Keratosis Palmoplantaris Associated with Early-onset Periodontitis

A Case Report

M Gunashekhar

ABSTRACT

Keratosis palmoplantaris associated with periodontopathy or Papillon Lefevre syndrome is a very rare genetic disorder with autosomal recessive mode of inheritance and is characterized by hyperkeratosis of the palms and soles and early onset of a severe destructive periodontitis. The clinical presentation, differential diagnosis, therapeutic and periodontal management of an 8-year old male child diagnosed with this syndrome is discussed.

Keywords: Palmoplantar hyperkeratosis, periodontitis, papillon-lefevre syndrome acitretin

Queratosis Palmoplantar Asociada con Periodontitis Incipiente

Reporte de un Caso

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RESUMEN

La queratosis palmoplantar asociada con la periodontopatía – también conocida como síndrome de Papillon Léfèvre – es un trastorno genético muy poco común, con un modo de herencia autosómico recesivo. Se caracteriza por la hiperqueratosis de las palmas de las manos y las plantas de los pies y el inicio temprano de una periodontitis destructiva severa. Se analiza la presentación clínica, el diagnóstico diferencial, así como el tratamiento terapéutico y periodontal de un niño de 8 años de edad con este síndrome.

Palabras claves. Hiperqueratosis palmoplantar; periodontitis, síndrome de Papillon Léfèvre, acitretina

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INTRODUCTION

Keratosis palmoplantaris with periodontopathy or Papillon-Lefèvre syndrome (PLS) is an extremely rare genodermatosis inherited as an autosomal recessive trait affecting children between the ages of one and four years (1, 2). Its prevalence is estimated to be one to four per million individuals in the general population with a carrier rate of two to four per 1000 (3). Males and females are equally affected with no racial predominance (4, 5).

Papillon-Lefèvre syndrome is characterized by diffuse or localized hyperkeratosis of the palms and the soles and severe early-onset periodontitis (2), the latter often leading to partial or complete loss of deciduous and permanent teeth (6).

Other features may include the tendency to frequent pyogenic infections and calcification of the dura, particularly the tentorium and falx cerebri (7). Consanguinity has been observed in one-third of the cases described (5, 8). Papillon-Lefèvre syndrome is associated with alteration on the gene CTSC, located on chromosome 11q14.1-q14.4, more precisely in the protein called cathepsin C (1, 9, 10).

CASE REPORT

A male child aged 8 years presented to the Department of the Paediatric Dentistry, Vishnu Dental College, with a complaint of loose teeth and painful swollen gums.

Family history revealed parental consanguinity but was otherwise unremarkable. General physical examination revealed bilateral yellow coloured hyperkeratotic areas on the soles and to a lesser extent in the palms (Fig.1a and b). The patient's elbows and knees were not affected. No other

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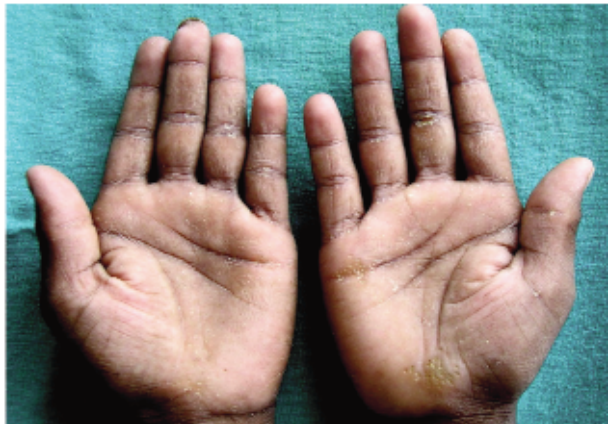
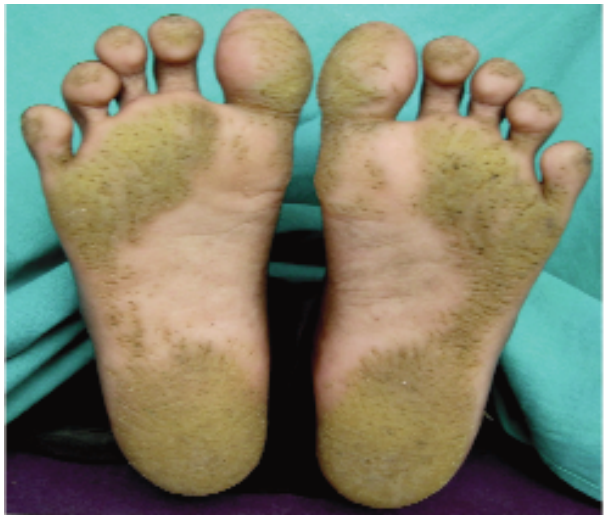


A



B

Figs. 1A and 1B: Hyperkeratosis of palms (mild) and soles (dirty and yellowish in colour)

