DOI: https://doi.org/10.36489/saudecoletiva.2021v11i68p7521-7532

Soft tissue manipulation techniques on dental implants: Literature review

Técnicas de manipulación de tejidos blandos en implantes dentales: Revisión de literatura

Técnicas de manipulação de tecido mole sobre implante dentário: Revisão de literatura

ABSTRACT
Introduction: The implant is considered a predictable and satisfactory procedure. However, after its installation, some soft tissue defects may appear, compromising the aesthetics and health of peri-implant tissues. Thus, various soft tissue grafting techniques are used as a means of reversing these failures. Objective: To analyze the main mucogingival surgical techniques performed in the region of dental implants. Method: This study was carried out through a literature review, using books and scientific articles, available in Portuguese, English and Spanish from 2015, obtained through the electronic databases PubMed, SciELO, Lilacs and Google Scholar. Result: The integrative review showed that it is possible to associate soft tissue graft surgeries in rehabilitation with dental implants, restoring harmony and gingival health. Conclusion: In cases of involvement of soft peri-implant structures, the dental surgeon can use mucogingival surgical techniques to maintain the health and aesthetics of peri-implant tissues.
DESCRIPTORS: Esthetic; Gums; Dental Implant.

RESUMEN
Introducción: El implante se considera un procedimiento predecible y satisfactorio. Sin embargo, después de su instalación, pueden aparecer algunos defectos en los tejidos blandos, comprometiendo la estética y la salud de los tejidos periimplantarios. Por tanto, se utilizan diversas técnicas de injerto de tejido blando como medio para revertir estos fallos. Objetivo: Analizar las principales técnicas quirúrgicas mucogingivales realizadas en la región de los implantes dentales. Método: Este estudio se llevó a cabo mediante una revisión de la literatura, utilizando libros y artículos científicos, disponibles en portugués, inglés y español a partir de 2015, obtenidos a través de las bases de datos electrónicas PubMed, SciELO, Lilacs y Google Scholar. Resultado: La revisión integradora demostró que es posible asociar cirugías de injerto de tejido blando en rehabilitación con implantes dentales, restableciendo la armonía y la salud gingival. Conclusión: En casos de afectación de estructuras periimplantarias blandas, el cirujano dental puede utilizar técnicas quirúrgicas mucogingivales para mantener la salud y estética de los tejidos periimplantarios.
DESCRIPTORES: Estética; Encía; Implante dental.

RESUMO
Introdução: O implante é considerado um procedimento previsível e satisfatório. Entretanto, após sua instalação alguns defeitos em tecidos moles podem surgir, comprometendo a estética e a saúde dos tecidos peri-implantares. Dessa forma, variadas técnicas de enxertia de tecido mole são utilizadas como meio de reverter essas falhas. Objetivo: Analisar as principais técnicas cirúrgicas mucogengivais realizadas na região de implantes dentários. Método: O presente estudo foi elaborado através de revisão de literatura, utilizando livros e artigos científicos, disponíveis em língua portuguesa, inglesa e espanhola a partir do ano de 2015, obtidos através dos bancos de dados eletrônicos PubMed, SciELO, Lilacs e Google Acadêmico. Resultado: A revisão de literatura, demonstrou que é possível associar as cirurgias de enxerto de tecido mole nas reabilitações com implante dentário, reestabelecendo a harmonia e saúde gengival. Conclusão: Em casos de comprometimento das estruturas moles peri-implantares, o cirurgião dentista pode utilizar técnicas de cirúrgicas mucogengivais para a manutenção da saúde e estética dos tecidos peri-implantares.
DESCRITORES: Estética; Gengiva; Implante Dental

RECEIVED ON: 05/19/2021 **APPROVED ON:** 06/25/2021

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INTRODUCTION

The use of dental implants and implants placed immediately after tooth extraction is considered a predictable treatment, however significant changes in soft tissue can occur, compromising the clinical results. The aggression generated in this region causes gingival recession, causing aesthetic impairment in rehabilitation. Thus, studies have been conducted in search of techniques to maintain the quality of the peri-implant mucosa and alternatives to improve its properties. [1, 2, 3]

