Case history

The patient is referred to you by his dentist. The profession of the patient is a steward with an airline company. He works in shifts and his lifestyle can be defined as irregular. His dietary habits have an irregular pattern as well.

Medical history

Three years ago the patient was diagnosed with diabetic mellitus, type 1. His diabetes has been difficult to regulate, even with applying insulin three times a day.

Dental history

The 26-year-old male patient visits the dental hygienist for the first time. He mentions that he is very keen on his oral hygiene. He brushes regularly with an electric toothbrush. Twice a day he is using dental floss, however he admits he has never had any instructions how to use dental floss. The dental hygienist considers him motivated.

Mouth inspection

There is generalized bleeding on probing. In the molar regions, pocket depths are 5–7 mm. The X-rays show horizontal bone loss (Figs. 1 and 2). Not much plaque is visible; only the bigger interdental areas in the molar regions are covered with a lot of plaque.

Questions

1. What is the definition of diabetes mellitus, type 1?
2. Which risks should a dental hygienist take into consideration when an insufficient diabetic is going to be treated?
3. What are the characteristics of a hyperglycaemia and a hypoglycaemia?
4. Which action should be taken when a hypoglycaemia turns up?
5. What could be the effect of diabetes mellitus on the periodontium?
6. What can the consequences be of an irregular lifestyle?
7. Which dietary rules can the patient follow?

Answers

1. Diabetes mellitus is a metabolic disease characterized by a reduction in carbohydrate metabolism and an increase in lipid and protein metabolism caused by a deficiency in insulin produced by the pancreas.

Diabetes is subdivided into two types: insulin-dependent diabetes mellitus (IDDM) or type 1 and non-insulin-dependent diabetes mellitus (NIDDM) or type 2.

Only IDDM will be discussed.

Type 1 diabetes mellitus results from autoimmune destruction of the beta-cells of the pancreas with an abrupt onset of symptoms in children and slow onset in adults (immune mediated or idiopathic).

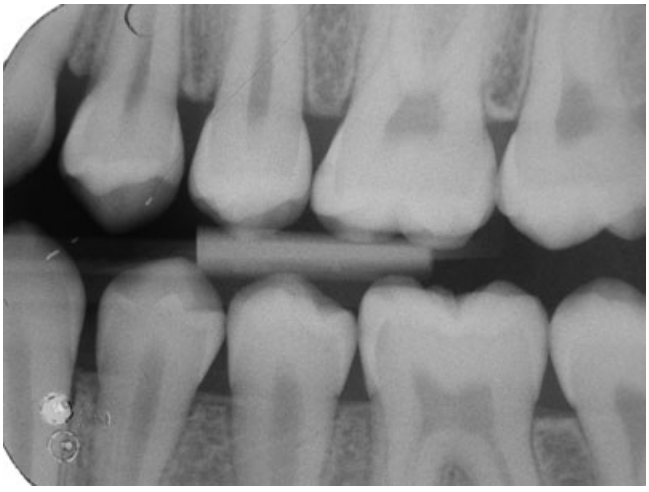

Fig 1. Radiograph showing bitewing 1.

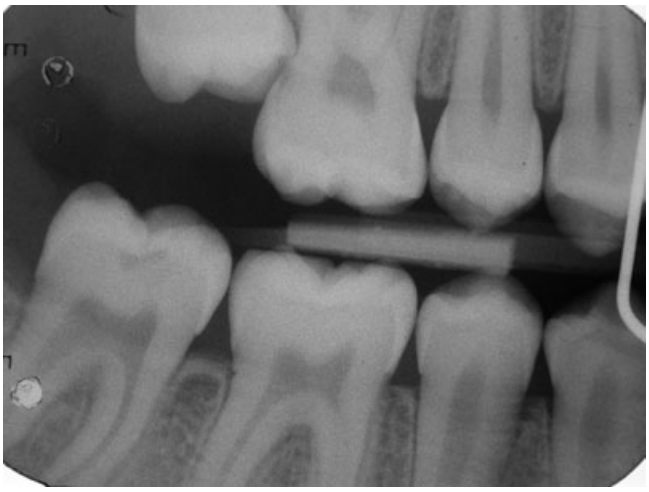

Fig 2. Radiograph showing bitewing 2.