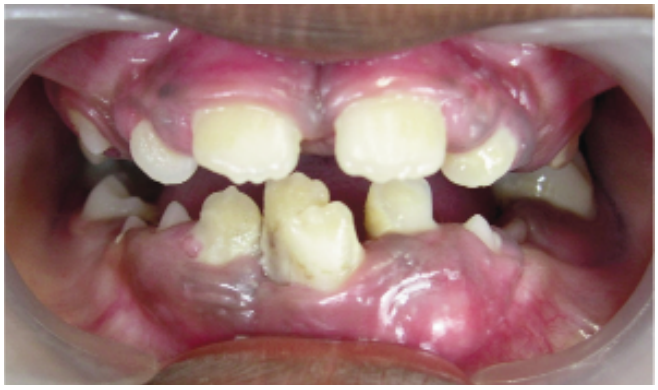


Fig. 2: Intraoral view.

cutaneous lesion or abnormality of hair, nails or sweating was seen.

Intraoral examination showed the presence of the following permanent teeth Fèdèration Dentaire Internationale) 11, 12, 16, 21, 22, 31, 32, 33, 36, 41, 42, 43, 44, 45, 47 with 26 and 46 missing. Multiple periodontal abscesses, pathologic migration and moderate to intense mobility affecting all the teeth were seen. Severely inflamed, red swollen gingivae and deep periodontal pockets accompanied by malodour were noticed (Fig. 2). There was loss of gingival stippling with bleeding occurring on probing the involved gums. Heavy deposits of supragingival and subgingival plaque and calculus indicated inadequate oral hygiene habits. All primary teeth were exfoliated.

The patient's mother reported that she had noticed skin lesions on the palms and soles of the feet together with swollen painful gums during the child's fourth year of life. Even so she had not sought treatment until age 8 years.

Radiographic examination included orthopantomograph which showed severe generalized destruction of the alveolar bone and areas suggestive of vertical and horizontal defects in the maxilla and mandible, predominantly in the molar region. The alveolar bone around the mobile teeth was devoid of definable lamina dura. The left mandibular first permanent molar appeared almost entirely out of its socket without any bone support giving the tooth a "floating-in-air" appearance **(**Fig. 3).

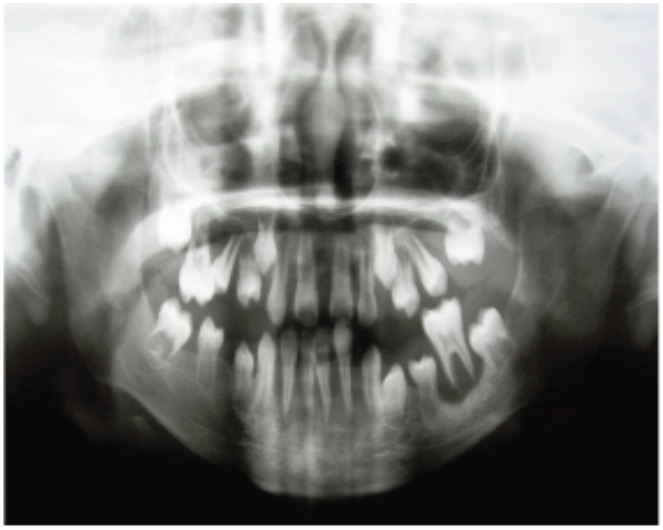


Fig. 3: Panoramic radiograph showing generalized severe alveolar bone loss and floating-in-air appearance of mandibular left first permanent molar.

Lateral cephalogram showed no evidence of intracranial calcification. Laboratory tests included complete blood count (CBC), alkaline phosphatase and blood biochemistry. All results were within normal standards for age and gender of the patient. The patient's mother declined a request for a biopsy of the lesions. Based on clinical, dermatological and laboratory findings, a presumptive diagnosis of Papillon-Lefevre syndrome was made.

In the initial phase, the dental treatment involved a professional prophylaxis, oral hygiene instructions and use of 0.12% chlorhexidine mouthrinses. Extraction of hopeless teeth *ie* permanent mandibular incisors and left mandibular first molar, which had deep periodontal pockets of > 5 mm were done. The patient was simultaneously placed on a 10-

day course of amoxicillin (250 mg bid) and metronidazole (250 mg tid). The dermatologist prescribed acitretin 20 mg orally daily for the initial 3 months and then 10 mg orally per day for the next two months.

The patient returned for follow-up a month later and presented with significant improvement in acute inflammation, and satisfactory reduction in hyperkeratotic lesions on the palms and soles. Preventive measures were reinforced and the importance of periodic follow-up visits for periodontal therapy was explained.

DISCUSSION

In Papillon-Lefevre Syndrome, the development and eruption of the deciduous teeth proceed normally but eruption is associated with gingival inflammation and subsequent rapid destruction of the periodontium resulting in premature exfoliation of primary teeth by age 4 years. The primary teeth do not resorb but are shed with their roots prior to the permanent teeth erupting. After exfoliation, the inflammation subsides and the gingiva appears healthy. However, with the eruption of the permanent dentition, the process of gingivitis and periodontitis is usually repeated followed by premature exfoliation of the permanent teeth at approximately 14 years (6, 8). The case described here showed these classic events of gingivitis, periodontitis and precocious loss of deciduous and several permanent teeth by the age of 8 years.

