IMPLANT RETAINED OVERDENTURES: BIBLIOGRAPHIC REVIEW

ANIELLE APARECIDA **PARMAGNANI**[1], FRANCYNE BALDO DO **NASCIMENTO**[1], ANDRÉS FELIPE **CARTAGENA**[2], GIOVANI DE OLIVEIRA **CORRÊA**[2*]

1. Undergraduate student in Dentistry at the State University of Londrina; **2.** PhD Professor, in the area of undergraduate and postgraduate Dentistry of the Dentistry course at the State University of Londrina.

* Rua Pará, 1080A, New City Garden, Maringá, Paraná, Brazil. CEP: 87023-080. giovanifop@yahoo.com.br

Received: 01/10/2019. **Accepted:** 24/10/2019

ABSTRACT

Natural teeth play an important role when related to facial aesthetics. However, its major function is linked to chewing, thus providing the guarantee of a healthy organism. With the possibility of using osseointegrated implants in prosthetic planning, new alternatives for rehabilitative treatments have emerged, allowing the placement of support abutments in edentulous areas. Among the treatments that use implants for edentulous individuals, the overdentures. Overdentures today have gained significant popularity as well as alternative treatment to conventional full dentures; Faced with complete edentulism, the placement of implants allows a significant improvement in the stability and retention conditions of these prostheses. This type of prosthesis provides significant increase in retention, stability and comfort compared to conventional total prostheses. Moreover, they are less expensive and easier to make compared to fixed implant prostheses, which makes them more accessible to a larger number of patients. A determining factor for the success of this treatment resides in the correct choice of the restraint system to be used. Given the above, the aim of this study was to review the literature on implant retention overdenture as a treatment option for edentulous patients.

KEYWORDS: Dentistry, Implants, Overdenture.

1. INTRODUCTION

Nowadays most edentulous patients have a very active social life and therefore need to feel safe with their prostheses. While the support and stability of the prostheses are related to their longevity and physiological comfort, respectively, psychological comfort is related to their aesthetics and retention. In this context, overdentures or overdentures are removable prostheses that have additional retention to the edentulous alveolar ridge. When these prostheses were originally designed by Ledger in 1856, the roots were kept submerged in the alveolar ridge in order to reduce bone resorption, promote better load transmission, and maintain some sensory response through periodontal proprioceptors[1,2].

Currently, prosthetic planning has been changing, allowing the replacement of missing teeth through osteointegrated implants. In the absence of proper placement and placement of implants, simple and inexpensive prosthetic planning was required, resurgent overdentures now supported by implants and no longer by residual roots. Implant-retained overdentures (OIR) come being an effective therapeutic modality with regard to success and predictability of results. The lack of retention of the total mandibular prosthesis, when compared to the maxilla, makes its planning even more complex. Due to this fact, several attempts have been made to minimize the effects of bone loss on the lower edge and muscle dynamics on the lower total prostheses[3].

Overdentures act similarly to conventional full dentures, whose support is predominantly mucous; They are total dentures supported by the residual edge and retained by endodontically treated remaining teeth roots or by osseointegrated implants[4].

Treatment with dental implants has proven to be a safe and reliable procedure, presenting a significant expansion among the elderly population. The literature has shown that medically stable elderly patients are suitable candidates for prosthetic rehabilitation with implants. In addition, the increase in rehabilitation success rates has made the demand for this type of treatment significantly increased[5].

Thus, the objective of this paper is to analyze in the literature about the efficacy of implant-retained overdenture in totally edentulous patients.

2. LITERATURE REVIEW

Edentulism results in addition to progressive alveolar bone loss, loss of dental proprioception, and transfer of all occlusal forces from the artificial teeth of the prosthesis to the oral mucosa. Using an overdenture provides simplicity of construction, easy maintenance, stability, retention, less trauma to supporting tissues and great aesthetics[6].

The ideal retention system for overdenture should provide good retention, providing stability to the prosthesis so that no loss of retention capacity occurs over time; should be easy low maintenance cost if replacement is required; It also has little height so that it can be used in small intermaxillary spaces, favoring aesthetics. It must also have biomechanical ability to assist in the distribution of functional loads to implants and adjacent bone[7].

