic rickets. Significant oral and dental features included papillomatous lesions of the gingiva, hemihyperplasia (hemihypertrophy) of the tongue, bone cysts, aplasia of teeth, enlarged pulp chambers, hypoplastic or absent enamel, and an odontodysplasia-like permanent tooth.

Ann Acad Med Singapore 1999; 28:744-8

Key words: Epidermal nevus syndromes, Follicular cysts, Hypophosphatemic rickets, Oral manifestations

Introduction

Schimmelpenning syndrome (SS) is characterised by specific skin manifestations, skeletal defects, and central nervous system abnormalities, such as mental deficiency and seizures. Happle¹ has shown that a clinical entity known as “epidermal nevus syndrome”, formerly used as an alternative term to SS, does not exist. Rather, several epidermal nevus syndromes are known to occur and can be distinguished by clinical, histopathological, and genetic criteria. Only one of those, SS, is described here. The major findings are summarised in Table I.² To date, very few articles have focused on the oral manifestations.³⁻⁶ The oral manifestations of previously reported SS cases are listed in Table II.³⁻²⁸

The purpose of the present paper was to review SS briefly and report the oral manifestations in a patient whose medical findings have been published elsewhere.²⁹

Case Report

General Findings

This male patient (Fig. 1) was the first child born to a healthy, unrelated couple with no family history of bone or skin problems. At birth multiple yellow-to-orange verrucous plaques were noted, mainly on the left side of the scalp, face and neck, on the left arm, on the left side of the chest, and on the back, where they extended across the midline in linear patterns and whorls. Histologic examination of a skin biopsy confirmed the clinical diagnosis of sebaceous nevus. At 14 months his gross motor skills were delayed and his fine motor skills were appropriate for age. Computed tomographic (CT) scanning of the brain showed an enlarged left lateral ventricle. Laboratory investigations indicated a low level of plasma phosphate, high level of alkaline phosphatase activity, low serum 1,25-dihydroxyvitamin D₃, and nor-

* Visiting Scientist

† Associate Professor

‡ Professor and Head

Department of Pediatric Dentistry, School of Dentistry

Faculty of Health Sciences, University of Copenhagen, Copenhagen, Denmark

** Professor

Department of Pediatrics

*** Associate Professor

Department of Oral and Maxillofacial Surgery

The University Hospital of Copenhagen, Copenhagen, Denmark

**** Professor of Oral and Maxillofacial Pathology, Faculty of Dentistry

Professor of Pediatrics, Faculty of Medicine

Dalhousie University, Halifax, Nova Scotia, Canada

Address for Reprints: Professor Sven Kreiborg, Department of Pediatric Dentistry, School of Dentistry, Faculty of Health Sciences, University of Copenhagen, 20 Nørre Allé, DK-2200 Copenhagen N, Denmark.

E-mail: sven.kreiborg@odont.ku.dk

TABLE I: FEATURES OF SCHIMMELPENNING SYNDROME

Findings	Percentage (n = 60)
Cutaneous	100
Epidermal nevi	
Nevus unius lateris	(60)
Ichthyosis hystrix	(20)
Linear nevus sebaceous	(10)
Localised acanthosis nigricans	(20)
Other verrucous or mixed lesions	(33)
Hemangiomas	37
Dermatomegaly	15
Hypopigmentation	10
Cafe-au-lait spots	10
Many melanocytic nevi	10
Skeletal	70
Kyphosis/scoliosis	28
Ankle and foot deformities	15
Genua valga	
Hemihyperplasia (hemihypertrophy)	15
Short limbs	10
Finger and toe deformities	10
Cranial and facial bone deformities	15
Bone cysts	3
Vitamin D-resistant rickets	2
Neurologic	50
Mental deficiency	40
Seizures	33
Hemiparesis	14
Cranial nerve involvement	8
Ocular	33
Extension of nevus to lid	19
Lipodermoid	15
Nystagmus	2
Coloboma and cortical blindness	, 2

