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Overdenture and prosthesis protocol in dentistry: A comprehensive review

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ABSTRACT
This article comprehensively reviews overdentures and protocol prostheses in dentistry, highlighting their indications, materials used, clinical techniques, and maintenance considerations. The objective is to provide a detailed view of the differences, similarities and technological advances that influence these treatment modalities, based on a critical analysis of recent scientific literature.

Keywords: Overdenture, Protocol Prosthesis, Oral Rehabilitation, Dental Implants, Dentistry.

1 INTRODUCTION

The rehabilitation of edentulous patients continues to be one of the great challenges of modern dentistry. The loss of natural teeth significantly affects the quality of life, compromising the chewing function, facial aesthetics, and, consequently, the self-esteem and social well-being of patients. Oral rehabilitation with implant-supported prostheses has revolutionized the treatment of these patients, offering more stable and functional solutions compared to conventional prostheses.

Two approaches stand out in the field of oral rehabilitation: overdentures and protocol prostheses. Overdentures, which are removable prostheses supported by implants, provide superior retention and stability compared to traditional dentures, and are suitable for patients with poor bone support or remaining teeth. Protocol prostheses, on the other hand, are fixed solutions that offer aesthetics and functionality comparable to natural teeth, and are especially suitable for patients seeking permanent rehabilitation.

This article aims to review and compare these two approaches, covering everything from clinical indications to the techniques and materials used, including maintenance and technological advances that have shaped modern dental practice.

WORLD TOURS

CLINICAL INDICATIONS

Overdentures are indicated for edentulous patients who have some dental remnant or who can receive implants for additional support. This modality is particularly useful in cases where

bone resorption is significant, making the use of a fixed prosthesis with multiple implants unfeasible or inadvisable. In addition, overdentures are recommended for patients who face difficulties adapting to conventional dentures, providing greater comfort and safety.

The preservation of the remaining teeth, when possible, is advantageous because it helps to maintain the alveolar bone structure, contributing to the stability of the prosthesis. In cases where the remaining teeth are not viable, implant placement can dramatically improve overdenture retention and functionality. Studies show that implant-supported overdentures result in better outcomes in terms of patient satisfaction, masticatory function, and overall quality of life, when compared to conventional dentures (Sadowsky et al., 2019).

MATERIALS USED

The materials used in the manufacture of overdentures play a crucial role in the durability, functionality, and comfort of the prosthesis. The base of the prosthesis is usually made of acrylic resin, which offers lightness, ease of adjustment and a good cost-benefit ratio. Acrylic resin allows for easy modification and repair, which is an important advantage in removable prosthetics.

The teeth of overdentures are usually made of acrylic resin. Acrylic resin is preferred because it is more affordable and offers a good combination of aesthetics and durability. Additionally, acrylic resin is less likely to cause wear and tear on implant components, which makes it ideal for use in overdentures.

Retention systems, or engagers, are fundamental components for the functionality of overdentures. These are often manufactured from titanium or cobalt-chromium alloys, materials chosen for their high corrosion resistance and durability. Titanium is widely used due to its biocompatibility, which promotes effective integration with bone tissues and minimizes the risk of implant failures (Adell et al., 2017). Recently, the use of engagers with materials such as fiber-reinforced resins has been investigated to improve the strength and longevity of prostheses.

CLINICAL TECHNIQUES

The success of an overdenture depends on meticulous planning and the precise application of clinical techniques. The first step involves thorough evaluation of the patient, including a detailed analysis of the bone condition through imaging tests, such as CT scans, to determine the optimal location of the implants.

Computer-guided surgery has become standard practice, allowing for more precise positioning of implants and reducing the risk of complications. After the implants are placed, an osseointegration period is required, which varies according to the patient's bone quality, before the attachment of the engagers and the installation of the final prosthesis.

Making overdenture involves multiple steps, starting with obtaining precise molds to capture all anatomical details. Wax tests are performed to ensure that occlusion and aesthetics conform to the patient's expectations before the prosthesis is finalized. The use of CAD/CAM technologies has been widely adopted, allowing for the creation of highly customized prosthetics with precise fits and superior aesthetics (Eckert et al., 2020).

MAINTENANCE AND HYGIENE

Maintaining proper hygiene and performing regular maintenance are essential for the longevity of overdentures. Patients should be educated about the importance of daily denture removal for cleaning, as well as the need for careful brushing of implants and engagers to prevent plaque buildup, which can lead to complications such as peri-implantitis.

The use of oral irrigators and interdental brushes is recommended to ensure cleanliness around the engagers, where the conventional brush may not reach effectively. In addition, regular dental visits are essential to assess denture retention, implant health, and make adjustments as needed (Schimmel et al., 2018). During these visits, the dentist should check the integrity of the engagers, which can wear out over time and require replacement to maintain the effectiveness of the retention.

PROSTHESIS PROTOCOL

CLINICAL INDICATIONS

The protocol prosthesis is an ideal solution for patients seeking fixed and definitive oral rehabilitation. This approach is especially indicated for cases of total edentulism, where the patient needs a solution that combines aesthetics, function, and stability. The protocol prosthesis is often recommended for patients suffering from significant bone atrophy, where other options, such as overdentures, may not offer the desired stability.

The "All-on-4" technique, developed by Paulo Malo, is widely used in the context of protocol prosthesis. This method allows for complete rehabilitation of edentulous arches with only four implants, two of which are angled to maximize bone contact and avoid important anatomical structures (Malo et al., 2021). The "All-on-4" technique is advantageous for its lower

invasiveness, reduced surgical time, and more affordable cost compared to approaches that use a larger number of implants.

