

Review Article

Prosthodontic Management Of Patients With Diabetes Mellitus

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INTRODUCTION: Diabetes mellitus is a disease of glucose, fat & protein metabolism resulting from impaired insulin secretion, varying degree of insulin resistance or both. Hyperglycemia is the most clinically important metabolic aberration in diabetes mellitus & the basis for its diagnosis. Apart from the obvious impact of impaired glucose metabolism, diabetes mellitus & chronic hyperglycemia are associated with important ophthalmic renal, cardiovascular, Cerebrovascular & peripheral neurological disorders. Management of the diabetic dental patient must take into consideration the impacts of diabetes on dental disease &

ABSTRACT: Diabetes mellitus is a disease resulting from impaired insulin secretion, varying degree of insulin resistance or both. Management of the diabetic dental patient must take into consideration the impacts of diabetes on dental disease & dental treatment, as well as a clear appreciation for the co morbidities that accompany long standing diabetes mellitus.

Key words: Diabetes, Dental, Insulin, Prosthodontics.

dental treatment, as well as a clear appreciation for the co morbidities that accompany long standing diabetes mellitus.¹

CLASSIFICATION

1. Primary
 - a. Type 1 or Insulin Dependent DM (IDDM)
 - b. Type 2 or non-insulin Dependent DM (NIDDM)
2. Other specific types of Diabetes
 - a. Pancreatic Disease

- b. Excess Endogenous production of hormonal antagonists to insulin
- c. Medication (Corticosteroids, thiazide diuretics, phenytoin)
- d. Associated with genetic syndromes.

3. Gestational Diabetes

EPIDEMIOLOGY

Type I diabetes accounts for 5-10% of cases of diabetes whereas type II diabetes accounts for 80% of cases of diabetes in USA & UK.

DIAGNOSIS

The diagnosis of diabetes is based on the classic symptoms like polyuria, polydipsia, polyphagia, weight loss and visual disturbances.²

According to American diabetic association (ADA): Fasting blood sugar (FBS) > 126 mg/dl or Post random blood sugar (PRBS) > 200mg/dl

In the absence of these classic symptoms, glucose intolerance may exist as impaired fasting glucose (IFG) when FBS is between 100 - 125 mg/dl. Similarly plasma glucose of 140 – 199 mg/dl called as impaired glucose tolerance (IGT). This distinction is important because individuals with IFG & IGT are at increased risk of developing atherosclerotic disease even though if they don't develop diabetes.

Type I diabetes often presents with markedly elevated plasma glucose & associated symptoms, whereas type II is often not diagnosed until complications

occur. Therefore screening test is important in type II diabetes.³

ADA recommends FBS screening in individuals above 45 years every 3 years, in case of obese. Screening should also considered at younger age in individuals with overweight (BMI > 25) and who have hypertension or any vascular disease.

PATHOPHYSIOLOGY

TYPE I DIABETES⁴

Activation of autoimmunity which leads to attack on beta cells of pancreas

TYPE II DIABETES

In contrast to type I diabetes, type II diabetes has no autoimmune mechanism.

Genetic influence is much more predominated than type I diabetes

RISK FACTORS FOR TYPE II DIABETES

1. Obesity combined with overeating & under activity
2. Ageing
3. Insulin resistance, may be due to any of these causes
 - Abnormal insulin molecule
 - Excessive amount of circulating antagonists
 - Target tissue defects
4. Repeated pregnancies , particularly in obese women

COMPLICATIONS

Short term complications

- Hypoglycemia
- Diabetic ketoacidosis

Long term complications

- Diabetic retinopathy
- Diabetic neuropathy
- Diabetic nephropathy
- Cardiovascular disease.

Diabetic retinopathy is most common cause of blindness in diabetics in the age of 30 - 65 years.

Diabetic neuropathy is symptom less in majority of diabetics, although it can be seen as symmetrical altered sensation in the toes & feet. Involvement of autonomic nervous system can affect gastric motility, erectile function, bladder function, cardiac function & vascular tone.⁵

Diabetic nephropathy is the earliest complication & affects 30% of type I & 4% of type II diabetes. This complication decreases over a period of time as age increases.

Cardiovascular disease occurs in majority of type II diabetics. Approximately 75% of type II diabetic patients die of cardiovascular disease. Coronary heart disease develops at an earlier age in diabetics & atypical angina symptoms & congestive heart failure are a more common

presentation. The risk of first myocardial infarction in patients with diabetes is equal to that of recurrent infarction in non diabetics.

Surgical site infection is more common in uncontrolled diabetics. Neutrophil adherence, chemotaxis, phagocytosis, cell mediated immunity are all compromised in hyper glycaemic diabetics. The plasma glucose threshold for such granulocyte dysfunction is in the range of 198 – 270mg/dl.

Optimal control of plasma glucose is important both in prevention & management of infection.⁶

ORAL MANIFESTATIONS OF DIABETES

- Oral conditions include burning mouth, altered wound healing, and an increased incidence of infection.
- Enlargement of the parotid glands and xerostomia
- Neuropathy
- Diabetes is a risk factor for the prevalence and severity of gingivitis and periodontitis.
- Risk of attachment loss and alveolar bone loss approximately 3 fold when compared to non diabetic control subjects.
- Enlarged gingival tissues, multiple periodontal abscesses.
- Changes in the function of host defense cells.
- Changes in the collagen metabolism, wound healing alternations and periodontal destruction.

