

# USE OF NON-REABSORBABLE MEMBRANE ASSOCIATED WITH SURGICAL TECHNIQUE TO INCREASE ATTACHED GINGIVA

ALINE MORINHO GALVAGNI<sup>1</sup>, STEFHANI DA SILVA ALVES<sup>1</sup>, VERUSKA DE JOÃO MALHEIROS PFAU<sup>3</sup>, EDUARDO AUGUSTO PFAU<sup>4\*</sup>

1. Undergraduate Student of Dentistry course of University Paranaense- UNIPAR – Umuarama - PR; 2. Dental Surgeon. Master by USP - São Paulo. Professor of the Graduate Course in Dentistry University Paranaense – UNIPAR - Umuarama- PR; 3. Dental Surgeon. PhD in Implantology by Faculty São Leopoldo Mandic - Campinas - SP. Professor of the Graduate Course in Dentistry University Paranaense – UNIPAR - Umuarama- PR.

\* Avenida Angelo Moreira da Fonseca, 5651, zona 1A, Umuarama, Paraná, Brasil. CEP: 87504-050. [epfau@unipar.br](mailto:epfau@unipar.br)

Received: 10/27/2014; Accepted: 12/09/2014

## ABSTRACT

The gingiva is a part of the periodontium having protective function of the dentoalveolar complex and has the ability to stabilize the progression of inflammation or gingival recession. Some medical conditions can contribute to reducing the gingiva, with the consequent loss of protective function, such as the gingival recession. The gingival recession may occur due to poor dental hygiene or excessive brushing, especially in patients with thin gingival biotypes. There are some specific situations indicating the use of interventions to increase the length of the attached gingiva to restore the natural protection of the periodontium. Thus, dentistry has different surgical techniques that aim to increase the width of attached gingiva unsatisfactory, as the penetrations of vestibules, gingival grafts and flaps repositioning. The implementation of periodontal surgical techniques using the principle of Periodontal Regeneration Guided through the use of absorbable or non reabsorbable membranes have demonstrated good results in operations where it is desired to exclude the migration of unwanted cells and favor the proliferation of desired cells during the healing. The objective of this study is to report a case in which surgical technique Modified apical repositioned flap (MARF) to increase attached gingiva was performed bilaterally, with the addition of a non- reabsorbable polypropylene membrane in only one side in order checking the possibility of different results between the operated side. Using the membrane superior results were obtained regarding the formation range of the gingiva, aesthetic appearance of the scar and ease of removal of postoperative suture. Thus, it can be concluded that periodontal surgical technique MARF associated with the use of the membrane was effective for increasing the gingiva.

**KEYWORDS:** Mucogingival surgery, guided periodontal regeneration, non-reabsorbable membrane.

## 1. INTRODUCTION

The concern for the integrity of periodontal tissue comes from the 70s<sup>1</sup>. The healthy gum tissue is characterized by having part of its structure and firmly adhered to the periodontal alveolar bone and thus received the

name of attached gingiva. According to Newman (2004)<sup>2</sup>, the keratinized epithelium of the sulcular epithelial and gingival tissues not only provides protection for underlying periodontal tissues, but also acts as a barrier against bacteria and their products. Among the functions of the attached gingiva, resistance to external injuries caused by physical trauma of brushing, the aid in reducing physiological forces exerted by muscle fibers of the alveolar mucosa and the responsibility to maintain the marginal gingival tissue in position around the tooth are the most cited in the literature<sup>3,4</sup>.

Thus, for years, various surgical techniques have been developed in order to increase the gingiva inserted and improve the clinical status of periodontium considered unfavorable. According to Lindhe (2005)<sup>5</sup>, the most primitive techniques to increase the attached gingiva are operations aimed at deepening the hall in which we can cite the technique of "denudation" proposed by Ochsenbein in 1960 and the technique of "split flap", proposed by Staffileno *et al.*, in 1962, for the maintenance of the periosteum. Accordingly, Reddy *et al.* (2013)<sup>6</sup> report that several periodontal surgical procedures have been proposed to obtain adequate amounts of keratinized tissue, in which stand out the free gingival grafts, lateral flap rotational pedicle, flap repositioned apically, coronally repositioned flap, graft subepithelial connective tissue, cellular cutaneous graft, etc.

