Introduction

This work regards the revision of the anchoring system on total removable prostheses, both top and bottom, of a patient who already wears a removable prosthesis, anchored by means of milled bars and “lug” or “bolt” mechanisms (Fig. 1).

The medical history of the patient V.B. aged 72 features more than 20 years of confrontation with several prosthetic solutions that proved unsatisfactory because of significant discomfort (Fig. 2) (relative mobility of the prosthesis, poor masticatory efficiency, steady accumulation of food debris along the borders and below...
the implants, and subsequent sores), has fuel the search and realization of a design to overcome those limits. With the invaluable help provided by the team of the MIUR research laboratory owned by Rhein’83 society, in particular by dental technician Mr. Marco Vannini, a program providing for the complete replacement of all components mounted on the fixture was devised. After careful analysis of possible solutions, it was decided to treat the case with use of the bar system with a passive fit system referred to as Anular Block.

**Clinical and laboratory procedure**

Based on the evaluation of the orthopantomografy (Fig. 3) the patient was proposed an opportunity for debridement targeted in the alveolar bone, with the removal of dental roots and implants unsuitable for the construction of the new prosthesis. The patient only partially accepted this proposal. The first step was the removal of the connecting bars fixed to the fixtures (Figs. 4 and 5).

With instruments made available to us by Rhein’83 biomechanics workshop, usually used in precision micromechanics, we performed the mapping of implants, detecting the various diameters, the different pitch threads and the different connection shapes (Fig. 6). The BG universal sliding caliper was used to obtain a level between the emergence profiles of the single abutments and the shape of the mucosa. This information made it possible to construct customized abutments, by milling processes, with ball anchoring of differing heights and forms, in relation to the heterogeneity of various types of implants. In fact, said implants were inserted by different means at different moments (Figs. 7-10).

After analysis of the occlusal plane, centric relation records and vertical dimension, we proceeded with articulator mounting of the dental models, followed by the clinical verification procedures (aural, functional and aesthetic testing). In laboratory, guide templates to help determine the spaces available for the fabrication of the meso and super structures were created from the articular mounting (Figs. 11 to 13).

A fused cap was placed on the only natural element (root) with a pivot and burnout sphere “Ot Cap” (Fig. 14). Once the titanium abutments with Sphero Block retention system were fabricated, they were tested by screwing them into the fixtures with the appropriate screwdriver (Figs. 15 and 16). Given that neither the transfers of the various types of implants nor the analogs were available, the retentive caps were employed as transfers (Fig. 17). Standard stainless steel housing produced by Sphero Block were used for plaster models. To keep the exact position and inclination of implant caps unaltered while taking the elastomer impression, the gray directional rings at 0 degrees were placed between the spheres and caps (Figs. 18 and 19). A bad mesostructure was modeled and fabricated on the plaster model, with the template guide, using the pre-fabricated burnout components Ot Box Micro Classic. The boxes placed over the spherical analogs envelop them, leaving a space between the sphere and box that will be filled in with the composite cement for passive fit of the implant bad structure (Figs. 20 to 23).

To complete the mesostructure, prefabricated burnout bad elements Ot Cap joined by a self-polymerizing resin were used (Fig. 24). All top and bottom structures and superstructures were modeled and fused without duplicating the investments (Figs. 25 to 27).
Fig. 1: Previous anchoring system
Fig. 2: Prostheses accumulated through the years
Fig. 3: OPT
Fig. 4: Removal of the old structure
Fig. 5: Previous connectors on fixtures
Fig. 6: Examination of parameters
Fig. 7: In-situ measurements
Figs. from 8 to 10: Elaboration with precision micro-mechanics
Fig. 11: Insertion of elements

Figs. 12 and 13: Abutments on the model

Fig. 14: Spherical cap on natural element
Figs. 15 and 16: In situ abutment test
Fig. 17: Transfer caps
Figs. 18 and 19: Directional rings

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Figs. 20 to 23: Prefabricated burnout structure

Fig. 24: Parallel fit of anchors

Figs. 25 to 27: Superstructure construction
The proximal walls near the mesostructures were adjusted with the use of a parollelometer, with a slight taper (2 degrees) that simplifies insertion and coupling. A chromium cobalt alloy was used to produce the castings (Fig. 28).

This system made it possible to avoid welding, stress and intra-mucosa ridge lap. Mesostructure finishes required particular attention during sanding and polishing operations, especially for what concerns the spherical attachments in order to prevent loss of retentive strength (Fig 29). The bars of the spherical abutments Sphero Block were fixed by using a dual self-adhesive composite cement that has many practical advantages.

In fact, lengthy curing allows easy positioning and fixing of the bad to the single connector to which it is screwed into (Fig. 30). Once all spaces between the (Anular Block) rings and the spheres have been filled with cement, polymerization was completed (integrated by the use of a photopolymerizing apparatus) (Fig. 31).

The composite cement employed has superior mechanical and dimensional stability; therefore, a strong long-term bond of the sphere-box interface is guaranteed. This technique implies the total respect of the passive fit of the structure, which is ensured despite the significant amount of non-parallelism that exists among the various abutment-fixture elements (Fig. 32).
From a bio-mechanical profile, there is an excellent control of unfavorable stress vectors on the fixtures, with the consequential benefit to the health of the peri-implant tissues.

Conclusions

The realization of this project resulted in complete patient satisfaction, both for the resolution of the problems linked to the previous implants and the aesthetic results obtained. (Figs. 33 and 34).

Thanks to the enhanced prosthesis stability, flogistic lesions of the oral mucosa have significantly decreased. Such lesions are more common in denture wearers and often include pressure sores. Fixing the removable prosthesis to the implant system, by means of the elastic retention caps OT CAP, represents a device that is able to...
absorb shock. In combination with the passive fit of the implant bad connection, there is a significant reduction of fixture traumatism, with a consequential advantage of decreased vertical bone absorption risk.

It must be noted that the elastic retention system of the caps has the exclusive peculiarity of the precise indication of their retentive strength; this allows the prosthodontist modularization in the various cases treated. With regard to peri-implant flogistic pathology prevention, it is important to note that this solution allows efficient daily hygiene thanks to ease of access to the tissues in areas more prone to inflammation.

A long-term radiologic check revealed the stability of the alveolar ridge shape and osseous framework of the peri-implant areas (Fig. 35).

Bibliography


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