- Periodontal infection increased the risk of poor glycemic control by six fold.
- Oral Candida infection also occurs in increased frequency in diabetics.⁷

PROSTHODONTIC MANAGEMENT OF DIABETIC DENTAL PATIENT

Key dental treatment considerations for diabetic patients include:

- 1) Medical history :
 - Take history and assess glycemic control at initial appt.
 - Glucose levels
 - Frequency of hypoglycemic episodes
 - Medication, dosage and times.
- 2) Establishing the levels of glycemic control early in the treatment process:
 - Patients recent glycated Hb values
- 3) Stress Reduction :
 - Endogenous production of epinephrine and cortisol increase during stressful situations.
 - Profound anesthesia reduces pain and minimizes endogenous epinephrine release.
 - Conscious sedation should be considered for extremely anxious patient.
- 4) Oral hygiene instructions, frequent prophylaxis & monitoring of periodontal health, as there is increased risk of periodontal disease.

- 5) Treatment: The use of antibiotics in case of infection and Diet Modification.

Appointment Timings⁸

- Diabetic patients can receive dental treatment in the morning.
- But, it is generally best to plan dental treatment to occur either before or after periods of peak insulin activity.
- Greatest risk of hypoglycemia will occur about
 - a. 30-90 min after injecting Lispro Insulin.
 - b. 2 – 3 Hours after injecting regular insulin
 - c. 4-10 hours after injecting Lente Insulin

Diabetic Emergencies Management

- The most common diabetic emergency in the dental office is hypoglycemia.
- Signs and symptoms of hypoglycemia include;- Confusion , sweating, tremors, agitation, anxiety, dizziness, tingling or numbness, and tachycardia. Severe hypoglycemia may result in seizures or loss of consciousness.
- Blood glucose with a glucometer should be checked.
- If glucometer is not available, condition is treated as hypoglycemic episode and the patient should be

given approx. 15g of oral carbohydrate.

- If patient is unable to take food by mouth i.v line is in place, 25-50 ml of 50% dextrose solution (D50) or 1mg of glucagon can be given intravenously.
- Signs and symptoms of hypoglycemia should reduce in 10-15 min.

Marked Hyperglycemia: If glucometer is not available, these symptoms must be treated as hypoglycemia.⁹

Signs & symptoms of hypoglycemia¹⁰

Mild

- Anxiety
- Tachycardia
- Sweating

Severe

- Confusion
- Seizures
- Coma

Management of hypoglycemia¹¹

- Terminate all dental procedures
- Alert the patient
- 15 gm carbohydrate(6 oz orange juice, 4 oz cola, 3-4 teaspoons sugar)
- In case of uncooperative patient, Glucagon 1 mg s.c, i.m. followed by oral glucose supplement or Dextrose-50 20- 50 ml i.v.

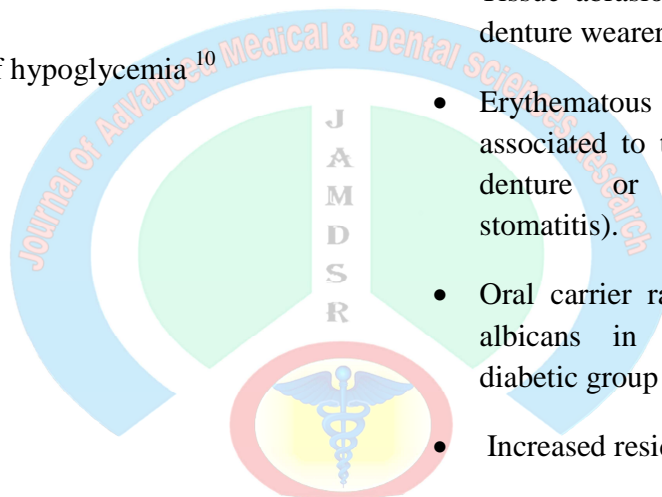
- The well controlled diabetic is probably at no greater risk of postoperative infection than in non diabetic. Therefore in routine oral surgical procedures do not require prophylactic antibiotics.
- In poorly controlled diabetic patient, prophylactic antibiotics should be considered.¹²

Diabetes and prosthodontics¹³

- Abutment Failure.
- Tissue abrasions are more likely in denture wearers.
- Erythematous candidosis is associated to the use of upper total denture or prosthesis (denture stomatitis).
- Oral carrier rate and density of *C. albicans* in denture wearers of diabetic group were higher.
- Increased residual ridge resorption.
- Mucostatic impressions should be made.

Diabetes and implant surgery¹⁴

- Implant dentistry is not contraindicated in most diabetics
- Diabetics patients with blood glucose levels of around 100 Mg/dl
- Sedative procedures and antibiotics.
- Need for a stress reduction protocol, diet evaluation before after surgery



and control of the risk of infection are all addressed.

- Corticosteroids, often used to decrease edema, swelling and pain may not be used in the diabetic's patient.
- Detrimental effects of diabetes on osseointegration can be modified using aminoguanidine systemically.¹⁵

CONCLUSION

Diabetes is a common metabolic disorder associated with glucose intolerance & longterm complications. Especially in type II diabetes, a clustering of co morbidities (obesity, hypertension, and dyslipidaemia) not only predisposes to diabetes but importantly, cardiovascular disease as well.

Management of diabetic dental patient should focus on periodontal health & the delivery of comprehensive dental care with minimal disruption of metabolic homeostasis & recognition of diabetic co morbidities.

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