Thoma *et al.* (2009)<sup>7</sup> in order to overcome problems with autogenous tissues, some alternative techniques and materials have been developed. In our recent studies, some authors included in the literature a surgical technique that became known as repositioned MARF - Modified Apically Repositioned Flap, which proved to be an efficient and effective technique to increase the height gum inserted into single or multiple teeth. All of these techniques have been demonstrated to improve the attached gingiva, however, MARF technique has aroused interest because of its easy implementation, fast and does not require a second surgical area, reducing morbidity for the patient and offering a favorable cosmetic

result, as stated Carnio *et al.* (2007)<sup>8</sup>.

Thus, this work aims to report two clinical procedures performed in a patient who needed gum inserted increase in contralateral areas, showing on one side the classic technique of MARF and on the other side the same technique associated with the use of a membrane not reabsorbable polypropylene, based on the principle of Guided Periodontal Regeneration - GPR, which is intended to exclude undesired cell migration, in order to observe the use of this material could favor the final result on the increase of attached gingiva.

## 2. CASE REPORT

Patient M. M. G. L., female, leukoderma, 46, attended the Dental Clinic UNIPAR with the intention of making a dental assessment and dental restorative and rehabilitation, in order to restore the function and aesthetics of the stomatognathic system. Patient reported being smokers and user of anxiolytic drug (Paroxetine hydrochloride - 20 mg). On examination, the upper arch there was the presence of prosthesis over dental implants - the type ceramic protocol. In the lower arch was noticed the absence of the elements 37 and 47, the presence of cervical caries, gingival biotype thin, with narrow band attached gingiva, generalized gingival recession and strong muscle insertion of adhesions in the alveolar mucosa (Figure 1).



**Figure 1.** Initial situation.

Regarding oral hygiene habits, the patient reported brushing their teeth three times a day and not flossing. Regarding the clinical condition of the periodontium, the patient reported that the gums bleed regularly, especially during brushing, which was verified the presence of bio-film in anterior lower teeth and changes in color of the mucosa, with reddish appearance, indicating clinical signs inflammation.

After the completion of the basic periodontal treatment, the proposed treatment plan was to hold a surgical technique to promote increased attached gingiva extension, in order to stabilize the progression of gingival recession and enable greater protection against the con-

stant inflammation. The techniques for selection were the MARF to increase inserted bilaterally gum, but with the addition of a polypropylene membrane on only one side, in order to verify the possibility of results between different sides operated.

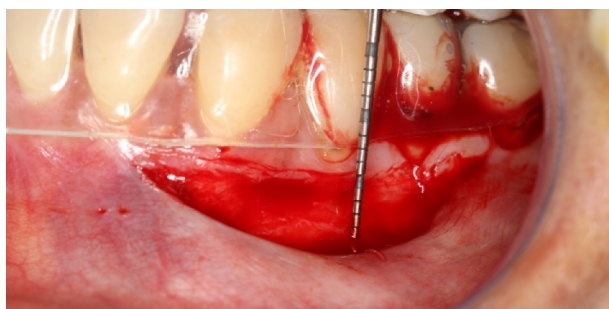
Previously, the patient was molded to manufacture a silicon plate to reference the height of the gum margin inserted before and after surgery. For the demarcation of areas to limit the attached gingiva and alveolar mucosa, Schiller a dye solution was used (potassium iodide to 4% alcohol solution) and a millimeter periodontal probe to measure the gingiva inserted present (Figure 2 and 3).



**Figure 2.** Preoperative the right side with silicon plate and millimeter probe in position, stained with Schiller solution.



**Figure 3.** Preoperative the left side with a silicone plate and millimeter probe position stained with Schiller solution.