Adapted from Gorlin et al²

TABLE II: ORAL MANIFESTATIONS OF SCHIMMELPENNING SYNDROME

Feature	Reference
Cleft palate	Berg and Crome, 1960 ⁷ ; Kalis et al, 1973 ⁸
Bifid uvula	Tobias, 1928 ⁹ ; Jancar, 1970 ¹⁰
High arched palate	Mackee and Rosen, 1917 ⁷ ; Tobias, 1928 ⁹ ; Jancar, 1970 ¹⁰ ; Aschinberg et al, 1977 ¹² ; Rogers et al, 1989 ¹³
Ankyloglossia	Rogers et al, 1989 ¹³
Hemihyperplastic (hemihypertrophic) tongue	Muller et al, 1980 ¹⁴ ; Dunbar et al, 1985 ⁵
Intraoral nevus	Marden and Venters, 1966 ¹⁵ ; Monahan et al, 1967 ¹⁶
Papillomatous lesions	Tobias, 1928 ⁹ ; Lenson, 1953 ¹⁷ ; Brown and Gorlin, 1960 ¹⁸ ; Berg and Crome, 1960 ⁷ ; Wauschkuhn and Rohde, 1971 ¹⁹ ; Kelley et al, 1972 ³ ; Lovejoy and Boyle, 1973 ²⁰ ; Hornstein et al, 1974 ²¹ ; Reichart et al, 1983 ⁴ ; Dunbar et al, 1985 ⁵ ; Oranje et al, 1994 ²²
Giant cell granuloma*	Bitter, 1971 ²³
Ameloblastoma	Lovejoy and Boyle, 1973 ²⁰
Bone cysts	Solomon and Esterly, 1975 ²⁴
Oligodontia	Rogers et al, 1989 ¹³ ; Palazzi et al, 1996 ²⁵
Hypoplastic teeth	Marden et al, 1966 ¹⁵ ; Monahan et al, 1967 ¹⁶ ; Kelley et al, 1972 ³ ; Muller et al, 1980 ¹⁴
Malformed teeth	Zaremba et al, 1978 ²⁶ ; Zaremba, 1978 ²⁷
Irregularly spaced teeth	Tobias, 1928 ⁹ ; Bianchine, 1970 ²⁸
Odontodysplasia	Kelley et al, 1972 ³ ; Slootweg and Meuwissen, 1985 ⁶

* Bitter claims his patient had true giant cell tumour of bone but histology shows giant cell granuloma.



Fig. 1. Facial photographs of the patient at 11 years of age showing sebaceous nevi on the left side of neck and face together with alopecia of scalp.

mal plasma levels of total calcium, parathyroid hormone, and creatinine. Radiographs demonstrated diffuse demineralisation, rachitic changes, bone destruction

of the metaphyses and healed fractures. He was found to have hypophosphatemic rickets.

Treatment with oral phosphate supplements and 1α -hydroxyvitamin D_3 was started, and the patient's general condition improved. Radiographs demonstrated healing of the rachitic changes. His growth rate became normalised but his height remained below the third centile. At 14 years of age, his height was 131 cm. His general health is good, and he attends a regular school.

Oral and Dental Findings

At the age of 2 years and 7 months, the boy was referred to the dental clinic at the University Hospital of Copenhagen for evaluation. Intraoral examination showed cystic lesions of the right maxilla and the mandible, and hyperplasia of the gingiva and the alveolar process on the left side. The palate was highly arched. The palatal mucosa and tongue were hyperplastic. Open bite was present.

Radiographs demonstrated follicular cysts in the right first and second primary maxillary and mandibular molar areas (54, 55, 84, and 85*). The cysts were incised and drained. Histologic examination showed a cystic lining.

At 4 years of age, the patient was treated for extensive caries under general anaesthesia. The right lower second primary molar was extracted at that time.