To resolve soft tissue defects arising from dental implants, several soft tissue management techniques have been developed. To obtain a better aesthetic result, it is necessary to identify the best therapy to be adopted, observing the characteristics, advantages and indication of technique for each clinical case. [4]

Proper management of the gingival tissues in the peri-implant region is one of the contributing factors for improving aesthetic results. However, if not properly managed, it can cause damage, such as gingival recession and bone resorption. Several causes can be associated with the failure of repairing the soft tissue around the implant, such as the quality of the buccal bone crest, type of implant used, distance between the implant and the bone table, peri-implantitis and peri-implant mucositis. [1, 2, 5]

Thus, using mucosal handling techniques it is possible to improve soft tissue thickening and increase the amount of keratinized mucosa, through autogenous soft tissue grafts and tissue substitutes, which were designed to reduce the risk of gingival recessions, maintain the stability of the level of the keratinized mucosa and compensate for possible post-surgical changes. [1, 2, 6]

Among the most varied soft tissue manipulation techniques is the connective tissue graft surgery technique, considered the gold standard, as it offers good aesthetics and satisfactory coverage if well performed. The technique has the benefit of improved healing and increased thickness of the keratinized mucosa. [6]

In addition, patients unable to perform connective tissue graft surgeries can rely on other repair techniques, as in the case of free gingival tissue graft surgery or the use of allogenic materials as in the case of acellular dermal matrix. [3, 4, 5, 6]

Defects in soft structures after dental implant are not rare and end up compromising the success of the treatment. Thus, this study aims to analyze the main mucogingival surgical techniques performed in the region of dental implants, aiming to demonstrate repair techniques, reestablishing harmony and gingival health. [1]

METHOD

This study was carried out through a literature review, with data obtained from books, with the theme of implantology and periodontics, and by consulting publications available in electronic databases such as National Library of Medicine (PubMed), Scientific Electronic Library Online (SciELO), Latin American and Caribbean Health Science Literature (LILACS) and Academic Google.

The selection of the bibliographies used was based on the recommendations of the PRISMA instrument, which was carried out based on a screening of the reading of titles, abstracts and descriptors, extraction of articles available for download for full reading, critical analysis of studies and interpretation of scientific evidence for review.

A time cut between 2015-2020 was

carried out and articles in English, Portuguese and Spanish were included. And the following descriptors were used: "Implante dental"; "Gengiva" e "Estética".

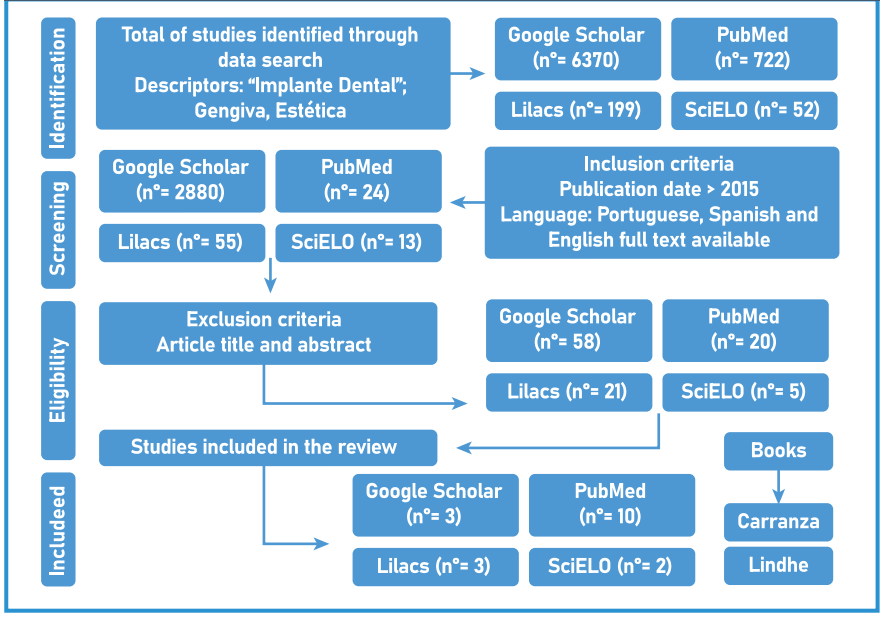
Original articles were included (experimental or observational design), monographs, book chapters, and review articles available in full, in the last 5 years, that included the guiding question, and articles that did not meet the research objective were excluded.

