DIABETES MELLITUS AND PERIODONTAL DISEASE – A TWO WAY RELATIONSHIP

Dr. Aashishraj V. Kamble
P.G. Student

Dr. Mala Dixit Baburaj
Prof. & HOD

Correspondence Address:
Dr. Aashishraj V. Kamble
Department of Periodontics
Nair Hospital Dental College
Mumbai-400 008

Abstract

|| Brief Background

Diabetes mellitus and its growing prevalence have profound implications in dentistry and specifically in periodontology. This article aims at providing an overview of diabetes and its effects on periodontal pathology. Also mentioned are the effects of periodontal therapy on the diabetic status. Special considerations from the periodontal treatment point of view in a diabetic patient are discussed as well.

|| Discussion

The discussion focuses on periodontal management of the patient with diabetes and the need for periodontal surgical therapy to be carefully planned in coordination with the patient's physician to ensure minimal disruption of metabolic diabetes mellitus control and to facilitate the patient's normal dietary intake to avoid an increased risk of other diabetic complications.

|| Summary and Conclusions

Diabetes mellitus definitely appears to be on the rise in the populations worldwide. A dental surgeon must take a thorough medical history comprising of direct questioning. On suspecting poor glycaemic control, the dental surgeon must advice appropriate glycaemic tests and referrals to the physician. Glycated haemoglobin seems to be the test which fits the dental requirements although more advances in it are awaited. Diabetes can result in increased risk of periodontal disease and is an indicator of poorer prognosis. Better glycaemic control has been shown to improve periodontal status in diabetics, but the claims of glycaemic control improvements after periodontal therapy need to be supported by further longitudinal research.

|| Key Words

Diabetes Mellitus, Glycaemic Control, Advanced Glycation End Products (AGEs), Neutrophils' Function, Monocyte/Macrophage Function, Periodontal Therapy.

|| Introduction

Diabetes mellitus is one of the most common chronic disorders that a dental surgeon is likely to face in everyday practice. There exists two types of diabetes mellitus; the rarer type I and the far commoner type II. The prevalence of type II diabetes in the year 2000 was estimated to be 150 million cases worldwide. It is estimated to increase to 220 million by the year 2010. This data implies that dental surgeons can anticipate more number of diabetic patients in their clinics. In fact, it is estimated that a dental practice having an adult population of 2000 can expect to encounter 40 to 80 people with diabetes.

|| Classification Of Diabetes:

The current classification of diabetes is based upon the pathophysiology of each form of the disease. Type I diabetes results from cell-mediated auto-immune destruction of pancreatic β-cells, usually leading to total loss of insulin secretion; hence was previously called Insulin Dependent Diabetes Mellitus (IDDM). These patients require exogenous insulin. They may develop diabetic ketoacidosis, a life threatening condition, in absence of insulin therapy.

Type II diabetes results from resistance to insulin in body cells, which alters the utilization of endogenously produced insulin in the target cells. Type II patients have altered insulin production as well, but they do retain some capacity for insulin production. Their therapy consists of oral antihypoglycemic agents, with or without the addition of insulin. Most patients with type II diabetes are obese or have an increased percentage of body fat distributed in the abdominal region.

Gestational diabetes can complicate pregnancies. It has its onset in the third trimester. Adequate treatment reduces perinatal morbidity. Most women with this condition become normoglycemic after parturition. It is, however, a significant risk factor for future development of type II diabetes.

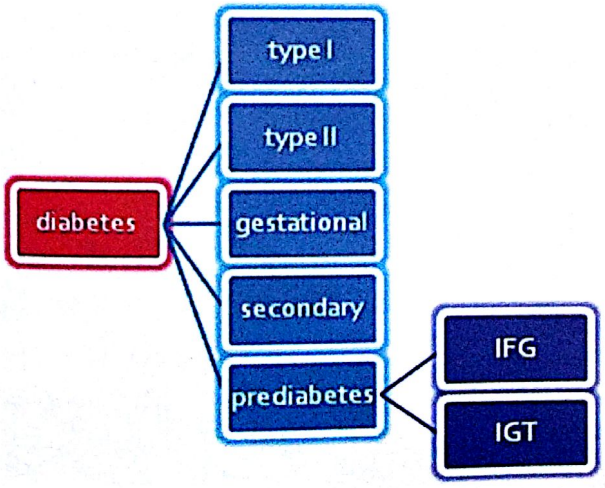

Fig.1: Classification Of Diabetes

Secondary forms of diabetes associated with other conditions such as pancreatic disease, drug therapies and endocrine disorders account for the remainder of cases.

Some individuals have glucose levels that do not meet the criteria for diabetes but are too high to be considered normal. These individuals have a condition called "prediabetes". This term encompasses 'impaired fasting glucose' (IFG- hyperglycemia during periods of fasting) and 'impaired glucose tolerance (IGT- hyperglycemia after a glucose load). These conditions are strong predictors of future development of type II diabetes and associated morbidity.

|| Evaluation Of Patients For Diabetes In Dental Clinics:

Appropriate dental practice requires a thorough oral examination and an appropriate medical history. The medical history format must include questions that elicit information regarding the patient's family history of diabetes mellitus and any general symptoms that may raise the practitioner's level of suspicion regarding this disease.

