

DIABETES MELLITUS, PERIAPICAL INFLAMMATION, AND ENDODONTIC TREATMENT : A CASE REPORT

Gita Tarigan*, Trimurni Abidin,**

* Resident of Spesialist Program of Conservative Dentistry

**Lecturer of Specialist Conservative Dentistry Faculty of Dentistry,
University of Sumatera Utara

Abstract

Diabetes mellitus (DM) is one of the most common metabolic disorders. DM is characterized by hyperglycaemia, resulting in wound healing difficulties and systemic and oral manifestations, which have a direct effect on dental pulp integrity. The influence of DM on periapical bone resorption and its impact on dental interventions are reviewed. Pulp from patients with diabetes have the tendency to have limited dental collateral circulation, impaired immune response, increased risk of acquiring pulp infection or necrosis, besides toothache and occasional tendency towards pulp necrosis caused by ischaemia.

A 72-year male patient presented to the department of Conservative Dentistry and Endodontics, Faculty of Dentistry, University of Sumatera Utara with severe pain and swelling for the last 3 days. The patient gave a history of some tooth restoration. Dressing with calcium hidroxiide was applied on the tooth for 1 months. Obturation was also applied together with AH26 sealer. The final restoration was full crown metal with fiber reinforced composite post.

Conclusion: Knowledge about how diabetes affects systemic and oral health has an enduring importance, because it may imply not only systemic complications but also a higher risk of oral diseases with a significant effect on pulp and periapical tissue.

Key Words: Diabetes Mellitus, Endodontics, Root Canal Treatment.

INTRODUCTION

Diabetes mellitus is one of the most common metabolic disorders, affecting 366 million patients of all ages in 2011.^{1,2} It is a chronic, complex, progressive, and debilitating disease that currently has no cure and is characterized by partial or total deficiency in insulin production.³ As a consequence, this disease promotes hyperglycemia,^{4,5} wound healing difficulties,^{6,7,8} as well as systemic and oral manifestations.^{1,4,9,10}

The relationship between oral health and diabetes has been extensively reported in the literature, especially in regard to periodontal disease. However, in the endodontic context, experimental and clinical studies also demonstrate a higher prevalence of periapical lesions in patients with uncontrolled diabetes.

^{3,8,11,12,13}

Pathology of DM

Diabetes mellitus is a relative or absolute insufficiency of insulin production in the pancreas, which may result in failing and/or inadequate carbohydrate, fat, and protein metabolism. Polydipsia, polyuria, polyphagia, and glycosuria represent signs and symptoms of diabetes.^{1,3} This condition presents two main types. Type 1, previously named 'insulin-dependent diabetes, is an autoimmune reaction that destroys pancreatic b-cells and inhibits insulin secretion.^{13,14} Type 2, the most common type of diabetes, is characterized by tissue's resistance to insulin action, showing glucose hormone intolerance or b-cell dysfunction. Type 2 diabetes has also been associated with hyperglycaemia and

hyperinsulinaemia.^{10,15} caused by glucose metabolism failure in the bloodstream.^{3,7}

In a systemic framework, these individuals are susceptible to bone metabolism alterations, peripheral neuropathy, vascular insufficiency and autonomic dysfunction.^{7,18,19} The long-term consequences are damage, dysfunction and/or failure of various organs, mostly affecting the kidneys, eyes, nerves, blood vessels and heart, consequently leading to progressive and chronic complications such as retinopathy, nephropathy and/or neuropathy. These individuals are also susceptible to acute pyelonephritis, osteopenia, osteomyelitis, foot ulcers, Charcot disease, and sexual dysfunction.²⁰ The generalized circulatory disorders presented in patients with DM due to insulin absence imply a deficient blood supply in damaged areas in addition to cellular dehydration.³ Furthermore, poor insulin control associated with DM may cause diabetic ketoacidosis, healing deficiencies, and/or coupling processes (impairment in new bone formation after resorption).^{8,21}

In both DM types, the vascular system is affected by atheromatous deposits, which accumulate in basal membrane lumen and basement membrane, resulting in an impaired leucocyte response and a diminished polymorphonuclear cell defense capacity.^{3,22} Therefore, these patients are more susceptible to infection processes,¹¹ especially anaerobic ones, due to reduced oxygen diffusion through the capillary wall. Neutrophil suppression and bacterial synergism imply a commonly delayed and severe infection process. High levels of glucose in damaged

areas promote bacteria proliferation, leucocyte death, apoptosis, and clearance beyond the homing-leucocytes capture.³ The hyperglycaemia scenario results in glycosylated end product formation and haemoglobin glycation, causing decreased efficiency in oxygen transportation compared to normal haemoglobin.³ Patients with diabetes are prone to developing oral complications such as caries,^{3,22} pulp and periapical pathosis^{3,4,14} and especially periodontal disease^{1,4,6,10,14,15,19} which is considered as the sixth most chronic DM complication.^{1,3} Oral infections are reported with higher prevalence and severity in uncontrolled type 1 DM.³ A list of other oral alterations presented in patients with DM includes the followings: impaired function of salivary glands (hyposalivation or xerostomy),^{1,10,19,20} taste changes, tongue and mouth burning, tendency towards oral infections (essentially candidiasis), delayed healing process, coated tongue, halitosis^{3,4} mucosa ulceration, erythema, recurrent abscesses, gingival inflammation and hyperplasia, down-regulation of epithelial keratinization, trabecular osteoporosis and up-regulation of bone loss and acidity levels.³