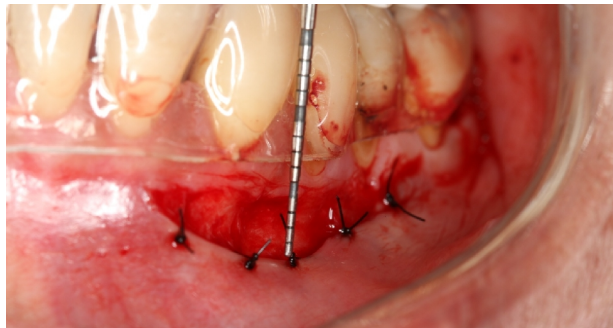


**Figure 4.** Intraoperative the left. Retail division to carry out the MARF technique.

On the left side, under local anesthetic infiltration Nerve Menton the conventional MARF technique was performed, with the completion of the incision in the extension of keratinized tissue, near the mucogingival junction extending from the tooth 33-35, with the retail division, with careful to keep the periosteum in the orig-

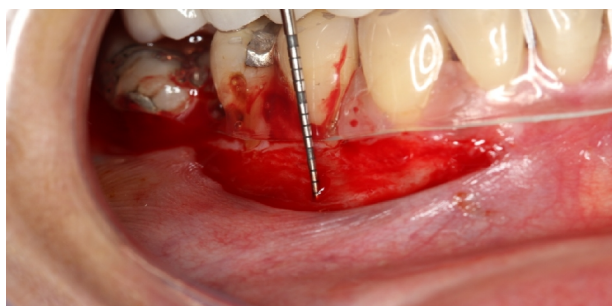
inal position, performing both the detachment of the muscles of the flanges of the region and followed by the reference of the silicon plate margin (Figure 4).

The flap was sutured repositioning in a more apical region with simple discontinuous points (Figure 5).



**Figure 5.** Intraoperative the left. Retail repositioning in a more apical position, sutured with simple stitches.

On the right, under local anesthetic infiltration Nerve Menton was performed the MARF technique with membrane increase, which was usually started by performing an incision in the extension of keratinized tissue, near the mucogingival junction extending from the tooth 43-45, according to the aforementioned technique (Figure 6).



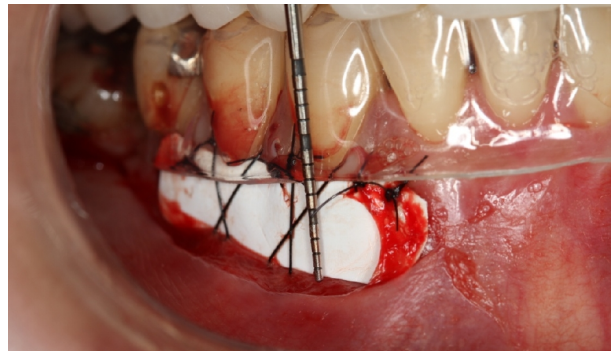
**Figure 6.** Intraoperative the right. Retail division to carry out the MARF technique.

Then, the preparation was carried out of the membrane, which was cut to size corresponding to the iris receptor site with sterile scissors. The stabilization of the membrane was performed by discontinuous simple sutures securing the membrane to the attached gingiva adjacent to and suspended sutures to the periosteum were fixed and anchored in the interproximal area of the teeth above the operated region (Figure 7).

At surgery completion, the patient was informed that only one membrane placed on the operated side should be maintained until the time of removal of sutures, in which it would also be removed. The patient was advised to refrain from brushing your teeth in the surgical site for about two weeks and instructed to perform rinsing the mouth with chlorhexidine 0.12% solution, three times a day for a week.

The patient was prescribed oral use Amoxicillin 500 mg three times daily for seven days Nimesulide 100 mg

twice daily for three days and Paracetamol 750 mg three times a day for three days. Other recommendations were passed on to the patient, how to rest on the day of surgery, avoid the intake of hot and hard foods, not move in the operated area and return after 14 days for suture removal (Figure 8).



**Figure 7.** Intraoperative the right. Membrane stabilization with suture simple points and suspenders.



**Figure 8.** Front postoperative after 14 days, after the removal of the membrane and suture.



**Figure 9.** Pós-operatório de 3 meses do lado direito.



**Figure 10.** Postoperative three months on the left.

The patient returned for post-surgical follow-up after 3 months (Figure 9 and 10) and 1 year (Figure 11 and 12) surgery, a new measurement is performed with the millimeter probe for verification of the formation of attached gingiva.



Figure 11. Postoperative 1 year on the right.



Figure 12. Postoperative 1 year left.

At both sides, one can observe an increase in the attached gingiva, this being greatest when used MARF associated with the membrane. It was also observed that there was a significant improvement in gingival inflammation of the operated area.

