INTRODUCTION

Poly methyl methacrylate (PMMA) denture bases have good mechanical, biological and aesthetic properties. However, they may fail because of excessive para functional and/or functional forces (in cases of bruxism and/or complete dentures opposing natural mandibular teeth). In such circumstances metals or metal alloys can be used to strengthen the denture bases. These thin metallic bases have several advantages, besides rigidity and fracture resistance, like: excellent strength to volume ratio, good adaptation to the supporting tissues, enhanced control of denture plaque, high thermal conductivity, high biocompatibility, no dimensional changes in time through fluids absorption and no interferences with phonation.

A treatment approach in a bruxing complete denture wearer is described.

CLINICAL REPORT

Bruxism is a para functional habit that can affect complete denture wearers too. A 60 year old male patient had been wearing dentures for four years. He was grinding the acrylic resin artificial teeth both while being awake and during sleep (Fig. 1.). The occlusal surfaces are flattened and the patient is complaining of poor masticatory efficiency (Fig. 2.). The maxillary complete denture has recurrently fractured and was repaired several times with autopolymerizing acrylic resin (Fig. 3.). Retention and stability of the old dentures were good. Clinical functional analysis revealed no signs or symptoms of temporomandibular disorders. The supporting soft tissues of the edentulous maxilla had no lesions or painful spots.

The patient was advised to remove his dentures during the night. His diurnal bruxism was more difficult to handle.
The diagnosis of diurnal bruxism was confirmed by the increased masseter muscle electromyographic activity during ten minutes of silent reading. The patient developed heavy occlusal strains, which could explain the maxillary denture fracture through flexural fatigue. He needed a reinforced denture base. A maxillary metal base cast from titanium was chosen to enhance the physical properties.

All stages in denture manufacturing were carried out in accordance with standard practice. The metal framework was cast using fourth degree titanium and the Titanplus Unit (Seitelettronica, Manfredi, Italy).
A critical point of the metal dental base was the interface between titanium and acrylic resin. Improper positioning of metal-resin finish lines can affect phonetics and its incorrect design will adversely influence the mechanical behavior of the adjoining acrylic resin (Fig. 4. and Fig. 5.).

The low density of titanium allowed a pre-clinical radiographic quality control of the metallic base for the detection of internal defects.

Anatomic acrylic resin teeth have been selected to prevent fast bone resorption of the residual ridges and to avoid chipping/fracture that often appears in porcelain artificial teeth (Fig. 6.). The anatomic design of the occlusal surfaces raised some problems in the accommodation of the bruxing patient with the new dentures. He was accustomed with flattened occlusal surfaces. To help him, the diurnal parafunctional activity was reduced by education, voluntary avoidance, relaxation and biofeedback techniques.

**DISCUSSION**

There are several methods to increase the resistance to mechanical stress of a maxillary denture base. In a patient with recurrent fractures of the denture the choice must be made between a metal base (casted Cr-Co alloy or titanium, galvanoformed pure gold) or a PMMA base reinforced with wire netting, carbon fibre, glass fibre or ultra-high modulus polyethylene.

Why titanium denture bases are rather used in heavy bruxers?

A titanium denture base is lighter than the one cast from a Cr-Co alloy due to the low density of titanium (4.5 g cm$^{-3}$). Its rigidity and mechanical resistance are much better than those of a galvanoformed gold denture base.

The adaptation to supporting tissues of complete dentures reinforced with metal wire (1.0 mm in diameter) decreases in comparison with the unreinforced ones regardless of the polymerization method.

**Fig. 4.** Maxillary denture framework cast in titanium. There is a shoulder between the palatal metallic sheet and the surrounding net that provides sufficient bulk to the acrylic resin.

**Fig. 5.** Maxillary complete denture with titanium framework. The metallic net covers the residual ridge and the posterior palatal seal area. This design offers optimum retention for the acrylic resin, a good marginal palatal seal and facilitates denture relining for the compensation of osseous resorption.

**Fig. 6.** Stable centric stops and bilateral balanced occlusion obtained with anatomic acrylic resin teeth.
Carbon or glass fibers and ultra-high modulus polyethylene are difficult to use from the point of view of the dental technician because of their processing characteristics. These reasons contributed to the selection of the titanium denture base.

The main disadvantage of the titanium base is its high cost, conditioned by the increased incidence of failures as well as by the prolonged casting process.

**CONCLUSIONS**

Titanium bases are ideal for maxillary dentures subjected to severe mechanical stresses in bruxing patients. In addition the patient should avoid wearing dentures during sleep and the dentist can decrease awake bruxism by making the patient aware of it and by managing psychogenic stress.

**REFERENCES**