

CASE REPORT

Nonsurgical Approach in Periodontal Therapy for a Patient with Metabolic Syndrome

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ABSTRACT

Aim: The aim of this article is to describe the effect nonsurgical periodontal therapy can have on the improvement in the glycemic and lipid indices of patients with metabolic syndrome (MS).

Background: Combination of noncommunicable diseases has become increasingly common among the people at present. Metabolic syndrome is a combination of dyslipidemia, diabetes mellitus (DM), obesity, and hypertension. Periodontal disease (PDD) is also a common entity among many people. The heightened chance of PDD in the diabetic patient is well established. Among the treatment modalities for PDD, nonsurgical therapy plays a major role. Reduction of the major causative factors of PDD can bring about a massive improvement of the disease through this approach.

Case description: Periodontal management of an adult patient with MS via nonsurgical periodontal therapy alone had shown dramatic improvement of periodontal as well as general health of the patient at the completion of the treatment.

Conclusion: Improvement of glycemic indices of diabetic patients has been shown with periodontal treatment in conjunction with medical treatment.

Clinical significance: Value of a dental professional in diagnosing metabolic diseases through detection of periodontal and other dental complications cannot be underestimated. A well-executed nonsurgical periodontal therapy alone can bring about a massive improvement of the PDD condition as well as other metabolic diseases, such as DM, emphasizing the importance of proper collaboration among the dental surgeons with the medical practitioner.

Keywords: Glycemic indices, Metabolic syndrome, Nonsurgical periodontal therapy.

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INTRODUCTION

The relationship of systemic risk factors and periodontitis is a well-established concept. Diabetes mellitus (DM),

obesity and metabolic syndrome (MS), osteoporosis, dietary calcium and vitamin D deficiency, smoking and alcohol consumption, stress, and genetic factors are some of the main systemic risk factors involved.¹ Presence of many of the noncommunicable health hazards, some of which are due to sedentary lifestyles of people today, has caused a major burden to a country's health care system.

Several studies have found that DM could lead to an exaggerated inflammatory response to the periodontal microbiota causing an exacerbation of insulin resistance.^{1,2} The association was exemplified as periodontitis had shown to adversely affect the glycemic control in patients with DM and contribute to the development of complications associated with DM. Periodontal therapy in individuals with DM has shown to result in a modest improvement in their glycemic control.²

Obesity was shown to have a profound effect on the general health including insulin resistance and a state of chronic systemic inflammation.³ The association of obesity with periodontal disease (PDD) has been hypothesized to result from the chronic systemic inflammation associated with obesity.⁴ Obesity is determined by body mass index (BMI) and waist circumference (WC), and the reference values may change according to ethnicity. For Asians, value of BMI is accepted as 27.5 kg/m², while WC measures remain as 90 and 80 cm for males and females respectively.⁵

Metabolic syndrome is a term given to a cluster of disorders which include increased blood pressure (BP), elevated plasma glucose, excess body fat around the waist and abdominal area, and altered cholesterol levels.¹ Presence of three or more of the above disorders concurrently in an individual is considered as requirements to be diagnosed as MS.

Stressful lifestyle is common among many individuals at present. Similar to other medical problems, stress may also be a significant contributor for the initiation and progression of PDD.

The following case report describes the benefits of mere nonsurgical periodontal treatment, lifestyle modification, and control of risk factors on a young adult male diagnosed with MS.

CASE REPORT

A 37-year-old male visited the Division of Periodontology, Faculty of Dental Sciences, University of Peradeniya,

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Sri Lanka, requesting replacement of his missing lower teeth and treatment for gingivitis and halitosis. His medical history on presentation revealed him to be healthy but living a very stressful lifestyle due to the demanding nature of his occupation. He was free from smoking, tobacco/betel chewing habits, alcohol consumption, or any other recreational drug abuse. He brushes his teeth in a haphazard manner.

On examination, intraorally, a generalized dark pink/red colored gingivae with an epulide in relation to the palatal aspect of 21 was evident. Rolled contour with generalized soft consistency and a reduced tone was evident with the absence of stippling of the gingivae. Purulent exudation was evident from periodontal pockets of 11, 31, 32, and 44. Except for 18, 42, 43, and 48, all other teeth were present (Figs 1 and 2). Generalized, heavy plaque, and calculus deposits were evident (Figs 1 to 3).