At the age of 4 years and 11 months, a large multilocular cyst containing the anlage of the first permanent molar (46) was diagnosed in the right mandible (Fig. 2A). The cyst was surgically excised and the malformed molar anlage removed at 5 years and 1 month of age. Electrosurgical treatment of the hyperplastic gingival lesions (Fig. 3) was carried out at the same time. Histologic examination showed islands and cords of odontogenic epithelium.

At 6 years of age, the lateral primary left maxillary incisor (62) and the second primary left maxillary molar (65) were extracted because of inflammation with gingival abscess formation. The crowns of the primary teeth were normal in size and shape, but intraoral photographs showed aplasia of six permanent mandibular teeth (31, 35, 41, 44, 45, and 47). Radiographically, the enamel was thin and the pulp chambers enlarged. Large dental follicles were found with teeth 22, 32, 36, 37, 42, and 43. Six months later, cystostomies and tooth extraction of 51, 61, 71, 75, 81, 83, and 84 were carried out under general anaesthesia.

At 7 years and 9 months of age, a large follicular cyst developed around the anlage of 37 which was mal-

formed (Fig. 2B). Cystostomy was carried out with removal of the molar. Papillomatous lesions of the anterior maxillary region and palate were treated by electrosurgery.

At 9 years and 3 months of age, large cystic lesions were found to be associated with teeth 13 and 23 (Fig. 2C). The cysts were excised and were microscopically consistent with dentigerous cysts. Teeth 14, 53 and 54 were removed at the same time to facilitate eruption of the permanent canine (13). The enamel was hypoplastic in all teeth except the mandibular incisors and canines (Fig. 4). At this stage the development of three third molars was observed (18, 28 and 48). It was especially noteworthy that 48 developed distally to the former cyst in the right mandible. There were no signs of development of 38.

At 12 years of age, the first left maxillary premolar (24) was autotransplanted to the region of the second left mandibular premolar (35), and gingivectomy in the maxillary anterior region was carried out.

Footnote.

*The FDI nomenclature for teeth is employed.

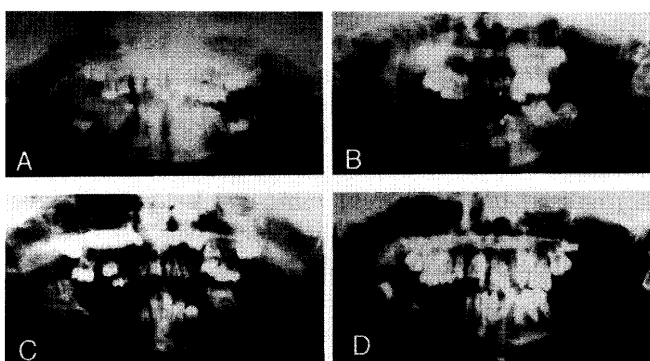


Fig. 2. Four stages of orthopantomograms showing cysts in association with developing tooth buds.

A: Patient at 4 years and 11 months of age. Note large multilocular cyst in right mandible.

B: Patient at 7 years and 9 months of age. Note cyst in relation to left mandibular second molar.

C: Patient at 9 years and 3 months of age. Follicular cysts in relation to both maxillary

D: Patient at 13 years of age. Note right mandibular third permanent molar which developed but was displaced by a follicular cyst

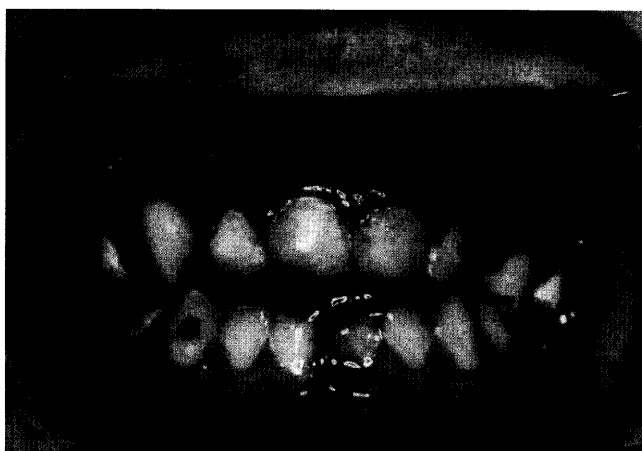


Fig. 3. Intraoral photograph at 5 years of age showing hyperplasia of gingiva in regions of the right first primary maxillary and mandibular molars.

