

Oro-dental characteristics of three siblings with Papillon–Lefevre syndrome

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Abstract

Papillon–Lefevre syndrome (PLS) is a rare autosomal recessive disorder, showing oral and dermatological manifestations in the form of aggressive periodontitis, leading to the premature loss of both primary and permanent teeth at a very young age and palmar-plantar hyperkeratosis. It was first described by two French physicians, Papillon and Lefevre in 1924. Immunologic, genetic, or possible bacterial etiologies have been thought to account for etiopathogenesis of PLS. Severe gingival inflammation and periodontal destruction occurred after the eruption of primary teeth. This condition should warn the physicians and dentists as a one of the important sign for the diagnosis of PLS. There have been over 250 cases reported in literature about PLS, but a few of these were in the same family. This study presents oro-dental characteristics, dental treatments, and follow-up of three siblings (age of sisters are 13, 6, and 4 years) with PLS, which is rarely seen in the same family.

Key words: Hyperkeratosis, Papillon–Lefevre syndrome, periodontitis

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Introduction

Papillon–Lefevre syndrome (PLS) is a rare autosomal recessive disorder, which has a prevalence of 1–4 cases/million people.^[1,2] Parental consanguinity caused by greater frequency and has been found in about 20–40% of all the PLS patients.^[3] Most patients with PLS have a mutation in the cathepsin C gene, located on chromosome 11q14–q21.^[4,5] The cathepsin C gene is expressed in epithelial tissue such as palms, soles, knees, and keratinized oral gingiva, commonly affected by PLS.^[6] There have been reported cases of PLS without the cathepsin C mutation and manifesting chemotactic and phagocytic function

failures of polymorphonuclear leukocytes in patients with PLS.^[2]

It affects both the sexes equally with no racial predominance. This was first described by two French physicians, Papillon and Lefevre in 1924 and characterized by palmar-plantar hyperkeratosis, early loss of primary and permanent teeth with severe destructive periodontitis, severe alveolar resorption, tooth mobility, abscesses, halitosis, heavy plaque, and calculus. Intracranial calcifications, susceptibility to bacterial infections and mental retardation may implicate. Eruption of deciduous and permanent dentition begins at normal age, in normal sequence, and in normal position.^[1,7-10]

Patients with PLS are born looking completely normal. They may have redness on the palms of their hands

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and the soles of their feet. Dermatological lesions of the disease are first seen in 1–4 ages and may be aggravated by cold. Erythematous keratotic plaques are associated with painful fissures. Nail changes such as transverse grooving and fissuring are occurred in some cases. In addition, due to decrease the cells of defense such as neutrophils, lymphocytes, and monocytes, the susceptibility to infection is increased. Intraoral symptoms are first seen at 3–4 ages.^[11] Severe gingival inflammation and periodontal destruction begin after the eruption of primary teeth, which leads to premature loss of the deciduous dentition. Gingival tissue grows back normal following the primary dentition exfoliations. This state relapses after the eruption of permanent teeth. This rapidly progressive periodontitis is unresponsive to conventional periodontal therapy. Because of alveolar bone resorption, teeth appear as ‘floating in air’ in radiographs.^[10,12] Consequently, patients with PLS are seen partial or complete edentulism by the age 14–16.^[13]

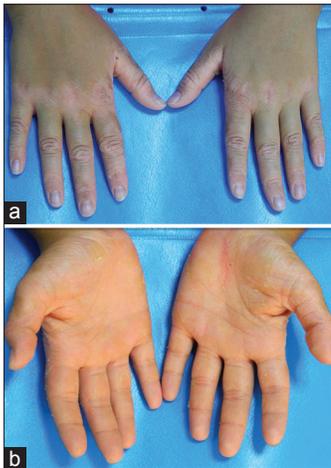


Figure 1: Symmetrical, well-demarcated, hyperkeratotic plaques view on the palms of the hands of Case I. (a) Dorsal surfaces of the hands and (b) palmar surfaces of the hands

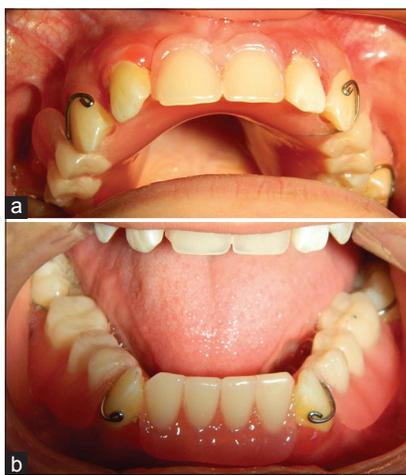


Figure 3: Partially movable dentures view of Case I. (a) Intraoral view of maxilla and (b) intraoral view of mandible

There have been over 250 cases reported about PLS, but a few of these were in the same family. This study presents oro-dental characteristics, periodontal problems and their managements, dermatological findings, and differential diagnosis of three siblings with PLS in the same family.

