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Case Report

The non-surgical management of a patient with Kostmann syndrome-associated periodontitis: a case report

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Abstract: Kostmann syndrome is a rare, congenital immunological disorder caused by a mutation of the hematopoietic cell-specific LYN substrate 1-associated protein X1. These patients pose a unique challenge to the dental practitioner due to the severe oral infections that are often seen in this population. The patient described in this report is a 16-year-old female with Kostmann syndrome-associated periodontitis. The treatment consisted of scaling and root planing performed in conjunction with subgingival irrigation with povidone-iodine solution. This report details how Kostmann syndrome-associated periodontitis can be successfully treated and maintained long-term, using non-surgical treatment modalities and local antimicrobial therapy. (J Oral Sci 56, 315-318, 2014)

Keywords: Kostmann syndrome; non-surgical periodontal therapy; local antimicrobial therapy; subgingival irrigation.

Introduction

The condition of hereditary agranulocytosis, known as Kostmann syndrome, is defined as a severe, non-cyclic neutropenia with an absolute neutrophil count (ANC) of less than 0.5×10^{-9}/L (1). Swedish pediatrician, Rolf Kostmann, first reported on this inherited condition in a Swedish family in 1956, in which several of the members died in infancy from a bacterial infection. Although Kostmann was able to show that the blood dyscrasia was inherited in an autosomal recessive manner, the underlying genetic defect responsible for the agranulocytosis was not elucidated until recently. Today, we know that a mutation of the gene that encodes the hematopoietic cell-specific LYN substrate 1-associated protein X1 (HAX1) is responsible for the development of this autosomal recessive condition. The HAX1 mutation causes the arrest in neutrophil maturation and decreased production of neutrophils that are evident in patients with Kostmann syndrome (2). Early in their development, patients with Kostmann syndrome present with severe ear, skin, respiratory and oral infections, ranging from gingivitis to advanced periodontitis with extensive bone loss (1,3). Patients with Kostmann syndrome are treated with daily injections of recombinant human granulocyte colony-stimulating factor (G-CSF), an anti-apoptotic factor that releases neutrophil reservoirs from the bone marrow and increases the neutrophil production by a factor of 10-12 (4). However, periodontal disease remains a life-long challenge for these patients (5). Due to the rarity of this disease, the dental literature is lacking pertinent information on the management of these patients. The purpose of this case report is to provide treatment recommendations, involving the use of local antimicrobial therapy, based on the successful management of a patient with Kostmann syndrome-associated periodontitis.

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Case Report

The patient, a 16 year-old Hispanic female, presented to the Herman Ostrow School of Dentistry USC Advanced Periodontology Clinic for comprehensive periodontal evaluation. Her medical history was non-contributory, with the exception of the diagnosis of Kostmann

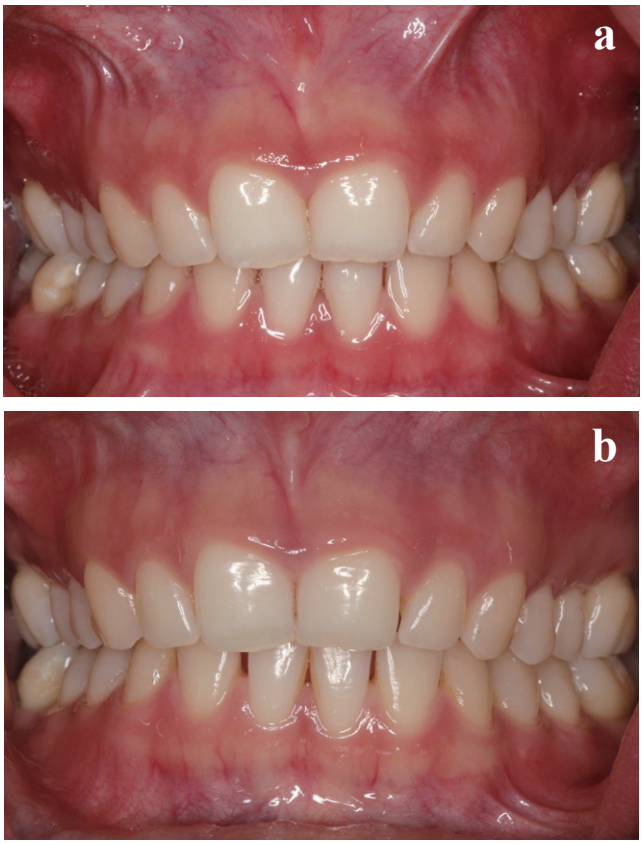

Fig. 1 **a** At baseline. Marginal gingiva appears rolled, erythematous and edematous. Generalized inflammation is evident. **b** Follow-up at 12 months. Gingiva appears coral pink, firm, and stippled. Generalized inflammation appears to have resolved.

