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The preventive prosthesis: Place of the over denture

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Abstract :
The concept of the supra-radicular complete removable prosthesis allows the dentist to assume an important role in the preservation of natural teeth and supporting structures. In many cases, the teeth that would be extracted can be conserved and this contributes to improving the retention and stability of the definitive prosthesis in a significant way.
Bone is a dynamic tissue. The extraction of teeth causes the initiation of bone resorption. When the tension force is received by the bone of the supporting teeth, supplementary bone formation takes place. These forces are produced when they are transmitted to the alveolar bone via the periodontal ligament.
Therefore the supra-radicular complete prosthesis may not be the elixir, but it is a positive means of retarding the process of bone resorption and maintaining bone volume as well as restoring esthetics.
The aim of our work is to clarify the keys to success in supra-radicular restorations which require a rigorous pre-analysis to reconcile balance optimization with the advantages and inconveniences which will also be discussed.

Keywords : *Overdenture, Preventive prosthesis,bone preservation, resorption, tooth retained overdenture.*

I. INTRODUCTION :

Patients with a complete removable prosthesis suffer from a multitude of complaints related to instability, lack of retention and chewing difficulties; pain during mastication. This can have a direct and negative impact on the psychology of patients who find themselves unable to communicate with comfort and confidence, to which are added problems of self-esteem [1-2].

Several authors have pointed out the advantages of using complementary means of retention (roots or implants) as an alternative to the conventional full prosthesis, in this case the conservation of bone volume, good masticatory efficiency and better psychological integration of the complete removable prosthesis [3].

However, the rate of success resides first of all in the evaluation of the patient's ability to maintain the hygiene of his prosthesis, and in the relevance of prosthetic choices based on the intrinsic value of the roots, their distribution over the arch and a rational and rigorous approach to the treatment plan [4].

In this context, the indication for mandibular supra-radicular prosthesis is largely justified because of the limited supporting surface. As for the maxilla, its indication is often judged useless given the difficulties inherent to the anatomical specificities of the maxillary arch.
Nevertheless, in the presence of unfavorable clinical conditions (bone atrophy), the use of roots for retention becomes a very interesting alternative.
The aim of our work is to clarify the keys to the success of supra-radicular restorations in the maxilla, which require a rigorous pre-analysis to reconcile the optimization of balance with the advantages and inconveniences that will also be discussed.

II. CLINICAL CASE :

A 45-year-old patient, in good general health, consults for a complete prosthetic rehabilitation. He expresses his desire to keep his residual teeth.Theexobuccal examination shows a correct DVO and harmonious labial support (Fig. 1). On endobuccal examination, there is complete mandibular edentulism and subtotal maxillary edentulism (persistence of canines) (Fig. 2).

Fig 1: Front view of the patient.

Fig 2: Oral situation before treatment.

The osteo-mucosal support in the maxilla is favorable: large ridges, well-developed tuberosities and profound Einsenring zones, and deep palate. The canines are intact, with long roots and very favorable bone support.

Therapeutic objectives :
- It is indispensable to respond to the patient's expectations,
- Restoring the aesthetics, ensuring a harmony of the smile,
- Restore all the functions mandated, within the context of an optimal masticatory coefficient and the preservation of the supporting structures by preventing resorption.

Therapeutic choice :

The therapeutic choice was oriented towards a complete maxillary supra-radicular prosthesis and conventional mandibular removable prosthesis.

Maxillary: The very favorable anatomical conditions (deep palate, high and wide ridges) and the presence of vestibular undercuts (canine bosses), which did not interfere with the insertion and disinsertion of the prosthesis, suggested the fabrication of a Classic mandibular overdenture; its only aim was to maintain the bone capital, ensure stabilization and maintain proprioception.

Diagnostic and conceptual phase :

The realization of a overdenture passes by a well-reasoned diagnostic and therapeutic approach allowing to optimize the positive factors and to bypass the difficulties related to the problematic of the case.

The study phase is an indispensable prerequisite, since it allows to appreciate the functional space.

The models are then mounted on an articulator in order to evaluate the height required for the proper integration of the restoration in overdenture abutment(Fig. 3), the resin and the prosthetic tooth (6 to 8 mm) within the adequate esthetic concept (Fig. 4).

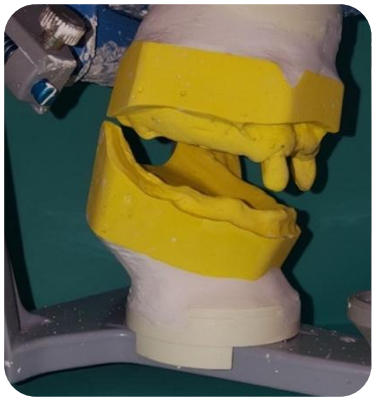

Fig3: Evaluation of the prosthetic height available on models mounted on an articulator.