Case Reports

A 13-year-old female (Case I) and her sisters, a 6-year-old female (Case II), and a 4-year-old female (Case III), of PLS patients, were referred to Akdeniz University Faculty of Dentistry Department of Pediatric Dentistry with a complaint of esthetic problems and discomfort eating due to early teeth loss. According to anamnesis from their mother, there was no marriage of consanguineous between parents, and they do not have any disease or syndrome except for PLS. Pregnancy and delivery were normal for all of them. On general examination, they had normal physical and mental development.

Case I

She is the oldest sister and 13-year-old. On extraoral examination findings, there were symmetrical, well-demarcated, hyperkeratotic plaques on the palms of the hands and soles extending onto the dorsal surfaces [Figure 1a and b]. On intraoral examination, she had permanent dentition with severe gingival inflammation, spontaneous bleeding, deep periodontal pockets, halitosis, heavy deposits of plaque, and loss of teeth numbers 11, 21, 31, 32, and 41. On radiological examination, she had generalized periodontitis [Figure 2].



Figure 2: Orthopantomographic view of Case I at the first visit



Figure 4: Orthopantomographic view of Case I at the last follow-up



Figure 5: Symmetrical, well-demarcated hyperkeratotic plaques view on the palms of the hands and knees surfaces of Case II. (a) Dorsal surfaces of the hands, (b) palmar surfaces of the hands, (c) closer view belonging to one of knees and (d) the view of knees



Figure 6: Pathologically migrated primary maxillary right and left central incisors (51, 61) of Case II (a) the view of opened mouth, (b) the view of closed mouth

Following treatment of scaling-root planing and adjunctive systemic antibiotics (amoxicillin and clavulanic acid for 1 week) and antibacterial oral rinse solution (chlorhexidine for 1 week) is prescribed, partial removable dentures were performed to improve her psychological position with rehabilitation of esthetic appearance and restore masticatory function [Figure 3a and b]. The patient had been following periodically in the 1st week, 1st month, 3rd month, 6th month, and 1st year. In the follow-up controls, modifications on dentures were performed according to soft tissue alterations. After 1 year, her dentures were renewed after extractions of teeth numbers 12, 22, 15, and 43. Increased mobility has been detected in teeth numbers 14, 24, 33, and 46 [Figure 4].

Case II

She is median sister and 6-year-old. On extra-oral examination findings showed that symmetrical, well demarcated



Figure 7: Exfoliated primary maxillary right central incisor (51) view of Case III

hyperkeratotic plaques on the palms of the hands and knees [Figure 5]. There were all deciduous teeth except the teeth numbers 52, 62, and 81, which were exfoliated when she is at 4-year-old and poor oral hygiene. On intraoral examination, she has gingivitis located on the maxillary canines region. Her teeth numbers 51, 61, and 74 showed Grade I mobility. Subsequently, teeth numbers 51 and 61 were pathologically migrated [Figure 6]. Loss of alveolar bone at maxillary incisors and mandibular left primary first molar regions were revealed. Teeth numbers 54, 55, 64, 73, 74, 75, 83, and 84 were exfoliated, and the tooth number 63 is extracted. She received scaling-root planing and adjunctive systemic antibiotics (amoxicillin and clavulanic acid for 1 week). Removable dentures were thought for her to rehabilitate masticatory function and esthetic appearance.

Case III

She is the youngest sister and 4-year-old. On extraoral examination findings, symmetrical, well-demarcated, hyperkeratotic plaques on the palms of the hands and soles extending onto the dorsal surfaces were seen. All deciduous teeth except exfoliated tooth number 51 were present, and poor oral hygiene was revealed [Figure 7]. Radiological

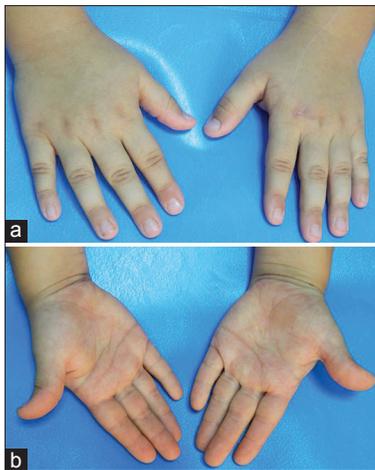


Figure 8: More slight hyperkeratotic plaques view in Case III according to Case I and Case II. (a) Dorsal surfaces of the hands and (b) palmar surfaces of the hands

examination showed the loss of alveolar bone. Teeth numbers 82 and 83 were exfoliated, and teeth numbers 54, 62, 64, 72, and 73 were extracted because of mobility during the follow-up period. As seen in her other two older sisters, scaling-root planing was performed, and adjunctive systemic antibiotics (amoxicillin and clavulanic acid for 1 week) was given. Treatment options for prosthodontics rehabilitation have been delayed until exfoliation of permanent teeth.