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Furcation															1	
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BOP	X	B B B	B	B B	B B	B B	B B	B B	B B		B	B B B	B B B	B B B	B B B	X
PD	X	4 2 4	4 2 6	5 2 4	3 2 3	3 2 3	3 2 2	2 1 2	2 1 2	3 2 3	3 2 3	3 2 3	4 2 4	5 2 4	4 2 4	X
Tooth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PD	X	3 2 4	4 2 4	3 2 3	3 2 3	2 2 2	2 2 2	2 2 2	2 2 3	2 2 3	3 2 3	3 2 4	3 3 4	4 3 4	4 2 3	X
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Recession	X		1 3 0													X
BOP	X	B B B	B B B	B B B	B B B	B B B	B B B	B B B	B B B	B B B				B B B	B B B	X
PD	X	4 3 4	4 3 5	4 3 4	3 2 3	2 2 3	3 2 3	3 2 3	3 2 3	3 2 3	2 2 3	3 2 2	3 2 4	4 3 5	4 2 4	X
Tooth	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
PD	X	4 2 4	4 2 5	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 4	4 2 6	5 2 4	X
BOP	X	B B B	B		B B B		B B B	B B B	B B B	B	B	B B B	B B B	B B	B B	X
Recession	X		0 2 1													X
CAL	X	4 2 4	4 4 6	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 3	3 2 4	4 2 6	5 2 4	X
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Fig. 2 Baseline full-mouth periodontal examination. Note the moderate CAL and furcation involvement present in the molars.

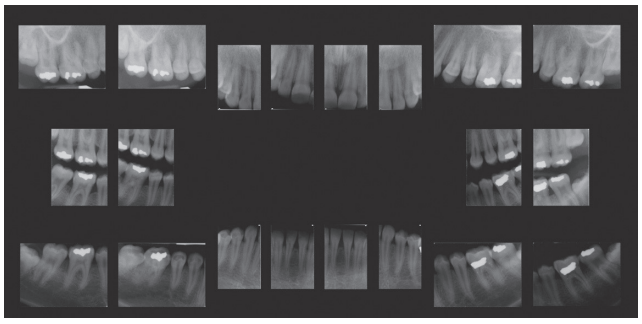

Fig. 3 Baseline full-mouth radiographs. Note the bone loss in the furcation area and on the distal aspect of the mandibular first molars.

syndrome, for which she was receiving daily 480 mcg/0.8 mL Neupogen (filgrastim) (Amgen, Inc. Thousand Oaks, CA,USA) injections. She presented with inflamed gingiva (Fig. 1) that exhibited generalized bleeding on probing (BOP). The probing depths (PD) and recession ranged from 4-6 mm and 1-3 mm, respectively. Additionally, there was Class I furcation involvement of six sites (Fig. 2). Localized mild horizontal and vertical bone loss and furcation involvement of #30 were observed on the full-mouth radiographic examination (Fig. 3). The patient was diagnosed with Kostmann syndrome-associated periodontitis and underwent scaling and root planing (ScRP) in four quadrants followed by subgingival irrigation with 10% povidone-iodine (Betadine) (Aplicare, Inc. Meriden, CT, USA) solution. The tip of the metal cannula of an endodontic syringe (Inter-Med, Inc. Racine, WI, USA) was placed just below the free gingival margin, and the Betadine solution was irrigated subgingivally, along all surfaces of the teeth, until a total contact time of 5 min was achieved (6-8). Due to the improvement of all periodontal parameters at the re-evaluation appointment, the patient was placed on a 3-month maintenance schedule. At the 12-month follow-up, there was an overall decrease in the percentage of sites with PDs measuring ≥5 mm, from 4.8% to 0.6%, an overall decrease in the percentage of sites measuring 4 mm, from 19.1% to 3.0%, and an overall increase in the percentage of sites measuring ≤3 mm from 76.2% to 96.4%. An overall reduction in BOP from 77.4% to 73.8% was observed, and there was a decrease in the percentage of sites with Class I furcation involvement, from 3.6% to 1.2% (Table 1).