RESULTS

This research aimed to verify in the literature the different methods of soft tissue manipulation on dental implants. Through the integrative review, it was possible to obtain more than 7.000 studies, which were filtered and analyzed for inclusion in this research.

By inserting the different descriptors in the selected search bases and applying the inclusion criteria of the search language, date and available full text, 2.972 results were obtained. Of these, the exclusion criteria were applied, where titles and abstracts were read, those considered irrelevant to the research were excluded, leaving 94 studies. After a meticulous reading of the 94 articles, only 20 were included in this research due to the similarity with the objective of this research.

Figure 1- Bibliographic Research Flowchart



Source: The Authors

DISCUSSION

Importance of the presence of keratinized mucosa for the success of dental implants

The anatomy of the gingiva is composed of an epithelial layer and underlying connective tissue known as the lamina propria, which together surround the teeth, giving rise to the free marginal gingiva, attached gingiva, and interdental or papillary gingiva. When in a healthy state, they have a characteristic light pink color and, in black people, they have a brownish color, a dotted texture called "stippling" that resembles orange peel, with varying thickness from 1 to 9 mm. However, this soft tissue can change when it surrounds a dental implant, triggering problems that compromise the patient's esthetics and periodontal health. [1, 2, 3]

Chart 1- Synthesis of bibliographic research included in the integrative review, according to the reference number, year of publication, title of the work, objective of the bibliographic research and methodology used.

CHART 1: SYNTHESIS OF BIBLIOGRAPHIES FOUND IN DATABASES

Nº	YEAR	TITLE	OBJECTIVE	METHODOLOGICAL DESIGN
1	2015	Concomitant Correction of a Soft-Tissue Fenestration with Keratinised Tissue Augmentation By Using A Rotated DoublePedicle Flap During Second-Stage Implant Surgery- A Case Report	Correct a soft tissue fenestration with keratinized tissue augmentation using a rotated double pedicle flap during implant surgery	A case report was carried out
4	2015	Soft tissue graft as an option to supply peri-implant defects	Demonstrate the success of one of the periodontal plastic surgical techniques as an alternative for covering areas that may disfavor red esthetics	Research was conducted through a clinical case report
18	2018	The use of dermal matrices in the treatment of gingival recessions	To present a clinical case report where acellular dermal matrix graft was used for root coverage	Clinical case report

Source: The Authors

The soft tissue surrounding the dental implant is called the peri-implant mucosa, and has several properties similar to the gingiva surrounding natural teeth, but it lacks the periodontal ligament. The characteristic of the peri-implant mucosa will be defined during the wound healing process, after the installation of the dental implant. The correct recovery will provide the adhesion of the mucous tissue to the implant, preventing products and microorganisms from the oral cavity from having access to the bone tissue, helping in the correct osseointegration. [7, 8, 9, 10]

A minimal width of the keratinized mucosa is correlated with gingival health. Studies indicate that 80% of gums with more than 2 mm of keratinized mucosa were healthy, while surfaces with less than 2 mm of keratinized mucosa were inflamed. 8 It was concluded that to maintain soft tissue health, it was necessary to have at least 2 mm of keratinized mucosa. Furthermore, studies have shown that patients with dental implants who had less than 2 mm of keratinized mucosa had greater discomfort during brushing, greater plaque accumulation and peri-implant inflammation. [8, 11]