According to Oliveira *et al,* (2004)[8], quality of life is influenced by tooth loss, because, among many factors, there is a decrease in food intake, making the diet low in nutrients. The 'edentulous condition' brings changes in appetite and also in the ability of patients to prepare their own meals. Oliveira also states that there is a need to

find alternative diets, more compatible with the limitations of these patients.

People with a deficiency in chewing function eventually swallow food into larger pieces. For this reason, they end up changing their diet, avoiding chewing more consistent foods. As a consequence, these patients have a reduction in nutrient absorption. The change in diet is basically due to the preferential consumption of softer or easier to chew foods such as processed foods over those rich in fiber and nutrients such as raw vegetables, meat and fresh fruits[9,10].

Borges et al (2010) [9] conducted a study to compare the chewing performance and nutritional status of users of conventional full dentures before and after conversion of the lower denture into a retained implant overdenture, as well as chewing performance and nutritional status. The study was divided into three stages, at the beginning the users were evaluated for masticatory performance and the nutritional condition of conventional full dentures. Then, all patients were submitted to the installation of two implants in the mandible, placement of a metal bar, connecting the two implants, and subsequent installation of the overdenture. Chewing performance and nutritional status were again evaluated at 3 and 6 months after the conversion of conventional dentures into overdentures. Masticatory performance improved after implant placement, becoming even more efficient after 3 months and stable after 6 months of follow-up. There was also an improvement in the nutritional status of the patients.

Oliveira et al (2004)[8], conducted a study to assess the possible risk of malnutrition among the elderly population, related to the use of conventional prostheses and overdentures, a study was performed in which patients underwent a nutritional test, as well as clinical examination and anamnesis. Chewing capacity and patient satisfaction with their prostheses were also evaluated. The results showed that patients using overdentures were considered well-nourished when compared to users of conventional full dentures. There was a significant difference in chewing capacity and nutritional status, reaching the conclusion that there is a higher risk of malnutrition in patients using conventional full dentures. Another important factor is that the patient's psychological state influences diet and food choice. To compare satisfaction and quality of life of an elderly population using conventional or overdenture dentures retained implant, Asunción et al (2007)[11], conducted a study with 34 elderly patients who underwent a questionnaire based on their oral health impact profile and oral health-related quality of life. The results of the questionnaires showed that there were no statistically significant differences between the groups regarding comfort, aesthetics, chewing ability, general satisfaction, pain, functional, phonetic, social and psychological limitations. Comparing the stability of the prostheses, the user group of overdentures presented better results. This study was different from most, as improvements are generally cited in all aspects.

Recently, osseointegrated implants have become a popular rehabilitation option for the edentulous patient and have been well accepted by them. However, while retained implant prostheses provide comfort and satisfactory functional capacity, this type of therapy requires consideration of the economic factor and additional care during surgical and prosthetic treatment[12].

The development of osteointegrable implants began in 1952 and was based over the years through a variety of clinical and laboratory research carried out under well-established and well-established scientific criteria and controls. This research has substantiated the effectiveness and safety in the installation and clinical use of osteointegrable titanium dental implants[13].

Unlike natural teeth, osseointegrated implants have no periodontal ligament, are ankylated to the bone, reacting biomechanically different from the occlusal force. Therefore, it is believed that implants may be subject to greater force overload, and is considered one of the potential causes for peri-implant disease, bone loss and, consequently, implant failure[14].

According to Yang et al (2011)[14] overdenture is subjected to a variety of forces in different directions during oral function. Mean values of axial displacement of teeth in the oral cavity are 25-100 µm, while implant range of motion has been reported to be approximately 3-5 µm. It can be emphasized that the objective of an adequate occlusion, in the case of implants, is related to the need to minimize the overload on the bone-implant and implant-prosthesis interface, to keep the load on the implants within physiological limits. and especially to ensure long-term stability of both the prosthesis and the implants.