A comprehensive periodontal assessment and charting was performed using a 6-point pocket chart. Both plaque and bleeding scores were 100%.

A digital dental panoramic tomogram (Fig. 4) and intraoral periapical radiographs of 12–22 region and 33–41 region (Fig. 5) were ordered. Sensibility testing was done from 13 to 23 and 33 to 41, which gave vital responses. A multilevel risk assessment was performed with special emphasis given to find out the presence of any medical condition, such as DM that may have not been diagnosed earlier. Patient was advised to return with laboratory investigations of his fasting blood sugar (FBS), glycated hemoglobin (HbA1C), and a lipid profile on subsequent visits. His BP was also measured at three separate occasions and an average was obtained. His weight, height, and the WC were measured and the BMI was calculated.

Details of the laboratory results and other test references are given in Table 1.

According to the periodontal parameters and clinical investigation records, the case was diagnosed as chronic, generalized moderate to severe periodontitis in a partially dentate patient with MS living a stressful lifestyle. A comprehensive treatment plan was formulated to manage the patient (Table 2).



Fig. 1: Preoperative intraoral view (upper). Note the epulide in relation to 21 (arrow)



Fig. 2: Preoperative intraoral view (lower)



Fig. 3: Preoperative intraoral view (front). Open mouthed position



Fig. 4: Preoperative dental panoramic tomogram



Figs 5A and B: Preoperative intraoral periapical radiographs: (A) 12–22, and (B) 33–41

Table 1: Laboratory and other test measurement results of the patient at the initial visit (before treatment)

Measured test	Value	Reference range
FBS	246 mg/dl (H)	65–110 mg/dl
HbA1C	11.3% (H)	4–6% (for nondiabetics) Less than 7% (for diabetics)
Lipid profile		
Total serum cholesterol	223 mg/dl (H)	150–200 mg/dl
HDL	29 mg/dl (L)	More than 40 mg/dl (for men)
Cholesterol/HDL ratio	7.7 (H)	3.8
Triglycerides	141 mg/dl	50–150 mg/dl
BP	140/90 mm Hg	130/85 mm Hg
BMI	27.68 kg/m ² (H)	27.5 kg/m ²
Waistline	94 cm (H)	90 cm

H: High; L: Low; FBS: Fasting blood sugar; HbA1C: Glycated hemoglobin; HDL: High-density lipoprotein; BP: Blood pressure; BMI: Body mass index

It was decided to perform full mouth disinfection (FMD) for this patient due to the presence of his medical condition, which has proven to have deleterious effects on his existing severe periodontitis. He was reviewed regularly following initial treatment to observe any improvement (Fig. 6). Evaluation of the response to phase I periodontal therapy in 6 weeks was performed along with reassessment of the sensibility of 13–23 and 33–41, which continued to give vital response (Fig. 7).

The medical reports, at the 3-month review visit, however, did not indicate that he was a good candidate to proceed with the surgical phase (Table 3). Therefore, surgical plan was postponed until the FBS report confirmed of a good diabetic control. Patient was informed and reassured and was encouraged on improving his medical condition.

Table 2: Formulated treatment plan for the patient

Treatment plan:

Phase 1 (etiologic stage):

Stage I (hygiene phase)

1. Oral hygiene instructions, education, and motivation.
2. Plaque demonstration and introduction to plaque control methods, including interdental cleaning aids.
3. Oral prophylaxis (scaling and polishing) to remove calculus and other plaque traps.
4. Referral to a medical specialist for the management of diabetes mellitus, hypercholesterolemia, and hypertension.
5. Advice on stress management.

Stage II (nonsurgical instrumentation)

1. Full mouth disinfection under local anesthesia. Provision of antibiotics and a mouthwash.

Phase 2 (surgical therapy)

This was planned to be done once the fasting blood sugar (FBS) level reaches a safe range.

1. Open root surface debridement and alveolar bone grafting for osseous defects of 11 and 21 regions and placement of periodontal membrane to attain guided tissue regeneration.
2. Extraction of 41 due to poor prognosis with grade III mobility.

Phase 3 (restorative phase):

1. Treatment plan for 42 and 43:
 - a. Provision of an acrylic removable partial denture (RPD) as a temporary measure once the periodontal condition resolves.
 - b. Provision of a metal RPD or a fixed partial denture for the replacement of the edentulous space from 41 to 43.
 - c. Restoration of tooth wear

Phase 4 (maintenance care):

1. Reevaluation of FBS, glycated hemoglobin level, lipid profile, and blood pressure in 3 months time following nonsurgical therapy.
2. Regular monitoring of the periodontal condition and supportive therapy.



