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Review Article

Treatment of Periodontitis in Diabetes Mellitus Patients

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Abstract

Special considerations for the management of patients with diabetes mellitus in the dental office are reviewed, including the signs and symptoms of diabetes mellitus, risk assessment for diabetes mellitus, and the challenges of "tight control" with insulin and oral agents with regards to hypoglycemia. It is recommended that a thorough medical history of the patient be obtained, that the patient's medications are known, that the dentist consults with the patient's physician to assess the patient's glycemic control, and that the patient's blood glucose levels and dietary intake be monitored before treatment. Finally, it reviews the long-term complications of diabetes mellitus, particularly the oral complications that can affect overall health.

Keywords: *Diabetes Mellitus; Periodontal Disease; Hypoglycaemia; Glycemic Control*

Introduction

Periodontal health is particularly important in people with diabetes mellitus because it is known that bacterial infections decrease insulin-mediated glucose uptake by the skeletal muscle leading to whole-body insulin resistance. Presence of endotoxins of bacteria and host-derived cytokines induce insulin resistance and reduce insulin action. Because of Untreated periodontal disease, chronic inflammation occurs which leads to increased insulin resistance, decreased glucose tolerance, and an increased risk of diabetic complications. Two studies have demonstrated that diabetic subjects with severe periodontitis are at greater risk for developing nephropathy and cardiovascular disease, which can both affect mortality in this patient population [1,2].

In an 11-year follow-up of subjects, Thorstensson and colleagues demonstrated that diabetics with severe periodontitis had a greater prevalence of proteinuria indicative of nephropathy and a greater number of cardiovascular complications [1]. These oral-systemic connections in diabetics have been confirmed most recently by Saremi and colleagues [2]. They reported that periodontal disease is strong predictive of mortality from ischemic heart disease and diabetic nephropathy in Pima Indian population with type 2 diabetes mellitus. In an 11-year follow-up, the age- and sex-adjusted death rates of the type 2 diabetics increased with the severity of their periodontitis. For medical management of the diabetic patient optimal oral health is essential.

Dental Management of Diabetes Mellitus

When a dental treatment is going to be performed, some considerations must be taken into account. These considerations would be appreciably different based on the type of diabetes mellitus suffered. In this paper, we analyze type 1 and 2 diabetes mellitus, the most prevalent forms.

Type 1 diabetic patients who are undergoing dental procedure

Follow the above considerations described

Non- invasive dental procedures: well- controlled patients can be treated similarly to nondiabetic individuals. There is increased suscep-

tibility of these patients to infections and delayed wound healing, which should be taken into consideration. If possible try to delay the dental treatment in poorly controlled patients, until they achieve good metabolic control.

Invasive dental procedures: patients should ask their doctor for instructions concerning their medication (normally, if they have metabolic stability, they should take half their daily dose of insulin the morning of the treatment; then, after the intervention, the whole dose should be taken with a supplement of rapid-acting insulin). Measure the Blood glucose level preoperatively. Invasive dental procedure can be performed or carried out only if it ranges between 100 and 200 mg/dl. If the level of blood glucose is > 200 mg/dl, an intravenous infusion of 10% dextrose in half- normal saline is initiated, and subcutaneous administration of rapid- acting insulin is given. If the treatment lasts more than 1 hour, blood glucose should be measured hourly. If the level of blood glucose is > 200 mg/dl, subcutaneous administration of rapid acting- insulin should be given.

Type 1 diabetes mellitus is considered as a risk factor with regard to suffering infection. For that reason, when invasive dental procedures are going to be performed (as intra ligamentous anesthesia, teeth extractions, biopsies, etc.), the usual guidelines for the antibiotic prophylaxis should be followed [3].

Type 2 diabetic patients who are undergoing a dental procedure

Follow the above considerations described

Non- invasive dental procedures: people who control their disease well by diet and exercise require no special perioperative intervention. Like in type 1 diabetic patients, care should be taken in terms of their susceptibility to infections and delayed wound healing. If necessary dental treatment should be delayed in poorly- controlled patients, until they achieve good metabolic control.

Invasive dental procedures: patients should ask their doctor for instructions regarding their medication (normally, those patients being treated with oral hypoglycaemic agents should take their normal dose in the morning and eat their regular diet).

