

Dental Management of Diabetes Mellitus: Review of Literature

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ABSTRACT

Background: The incidence of diabetic mellitus is increasingly steadily. The increasing longevity of the population and more effective diagnostic protocol mean that the dental practitioner will be treating an increasing number of patients with diabetic mellitus. The authors present relevant information about diabetic mellitus, its type, path physiology, complications, medical and dental management of these patients. There are many medical and dental management issues that dentists should consider when treating patient with diabetic mellitus.

Keywords: Dental management, diabetes mellitus, dentistry.

INTRODUCTION

Diabetes Mellitus is a disease of Glucose, fat and protein metabolism resulting from impaired insulin secretion, varying degree of insulin resistance or both¹. It is a disease complex with metabolic and vascular components. This chronic disease is characterised by hyperglycemia and complications that include micro vascular disease of the kidney, eye and a variety of clinical neuropathies². It is a

very common disease with concomitant oral manifestation that impact dental care⁴.

It can be classified as TYPE I (formerly, Insulin - dependent diabetes) and TYPE II (Non -Insulin dependent diabetes). Blood glucose elevation that does not satisfy either Type I or Type II DM is classified as Impaired Glucose Tolerance or Impaired Fasting Glucose¹.

The ADA classification of diabetes is summarized in Box 1(a)

Table 1: Current Classification of Diabetes (American Diabetes Association, 1997).

Type 1	Beta-cell destruction or defect in beta cell function, Usually leading to absolute insulin deficiency
Immune Mediated	Presence of islet cell or insulin antibodies that identify the autoimmune process leading to beta-cell destruction
Idiopathic Type 2	No evidence of autoimmunity Insulin resistance with relative insulin deficiency
Other specific types	Genetic defects of beta-cell function or insulin action, pancreatic diseases, endocrinopathies, malnutrition, or chemical-induced diabetes Impaired fasting glucose (impaired glucose tolerance) Abnormalities of fasting glucose (abnormal glucose tolerance)
Gestational	Any degree of abnormal glucose tolerance during pregnancy diabetes

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ETIOLOGY

Diabetes Mellitus may be the result of any of the following-

1. A Genetic disorder
2. Primary destruction of islet cells through inflammation, cancer or surgery
3. An endocrine condition such as hyperpituitarism or hyperthyroidism
4. An iatrogenic disease that occurs after steroid have been administered

The genetic type of diabetes also called as Primary, Hereditary or Essential diabetes is the most common type. The two types of genetic diabetes are Type I and Type II. Role of genetic in Type II diabetes is much greater than in Type I diabetes whereas environmental factors such as viral infection and auto immune reactions appear to be causative for Type I diabetes².

PATHOPHYSIOLOGY OF TYPE I DIABETES

Type I Diabetes Mellitus is characterised by absolute insulin deficiency brought about by the auto immune destruction or accelerated disappearance of pancreatic beta cells⁷. Susceptibility to Type I Diabetes Mellitus is inherited and the principle gene associated with this is MHC (major histocompatibility complex) on chromosome 6.

PATHOPHYSIOLOGY OF TYPE II DIABETES

Type II Diabetes Mellitus is complicated since patients present with varying degrees of both insulin deficiency and insulin resistance²⁴.

In contrast to Type I, hyperglycemia in Type II is a result of insulin resistance. The eventual loss of ability of the pancreas to increase insulin output, in the setting of insulin resistance, creates a relative insulin deficiency and progression to established Type II Diabetes Mellitus.

COMPLICATION OF DIABETES

Chronic elevation of plasma glucose leads to increased intracellular accumulation of glucose and its metabolic products. The long term complication include microvascular disease of eye (retinopathy) and kidney (nephropathy) and a variety of

neuropathies³⁵. Diabetic retinopathy occurs in all forms of Diabetes Mellitus with the earliest manifestations being retinal microaneurysm.

ORAL MANIFESTATIONS OF DIABETES

Oral Complications of poorly controlled diabetes mellitus may include xerostomia, bacterial, viral, and fungal infections (including candidiasis), poor wound healing, increased incidence and severity of caries, gingivitis and periodontal disease, periapical abscesses, and burning mouth symptoms. Oral findings in patients with uncontrolled diabetes most likely relate to excessive loss of fluids through urination, altered response to infection, microvascular changes, and possibly, increased glucose concentrations in saliva⁷³⁻⁷⁷.

Independent of the severity of plaque accumulation, gingivitis, periodontitis and periodontal bone loss are associated with Diabetes Mellitus, especially when poorly controlled⁴⁸⁻⁵¹. Defects in immune status, altered bacterial flora and micro vascular disease are the postulated pathogenesis of diabetic periodontal disease. Evidence indicates that bacteremia associated with periodontitis contributes to insulin resistance and destruction of pancreatic islet cells.

Diabetic patient may complain of dry mouth. Xerostomia be a manifestation of hyperglycaemia associated dehydration or impaired salivary gland function⁵⁴. Oral candidiasis occurs commonly in poorly controlled diabetics⁵⁵.

Oral lesions are more common in patients with diabetes. A significantly higher percentage of oral lesions, especially candidiasis, traumatic ulcers, lichen planus, and delayed healing, has been seen in individuals with Type I diabetes, as compared with a control population. Alterations in the immune system may be responsible for the appearance of lichen planus in diabetes.