The Case I and II had more severe hyperkeratotic plaques on the palms of the hands, although there were more slight hyperkeratotic plaques in Case III [Figure 8]. On radiological examination, there were deciduous molars with taurodontism (Case III) [Figure 9]. On lateral cephalogram, there was no suspicion of intracranial calcification in the three cases.

Scaling-root planing with administration systemic antibiotics was performed for all the patients. We recommended oral hygiene instructions to all cases. All three of the siblings have been followed up by routine appointments for 3 years.

Discussion

PLS is a destructive disorder due to skin lesions and partial or complete edentulism at a young age. Functional, esthetical, developmental, and psychological problems may arise in PLS during childhood. Early diagnosis prior to permanent dentition and a multidisciplinary approach is needed for psychological rehabilitation and quality of life; subsequently, regular dental and dermatological cares are important for PLS with children.

Over 250 cases have subsequently been reported until now.^[10,12] The etiopathogenesis of PLS is relatively



Figure 9: Deciduous molars with taurodontism view on radiological examination of Case 3

uncertain. Genetic, immunologic, and microbiologic factors are efficient initiation and progression of the disease.^[14,15] Latest studies suggested the high incidence of mutation in the cathepsin C gene, located on chromosome 11q14–q21.^[5] This gene plays a role in the maintenance of skin, immune, and inflammatory cells. When this gene has a mutation, it may be responsible for abnormalities in skin development and periodontal destruction process. Several authors suggested that abnormal neutrophil dysfunction with PLS to explain the pathogenesis,^[12] however, others reported cases with normal values.^[16] Microbiological studies have demonstrated that *Actinobacillus actinomycetemcomitans*, *Porphyromonas gingivalis*, *Fusobacterium nucleatum*, *B. forsythus*, *Treponema denticola*, *Prevotella intermedia*, and more pathogens may be involved in the disease.^[14] Previous case reports and studies have reported that *A. actinomycetemcomitans* plays a significant role in the pathogenesis and progression of the rapid periodontal breakdown in patients with PLS.^[17] Furthermore, developing liver abscess due to untreatable bacterial infections can cause death. This is an important complication related to PLS.^[15] Liver abscess was not seen at any of our patients, because of their infection control is regularly done.

In our cases, because of spending so much time at the hospital without any certain treatment, they tend not to come to follow-up appointments periodically. That is why genetic testing could not be performed to identify gene mutation, although our consultation, but dermatological, periodontal, and radiological findings encouraged the diagnosis of PLS. Their parents are not consanguineous offspring. There was no family history. Phenotypically, the parents are healthy.

Differential diagnoses included Haim-Munk syndrome, which has a similar mutation on cathepsin C, and characterized prepubertal periodontitis and palmoplantar hyperkeratosis. Also arachnodactyly, acroosteolysis, atrophy of the nails and deformity of the phalanges of the hand were seen. Hypophosphatasia, Langerhans cell histiocytosis, leukemia, Chediak-Higashi syndrome, acrodynia, acatalasia, cyclical neutropenia, agranulocytosis, and lazy leukocyte

syndrome, which exhibit premature loss of primary and/or permanent teeth.^[10,12,14]

Several treatment processes for PLS have been recommended in literature, but a definitive treatment protocol has not been established until now; whereas to control periodontal failure, several treatment regimens have been suggested, e.g., conventional periodontal therapy, oral hygiene instructions and systemic antibiotics, synthetic retinoid, and different extraction protocols including the extraction of all primary teeth followed by a period of edentulousness, and another approach is all erupted teeth present at that time are extracted to allow the permanent teeth erupting without infection and healthy periodontium.^[12] Supplement researches are required for defining a treatment to maintain the smiles of children with PLS.

The loss of teeth periodically challenges the process of prosthetic rehabilitation, and skin lesions can cause serious infection. All of these situations have negative impacts on the child's physical, psychological, and social development. Therefore, the management of PLS requires multidisciplinary approach of pediatric dentists, pediatrician, and dermatologist. The quality of life of patients can be increased with early diagnosis, treatment, and multidisciplinary approach.

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Conflicts of interest

There are no conflicts of interest.

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