### 3. DISCUSSION

The mucogingivais features may vary according to the gingival biotype of each individual, which can be classified as flat and thick or thin periodontal periodontal and scalloped, as shown by Silva *et al.* (2007)<sup>9</sup>. For Nasser & Souza (2012)<sup>10</sup>, the classification of periodontal biotype in the pre-treatment is important in various specialties of dentistry such as dental implants, Dentistry, Prosthodontics and Orthodontics, it offers subsidies for determining the prognosis of the procedure. "The small height or absence of keratinized tissue is a risk factor in the development of marginal tissue recessions. The measurements of height and gingival tissue thickness is

of paramount importance in rehabilitation planning"<sup>11</sup>.

Thus, it is considered that periodontium with reduced height of keratinized gingival tissue and little thickness characterized by being more likely to develop inflammatory lesions mucogingivais origin and gingival recession, as in the reported case. The attached gingiva that can be considered ideal is an issue that differs views between studies for many years. Accordingly, Løe & Lang (1972) suggested that two 12 mm keratinized gum is sufficient to maintain the gingival margin stable, resist brushing trauma and maintaining homeostasis of the periodontium.

According to the American Academy of Periodontology (2001)<sup>13</sup>, gingival recession can be defined as the apical migration of the gingival margin in relation to the cemento-enamel junction. In this sense, Pradeep *et al.* (2012)<sup>14</sup> and Potârniche (2013)<sup>15</sup> agree to report that the recession of the gum tissue can be considered as a periodontal disease complex, multifactorial and still poorly understood etiology. However, some authors<sup>16,14,17,15</sup> argue that some possible factors should be considered as the possible cause and progression of gingival recession, such as periodontal biotype, this amount of attached gingiva, labial frenulum with strong presence, type of occlusion, poor tooth brushing or hard excessive margins of subgingival restorations and harmful habits like smoking, among other factors.

Pradeep *et al.* (2012)<sup>14</sup> report that the traction of the marginal gingiva by high insertion brakes or adhesions can hinder the removal of plaque and promote the progression of gingival recession. Thus, as observed in this clinical case, the presence of biofilm, strong muscle insertions of adhesions in the alveolar mucosa, brushing performed unsatisfactorily, associated with smoking, would be the possible factors responsible for the progression of gingival recession.

According Vieira & Cotter (2011)<sup>16</sup> mucogingivais the surgical procedures are required with the function to correct the loss of soft tissue. Lindhe (2005)<sup>5</sup>, based on scientific evidence and clinical case reports, directions to the increase in gingival volume should be considered in cases where one wishes to avoid the gradual recession of the marginal gingival tissue; when the orthodontic movement can occur bone dehiscence; when changes in morphology around the teeth or implants facilitate plaque control or improve comfort for the patient or in situations where rehabilitation treatments will be performed. In this reported case, the patient had cervical cavities that needed subgingival restorations, justifying the execution of the surgical technique for improving the gingival condition.

Deepalakshmi & Arunmozhi (2006)<sup>18</sup> the purpose of performing plastic surgery in gingival tissues is the gingival recession correction when cause functional or aesthetic problems. Thus, the treatment plan should be indi-

visualized, taking into account the particularities of each patient. When the surgery is planned, the most appropriate method should be chosen taking into account several factors. To Palma (2013)<sup>17</sup>, selecting a surgical technique depends on the assessment of the anatomical location of the factors to be operated, the conditions presented by the patient and aesthetics necessity.

The technique was proposed by MARF Carnio *et al.* in 2006, in order to increase the size of the apical-coronal attached gingiva over several adjacent teeth, wherein the technique involves lifting the flap and its displacement in a more apical when the suture. On biological principles of the technique, Carnio, Passanezi and Campbell (2007) report that the periosteum is intentionally left exposed, so that the wound edges are surrounded by keratin tissue, so that during this healing wound, there is a inducing the formation of new tissues keratin, filling the region where the periosteum was left exposed.

Carnio *et al.* (2007)<sup>8</sup> conducted a follow-up for 6 months in 33 patients operated using the technique of MARF. The authors found that the treatments made with this technique resulted in a significant increase in apical-coronal extent of keratinized tissue, and concluded that MARF technique is an effective technique in the attached gingiva increased in length, having several advantages compared to other techniques used for the same purpose. Carnio *et al.* (2010) 19 agree with the above authors to state that the technique is simple and can be done quickly because it eliminates the need for a second surgical site to the donor tissue removal and favors an appropriate aesthetic result because the color of the new tissue formed corresponds to the adjacent gingival tissue. In this concept, the technique has MARF their use justified offering the advantage of minimizing patient discomfort when compared to autogenous gingival grafting techniques.