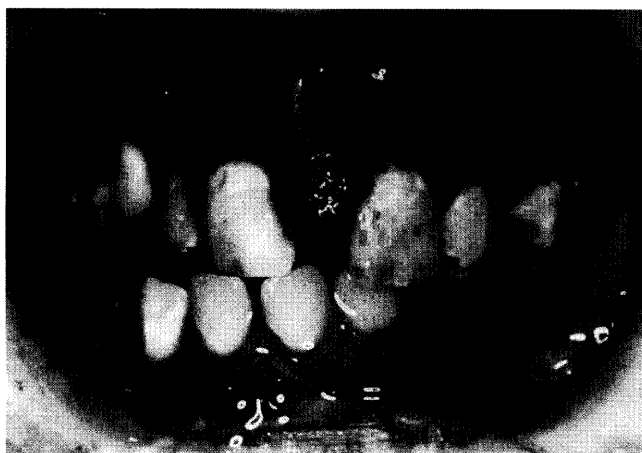


Fig. 4. Intraoral photograph at 9 years and 3 months showing gingival lesions in maxillary incisor region and enamel hypoplasia of permanent teeth, except mandibular incisors.

At 13 years of age, the third right mandibular molar also developed a large follicular cyst (Fig. 2D); the cyst was removed together with the third molar. Histology showed a cystic lining and marked proliferation of odontogenic epithelium. Odontodysplasia of the second right maxillary premolar (15) was found (Fig. 2D).

At 13 years and 10 months of age, a follicular cyst developed around the retained second left maxillary premolar (25). The labial gingival tissue of the maxillary canine area was severely hyperplastic and dark red. Marked mandibular shift to the right with facial asymmetry was observed. Autotransplantation of the second left maxillary premolar (25) to the right mandibular molar region is currently being considered.

Discussion

Most cases of SS are sporadic, and Happle³⁰ proposed that SS was caused by somatic mosaicism, lethal in the non-mosaic state. Such a theory would account for both sporadic occurrence and the wide variability of the phenotypic spectrum. However, there are three instances of father-to-son transmission, one instance of mother-to-daughter transmission, and one instance of affected siblings born to normal parents.²⁴ Several families have been observed in which only the proband had SS, but various other family members had mental deficiency and /or seizures.²

The present case report deals with a boy with the rare combination of SS and hypophosphatemic rickets.^{2,29} His parents were unrelated and without any family history of bone or skin disease. The patient was noted to have hypophosphatemic rickets, which has only been documented in 2% of cases (n = 60).²

The oral manifestations of SS included papillomatous lesions of the gingiva, hyperplastic mucosa of the palate and tongue, hemihyperplasia (hemihypertrophy) of the tongue, bone cysts, aplasia of permanent teeth, enlarged pulp chambers, hypoplastic-to-absent enamel, and an odontodysplasia-like appearance of a single permanent tooth.

Papillomatous lesions of the gingiva have been observed frequently in SS (Table II). Only a few cases have shown intraoral pigmented nevi.^{15,16} Such nevi were not observed in the present case.

Follicular cysts have been reported in a few SS cases,²⁴ and a single study reported the presence of an ameloblastoma of the mandible in a 5½-year-old boy.²⁰ Although three mandibular cysts in the present case resembled ameloblastomas radiographically, the histopathological diagnosis proved all three to be follicular cysts. There has been no sign of recurrence after surgical treatment, which is common for ameloblastoma. However, in one cyst the histological findings resembled ameloblastoma. Thus far, there is no sign of recurrence

in this region.