In addition to being indicated for patients with bone atrophy, the protocol prosthesis is also an excellent option for those looking for a solution that combines high aesthetics and functionality, providing a significant improvement in chewing, speech, and facial appearance. Studies show that patients with protocol prostheses have high satisfaction rates, due to the stability, aesthetics, and comfort provided by this type of rehabilitation (Balshi et al., 2019).

MATERIALS USED

The materials used in the manufacture of protocol prostheses are chosen to ensure durability, biocompatibility and aesthetic excellence. The support structures of these prostheses are often manufactured from titanium, a material widely recognized for its superior biocompatibility and mechanical strength. Titanium is crucial to withstand masticatory forces, especially in patients who require a fixed and permanent solution.

Zirconia is also used in some cases, mainly due to its superior aesthetic properties. This material is highly resistant and offers an appearance very similar to that of natural teeth, making it a preferred choice for patients who prioritize aesthetics. Zirconia can be used in both the support structure and coating of prosthetic teeth, providing a solution that combines durability with aesthetics.

The teeth of protocol dentures are often made of ceramic, which offers excellent wear resistance and superior esthetics. Ceramics are also highly compatible with soft tissues, minimizing the risk of irritation or adverse reactions. With advances in CAD/CAM technologies, protocol prostheses can be designed and manufactured with millimeter precision, ensuring a perfect fit and reducing the need for later adjustments (Pjetursson et al., 2019).

In addition, the development of hybrid materials, which combine the strength of titanium with the aesthetics of ceramics, has provided solutions that balance durability and natural appearance. Advances in surface coatings for implants have also improved the osseointegration and longevity of implants, even in patients with compromised bone quality.

CLINICAL TECHNIQUES

The successful execution of a protocol prosthesis requires good planning and the application of advanced clinical techniques. The process begins with a detailed evaluation of the

patient, using imaging tests, such as CT scans, to map the bone structure and plan the optimal placement of the implants.

Computer-guided surgery is widely used to ensure accuracy in implant placement. Customized surgical guides are produced based on digital models, guiding the surgeon in inserting the implants at the correct angles and depths, which is essential for the long-term success of the treatment (Tahmaseb et al., 2018).

One of the main advantages of the "All-on-4" technique is the possibility of immediate loading, where a fixed temporary prosthesis can be installed on the same day of surgery. This allows the patient to leave the clinic with fixed teeth, immediately improving chewing function and aesthetics (Balshi et al., 2019).

After the osseointegration period, which usually lasts from three to six months, the definitive prosthesis is made. The use of CAD/CAM technology in the manufacturing phase allows the creation of a prosthesis that adapts perfectly to the patient's anatomical conditions, offering superior aesthetics and long-lasting functionality. The accuracy offered by this technology reduces the need for later adjustments and improves patient satisfaction with the end result.

MAINTENANCE AND HYGIENE

Although protocol prostheses are fixed and more stable, proper maintenance is crucial to ensure their longevity. Strict oral hygiene must be maintained to prevent peri-implantitis, an inflammatory condition that can compromise implants. The use of interdental brushes, oral irrigators, and other cleaning devices is essential for removing plaque and food debris that can build up around implants.

Regular dental visits are necessary to monitor the health of the implants and make adjustments to the prosthesis if necessary. During these visits, the dentist must assess the integrity of the denture, check for signs of inflammation around the implants, and perform professional cleaning to remove biofilm and tartar (Berglundh et al., 2018).

In addition, the protocol prosthesis may require the replacement of components over time, such as retaining screws or the ceramic coating itself, to ensure long-term aesthetics and functionality. Early detection of problems such as loosening screws or wear of materials is essential to avoid major complications.

COMPARISON BETWEEN OVERDENTURE AND PROSTHESIS PROTOCOL

Comparing overdentures and protocol prostheses reveals significant differences in terms of cost, complexity, and functional outcomes. Overdentures, being removable, offer flexibility and are generally more affordable, both in terms of initial cost and maintenance. They are ideal for patients with limited bone conditions or those who prefer a solution that allows the removal of the prosthesis for cleaning.

On the other hand, protocol prostheses, especially fixed ones such as the "All-on-4", offer a permanent solution that combines aesthetics and high-level functionality. Although the initial cost is higher, the investment can be justified by durability and superior results in terms of comfort and chewing function. The protocol prosthesis is particularly indicated for patients who wish to avoid the inconvenience of removable prostheses and who seek a result that more closely resembles natural teeth (Slot et al., 2019).

In addition, the choice between an overdenture and a protocol prosthesis may depend on factors such as the patient's ability to perform prosthesis maintenance, general health, and aesthetic preferences. Overdentures may be easier to adjust and maintain over time, while protocol dentures offer a fixed solution that is less prone to dislocations during chewing.

CONCLUSION

The decision between the use of overdentures or protocol prostheses should be based on a careful and individualized analysis of each clinical case, taking into account the anatomical conditions, the patient's expectations, and the available resources. Overdentures are indicated for patients looking for a removable solution, but with greater retention and comfort than conventional dentures. Protocol prostheses, on the other hand, are ideal for those who want a fixed solution, providing excellent aesthetics and functionality, with the "All-on-4" technique being one of the most used due to its predictability and long-term success.

The longevity of treatments depends not only on the correct choice of the type of prosthesis, but also on proper planning, the selection of high-quality materials, and adherence to strict maintenance protocols. Regular maintenance and continuous follow-up are key to preventing complications and ensuring the long-term success of implants. Ultimately, both overdentures and protocol prostheses have their place in oral rehabilitation, and the choice between them should be guided by the patient's needs and desires, always based on the best available scientific evidence.

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