The oral examination should identify oral features suggestive of diabetes mellitus, such as:

» Diminished salivary flow with or without burning mouth or tongue and concomitant enlargement of the parotid salivary glands.

» Desiccation of oral mucosa induced by diabetes mellitus-associated xerostomia; leading to increased susceptibility to trauma, opportunistic infections like candida, increased plaque and food debris accumulation leading to increased susceptibility to dental caries and periodontal infections.

» Burning mouth or tongue and altered taste sensation.

» In the event of these features being present, a medical consultation is needed. The consultation request should provide information regarding any general or oral features that have raised the dental practitioner's level of suspicion.

On some occasions, it may be preferable for the dentist to perform screening blood glucose tests prior to referring the patient for medical evaluation. Often dental patients are reluctant to seek medical evaluation and occasionally even resentful that the dentist would require medical consultation as a condition for receiving dental treatment. In these circumstances several screening tests are available which include fasting plasma glucose, glucose tolerance tests and glycated haemoglobin. The first two require rigid compliance with the appropriate pre-test protocol and careful interpretation of results. Hence they are not very practical in dental practice.

Although not advocated by many diabetologists, in the periodontist's office, the glycated haemoglobin (Hb A1c) has been proposed as offering several advantages as a screening test. It is accurate; relatively inexpensive; requires only one laboratory test and patient compliance is not required as it is for fasting glucose and glucose tolerance tests.

Home monitoring devices (glucometers) are commonly used by diabetic patients; they are simple; inexpensive and reasonably accurate. They can be used to monitor the glycaemic status prior to an extensive periodontal surgical treatment or prior to treatment likely to disrupt the patient's normal dietary routine.

|| Effects Of Diabetes On Periodontium:

Diabetes is a risk factor for gingivitis and periodontitis and the level of glycaemic control appears to be an important determinant in this relationship.

» In many studies, the prevalence and severity of gingivitis has been demonstrated to be higher in individuals with diabetes.

» The presence of diabetes is often, but not always, associated with increased gingival inflammation. In addition, the level of glycaemic control may play a role in the response to bacterial plaque in people with diabetes.

» Diabetes also increases the risk of periodontitis, including periodontitis even at a young age.

» Longitudinal research has also shown an increased risk of progressive periodontal destruction in people with diabetes.

» Epidemiologic studies in diabetic adults have often shown an increase in the extent and severity of periodontitis.

» However, the relationship between metabolic control of diabetes and periodontal disease is difficult to define conclusively.

|| Mechanisms By Which Diabetes May Influence The Periodontium:

A large evidence base is available to describe the potential mechanisms by which diabetes may influence the periodontium. Many of these are strikingly similar to those associated with the classic diabetes complications of retinopathy, nephropathy, neuropathy, macrovascular diseases and altered wound healing. In fact, so strong is the evidence that it has led some to suggest that diabetes should be listed among the "classic" complications of diabetes.

Although bacteria are necessary for periodontal disease to occur, there are not many differences in the subgingival microflora between diabetic and non-diabetic patients with periodontitis. This apparent lack of significant differences suggests that alterations in the host immunoinflammatory response may have a major influence on the increased severity and prevalence of periodontal disease in diabetics.

The function of immune cells, including neutrophils, monocytes and macrophages is altered in diabetes. Neutrophil adherence, chemotaxis and phagocytosis are often impaired which may inhibit bacterial killing in periodontal pocket and significantly increase periodontal destruction. On the other hand, the monocyte/macrophage cell line may exhibit up-regulation in response to bacterial antigens. This hyper-responsiveness results in significantly increased production of inflammatory cytokines and mediators. The net effect is an increase in periodontal inflammation, attachment loss and bone loss.

There also exist alterations in the connective tissue that uncouple the resorptive and the formative responses. There is additional evidence emerging that due to increased apoptosis in response to the p. gingivalis infection in hyperglycaemic state, the number of matrix-forming cells like fibroblasts and osteoblasts decreases. High glucose levels in the gingival crevicular fluid may directly hinder the wound healing capacity of fibroblasts in the periodontium by inhibiting attachment and spreading these cells that are critical to wound healing and normal tissue turnover.

The microvascular changes include abnormal growth and impaired regeneration of vessels.

In individuals with sustained hyperglycaemia, proteins become

2005 American Diabetes Association Criteria for the Diagnosis of Diabetes Mellitus, IGT and IFG

	Normal	Diabetes	IGT	IFG
Fasting plasma glucose (mg/dl)	< 100	≥ 126		100 to 125
Casual plasma glucose (mg/dl)		≥ 200 plus symptoms of diabetes		
2-hour PG* (mg/dl)	< 140	≥ 200	140 to 199	

• 2-hour postload glucose (PG) using the 2-hour glucose tolerance test

Fig.2: Evaluation Of Patients For Diabetes In Dental Clinics