The soles of the feet are severely affected and hyperkeratosis is preceded by erythema. The hands are also affected but to a lesser degree (2, 5). Severe periodontal destruction is a typical radiographic finding in PLS patients (5). Consistent with this finding, panoramic radiograph in the present case showed severe resorption of alveolar bone giving the teeth a "floating-in-air" appearance on dental X-ray film.

The aetiology and pathogenesis of PLS is not well understood. Genetic analysis of several affected families suggested that the disorder may result from mutations of a gene that regulates production of an enzyme known as Cathepsin-C (CTSC). This enzyme is a lysosomal cysteine proteinase that plays an important role in intracellular degradation of proteins and also processes and activates several leukocyte and mast cell granules, serine proteinases, critical to immune and inflammatory responses (11). The CTSC is expressed in epithelial regions commonly affected by PLS such as palms, soles, knees and keratinized oral gingiva. It is also expressed at high levels in various immune cells including polymorphonuclear leukocytes, macrophages and their precursors (12, 13).

The possible immunological alterations involved are impaired chemotaxis of neutrophils and, possibly, an induced immunological defect caused by an interaction of periodontal pathogens and pocket epithelium (9, 14). Bacterial studies of plaque at the site of the lesion in PLS showed a flora similar to that of periodontitis and was composed basically of virulent Gram-negative anaerobic pathogens such as *Porphyromonas gingivalis, Prevotella intermedia and Actinomyces actinomycetemcomitans (*5, 9).

The differential diagnosis of PLS includes conditions such as hypophosphatasia, histiocytosis X, Haim Munk syndrome, Melada disease and Prepubertal periodontitis. The diagnosis of hypophosphatasia could be excluded in the present case owing to normal values of alkaline phosphatase obtained in laboratory tests. Prepubertal peridontitis and Histiocytosis X presenting with similar findings of periodontitis and premature loss of teeth are differentiated from PLS by the absence of associated palmoplantar hyperkeratosis (15).

The absence of nail deformities and arachnodactyly in the present case eliminated the diagnosis of Haim Munk syndrome, an autosomal-recessive genodermatosis characterized by congenital palmoplantar keratoderma and progressive early-onset periodontitis (15). Melada disease differs from Papillon-Lefèvre syndrome by hyperkeratosis of fingers and palms and no periodontitis (13).

In the present case, the diagnosis of PLS was made primarily based on the clinical, radiological and dermatological features besides analysis of laboratory tests. Molecular tests specific for PLS could not be performed due to the low socio-economic status of parents.

Various treatment approaches to periodontal conditions associated with PLS include oral hygiene instructions, use of chlorhexidine rinses, frequent debridement, systemic antibiotic regimens, periodontal surgery, extraction of hopeless teeth and referral to dermatologists to treat skin lesions (11, 16, 17). Because the aetiology and pathogenesis of PLS periodontitis is directly related to high levels of *A actinomycetemcomitans*, the administration of an antibiotic that acts specifically on this pathogen has been claimed to be important for a successful treatment plan (16, 17).

Recent studies have shown promising results with systemic amoxicillin/metronidazole against *A actinomycetemcomitans* and have been suggested for inclusion in the therapeutic protocol of persons with PLS (16, 17). A seven-day long course of treatment with this combination has been shown to eradicate this pathogen for up to two years following treatment in patients with chronic periodontitis and in one PLS patient (16). However, there is little evidence of antibiotic therapy having an effect on the prognosis of the dentition as no controlled trials have been carried out.

Other authors presented different protocols, such as extraction of deciduous teeth, followed by antibiotic therapy during and after permanent tooth eruption. Another management would include continuous and combined use of mechanical control of plaque and systemic therapy with specific antibiotics which could change the course of disease (9, 18).

In the index patient, treatment included extraction of only the hopelessly affected teeth combined with periodontal therapy and antibiotic coverage with amoxicillin and

metronidazole, in accordance with the standardized dental treatment protocol for patients with PLS at the time the treatment began (19).

Newer treatment modalities reported to be beneficial for both dental and dermatological lesions of PLS include oral retinoids such as acitretin, etretinate and isotretinoin. Retinoid treatment may end up with normal dental development if started during eruption of permanent teeth (7, 16). Use of low dose acitretin therapy in the present case showed satisfactory reduction in hyperkeratotic lesions on the palms and soles. Effectiveness of acitretin therapy (0.4–1 mg/kg/day) in PLS patients has been previously reported (7, 20).

Successful periodontal management of PLS patients remains challenging. Further studies and continued research on PLS should aim at increasing one's understanding of the aetiological factors, developing more specific antibiotics and conservative treatment approaches. The importance of early diagnosis of PLS–associated periodontitis and use of appropriate treatment methods should be recognized.

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