

## Diabetes Mellitus and Orthodontic Treatment: A review

### Abstract

Hospitals in India remark that they do not observe juvenile diabetes in their hospitals and clinics, leading to gross underestimation of the magnitude of the problem. Hospital records and/or clinic data over the last 3 decades indicate that young diabetics (diabetes onset before 15 years) constitute 1-5% of the total diabetic subjects enrolled. Providing orthodontic care for chronic childhood disease like diabetes is a major economic and psychological burden on the family members.

DM is of two types, Type 1 or Insulin Dependent Diabetes, which accounts for the majority of childhood onset diabetes mellitus (onset before 20 years of age) is caused due to total deficiency in insulin secretion. Type 2 DM is caused due to a combination of resistance to insulin action and inadequate compensatory insulin secretion.

The most common effect of diabetes mellitus is delayed healing and an increased tendency for periodontal disease. Since orthodontic treatment involves inflammatory histo-pathologic changes around the tooth. There might arise an untoward reaction even to the normal orthodontic forces in diabetics. The orthodontist must be aware of the implications of this chronic metabolic disorder. This review aims at understanding the consequences of disease in relation to orthodontic treatment.

### Key Words

Diabetes Mellitus, Orthodontic treatment, type I, type II diabetes Insulin related metabolic disorders, Glycosylated hemoglobin, Periodontal breakdown.

### Introduction

Diabetes mellitus is characterized by increased levels of blood sugar levels. Hyperglycemia causes delayed healing as a side effect. Orthodontic treatment involves tooth movement which is brought about by the iatrogenic

forces applied by orthodontists and an inflammatory reaction in response to these forces. The diabetic patient might not experience a physiologic healing process as a normal patient and might end up in an inadvertent break down of the supporting dental apparatus i.e. the periodontal ligament. DM is diagnosed based on the blood glucose concentration of or Glycosylated hemoglobin concentration.

### Oral Manifestations

Routine medical checkups not being a part of the Indian health system, more than half of the patients of DM actually go undiagnosed. Knowledge of the oral manifestations many a times leads to the discovery of diabetes in dental offices. The dental practitioner therefore should be aware of the oral manifestations of DM in order to spot initial symptoms of

the disease.

The following clinical oral manifestations sometimes give first indications of the disease.

- Xerostomia (Dry Mouth)
- Acetone Breath
- Oral Candidiasis
- Burning Mouth (Glossopyrosis)
- Impaired wound healing.
- Recurrent Oral Infections

Any patient suspected of having such symptoms should be sent for medical evaluation. Technically speaking, decreased Polymorphonuclear Leucocyte function, abnormal collagen metabolism and prolonged healing time, all possibly contributes to the oral complications.

The Polymorphonuclear Leucocytes (Neutrophils) show impaired chemotaxis and macrophagic function i.e. do not bind to the bacterial byproducts and plasma proteins and hence lead to the impaired healing.

The impaired use of glucose leads to the increased collagen breakdown in

- <sup>1</sup> Amanish Singh Shinh
- <sup>2</sup> Harjupinder Kaur Shinh
- <sup>3</sup> Junaid Ahmad Shaik
- <sup>4</sup> Guneet Guram
- <sup>5</sup> Pritesh Singla

<sup>1</sup> Professor and Head  
Department Of Orthodontics  
Adesh Institute Of Dental Sciences, Bathinda.

<sup>2</sup> Private Practitioner. Bathinda, Punjab

<sup>3,4,5</sup> Reader  
Department Of Orthodontics  
Adesh Institute Of Dental Sciences, Bathinda.

### Address For Correspondence:

Dr. Amanish Singh Shinh  
Professor and Head, Department of Orthodontics  
Adesh Institute of dental sciences, Bathinda 151001.  
E mail id amanishshinh@gmail.com

**Submission :** 12<sup>th</sup> August 2012

**Accepted :** 19<sup>th</sup> January 2013

Quick Response Code



connective tissues, in addition altered protein metabolism might add to the impaired healing response in diabetics.<sup>[2]</sup>

The caries and periodontal disease susceptibility increase in diabetics. Decreased salivary flow causes failure of self cleansing mechanism further increasing the caries susceptibility<sup>[3]</sup>. Elevated salivary glucose levels results in increased bacterial substrate and hence increased exposure to bacteria.