Diabetic neuropathy may lead to oral symptoms of paresthesias and tingling, numbness, burning, or pain caused by pathologic change involving nerves in the oral region. Diabetes has been associated with oral burning symptoms. Early diagnosis and treatment of diabetes may allow for regression of these symptoms, but in longstanding cases, the changes may be irreversible⁸⁰⁻⁸¹.

MANAGEMENT

Diabetes Mellitus is not a curable disease. Therapy for diabetic patient is a highly individualised process and usually continues for the rest of patient's life. This needs lifelong patient compliance which is a problem for many patients. Result of treatment and of testing must be re-evaluated on a continual basis, patient education regarding the disease, its complication, and its management is an ongoing process.

Therapeutic goals for most patients include the following-

1. To maintain the blood glucose level as close to normal as possible without repeated episodes of hypoglycaemia.
2. To strive to maintain normal body weight.
3. To control hypertension and hyperlipidemia.
4. To develop a flexible treatment plan that does not dominate the patient's life.

The patient with diabetes may be treated through control of diet and physical activity, along with oral hypoglycaemic agents and Insulin.

Treatment of Patients with Diabetes Mellitus

Type 1 Diabetes

- Diet and physical activity
- Insulin
 - Conventional
 - Multiple injections
 - Continuous infusion
 - Pancreatic transplantation

Type 2 Diabetes

- Diet and physical activity
- Oral hypoglycaemic agents
- Insulin plus oral hypoglycaemic agents
- Insulin

DENTAL MANAGEMENT

Any dental patient whose condition remains undiagnosed but with cardinal symptom of diabetes (ie polydipsia, polyuria, polyphagia, weight loss and weakness) should be referred to a physician for diagnosis and treatment. All patients with diagnosed diabetes must be identified by history and type of medical treatment they are

receiving. The Type of diabetes and the presence of complications noted. Historical information regarding the comorbidities of hypertension, obesity, lipid disorders and smoking are very important because of their role in the development of Cardiovascular disease.

The dental management of a patient with diabetes whether insulin or non insulin dependent require special attention. (Box- 3)

Dental Management of the patient with Diabetes

1. Non-insulin-dependent patient:

If diabetes is well-controlled, all dental procedures can be performed without special precautions.

2. Insulin-controlled patient:

- If diabetes is well-controlled, all dental procedures can be performed without special precautions.
- Morning appointments are usually best.
- Patient advised to take usual insulin dosage and normal meals on day of dental appointment; information confirmed when patient comes for appointment.
- Advise patient to inform dentist or staff if symptoms of insulin reaction occur during dental visit.

3. If extensive surgery is needed:

- Consult with patient's physician concerning dietary needs during postoperative period.
- Antibiotic prophylaxis can be considered for patients with brittle diabetes and those taking high doses of insulin who also have chronic states of oral infection.

If not well-controlled (i.e., does not meet ANY of above criteria: fast blood glucose <70 mg/dL or >200 mg/dL and ANY complications [post MI, renal disease, congestive heart failure, symptomatic angina, old age, cardiac dysrhythmia, cerebrovascular accident], and blood pressure > 180/110 mm Hg, or functional capacity < 4 metabolic equivalents):

- Provide appropriate emergency care only.
- Request referral for medical evaluation, management, and risk factor modification
- If symptomatic, seek IMMEDIATE referral

- If asymptomatic, request routine referral

A diabetic with risk for coronary artery disease should have important practical management implications. Various measures to decrease myocardial oxygen demand should include steps to reduce stress and elevate endogenous catecholamines (through the use of sedation technique) and a reduction in the administration of catecholamines as much as possible.

Because of heightened risk of periodontal disease in Diabetes Mellitus, preventive periodontal therapy is an important component in comprehensive dental management of the Diabetic patient. Therapy should include careful assessment of a patient's periodontal status followed by explicit, ongoing hygiene instruction, frequent prophylaxis and monitoring of periodontal health.

Scheduling of elective surgical procedures must take into consideration not only the anesthetic need of the diabetic, but also the impact the surgical procedure may have on the patient's ability to consume an appropriate diet. It is important that the total caloric content and the protein, carbohydrate, fat ratio of the diet remain the same so that control of the disease and proper blood glucose balance are maintained. Any patient with diabetes and an acute dental and oral infection presents a significant management problem. Box 4.

Dental Management of the Patient with Diabetes and Acute Oral Infection

1. Non-insulin-controlled patients may require insulin; consultation with physician required
2. Insulin-controlled patients usually require increased dosage of insulin; consultation with physician required
3. Patient with brittle diabetes or receiving high insulin dosage should have culture(s) taken from the infected area for antibiotic sensitivity testing
 - a. Culture sent for testing
 - b. Antibiotic therapy initiated
 - c. In cases of poor clinical responses to the first antibiotic, a more effective antibiotic is selected according to sensitivity test result

4. Infection should be treated with the use of standard methods
 - a. Warm intraoral rinses
 - b. Incision and drainage
 - c. Pulpotomy, pulpectomy, extractions, etc.
 - d. Antibiotics

SUMMARY

Diabetes is a common metabolic disorder associated with glucose intolerance and long term complications. Especially in Type II diabetic, a cluster of comorbidities (obesity, Hypertension) not only predispose to diabetes but to cardiovascular disease as well. Intensive regulation of plasma glucose along with the management of comorbidities comprising the "Metabolic Syndrome". Management of diabetic dental patient should focus on periodontal health and the delivery of the comprehensive dental care with minimal disruption of metabolic homeostasis and recognition of diabetic comorbidities.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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