Yang et al (2011)[14] also stated that implants for overdentures should be positioned so that they are parallel to each other and in the path of prosthesis insertion, as well as perpendicular to the occlusal plane, however, these conditions are limited by bone quality, anatomical structure and clinical practice, which will determine the inclination and insertion of the prosthesis. A variety of docking systems have been used to support overdentures, including clip-on, oring, magnet and telescopic crown systems. The selection of the locking system is related to the quality of the bone support, ease of cleaning, adaptation and removal of prosthesis by the patient, as well as the shape of the jaw[14-16]. Restraint systems are used to apply force to resist displacement relative to the insertion axis and also to stabilize overdenture during the function. With the increasing number of inserts available on the market, more research is needed to determine the biomechanical relationship 29 of these devices with the implants, as well as the approximate time of use of each device without fatigue that could compromise the osteointegration process[3].

Currently there are several options regarding retention mechanisms, which may be rigid or resilient, however, the use of both still presents controversy in the literature. Excessive lateral forces on the implant increase mechanical risks such as wear or fracture. An optimal fixation system should provide greater retention

force with less lateral force for the implant while using the prosthesis[14,17-19].

Overdenture eliminates the possibility of forming a gap between the prosthetic structure and the alveolar bone edge, avoiding problems with phonics and aesthetics common in fixed prostheses. When compared to a conventional removable prosthesis, it determines increased stability, retention and masticatory efficiency of the prosthesis. The benefits of implant-supported overdentures also include preservation of the alveolar bone edge height by physiological stimulation of the loads surrounding the implants, satisfactory restoration of masticatory system function, increased self-confidence and self-esteem, returning the patient to social life without the psychological trauma of tooth loss mutilation[19].

3. DISCUSSION

Edentulism results in loss of dental proprioception, progressive alveolar bone loss and transfer of all occlusal forces from artificial teeth to the oral mucosa. Using an overdenture provides simplicity of construction, easy maintenance, stability, retention, less trauma to supporting tissues and great aesthetics[6].

Some patients do not adapt well to conventional full dentures and do not have the economic, functional and / or anatomical conditions to receive a fixed partial implant prosthesis. In such cases, implant-supported overdentures may be considered a viable alternative treatment as they have a wide application versatility, providing better retention, stability, chewing performance, residual lip preservation and greater patient comfort[3].

For Oliveira et al (2004)[8] among the drawbacks, only the possible dissatisfaction of the patient stands out since the overdenture does not satisfy the psychological need to feel that the prosthesis is part of the body, as in the case of total fixed prostheses on implants. Other drawbacks, such as decreased bite force and chewing effectiveness which in a fixed prosthesis is tripled, should not be taken into account since, compared to a traditional mucus-supported prosthesis, an implant-supported overdenture provides an increase in chewing strength and effectiveness by around 20%.

The high success rates achieved with modern implantology assure us of great reliability in our rehabilitation with mandibular overdentures. Several authors report in their work indexes greater than 90% of osseointegration of implants[14,12,16]. For this success to be achieved, it is of utmost importance that the rehabilitation professional knows concepts of conventional total prosthesis, and must rehabilitate following these concepts. Intermaxillary relationships (vertical dimension, occlusal plane, Spee curve and tooth alignment), function and aesthetics are fundamental to the longevity of the prosthetic work performed[7].

The amount of implants required for better retention and stabilization of an overdenture is the subject of much discussion among the authors. Heckmann (2004)[15] conducted a research placing two, three and four implants in the edentulous mandible, and it was concluded that only two implants are required for proper retention and that the best type of accessory is the clip bar[15]. Patient satisfaction was also analyzed by Daas (2008)[17], when 110 patients were rehabilitated with two or four implants, with and without interconnecting bar, and most implants were smaller than 10 mm. All rehabilitated patients expressed satisfaction regardless of the number of implants.

According to reports in the literature, when a total prosthesis is replaced by an implant-retained and mucosupported overdenture using fittings, the main advantage observed is the improvement of the chewing function, which becomes more efficient and comfortable when compared to the conventional total prosthesis; the patient is satisfied due to the retention and stability, which allows a safe return to social life[9,10,14,19].

4. CONCLUSION

Based on this literature review, it can be concluded that, when compared to conventional total dentures, overdentures have numerous advantages, including improved aesthetics and chewing function, making them more efficient and comfortable; besides presenting an improvement in the retention and stability that allow a better social life.