This form of diabetes, which involves about 15% of the diabetic population, generally occurs in childhood and adolescence but can strike at any age. An absolute deficiency of insulin secretion is characteristic in this type, and treatment requires regular lifelong administration of insulin to prevent ketosis and sustain health (1, 2). These patients are prone to ketoacidosis.

Results of twin studies suggest a genetic difference between type 1 and type 2 diabetes, a concept further supported by human leukocyte antigens (HLA) presence and family studies. More than 95% of persons with type 1 diabetes possess certain HLA, compares with only 40% of type 2 and non-diabetic individuals. A predisposition to type 1 diabetes seems to be inherited because approximately 50% of non-diabetic individuals have the HLA in question, yet only 0.1% of that population develop type 1 diabetes (1).

2. Assess for glycaemic control by asking questions about the patient's lifestyle, such as how often the blood glucose level is monitored and by whom; what forms of treatment have been prescribed and the level of compliance; what dietary habits are practised; and conditions of the oral soft tissues. Dry crackled lips, xerostomia, parotic gland enlargement, burning inflamed mucosa, gingival oedema and bleeding, poor wound healing, candidacies, periodontal abscesses, significant probing depths, and neuropathy are consistent with uncontrolled diabetes (3).

3. Hypoglycaemia: an abnormally low level of glucose in the blood. In contrast, hyperglycaemia has very high blood glucose.

Symptoms of hypoglycaemia:

- **a.** restlessness;
- **b.** anxious, irritable, agitated;
- **c.** incoordination, weakness;
- **d.** skin: moist, sweaty, perspiration, hunger, headache, tremor, shakiness, weakness, pallor, dilated pupils, blurry vision;
- **e.** dizziness, staggering gait (1–3).

Hyperglycaemia results from a defect in insulin secretion, insulin action or both. There is a relative or absolute lack of insulin or an inadequate function of insulin. Chronic hyperglycaemia is associated with long-term damage, dysfunction and failure of numerous organs

Symptoms of hyperglycaemia:

- **a.** polyuria: excessive excretion of urine;
- **b.** polydipsia: excessive thirst;
- **c.** weight loss;
- **d.** polyphagia: excessive ingestion of food;
- **e.** blurred vision;
- **f.** increased susceptibility to infections;
- **g.** skin: flushed, dry;
- **h.** drowsiness;
- **i.** abdominal pain, nausea, vomiting;
- **j.** fruity smelling breath (1–3).

4. Use the following treatment: give sugar to raise blood glucose level (apple juice, glucose tablets), the revival is prompt. Administer sugar (fruit drink) (2, 3).

5. A patient with diabetes may have lowered resistance to infections, delayed healing, multiple systemic complications, and is prone to life-threatening emergencies. The presence of infection, including periodontitis, may intensify symptoms and make diabetes more difficult to regulate.'

- **a.** Periodontitis: more frequent, severe, longer duration
- **b.** Attachment loss: more frequent, more extensive
- **c.** Probing depths: more teeth with deep pockets
- **d.** Alveolar bone loss: more
- **e.** Tooth mobility and migration: increased
- **f.** Healing: delayed, increased infection after surgery (2).

Insulin-dependent diabetics in particular appear to be more susceptible to periodontal diseases than normal and the periodontal state of some diabetics is characterized by rapid breakdown. This appears to be due to an altered host response (4).

Patients with uncontrolled diabetes are more prone to periodontal disease, are more susceptible to dental caries and have xerostomia. There may be an increased risk for infection and reduced healing (4). Periodontal treatment should involve meticulous plaque control (4).