To obtain the health and good appearance of the implant, studies indicate that it is essential to have the presence of the keratinized mucosa, which consists of a dense connective tissue rich in collagen delineated by keratinized epithelium. For the treatment to be successful, it is necessary to link the implant to the health of the peri-implant tissues. In addition, the research showed that in implanted regions with a thin area of mucosa it impaired the healing process and induced marginal bone resorption. [7, 9, 11]

Although in the past there was a belief that the keratinized mucosa was not related to the success of dental implants. More recent studies bring the presence of this mucosa as an important factor for the success of osseointegrated implants. The absence of peri-implant keratinized mucosa may be associated with increased plaque accumulation, attachment loss and peri-implant mucosa recession. Patients with implants without the presence of keratinized mucosa reported suffering from pain and discomfort. Where such symptoms were alleviated when soft tissue graft was performed at the site. [10,12,13]

The unsatisfactory gingival covering around dental implants generates an accumulation of bacterial plaque in this region, favoring the development of an inflammatory response, especially in implants with a rough surface. [12,13]

Connective tissue graft

Dental implants are an alternative for rehabilitative treatment in edentulous patients, enabling the restoration of masticatory, phonetic and aesthetic functions. For the therapy to be effective, some factors are important such as quality and quantity of bone tissue, adequate general health, good oral hygiene, stability in the implants, absence of parafunctional habits, and also the presence of soft tissue surrounding the implant. [4, 14]

Although essential for esthetics and oral health, soft tissue is not always present, in satisfactory quantity and quality, leading to the indication of grafts at the time of implant installation or after. Soft tissue grafting is a technique designed to improve healing and increase the thickness of the keratinized mucosa. Randomized clinical trials demonstrated that the use of connective tissue graft increased the gingival thickness in the region of the dental implant compared to implants without the use of a connective tissue graft. [6, 7]

The use of autogenous grafts provides a more natural appearance to soft tissues, for this characteristic and for offering predictable and consistent results, connective tissue grafts are being increasingly indicated, improving the thickening of soft tissues, being used in the treatment of recession , enlargement and reconstruction of papillae. [14, 15]

Connective tissue graft is performed using subepithelial soft tissue, with the donor area being the palate region and retromolar pad, using a "trap-door" approach. In relation to the epithelialized graft, the connective graft technique is superior, as it presents a better esthetic result and the donor region is more preserved. [6, 7]

Connective tissue grafting is widely used to correct peri-implant soft tissue defects and is considered a reliable method. This corrective surgery has the advantage of contouring the peri-implant margin and increasing the oral volume of the peri-implanted soft tissue, and has advantages over the technique that uses ADM, which is more susceptible to clinical complications such as colonization and bacterial infection. [5, 16]

The use of connective grafts has been shown to prevent complications that may arise from the use of synthetic membranes, in addition to improving metabolism at the site of superficial tissues and increasing tissue height and thickness. Thus, the technique is promising in cases where the patient manifests insufficient soft tissue or thin gingival biotype, allowing the transfor-

Figure 2 – On the right, image of retraction of the peri-implant mucosa, centralized coverage of the recession with a connective tissue graft, and on the left, successful coverage after 1 year of surgery.

Source: FICKL [12]

mation of thin mucosa into thick and hiding the restorative materials of the implant. [16]

Free Gingival Graft

Due to the frequency of observation of soft tissue defects around implants, the use of reconstructive surgical techniques such as peri-implant mucogingival surgery has been increasingly performed, with the aim of improving the soft tissue and restoring harmony to the gingival structures. [1, 2, 17]

The presence of keratinized gingiva is largely correlated with improved soft tissue health, however, when the patient has an insufficient amount of keratinized soft tissue, the DS can use the free gingival graft technique, which has good predictability and easy execution. [1, 2, 17]

The free gingival tissue graft is described as predictable and popular in the correction of soft tissue defects, helping to increase the width of the keratinized tissue. However, the technique has some disadvantages, such as postoperative discomfort and pain, limited availability and amount of donor area and patient morbidity. [15]