REFERENCES –

[1] Crum J, Loiselle RJ. Oral perception and proprioception: a review of the literature and its significance to prosthodontics. J Prosthet Dent 1972; 28:215-30.
[2] Thayer HH. Overdentures and the periodontium. Dent Clin North Am 1980; 24:369-77.
[3] Bonachela, WC, Pedreira, AP, Marins, L, Pereira, T. Avaliação comparativa da perda de retenção de quatro sistemas de encaixes do tipo era e o-ring empregados sob overdentures em função do tempo de uso. J Appl Oral Sci, São Paulo, 2003; 11(1): 49-54.
[4] Moura JÁ, Faleiros AM, Passos LET. Sobredentadura suportada por sistema O'Ring: relato de caso clínico. PCL – Ver Bras Prot Clín Lab, 2001; 3(16):465-72.
[5] Silva AC, Campos AC, Moreira RW. Análise das Intercorrências e Complicações em Instalação de Implantes Dentais – Um Estudo Retrospectivo. Rev. Cir. Traumatol. BucoMaxilo-Fac., Camaragibe 2010; 10(4): 63-78.
[6] Landulpho AB, Silva WAB, Silva FA, Muzilli CA. Soluções protéticas através do sistema ERA de attachments – Parte I: overdenture. Revista Brasileira de Implantodontia & Prótese sobre Implantes, 2003; 10(38): 128-31.
[7] Setz JM, Wright PS, Ferman AM. Effects of attachment type on the mobility of implant-stabilized overdentures – an in vitro study Int J Prosthodont 2000; 13(6):494-9.
[8] Oliveira TR, Frigerio ML. Association between nutrition and the prosthetic condition in edentulous elderly. The Gerodontology Association and Blackwell Munksgaard Ltd, 2004; 21 (4): 205-8

[9] Borges TF, Mendes FA, Oliveira TRC, *et al.* Overdenture with immediate load: mastication and nutrition. British Journal of Nutrition in press, 2010.
[10] AlSourori AA, Mostafa MH, Kaddah AF, Fayyed AE, Swedan MS, Al-Adl AZ. Impact of single implant versus two-implant mandibular retained overdentures on retention and success rate in totally edentulous patients. A randomized controlled clinical trial. J Osseointegrat. 2018; 10(3):79-86.
[11] Assunção WG, Zardo GG, Delben JA, Barão VAR. Comparing the efficacy of mandibular implant-retained. The Gerodontology Association and Blackwell Munksgaard Ltd, 2007; 24(4): 235–238.
[12] Aquino EB, Alvez BP, Filho JNA. Sistemas de Encaixes Utilizados em Overdentures Implantossuportadas. Revista Ibero-americana de Prótese Clínica e Laboratorial, 2005; 7(36):159-65.
[13] Branemar KPI. Osseointegration and its experimental background. J Prosthet Dent, 1983; 50 (3): 399-410.
[14] Yang T, Maeda Y, Gonda Y, Kotecha S. Attachment systems for implant overdenture: influence of implant inclination on retentive and lateral forces. Clinical Oral Implants Research, 2011; 22(11):1315-9.
[15] Heckmann SM, Schrott A, Graef F, Wichmann MG, Weber HP. Mandibular two-implant telescopic overdentures: 10-year clinical and radiographical results. Clin Oral Implants Res, 2004; 15(5):560–9.
[16] Attard NJ, Laporte A, Locker D, Zarb GA. A prospective study on immediate loading of implants with mandibular overdentures: patient-mediated and economic outcomes.Int J Prosthodont. 2006; 19(1):67-73.
[17] Daas M, Dubois G, Bonnet AS, Lipinski P, Rignonbret C. A complete finite element model of a mandibular implant-retained overdenture with two implants: Comparison between rigid and resilient attachment configurations. Medical Engineering & Physics, 2008; 30 (2): 218-25
[18] Bielemann AM, Marcello-Machado RM, Schuster AJ, Chagas Júnior OL, Del Bel Cury AA, et al. Healing differences in narrow diameter implants submitted to immediate and conventio nalloading in mandíbulas overdentures: A randomized trial.J Periodontal Res. 2018; 19.
[19] Emami E, Heydecke G, Rompré PH, De Grandmont P, Feine JS. Impact of implant support for mandibular dentures on satisfaction, oral and general health-related quality of life: A meta-analysis of randomized controlled trials. Clin Oral Implants Res. 2009; 20:533-44.