According Abreu *et al.* (2007)<sup>20</sup> in the last decades for the treatment of gingival recession been suggested GPR procedures as a modification to conventional techniques, through the use of membranes absorbable, non-absorbable or other biomaterials. "The exclusion of undesirable tissue in the area where you want to form a specific tissue is the basic principle of guided regeneration. The goal is to allow only cells with regenerative capacity have access to the region"<sup>21</sup>. To Alpiste-Illueca *et al.* (2006)<sup>22</sup> during the healing period, the phase of performance of granulation tissue in the wound surface epithelial cells similar to the original epithelium migrates rapidly from the wound margins. Thus, the membrane tends to act as a physical barrier preventing the proliferation of unfavorable tissue as supports Hardwick, Hayes & Flynn (1995)<sup>23</sup>.

In our case, an adaptation of MARF technique with the use of a non-resorbable membrane was made of pol-

propylene (Bone Heal<sup>®</sup>) with the purpose of verifying the principle of Guided Bone Regeneration can also be applied to soft tissues, in which waited was found that the cells that form the new keratinized tissue suffer greater proliferation in the space created by the membrane to the formation of a greater height and better tissue while the cells remain barred alveolar lining, preventing their proliferation. This membrane was ideally designed for use in cases of Guided Bone Regeneration after tooth extractions in which Solomon *et al.* (2010)<sup>24</sup> reported that the membrane has many advantages, because it is waterproof, can be exposed to the oral environment and prevent the infiltration of soft tissue cells, promoting proliferation of bone cells into the alveolar bone. However, the use of these membranes has some disadvantages, such as their cost and the time required for installation and removal, given that it is non-resorbable.

The results obtained in the clinical case after surgery, there were certain advantages over the use of the membrane with respect to another area without the use of the same. The membrane preserved a distance from the edges of the surgical wound for a longer time, promoting greater epithelialization and consequently the formation of a keratinized tissue of better quality. Upon removal of the suture, the side which received the membrane has facilitated this procedure, compared to the other area without the use of the same. After the end of the healing period, it can be seen that there has been the formation of a more visible scar on the side that did not receive the membrane.

#### 4. CONCLUSION

After the analysis and monitoring of the clinical case in question, we can conclude that the results obtained with the MARF - Modified Apically Repositioned Flap periodontal surgical technique with the use of non-absorbable polypropylene membrane based on the principle of GPR- Guided Periodontal Regeneration showed some advantages compared to the conventional surgery without the use there, especially in the formation of a greater range of attached gingiva, less scarring and more easily at the time of suture removal. Thus, it can be considered that both surgical techniques are effective for improvement of the periodontium protection around the teeth with technical superiority of the membrane-associated.

#### REFERENCES

- [1] Maynard JG Jr, Wilson RDK. Physiologic dimension of the periodontium significant to the restorative dentist. *J Periodontol.* 1979; 50( 4):170-4.
- [2] Newman MG, Takei HH, Carranza FA. *Periodontia Clínica.* 9ª edition. Rio de Janeiro: Guanabara Koogan; 2004.