Free gingival graft surgery may be indicated at different surgical times, which may be before the installation of dental implants, during the dental implant placement surgery or after placement of the dental implant. This technique works by helping to increase the width of the keratinized tissue. The graft can be performed under local anesthesia, having the palate as the donor area, where a thin layer of tissue will be extracted. [13, 15]

Different cases may suggest the need for grafting, among them there is gingival recession with continuous loss of attachment, which reduces the amount of keratinized gingiva, which can lead to the use of the repair technique with free gingival tissue graft. [1, 17]

The free gingival tissue graft is described as predictable and popular in the correction of soft tissue defects, helping to increase the width of the keratinized tissue.

In addition, the professional can use the mixed free gingival graft technique, where the free gingival graft with connective tissue pedicle will be used. This technique aims to condition the gingival tissue prior to reconstructive surgery.

Mixed grafting offers a good gingival increase in height and thickness and proved to be an excellent option for patients with insufficient keratinized mucosa. Although autogenous graft surgery causes greater post-surgical discomfort and longer operative time, the benefits are greater and it is considered the gold standard technique with greater patient satisfaction and better esthetics. [17]

Figure 3 – On the right, incision area for removal of the donor part for mixed free gingival graft, in the middle, adaptation and suture of the mixed free gingival graft in the recipient bed, and on the left, healing after 40 days of surgery

Source: RIBEIRO, et al. [17]

Acellular dermal matrix (ADM)

Although the results of grafts with connective tissue are satisfactory, the availability of this technique is limited, due to the limited number of donor areas. As an alternative to replace this treatment, grafts with ADM are used, which enables tissue repair, even in cases where the patient does not have donor areas for autogenous grafting. [6, 18]

ADM is a biomaterial extracted from the dermis of human cadavers, which goes through a cell exclusion process, going through several procedures that will remove possible factors that lead to tissue rejection. Made up of two sides: one the connective tissue and the other the basement membrane, ADM also has the advantage of maintaining a color compatible with that of the adjacent tissues. [15, 18, 19, 20]

ADM acts as a mold for tissue regeneration. After acellular dermis transplantation, it creates an empty space that induces the occupation of fibroblasts and other cells in the patient. There is then an invasion of these cells, which proliferate towards the tissue, transforming the acellular dermal matrix into new collagen fibers. [18, 19, 20]

Its revascularization takes place within 1 week, while its remodeling takes 3 to 4 months to occur completely. In the results of randomized studies, the material showed promise, reaching 86% tissue regeneration in the implanted area. [17, 18]

Comparative studies between connective tissue graft and ADM have shown no significant differences between the two techniques. In a study, where 107 defects were analyzed over a 12-month period, similar results between connective tissue graft and MDA were found, with a coverage of 96,2% with subepithelial

connective tissue and 95,8% with ADM, demonstrating that both techniques obtained satisfactory results for the correction of soft tissue defects. [15,17]

Although ADM is more used in cases where it is impossible to obtain a donor area, it has some benefits in relation to grafts with autogenous tissue. Some of the possible advantages are: reduction of surgical time, reduction of surgical sites, unlimited amount of donor material available, reduction of postoperative pain and discomfort. However, ADM does not have the same revascularization capacity as autogenous grafts, thus presenting limitations in its indication. [15, 18]

CONCLUSION

Based on the articles and books researched, it is possible to conclude that defects in peri-implant tissues are not rare, and that different techniques can be used for their correction, and it is up to the professional to assess which is the most suitable according to the patient's needs. In addition, it was found that the presence of keratinized mucosa is of paramount importance for the success of the treatment, providing greater comfort and improved aesthetics in the peri-implant region. However, in patients with an absence or insufficient amount of this tissue, the technique of grafting free gingival tissue can be performed and in cases of impossibility to obtain donor areas, grafting techniques with allogeneic tissues can be used, as in the case of the acellular dermal matrix. ■

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