Aplasia of several permanent teeth was observed in the present case. A similar finding was reported previously.^{13,25} In our case the missing teeth were clearly related to the location of the cystic bone lesions. It was noteworthy that the three molar teeth that were removed with the mandibular cysts (37, 46, and 48) were all malformed. The right permanent mandibular second molar (47) and the left mandibular third molar (38) were not formed, probably because the dental lamina for these teeth was destroyed either by the cystic lesions or by surgical removal of the cysts around the neighbouring molars. The right mandibular third molar (48) did develop despite aplasia of the second permanent molar. The explanation for this must be that remnants of the dental lamina were left in the bone after surgery in the region.

Enlarged pulp chambers have not been reported previously but are common with X-linked hypophosphatemic rickets,³¹ a condition present in our patient.

Enamel hypoplasia has been observed in several cases in the literature (Table II) and has also been seen in cases with hypophosphatemic rickets.^{31,32}

Odontodysplasia, present in our case, has also been reported,^{3,6} but has not been recorded in cases with hypophosphatemic rickets.^{31,32}

It is concluded that children with SS may have complex and severe oral manifestations, including dental cyst formation. Thus, these children should be referred to the pedodontist for special care as soon as the diagnosis is made. Careful radiographic monitoring of developing follicular cysts should be carried out because early surgical treatment in some cases is necessary to secure normal eruption of the permanent teeth.

REFERENCES

1. Happle R. Epidermal nevus syndromes. *Semin Dermatol* 1995; 14:111-21.
2. Gorlin R J, Cohen MM Jr, Levin L S. *Syndromes of the Head and Neck*. 3rd ed. New York: Oxford Univ Press, 1990:362-6.
3. Kelley JE, Hibbard ED, Giansanti JS. Epidermal nevus syndrome. Report of a case with unusual oral manifestations. *Oral Surg* 1972; 34:774-80.
4. Reichart P A, Lubach D, Becker J. Gingival manifestation in linear nevus sebaceous syndrome. *Int J Oral Surg* 1983; 12:437-43.
5. Dunbar S Y, Fantasia J E, Miller A S. Epidermal nevus syndrome: Report of a case with oral involvement. *J Pedodont* 1985; 9:169-74.
6. Slootweg P J, Meuwissen P R M. Regional odontodysplasia in epidermal nevus syndrome. *J Oral Pathol* 1985; 14:256-62.
7. Berg J M, Crome J. A possible case of atypical tuberous sclerosis. *J Ment Defic Res* 1960; 4:24-31.
8. Kalis P B, Degos R, Harmel L, Roset-Charles J. *Nævus sébacé verruqueux avec manifestations neurologique-oculaire-osseuse (Nævus de Solomon)*. *Ann Dermatol Syphiligr (Paris)* 1973; 100:380-1.
9. Tobias N. Congenital hemiatrophy associated with linear nevus. Report of a case. *Arch Pediatr* 1928; 45:673-80.