Studies have shown that gingivitis is more severe in children with diabetes, and becomes even more severe with increasing blood glucose levels ref<sup>[4]. [5]. [6]. [7]</sup>.

Even well controlled DM patients have more gingival inflammation, probably because of impaired neutrophil function. Periodontal disease tends to be more common due to vascular changes in DM related microangiopathies<sup>[8]</sup>.

Rylander et al reported that significantly more gingival inflammation in young DM patients with retinopathy compared with those without complications.<sup>[9]</sup>

### Orthodontic Considerations

1. First and of the foremost importance to successfully treat a diabetic patient orthodontically is to have a good medical control. Patients with uncontrolled diabetes should not be considered for the treatment. If the patient is not in good metabolic control (HbA 1c>90%) every effort should be made to improve blood glucose levels before starting the treatment.
2. In patients with good medical control, all orthodontic/dental procedures can be performed without special precautions specially if there are no complications of DM.
3. Both removable or fixed appliances can be used.
4. When fixed appliances are used it is important to stress on good oral hygiene.
5. Prophylaxis should be performed regularly to avoid accumulation of deposits and avoid decay and periodontal disease progression.
6. Fluoride/chlorehexidine mouth rinse can provide further preventive benefits.
7. Diabetes related microangiopathy can occasionally occur in periapical vascular supply, resulting in unexplained dental pain, percussion sensitivity, pulpitis, or even loss of vitality in sound teeth<sup>[10], [11]</sup>. The vitality of the teeth should be regularly checked. Use of optimum orthodontic forces to move the teeth remains the golden rule.
8. All adult diabetic patients should go for a complete periodontal diagnostic checkup including probing, plaque and gingivitis scores, and the evaluation for the periodontal treatment need. Any periodontal disease must be brought in control before instituting orthodontic treatment. It is recommended that all patients of diabetes controlled or uncontrolled should be marked as periodontal patients in orthodontic treatment plan. And considerations should be accordingly made. Retarded osseous regeneration, weakening of the periodontal ligament and microangiopathies in the gingival area have been reported

<sup>[12]</sup> the researchers found that certain diabetic changes in periodontium are more pronounced after orthodontic tooth movement.

Mechanical devices like tooth brush, interdental brushes should be used, but if are not enough then chlorehexidine mouth rinses can be used as an adjunct. However there should be an interval of at least 30 minutes between tooth brushing and chlorehexidine rinse<sup>[13], [14]</sup> to minimize the neutralizing effect of the tooth paste on the chlorehexidine<sup>[15], [16]</sup> molecule. Chlorehexidine is cationic in form and tends to form salts with anions such as sodium lauryl sulphate widely used as a detergent in tooth pastes.

Type 2 DM patients can be considered more stable however type 1 are sensitive and should be handled with utmost care. They also experience more hypoglycemic episodes. Most of the type 1 patients are young adults, morning appointments are preferable, if a long appointment ie lasting for more than an hour is required, patient should be advised to eat a usual meal and take the medication as usual.

To avoid any hypoglycemic episode in the office the dental staff should make sure that all the recommendations are met.

### Conclusions

To look good is every one's fundamental right. In today's world every child has the right to look the best and undergo any treatment to get there. General diseases should not be a handicap to achieve the optimum of beauty. When diabetes mellitus is a part of the patient's history, the orthodontic practitioner should have the basic knowledge and understanding of this disease and its impact on the oral cavity, and should understand the consequences of DM in relation to the orthodontic treatment.

Type 1 DM especially uncontrolled can have deleterious effects on the treatment outcome. Hyperglycemia may cause complications in treatment in form of delayed healing, increased periodontal breakdown, odontalgia, Non vital teeth, gingivitis etc. Hypoglycemic reaction on the other hand can be a life threatening emergency.