One (5) but many studies (6–8) indicated that periodontitis is more severe in juvenile or adult diabetic subjects than non diabetic controls (6–8). Microbiologic studies of diabetic subjects have indicated that similar periodontal pathogens were found in diseased sites of diabetic subjects as in non diabetic periodontal patients. Mandall *et al.* (9) found that a number of suspected sites in poorly controlled insulin-dependent diabetics including *Prevotella intermedia*, *Bacteroides melanninigenica*, *Campylobactor gracilis*, *Eikenella corrodens*, *Fusobacterium nucleatum* and *Campylobactor rectus* when compared with healthy sites in the same subject. Similar species were found in adult periodontitis patients with non insulin-dependent diabetes. *P. intermedia* was the most frequently detected species, while *C. rectus* and *P. gingivalis* were also common.

This study found that periodontal lesions, for the most part, appeared to be related to already suspected periodontal pathogens and not to some novel species. It suggest that altered host susceptibility may change the rate of disease progression in affected individuals, but by and large the periodontal pathogens are likely to be the same as those found in uncompromised subjects (9).

However, patients with long duration, poorly controlled diabetes appear to experience more attachment and bone loss

than diabetics with good metabolic control (7). An attempt to offer a biologically plausible explanation for this observation is provided by Oliver *et al.* (10).

These authors showed an increased concentration of catabolic enzymes in the gingival crevicular fluid of patients with poorly controlled diabetes. It has to be realized that the impact of diabetes on periodontal diseases has been documented in patients with untreated periodontal disease, while, as of today no clear evidence is available for treated patients. It is reasonable, however, to assume that the influence of the systemic conditions may affect recurrence of disease (11). Soskolne and Klinger (12) discussed two hypotheses for testing the relationship between periodontitis and diabetes. The first proposes a direct causal or modifying relationship in which the hyperglycaemia of diabetes result in metabolic alterations that may then exacerbate bacteria-induced inflammatory periodontitis. The second hypothesis proposes a fortuitous combination of genes (gene sets) could result in a host who, under the influence of a variety of environmental stressors, could develop either periodontitis or diabetes or both.

The goal to be achieved is a high standard of plaque control, and along with dietary control must go on emphasis on oral hygiene if the teeth are to be preserved (need for immaculate plaque control).

6. Lifestyle is defined as relatively permanent organization of activities, including work, leisure and associated social activities, characterizing an individual (13).

Careful monitoring and diet control are required to attain the proper balance. During times of illness, stress and decreased food intake, insulin requirements may change. Failure to adjust the insulin dosage may result in an hypoglycaemic or hyperglycaemic state (3).

Irregular work can mean that it is difficult to clean your teeth more than once per day.

Flossing twice a day in larger interdental spaces (the molars) seems less effective. Interdental brushes would be a better choice. Generally it is easier to use interdental brushes and triangular toothpicks in between meals than dental floss, as you only need one hand to do it. This can lead to better plaque control and thus to less pocket depths and disease.

7. There is no specific diabetic diet. Well-controlled, healthy persons can have a diet very similar to a person without diabetes. No foods are prohibited but eaten in moderation at observed times (2).

Consistent, specific times for medication and food intake to control blood glucose level. Usually three on-time meals and three intervals feedings are followed.

According to Darby and Walsh (1), the diet remains the hallmark of diabetes therapy. Diabetic diets are designed to provide appropriate quantities of food at regular intervals, supply daily caloric requirements to aid in achieving or maintaining desirable body weight, and reduce fat intake to correct an unfavourable lipid profile conducive to arteriosclerosis (1).

Brand *et al.* (13) means that doses of saturated fat should be limited up to 10%, which is 30–40% less than the current consumption. The amount of sugar intake is only of importance by the spread of carbohydrates. Except for the three main meals which contain less carbohydrates as usual, between meals should be more often taken. The purpose of these between meals is to prevent a hypoglycaemia. A dietician is the person to consult in relation to the diet.

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