Fig. 4: Directional setup confirms that there is sufficient prosthetic space in all directions.

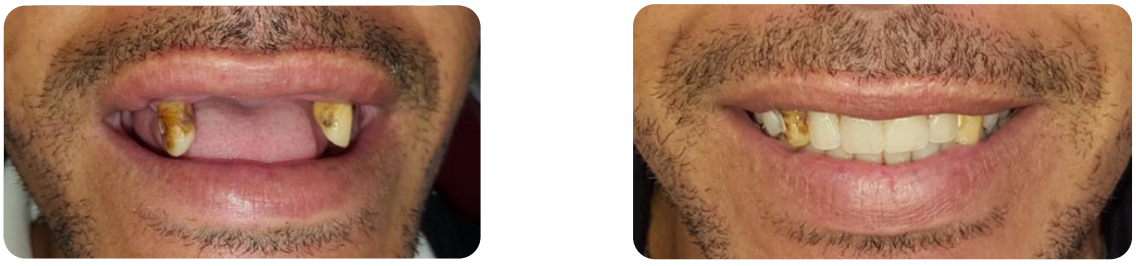

Fig 5: Try-in of the set-up according to esthetic and occlusal requirements

The realization of a set-up materializing the prosthetic project will allow to [5]:
- Quantify the importance of the anterior vestibulo-version in order to evaluate the prosthetic insertion trajectory.
- Validate the esthetic rendering more precisely the labial support and DVO (Fig. 4).
- Validate the selected occlusal-prosthetic scheme (bilaterally balanced occlusion).

Pre-prosthetic phase :
After endodontic treatment (Fig. 6), and periodontal restoration, the teeth were prepared.

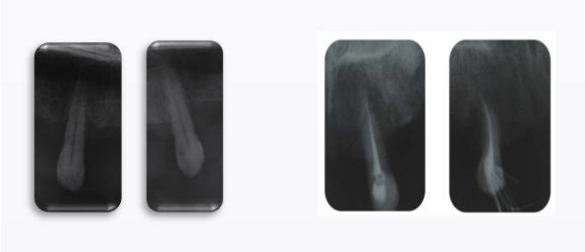

Fig 6 : Endodontic treatment on 13 and 23.

The clinical crown is sectioned and the cervical part prepared in the shape of a dome 1 or 2 mm above the marginal gum :
- Peripheral preparation: a horizontal plateau was prepared in the lingual part, lower in the vestibular part; a large margin, following the profile of the gingival festoon (Fig. 7).
- Preparation of the ovoid pre-section hole will only result in the disobstruction of the 2 to 3 mm coronal canal.
- Composite restoration after glass ionomer cement obturation (Fig. 8).
- Dome modeling.
- Polishing.

Fig. 7: Root preparation in the form of a plateau with peripheral margin preparation

Fig. 8: Dome composite obturation after glass-ionomer cement obturation and polishing.

The next step was the impression phase.

A primary impression of the maxilla was taken using alginate, to ensure the initial registration of all the elements constituting the bearing surface (Fig. 9).

Fig 9 : Primary impression

After treatment of the impression in the laboratory, we obtain the primary model.
A customized Individual Impression Tray is made using the self-curing acrylic resin. The borders of the impression tray are adjusted to 1 mm from the vestibule base and 2 mm from the brake inserts.
The secondary impression of the supporting surface was made using the GOUMY technique:
First, the anatomo-functional registration of the peripheral joint is made in a single step with eugenol zinc oxide paste (Fig. 10).
Excess impression material on the intrados of the impression tray is carefully removed with a No. 15 scalpel blade mounted on a handle. The palatal joint is then registered with kerr paste (Fig. 11), and the central impression is taken with a polyether l'impregum (Fig. 12).

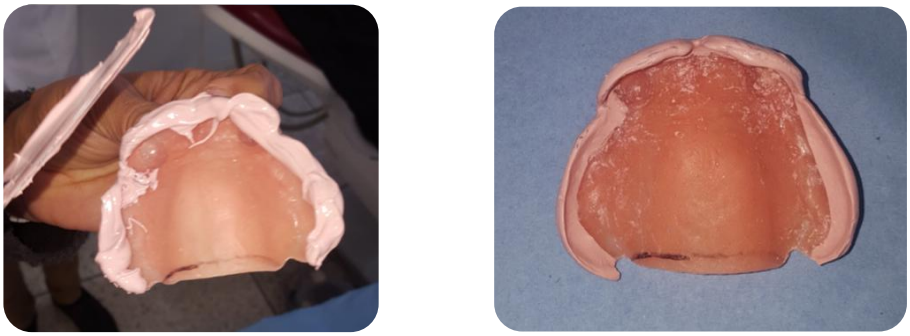

Fig 10 : Anatomical-functional registration of theperipheral joint in a single step with zinc oxide eugenol paste.