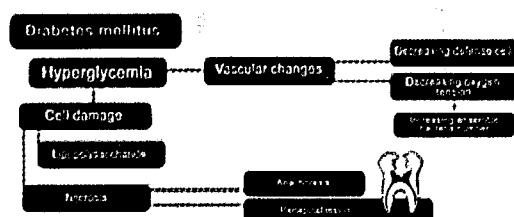


Figure 1. Direct impact of The Diabetes in Pulp Integrity.³

DM AND ENDODONTIC THERAPY

Endodontic treatment of diabetic patients with root canal infections is related to decreased success and these patients may have increased flare-ups.¹⁶ Therefore endodontic treatments to these patients should be to these patients should be based on careful assessments and effective antimicrobial regimens of the root canal.²³ Indeed, the relationship between poorly controlled diabetes and periapical lesions remains unclear.²⁴ Root canal treatment in patients with DM should be performed using controlled strategies to prevent dissemination of microorganisms through intracanal disinfectants and decontamination agents use prior to crown-down instrumentation. Nevertheless, these interventions are preventive measures. In addition to management, it is relevant in cases of uncontrolled or poorly controlled diabetes in patients who need dental treatment that the glycaemic control has to be established or the procedure has to be subjected to medical clearance. Antibiotic therapy must be adopted in emergency cases (presence of oral infection/dentoalveolar surgery) to reach a minimum potential for postoperative infections and delayed wound healing.^{33,34} For adult patients with controlled diabetes and absence of systemic complications, dental treatment should be the same as that of nondiabetic patient, and antibiotics must be prescribed only in high-risk situations, such as in acute oral infections.³⁵ However, there is no special treatment (neither methods of diagnosis nor follow-up criteria) implemented

in handling DM patients with periapical lesions. Based on the literatures and clinical evidence, periapical lesions in patients with DM present some particularities that affect the success rates of treatment. Molecular knowledge of these specificities, especially related to periapical lesions, microorganisms, and the immunoinflammatory response, could better guide efficient endodontic treatment and offer new therapeutic directions for these patients.²⁰

CASE REPORT

A 72 year-old male patient reported to our endodontic department with the chief complaint of pain in the right back lower jaw region. The patient was diabetic and was under medication. Intraoral examination revealed occlusal carious lesion of maxillary incisor, tenderness on percussion, and deep periodontal pocket with a probing depth of 13 mm in the area of associated tooth with grade II furcation involvement.

Pretreatment radiographic examination and pulp vitality test suggested combined endo-perio lesion of non-vital maxillary incisor. The IOPA radiograph showed bone loss around the distal root and the interradicular area of maxillary incisor (Figure 2). Scaling and polishing followed by root canal treatment were suggested. As the patient was diabetic, the periodontal surgery was postponed. Thorough scaling and polishing were performed. The root canal treatment was completed as described in case one and the patient was kept under follow-up (Figure 3).



Figure 2. Panoramic of Diabetic patient



Figure 3. patient's teeth post scaling treatment/ before endodontic treatment



Figure 4. Porcelain Fused to Metal

DISCUSSION

Endodontic-periodontal lesion is a clinical manifestation of the pathologic inflammatory inter-communication between pulpal and periodontal tissues. On the basis of the pathologic origin, Simon et al classified endodontic-periodontal lesions into primary endodontic lesions, primary endodontic lesions with secondary periodontic

involvement, primary periodontic lesions, primary periodontic lesions with secondary endodontic involvement, and true combined lesions.

Later, an additional classification was added by Belk and Gutmen as concomitant endodontic and periodontal lesions. Endodontic-periodontal lesion is a true challenge. It requires a thorough understanding of the wound healing process involves endodontic.¹⁰ However, this study has a different results comparing with Walton's and Torabinejad's ¹⁰ which the variations incidence of flare-up only around 2% to 4%. This may because various factors such as lack of expertise in the field of endodontic treatment (conservation specialists), the difference of the location of research , as well as the lack of knowledge about flare-ups among common people and dentists.

This study also has different result comparing with Emmanuel Christopher's¹³ who found the frequency of flare-ups is relatively high. Therefore, flare-up cases should be considered in root canal treatment. According to Christopher and Emmanuel,¹³ the frequency of flare-up which was about 16 (10%) might probably because of the differences of the location and the condition of each patient in every studies.

CONCLUSIONS

Inadequate DM control may predispose such patients to several oral infections, including dental pulp infection. In addition, the presence of apical periodontitis in patients

with DM also corroborates with the lack of DM control. This relationship demonstrates a cross-susceptibility between both diseases, which increases the clinical rate of endodontic treatment failure. The special characteristics of periapical lesions of patients with DM provide evidence that the targets of success in these patients should be adjusted. Little is known about the microbiology of endodontic infections and immunoinflammatory reaction in DM that could be implemented in new therapies for these patients. The search for this knowledge should include both clinical and basic sciences and could help in raising endodontic success rates for these patients.

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