Patient's medical history is very crucial in

clinical examination and patients suspected of having DM should be referred for the medical evaluation.

Well controlled DM is not a contraindication for orthodontic treatment.

In type 1 DM patients who are considered to be more brittle, oral cavity should be monitored regularly. And look for Candida infections, gingivitis, and periodontal breakdown. If type 1 DM patient suffers from a hypoglycemic reaction it should be assumed that diabetic state is not in well control.

If during orthodontic treatment signs of deterioration of glycemic control are noticed, the orthodontist should be advised to consult his/her physician.

### References

1. P.S.N. Menon, A. Virmani, P. Shah M. Joshi, R. Raju, S. Setia, A. Sethi, N. Kochupillai, M.M.S. Ahuja. Childhood onset diabetes mellitus in north India, clinical trial and immunological studies. Department of Pediatrics and Endocrinology-Diabetes, All India Institute of Medical Sciences, New Delhi-110029, India.
2. Saoudoun A. Diabetes and periodontal disease. A review and update. J west soc Periodontol Periodontol Abstr 1980; 28:116-39.
3. Rothwell B, Richard E. Diabetes Mellitus: Medical and dental considerations. Spec Care Dent 1984; 4:58-65.
4. Gislén G, Nilsson KO, Matsson L. Gingival inflammation in diabetic children related to degree of metabolic control. Acta Odontol Scand 1980;38:241-6.
5. Ringelberg ML, Dixon DO, Fancis AO, Plummer RW. Comparison of gingival health and gingival crevicular fluid flow in children with and without diabetes. J Dent Res 1977;56:108-11.
6. Gusberti FA, Seyd SA, Bacon G, Grossman N, Loesche W. Puberty gingivitis in insulin-dependent diabetic children. I cross-sectional observations. J periodontal.
7. Katz PP, Wirthlin MR Jr, Szpunar SM, Selby JV, Sepe SJ, Showstack JA. Epidemiology and prevention of periodontal disease in individuals with diabetes. Diabetes care 1991;

- 14:375-85.
8. Tervonen T, Oliver RC. Long term control of diabetes mellitus and periodontitis. *J Clin periodontal* 1993; 20:431-5.
  9. Rylander H, Ramberg P, Blohme G, Lindhe J. prevalence of periodontal diseases in young diabetics. *J Clin Periodontol* 1987;14:38-43.
  10. Firkin D, Ferguson J. Diabetes Mellitus and the dental patient. *NZ Dent J* 1985; 81:7-11
  11. Geza T, Rose L. Dental correlations for diabetes mellitus. In Rose LF, Kaye D, Editors, *Internal medicine for dentistry*. 2nd ed. St Louis: C.V. Mosby; 1990. p.1153.
  12. Holtgrave EA, Donath K. Periodontal reactions to orthodontic forces in the diabetic metabolic state. *Fortschr Kieferorthop* 1989; 50:326-37.
  13. Barkvoll P, Rolla G, Svendsen AK. Interaction between chlorhexidine digluconate and sodium lauryl sulfate in vivo. *J Clin Periodontol* 1989;16; 593-5.
  14. Owens J, Addy M, Faulkner J, Lockwood C, Adair R. A short term clinical study design to investigate the chemical plaque inhibitory properties of mouthrinses when used as adjuncts to tooth pastes: applied to chlorhexidine.
  15. Anderson G, Bowden J, Morrison E, Caffesse R. Clinical effects of chlorhexidine mouthwashes on patients undergoing orthodontic treatment. *Am J Orthod Dentofacial Orthop* 1997;111:606-12.
  16. Gehlen I, Netuschil L, Berg R, Reich E, Katsaros C. The influence of a 0.2% Chlorhexidine mouth rinse on plaque re-growth in orthodontic patients randomized prospective study. Part I: clinical parameters. *Orofac Orthop* 2006; 61:54-62.

Source of Support : Nil, Conflict of Interest : None declared