Fig 11 : Registration of the palatal joint with kerr® paste.

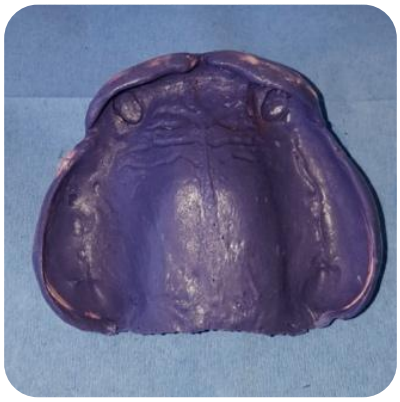

Fig 12: Central impression with impregum®.

After rinsing, the impression is read and validated, then disinfected before being processed in the laboratory.
The other steps in the fabrication of complete dentures are carried out according to the conventional method:
- The determination of the vertical dimension of occlusion ;
- The registration of the inter-maxillary relation (fig.13);
- The selection and mounting of the teeth as well as the assessment of the esthetic and functional value of the mounting during the try-in (fig.14);
- The occlusion is adjusted according to the concept of bilaterally balanced occlusion.
The prostheses were then inserted and checked in the mouth (Fig. 15).
Care instructions were given: the importance and necessity of good plaque control to ensure the long-term durability of the restoration, with a brushing of the intrados and extrados of the prostheses.

Fig 13: Intermaxillary relation recording in centric relation occlusion

Fig 14 : Mounting of prosthetic teeth on articulator.

Fig 15 : Overdenture in the mouth.

III. DISCUSSION :

In complete removable prostheses, mastery of conventional methods will in most cases achieve a satisfactory balance of the prosthesis. This balance involves many parameters of the Housset triad [6].
With the evolution of knowledge and techniques, modern dentistry is mainly focused on preventive prosthetics, which is an alternative philosophy to conventional removable prostheses and is based on the preservation of the residual roots in good condition. Overdenture is an example that best illustrates this principle.
The use of roots as a support for the retention and stabilization of prostheses is not a new concept [7].
The use of residual dental roots under a complete denture has many advantages:
- Conservation of the dental organs ensures that the bone level is maintained in all planes, limits the penetration of the prosthesis and prevents secondary bone resorption when the root supports are correctly located in the arch [8, 4];
- Maintenance of the desmodontal proprioception. The receptors located in the periodontium receive various stimuli, which favors a precise neuromuscular control of mastication [9, 10, 11];
- Increased stability and retention of the prostheses. Prosthetic stability is improved by sustentation, root topography, and maintenance of bone capital.
Retention is optimized through axial attachments or an anchorage bar [12, 13];
- Comfort and better psychological integration of future prostheses by optimizing retention and increasing masticatory efficiency [4, 14].
the overdenture in the maxilla is considered to be a delicate therapy whose main inconveniences are related to the difficulty of achieving a satisfactory peripheral joint at the anterior level, since the extra thickness of the prosthetic base in relation to the canine bumps can compromise esthetics [4, 14].
Nevertheless, all these difficulties can be bypassed when the indication is well placed.
Therapeutic success depends on the importance given to the prosthetic conception phase, that is, the prior evaluation of the available height by the articulator mounting and the validation of the prosthetic design by the mounting, which is a decisive step in the validation of the esthetic and functional prosthetic design [4].
In some cases, in the absence of dental roots and in spite of the academic requirements for the realization of complete removable prostheses, these do not allow to obtain an optimal prosthetic balance, the implant alternative then offers excellent results.
The implant solution is certainly to be favored, especially in cases of dubious teeth or in patients at high risk of caries and especially in cases of significant bone resorption.
On the other hand, studies have shown that there is no statistically significant difference between implant-supported prostheses and those with natural roots in terms of masticatory efficacy, esthetic and phonetic results [15, 16].

IV. CONCLUSION

In addition to the mechanical advantages, the choice of overdenture allows preservation of the alveolar ridge, provides sensory feedback, and improves prosthesis stability and even retention when the attachments are integrated into the prosthetic scheme.

Despite advances in dental implantology, many anatomical and financial constraints may prevent their use in some patients. In addition, the proprioceptive mechanism of the teeth cannot be compensated for by supra-implant prostheses.

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