Discussion

Kostmann syndrome is a rare disorder found in less than 4% of the general population (9). As a result, there is a paucity of information about the periodontal management of these patients in the literature. According to Goultschin et al., good oral home care and regular dental visits can significantly improve the plaque control and overall systemic condition of these patients (10). There-

Table 1 Clinical parameters at baseline and 12 months

Clinical parameter	Baseline (%)	12 months (%)
Sites with ≥5 mm PDs	8/168 = 4.76%	1/168 = 0.60%
Sites with 4 mm PDs	32/168 = 19.05%	5/168 = 2.98%
Sites with ≤3 mm PDs	128/168 = 76.19%	162/168 = 96.43%
Sites with recession	10/168 = 5.36%	5/168 = 2.98%
Sites with class I furcation	6/168 = 3.57%	2/168 = 1.19%
Sites with BOP	130/168 = 77.38%	124/168 = 73.81%

CBC (Includes Diff/Plt)	Normal Range	12/9/10	11/14/11	12/10/11	11/16/12	12/17/12
White Blood Cell Count	4.5-13.0 Thousand/uL	7.2	6.8	5.4	7.6	7.4
Red Blood Cell Count	3.80-5.10 Million/uL	4.01	3.94	4.09	4.26	4.17
Hemoglobin	11.5-15.3 g/dL	12.4	12.4	12.9	13.3	13
Hematocrit	34.0-46.0 %	36.7	36.8	38.1	40.3	39.4
MCV	78.0-98.0 fL	91.5	93.4	93.9	94.7	94.4
MCH	25.0-35.0 pg	30.8	31.6	31.5	31.2	31.2
MCHC	31.0-36.0 g/dL	33.7	33.9	33.6	33	33
RDW	11.0-15.0 %	14.3	15.4	15.8	14.2	14.6
Platelet Count	140-400 Thousand/uL	188	193	174	172	189
Absolute Neutrophils	1800-8000 cell/uL	1080	952	599	660	1073
Absolute Lymphocytes	1200-5200 cells/uL	2246	1274	2198	2573	2405
Absolute Monocytes	200-900 cells/uL	3434	3740	1955	3713	3404
Absolute Eosinophils	15-500 cells/uL	324	544	637	503	474
Absolute Basophils	0-200 cells/uL	115	272	11	53	44
Neutrophils	%	15	14	11.1	8.8	14.5
Lymphocytes	%	31.2	18	40.7	31.3	32.5
Monocytes	%	47.7	55	36.2	49.5	46
Eosinophils	%	4.5	8	11.8	6.7	6.4
Basophils	%	1.6	1	0.2	0.7	0.6

Fig. 4 Complete blood cell count with differential results. Note the low neutrophil counts throughout the course of periodontal treatment.

fore, regardless of their neutrophil counts, all patients with Kostmann syndrome can benefit from dental care involving a closely monitored maintenance program to help control oral disease. The patient followed in this case report had a neutrophil count, ranging from 599-1080 cells/μL, throughout the course of periodontal treatment, but was otherwise systemically healthy (Fig. 4). When she initially presented for dental care, she exhibited a relatively advanced periodontal disease for her age. After the initial therapy, which consisted of ScRP performed in conjunction with subgingival irrigation with an antimicrobial solution, the patient exhibited marked improvement in all periodontal parameters, in spite of her neutropenic state. There was an overall decrease in the PDs and no site experienced further breakdown. Iodine was used as an adjunct to ScRP, because of its well-documented benefits, which include significantly greater reduction in PD and inflammation (6-8). However, to the author's knowledge, this is the first report in the literature that has described the use of subgingival irrigation with Betadine solution for management of periodontal disease in a patient with Kostmann syndrome. This one-year follow-up has demonstrated that it is possible to arrest periodontal breakdown in Kostmann syndrome-associated periodontitis patients and maintain the results for one year using non-surgical procedures and local antimicrobial therapy.

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