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Considerations of Oral Manifestations and Prosthodontic Management of Patients with Diabetes Mellitus

Natasha Stavreva[1*], Amela Cana[2], Jetmire Alimani Jakupi[3],
[1]*Department of Prosthodontics, Faculty of Dentistry Skopje, "Ss. Cyril and Methodius University in Skopje, Macedonia*
[2]*Department of Orthodontics, University Dental Clinic-Skopje, Macedonia Macedonia*
[3] *Faculty of Medical Sciences, Tetovo, Macedonia*
Corresponding Author: Natasha Stavreva

Abstract: *Diabetes Mellitus is a pandemic metabolic disease prevailing globally and is characterized by chronic hyperglycemia due to absolute or relative deficiency of insulin. It affects most parts of human body including the oral cavity. Prosthodontic care of a patient suffering from diabetes demands the specialist to have thorough understanding of the concealed facts about the metabolic disorder. It is characterized by chronic hyperglycaemia. Contributing factors include genetics, obesity, physical inactivity and advancing age. Diabetes affects most parts of the human body, also oral cavity is no exception for the same. The aim of this review article is to enlighten the adverse effect of diabetes mellitus, oral manifestations and its effect on prosthodontic management and care.*

Key words*: oral manifestation, prosthodontic management, Diabetes Mellitus*

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I. Introduction

Diabetes is a systemic condition where there is lack of insulin production in the body or insulin that is produced is no longer as effective at cellular level. It is a syndrome not only affects the metabolism of carbohydrates, protein and glucose, also under chronic situation causes long term damage to various organs such as heart, eyes, kidneys, nerves & vascular system.

Hyperglycemia is the most clinically important metabolic aberration in diabetes mellitus & the basis for its diagnosis. 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.[1]

II. Classification

Type 1 - Beta cell destruction which in turn may result in total absence of insulin or deficiency of insulin. It is also called insulin dependent diabetes mellitus.[2] It is mostly commonly occur in childhood and adolescence of any group of age.

Type 2 - beta cell dysfunction or insulin resistance. It is also called non- insulin dependent diabetes mellitus. [3] It seen in patients with increase in age, obesity & lack of physical activity.

III. Epidemiology

Type 1 diabetes accounts for 5-10% of cases diabetes whereas type 2 diabetes accounts for 80% of cases of diabetes in USA & UK.

IV. Diagnosis

The diagnosis of diabetes is based on the classic symptoms like polyuria, polydypsia, polyphagia, weight loss and visual disturbances.[4] 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.[5] 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.

V. Oral Manifestationts Of Diabetes Mellitus

- Xerostomia
- Gingival Inflammation
- Increased Caries Risk
- Burning Sensation
- Periodontitis
- Fungal Infections
- Poor Wound Healing
- Alveolar Bone Resorption

Xerostomia:

Xerostomia is condition of dry mouth. Patients with diabetes has polyurial action which means increased excretion of water lead to dehydration, increasing the sensation of dry mouth and causing xerostomia. Secondly, Peripheral nervous system disfunction caused by diabetes (autonomous peripheral neuropathy) can cause damage to the salivary glands and decrease of salivary flow. As a result, there is increase in stomatitis and candidal infections in the oral cavity. Patients using removable dentures should be informed about oral care as well as about maintenance of the dental prostheses and the need to renew them.

Poor Wound Healing:

In diabetes there is a pronounced imbalance of pro-/anti-inflammatory cytokines leading to impaired tissue repair and weakened cellular and humoral immune defense mechanisms. Poor wound healing in diabetes mellitus patients may be due to insufficient nerve-derived mediators i.e., neuropeptides such as substance P may contribute to the impaired response to injury.[6] Decreased collagen formation may also leads to poor wound healing because clotting involves collagen fibres. Impaired growth factor secretion may also be a key mechanism for impaired wound healing in diabetics.[7]

Gingival Inflammation:

Gingival inflammation is one of the major complications for diabetes mellitus. Worsening of glycemic level or increased glucose level in blood lead to poor metabolism which may lead to gingival inflammation.

