CASE REPORT

Orthodontic Treatment of a Patient with Type 1 Diabetes Mellitus

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Diabetes mellitus is a metabolic disorder characterized by either partial or total deficiency of insulin or by a resistance to that hormone, leading to an increase in blood glucose levels and subsequent complications.[1] Most cases of diabetes mellitus fall into two categories: type 1 (insulin-dependent) and type 2 (some combination of insulin-deficient and insulin-resistant).[2]

Type 1 diabetes mellitus is distinguished by a complete lack of insulin production, usually accompanied by intense hyperglycemia and ketoacidosis. Most patients develop the disease during childhood and require exogenous insulin injections to survive.[1]

The five classic complications of diabetes are microangiopathy, neuropathy, nephropathy, macrovascular diseases, and wound-healing delay.[3-5] The World Health Organization added periodontal disease as a sixth classic complication in 1993.

The increased risk of periodontitis in diabetic patients is associated with multiple factors, including the patient's age, the duration of the diabetes,[2,6,7,16-18] the presence or absence of metabolic controls, and the level of bacterial plaque.[2,8,9] Adults with type 1 diabetes have been found to be more susceptible than nondiabetic adults to gingivitis and periodontitis.[11,12] Over a long period of time, type 1 diabetes can alter the periodontal tissue and thus speed up the clinical loss of periodontal ligament insertion.[10] Bone metabolism is adversely affected by both the direct impact of hyperglycemia and the long-term effects of vascular disease.[13-15] Patients whose diabetes is inadequately controlled also tend to show a greater loss of periodontal fiber insertion and alveolar bone than patients with well-controlled diabetes.[7,19-21]

These findings are significant for the orthodontist, because if a diabetic patient presents with advanced periodontal disease, it will be necessary to use the least traumatic treatment possible to avoid a worsening of the already deficient periodontium. The present article reports an orthodontic treatment involving the extraction of four second premolars in an adult patient with type 1 diabetes mellitus and a widespread loss of supporting bone.

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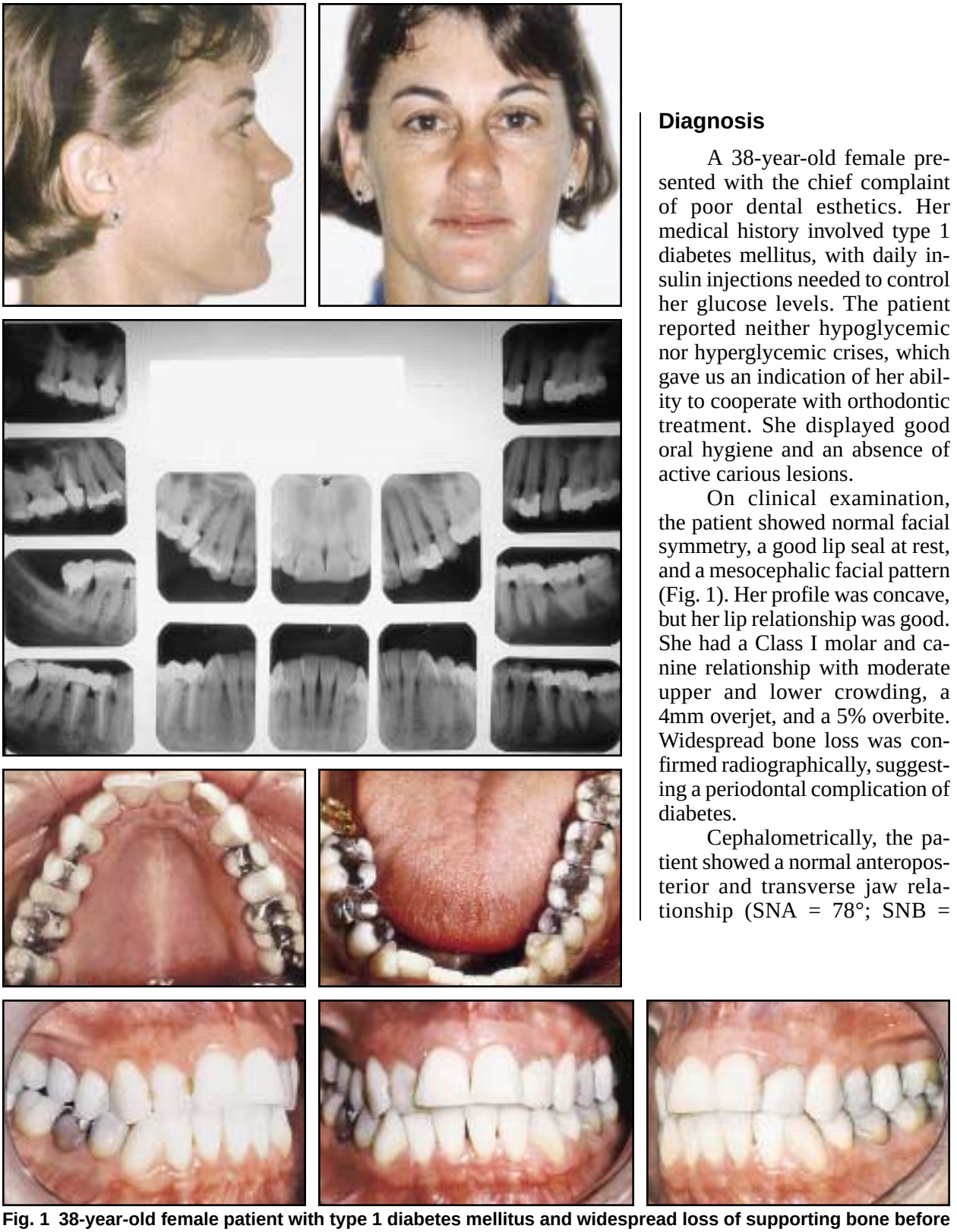

Fig. 1 38-year-old female patient with type 1 diabetes mellitus and widespread loss of supporting bone before treatment.