Fig. 6: Two weeks after nonsurgical therapy
Note the healing of the epulide at 21



Fig. 7: Six weeks after nonsurgical therapy

Table 3: Laboratory test results of the patient 3 months after nonsurgical periodontal treatment

Measured test	Value	Reference range
FBS	207.3 mg/dl (H)	65–110 mg/dl
HbA1C	9.3% (H)	4–6% (for nondiabetics) Less than 7% (for diabetics)
Lipid profile		
Total serum cholesterol	223 mg/dl (H)	150–200 mg/dl
HDL	69.3 mg/dl	More than 40 mg/dl (for men)
Cholesterol/HDL ratio	3.3 (L)	3.8
Triglycerides	114.1 mg/dl	50–150 mg/dl

H: High; L: Low; FBS: Fasting blood sugar; HbA1C: Glycated hemoglobin; HDL: High-density lipoprotein



Fig. 8: Postoperative view with the denture

An acrylic removable partial denture was provided as a replacement of 42 and 43 (Fig. 8). Composite resin restorations were performed for the abfraction lesions of 25 and 26. He was placed on a stringent maintenance care afterward.

With much improvement of his periodontal condition with the broadened knowledge of the association between DM and PDD, and most importantly the value of his contribution toward living a healthy lifestyle with the changes made especially on eating habits, the patient was highly satisfied at the end of this preliminary phase of treatment.

DISCUSSION

Optimum plaque control is still the cornerstone for a successful treatment outcome of PDD. Control of supragingival plaque has shown to affect both the total number of bacteria and the composition of the subgingival microbiota.^{6,7} Therefore, the importance of removing supragingival plaque cannot be underrated. Subgingival plaque has shown to evade the defense mechanism of the host as well as the chemotherapeutics that were being used.⁷ Use of a chemical plaque-controlling mode had shown to enhance the effect of the mechanical plaque removal.

The concept of FMD involves full mouth debridement of the periodontally affected sites in the entire dentition in two visits within 24 hours of one another.⁶ The success of the treatment is considered due to the reduction in bacterial cross-contamination, optimum application of antiseptics, and/or the Schwartzman reaction (a fever-like reaction experienced by the patient as a result of activation of the host's immune system in response to bacterial toxins released at the time of the treatment). Patients with severe periodontitis and gross accumulation of plaque and calculus deposits are immensely benefited from this approach.⁶

Periodontal disease is considered the sixth complication of DM.⁸ Due to the bidirectional relationship of DM with PDD, the severity of the disease had shown to be greater among individuals with uncontrolled state of DM.¹ The risk of progression of bone loss had shown a reduction in those with a better control. An accelerated progression of PDD was seen in patients having an elevated HbA1C level of greater than 7%.⁹ Periodontitis was suggested as an independent risk factor for the development of type 2 DM.¹⁰ By treating periodontal infections, a good glycemic control can be achieved by overcoming insulin resistance. However, concurrent control of DM through diet, medication, and exercise should all come into play to obtain favorable results.²

The American Heart Association provides a comprehensive guideline for the diagnosis of MS. Increasing physical activity, reducing body weight, eating a heart-healthy diet that is rich in whole grains, fruits, vegetables, and fish, and management of the blood glucose, cholesterol, and pressure levels can minimize the associated risks that can bring about from this serious condition. The association of psychological stress with PDD among adults was also a well-established phenomenon.^{1,11,12}

CONCLUSION

The importance of nonsurgical periodontal therapy can never be underestimated. Provision of it alone can bring about outstanding results in a patient with periodontitis, and also can minimize the necessity of surgical interventions, thus simplifying the treatment, reducing the cost and the time for the patient.

Dental plaque biofilm cannot be eliminated. However, the pathogenic nature of the dental plaque biofilm can be reduced by reducing the bio-burden (total microbial load and different pathogenic isolates within that dental plaque biofilm) and maintaining a normal flora.¹³

CLINICAL SIGNIFICANCE

Proper management of PDD, even with simple nonsurgical therapy, can bring about astounding results in a patient's medical conditions, such as DM.

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