Increased Risk of Fungal Infection:

Fungal infections like candidiasis is associated with poor glycemic control and use of denture. It is due to Change in pH, increased salivary glucose levels and immune dysregulation in diabetic patients.

Burning Sensation:

In diabetes, burning mouth syndrome, which develops due to peripheral neuropathy, causes xerostomia, candidiasis and taste disturbance in the mouth. These adversely affect the patient's food intake and create a negative effect on metabolic control of diabetes.

Increased Caries Risk:

Patients with diabetes mellitus have increased risk of caries and periodontal problems. As there is change in the oral environment due to decreased salivary flow and pH and increased pathogenic bacterial growth in the mouth causes damage to the hard and soft tissue of the teeth.

VI. Prosthodontic Management of Diabetes Patients

Eradication of any disease that will affect the prognosis of any dental prosthesis will be the first line of action. Teeth requiring restoration must be restored by appropriate restorative procedures like filling, endodontic treatment etc. As previously mentioned restoration and the maintenance of good oral hygiene is mandatory before starting any prosthodontic procedures. On first visit, assessment of the patient should be done which include proper history and examination. Details regarding type of prosthesis, duration of treatment, number of appointments must be explained to the patient. [8]

Radiographic evaluation must be carried out. Patients is advised to bring reports of recently done and up to date laboratory investigation regarding blood sugar level. Secondly it is better to note blood sugar level before starting any dental procedure with the help of glucometer. Patient must be instructed to consult his or her physician before initiating any procedure. [9]

If patient is provided removable partial denture (RPD), then restoration and maintenance of good oral hygiene by any restorative procedures or root planning and scaling must be accomplished first. Health of abutment teeth is very important and will be achieved by various means for better prognosis of RPD treatment. All components of RPD must be tissue friendly by making appropriate design of the prosthesis. As diabetic patients are more prone to develop periodontal diseases, therefore in certain cases splinting of periodontally compromised teeth is also a good option. Selection of particular type of RPD is also very important, in Diabetic patients. If an acrylic denture is a preferred option then the design should incorporate the principles of 'Every Denture' with wider self cleansing interdental spaces and embrasures areas, uncovered marginal gingiva, point contact between denture and natural abutment teeth, free gliding occlusion, maximum retention following complete denture making principles. These all factors are beneficial for the diabetic patients if they need RPD.

When complete denture is fabricated for diabetic patients then always use tissue friendly material and technique, impression making will be done by mucostatic technique. Occlusal vertical dimension should be appropriate.

This approach will decrease the stress on the underlying tissue to retard bone resorption, concept of neutral zone can also be employed.

It is also mandatory for the dentist to fully educate and motivate the patient to the importance of maintaining good oral hygiene and towards the importance of regular follow-up visits to the dentist.

For patients requiring a fixed prosthesis like crown or fixed partial denture (FPD), the finish-line of the preparation should be placed supragingival and to provide chamfer finish-line on the facial aspect of prepared tooth as it is better than shoulder because shoulder can concentrate stresses on weakened tooth/ teeth. Ante's law should be obeyed; minimal preparation like three quarter crowns can be done on teeth like pre-molar.

In certain cases procedures like crown lengthening, periodontal surgery and orthodontic extrusion of tooth will further improve the quality of fixed prosthesis in diabetic patients. Implant supported prosthesis are not advised for patients whose blood sugar level remains uncontrollable but if conditions are favorable, then this type of prosthesis can be planned. [10]

Proper medication must be provided before and after implant placement. Complete history and examination along with radiographic evaluation must be carried out for selection of type of dental implant, number of dental implants, site of implant placement, type of artificial prosthesis and occlusal scheme. All these considerations will ensure better performance of implants supported prosthesis.

VII. Conclusion

The metabolic disorder is so complex and demanding that proper education becomes an important and integral part of diabetes treatment. providing safe and effective prosthodontic care for patients with diabetes requires an understanding of the disease and familiarity with its clinical manifestations. The goal of any prosthodontic therapy must be, to preserve the hard and soft tissues that are remaining rather than replacement of the lost part. The maintenance of proper oral hygiene and regular use of antiseptic mouth rinses must be emphasized.

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