Diagnosis

A 38-year-old female presented with the chief complaint of poor dental esthetics. Her medical history involved type 1 diabetes mellitus, with daily insulin injections needed to control her glucose levels. The patient reported neither hypoglycemic nor hyperglycemic crises, which gave us an indication of her ability to cooperate with orthodontic treatment. She displayed good oral hygiene and an absence of active carious lesions.

On clinical examination, the patient showed normal facial symmetry, a good lip seal at rest, and a mesocephalic facial pattern (Fig. 1). Her profile was concave, but her lip relationship was good. She had a Class I molar and canine relationship with moderate upper and lower crowding, a 4mm overjet, and a 5% overbite. Widespread bone loss was confirmed radiographically, suggesting a periodontal complication of diabetes.

Cephalometrically, the patient showed a normal anteroposterior and transverse jaw relationship (SNA = 78°; SNB =

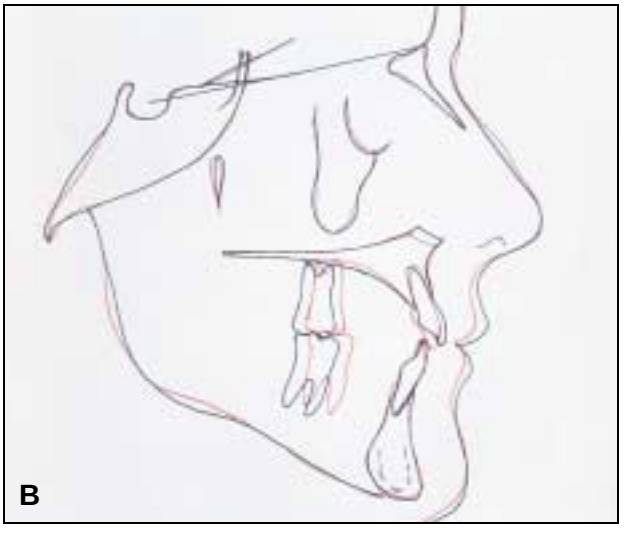

Fig. 2 A. Patient after four second premolar extractions and three years of orthodontic treatment. B. Superimposition of pre- and post-treatment cephalometric tracings.

76°) with a skeletal Class I pattern (ANB = 2°). The upper and lower incisors were well positioned (1-NA = 23°, 5mm; 1-NB = 22°, 4mm; 1-1 = 131°).

Treatment Plan

Premolar extractions were proposed because of the patient's satisfactory lower incisor position and 7mm arch-length discrepancy. The second premolars were chosen, since extraction of the first premolars would have resulted in more repositioning of the incisors, further increasing the concavity of the lower third of the face. A dose of amoxycillin was prescribed one hour before the extractions to prevent infection.

Prior to orthodontic treatment, the patient was referred to an endocrinologist for evaluation of her glycemic level and to a periodontist for bacterial plaque control and oral hygiene instruction. The patient was told to maintain her daily dosage of insulin and to return to the endocrinologist and periodontist every three months throughout the orthodontic therapy, emphasizing the need for multidisciplinary cooperation in the treatment of diabetic patients. Once the patient's glycemic rate and degree of bone loss were verified, the initial upper and lower edgewise appliances were placed.

Treatment Progress

Leveling and alignment were carried out with segmented arches from second molar to the canine, and the first premolars and canines were partially retracted with elastic chain. Continuous .016", .018", .020", and .019" × .025" archwires were then used to complete the leveling and alignment and close the remaining spaces. An .019" × .025" finishing archwire with torque and ideal bends was used to complete the case.

After three years of treatment, the appliances were removed. A 3-3 lower lingual retainer was bonded, and an upper wraparound retainer was prescribed.

Results

Satisfactory occlusal results were achieved, with canine guidance in lateral movements and incisor guidance in protrusive movements (Fig. 2). Cephalometrically, as consequences of the extraction space closure, a retroclination and retrusion of the upper and lower incisors (1-NA = 12°, 3mm; 1-NB = 21°, 3mm) and a loss of molar anchorage could be seen.

The patient's lower facial concavity increased because of the repositioning of the incisors and aging of the soft tissues. A slight loss of periodontal support was observed, mainly at the extraction sites, which would be consistent with the susceptibility of diabetic patients to bone loss and inflammation.

The slow, gradual increase in orthodontic forces,[22] proper glycemic control, and good oral hygiene by the patient all contributed to the successful results. Five years after treatment, when the patient returned for a re-evaluation, her occlusal and periodontal conditions had remained stable.

Discussion

Orthodontic treatment of a patient with type 1 diabetes mellitus should not begin until the disease is properly controlled, since a diabetic patient is more susceptible to infection and periodontal disease, and a hypoglycemic crisis could lead to a coma. The maintenance of adequate oral hygiene is important to avoid bacterial plaque retention, especially with the patient's increased risk of caries and periodontal disease.[23]

As we have shown, conventional orthodontic treatment of a diabetic patient is possible, requiring only strict control of the force intensity and constant evaluation of the patient's glycemic and periodontal conditions.

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