Acute Complications

Hypoglycemia is the major issue that confronts dental practitioners when treating diabetic patients, particularly if patients are fasting. Clinical presentation of hypoglycemia and hyperglycemia are very similar. In cases of doubt, it should be treated as a hypoglycemia. The characteristics and treatment of this complication are showed in table 1 [4]. Hypoglycemia usually appears in response to the stress experienced before, during or after the treatment, and has been shown to cause a significant increase in perioperative morbidity and mortality [5]. The stress response is characterized by acute metabolization of carbohydrates, proteins and fats to provide increased levels of glucose, which is necessary as a major fuel source to the vital organs. In addition, there is increase in resistance to the effects of insulin. There are no specific guidelines regarding which levels of hyperglycemia are dangerous or how it should be managed before or during the procedure, so if the patient is conscious and can follow other instructions, it is prudent to continue with the treatment [4].

Criteria for the Diagnosis of Diabetes		
Measurement	**Diagnostic Values for Diabetes**	**Characteristics**
Glycosylated hemoglobin (HbA1c)	≥ 6.5%	The test should be performed in a laboratory using the standarized method. It reflects average blood glucose levels over a 2- to 3-month period of time
Fasting plasma glucose	≥ 126 mg/dl (7.0 mmol/l)	Fasting is defined as no caloric intake for 8 hours
Postprandrial plasma glucose (2 hours after caloric intake)	≥ 200 mg/dl (11.1 mmol/l)	The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in water
Random plasma glucose	≥ 200 mg/dl (11.1 mmol/l)	

Table 1: *Criteria for the diagnosis of diabetes mellitus (ADA 2010).*

Chronic Complications

The possible cardiovascular complications of diabetes mellitus should be properly assessed before dental treatment. Autonomic neuropathy can predispose to orthostatic hypotension, respiratory arrest or hemodynamic instability. If the patient has renal complications, a dose adjustment of the drugs should be performed, using the creatinine clearance [5]. It is recommended to associate antibiotic treatment when mechanical periodontal treatment is performed, and also administers an antibiotic prophylaxis [6,7]. Osteoporosis present in type 1 diabetes mellitus requires great care when performing surgery, in order to prevent iatrogenic fractures [4]. Due to the delayed healing response in diabetic patients [8,9], implant therapy is still controversial and at the moment, there is a lack of definitive guidelines. In any case, these individuals could be candidates for the placement of dental implants if they have good control of their metabolism. There is general agreement in advocating the use of prophylactic antibiotics in diabetic patients [10].

Identification and Treatment of Hypoglycemia	
Identification	
Symptoms	**Signs**
• Shakiness • Anxiety • Increased sweating • Hunger	• Tremors • Tachycardia • Altered consciousness (lethargy and obtundation or personality change) • Blood glucose level: < 60 mg/dl
Treatment	
Conscious patient	**Unconscious patient**
• Administer 15 mg of simple carbohydrates • Repeat finger- stick glucose test in 15 minutes: • Blood glucose level > 60 mg/dl: patient should be asked to eat or drink (for example, a sugar-sweetened beverage) • Blood glucose level < 60 mg/dl: repeat treatment of 15 g of simple carbohydrates and check blood glucose in 15 minutes. Continue until achieving a blood gluco- se level > 60mg/ dl • Ask the patient to notify his/ her physician.	**With intravenous access:** • Administer 5 to 25 g of 50% dextrose immediately • Notify the patient's physician **Without intravenous access:** • Apply glucose gel inside the mouth in a semiobtund patient or treat with 1 mg of glucagon intramuscularly or subcutaneously • Repeat the blood glucose test in 15 minutes • Establish intravenous access and notify the patient's physician

Table 2: *Identification and treatment of hypoglycaemia in the dental office.*

Conclusion

In conclusion, diabetes mellitus has a significant impact on the tissues throughout the body, including the oral cavity. The risk of periodontitis increases in cases of poorly controlled diabetes mellitus. Periodontal infection and the treatment of periodontal disease can alter glycemic control. Long-term complications of diabetes mellitus, such as nephropathy and cardiovascular disease which have an impact on mortality can be prevented or controlled by early intervention and treatment of periodontitis. There will be greater need for dental and medical practitioners in future to communicate and partner. In future, the group practice will most likely be the dentist and the physician working very closely together. The treatment of Periodontal disease may eventually be covered by medical insurance, which may include consultations, diagnostics, and therapeutics. The data emerging from studies of diabetic patients are important for establishing the absolute necessity for periodontal health. The treatment of periodontal disease should not be taken as an option or elec-

tive and the demand for preventive care should be increased. There is an urgent need for knowledge transfer, which will be facilitated by the integration of the emerging data and concepts into both dental and medical school curriculum at all levels.

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