10. Jancar J. Naevus syringocystadenomatosus papilliferus with skull and brain lesions, hemiparesis, epilepsy and mental retardation. *Br J Dermatol* 1970; 82:402-6.
11. Mackee G M, Rosen I. Erythrodermie congenitale ichthyosiforme. Report of cases with a discussion of the clinical and histological features and a review of the literature. *J Cutan Dis* 1917; 35:511-40.
12. Aschiner L C, Solomon L M, Zeis P M, Justice P, Rosenthal I M. Vitamin D-resistant rickets associated with epidermal nevus syndrome: Demonstration of a phosphaturic substance in the dermal lesions. *J Pediatr* 1977; 91:56-60.
13. Rogers M, McCrossin I, Commens C. Epidermal nevi and the epidermal nevus syndrome. A review of 131 cases. *J Am Acad Dermatol* 1989; 20:476-88.
14. Muller J T, Pickett A B, Frederick F D. Facial hemihypertrophy associated with nevus unius lateris syndrome. *Oral Surg* 1980; 50:226-8.
15. Marden P M, Venters H D Jr. A new neurocutaneous syndrome. *Am J Dis Child* 1966; 112:79-81.
16. Monahan R H, Hill C W, Venters H D. Multiple choristomas, convulsions and mental retardation as a new neurocutaneous syndrome. *Am J Ophthalmol* 1967; 64:529-32.
17. Lenson N. Nevus unius lateralis. Report of a case. *N Engl J Med* 1953; 248:757-9.
18. Brown H M, Gorlin R J. Oral mucosal involvement in nevus unius lateris (ichthyosis hystrix). A review of the literature and report of a case. *Arch Dermatol* 1960; 81:509-15.
19. Wauschkunn J, Rohde B. Systematisierte Talgdrüsen-, Pigment- und epitheliale Naevi mit neurologischer Symptomatik; Feuerstein-Mimssches Neuroektodermales Syndrom. *Der Hautarzt* 1971; 22:10-3.
20. Lovejoy F H Jr, Boyle W E Jr. Linear nevus sebaceous syndrome: Report of two cases and a review of the literature. *Pediatrics* 1973; 52:382-7.
21. Hornstein O P, Knickenberg M. Zur Kenntnis des Schimmelpenning-Feuerstein-Mims-Syndroms. *Arch Derm Forsch* 1974; 250:33-50.
22. Oranje A P, Przyrembel H, Meradji M, Loonen M C B, De Klerk J B C. Solomon's epidermal nevus syndrome (type: linear nevus sebaceus) and hypophosphatemic vitamin D-resistant rickets. *Arch Dermatol* 1994; 130:1167-71.
23. Bitter K. Über die Erstbeobachtung eines angeborenen Naevus sebaceus im Trigemini-bereich mit Gehirnmißbildungen und Riesenzellgeschwülsten des Ober- und Unterkiefers. *Deutsche Zahn-Mund-Kieferheilk* 1971; 56:17-24.
24. Solomon L M, Esterly N B. Epidermal and other congenital organoid nevi. *Curr Prob Pediatr* 1975; 6:3-56.
25. Palazzi P, Artese O, Paolini A, Cazzato C, Cucchiarelli S, Iezzi D, et al. Linear sebaceous nevus syndrome: Report of a patient with unusual associated abnormalities. *Pediatr Dermatol* 1996; 13:22-4.
26. Zaremba J, Wislawski J, Bidzinski J, Kansy J, Sidor B. Jadassohn's naevus phakomatosis: 1. A report of two cases. *J Ment Defic Res* 1978; 22:91-102.
27. Zaremba J. Jadassohn's naevus phakomatosis: 2. A study based on a review of thirty-seven cases. *J Ment Defic Res* 1978; 22:103-23.
28. Bianchini J W. The nevus sebaceous of Jadassohn. A neurocutaneous syndrome and a potentially premalignant lesion. *Am J Dis Child* 1970; 120:223-8.
29. Skovby F, Svejgaard E, Møller J. Hypophosphatemic rickets in linear sebaceous nevus sequence. *J Pediatr* 1987; 111:855-7.
30. Happle R. How many epidermal nevus syndromes exist? A clinicogenetic classification. *J Am Acad Dermatol* 1991; 25:550-6.
31. Marks S C, Lindahl R L, Bawden J W. Dental and cephalometric findings in vitamin D resistant rickets. *J Dent Child* 1965; 32:259-65.
32. Solt D B. The pathogenesis, oral manifestations, and implications for dentistry of metabolic bone disease. *Curr Opin Dent* 1991; 1:783-91.