- [3] Hassel TM. Tissues and cells of the periodontium. *Periodontol* 2000. 1993; 3(1):9-38.
- [4] Novaes VCN, Santos MR, De Almeida JM, et al. A importância da mucosa queratinizada na Implantodontia. *Rev Odonto Araça* [Internet]. 2012 [citado em 25 out. 2014];33(2):41-6. Disponível em: <http://apcdaracatuba.com.br/revista/2013/08/trabalho6.pdf>
- [5] Lindhe J, Karring T, Lang NP. *Tratado de Periodontia Clínica e Implantologia Oral*. 4ª edition. Rio de Janeiro: Guanabara Koogan; 2005.
- [6] Reddy VK, Parthasarathy H, Lochana P. Evaluating the clinical and esthetic outcome of apically positioned flap technique in augmentation of keratinized gingiva around dental implants. *Contemp Clin Dent* [Internet]. 2013; 4(3):319-24. Disponível em: [http://www.contempclindent.org/temp/ContempClinDent4331-9-5154298\\_141902.pdf](http://www.contempclindent.org/temp/ContempClinDent4331-9-5154298_141902.pdf)
- [7] Thoma DS, Benic GI, Zwahlen M, et al. A systematic review assessing soft tissue augmentation techniques. *Clin Oral Implants Res* [Internet]. 2009 [citado em 15 ago. 2014]; 20(4):146-65. Disponível em: <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0501.2009.01784.x/pdf>
- [8] Carnio J, Camargo PM, Passanezi E. Increasing the apico-coronal dimension of attached gingiva using the Modified Apically Repositioned Flap Technique: a case series with a 6-month follow-up. *J Periodontol*. 2007; 78(9):1825-30.
- [9] Silva, RC, Carvalho PFM, JOLY JC. Planejamento estético em Periodontia. Congresso Internacional de Odontologia de São Paulo; 2007 Jan; São Paulo.
- [10] Nasser KRP, De Souza DM. Relação entre características mucogengivais e ocorrência de recessão gengival. *Braz J Periodontol* [Internet]. 2012 Dec [citado em 15 ago. 2014]; 22(4):72-8. Disponível em: [http://www.revistasobrape.com.br/arquivos/2012/dez/REVPE\\_RIO\\_DEZ\\_2012\\_SITE\\_PAG-72\\_A\\_78.pdf](http://www.revistasobrape.com.br/arquivos/2012/dez/REVPE_RIO_DEZ_2012_SITE_PAG-72_A_78.pdf)
- [11] Warrer K, Buster D, Lang NP, et al. Plaque-induced peri-implantitis in the presence or absence of keratinized mucosa. *Clin Oral Implants Res*. 1995; 6(3):131-8.
- [12] Lang NP, Løe H. The relationship between the width of keratinized gingival and gingival health. *J Periodontol*. 1997; 43(10):623-7.
- [13] American Academy of Periodontology. Glossary of periodontal terms [Internet]. 2001 [citado em 15 jul. 2014]; 4ª edition, Chicago. Disponível em: <http://www.perio.org/sites/default/files/files/PDFs/Publications/GlossaryOfPeriodontalTerms2001Edition.pdf>
- [14] Pradeep K, Rajababu P, Satyanarayana D, et al. Gingival recession: review and strategies in treatment of recession. *Case Reports in Dent* [Internet]. 2012 [citado em 15 ago. 2014]; 2012:1-6. Disponível em: <http://www.hindawi.com/journals/crid/2012/563421/>
- [15] Portâniche O, Solomon S, Paserin L, et al. Statistical study on the prevalence of gingival recession in young adults. *Intern J of Med Dent* [Internet]. 2013 Jul/Sep [citado em 15 ago. 2014]; 3(3):219-24. Disponível em: [http://www.ijmd.ro/articole/319\\_43\\_pdfsam\\_IJMD%203-2013%20web.pdf](http://www.ijmd.ro/articole/319_43_pdfsam_IJMD%203-2013%20web.pdf)
- [16] Vieira A, Cotter BB. Procedimentos de aumento gengival e recobrimento radicular: revisão bibliográfica e apresentação de um caso clínico [monografia]. [Internet]. Porto: Universidade Fernando Pessoa, Faculdade Ciências da saúde; 2011 [citado em 29 ago. 2014]. Disponível em: [http://bdigital.ufp.pt/bitstream/10284/2611/3/TM\\_12926.pdf](http://bdigital.ufp.pt/bitstream/10284/2611/3/TM_12926.pdf)
- [17] Palma MAG. Revisão de literatura do uso das técnicas de retalho posicionado lateralmente, enxerto gengival livre e enxerto conjuntivo subepitelial associado à técnica do túnel no tratamento de recessões gengivais [monografia]. [Internet]. Piracicaba: Faculdade de Odontologia de Piracicaba, Universidade Estadual de Campinas; 2013 [citado em 15 ago. 2014]. Disponível em: [www.bibliotecadigital.unicamp.br/document/?down=000903472](http://www.bibliotecadigital.unicamp.br/document/?down=000903472)
- [18] Deepalakshmi D, Arunmozhi U. Root coverage with free gingival autografts-a clinical study. *Ind J of Dent Res*. 2006; 17(3):126-30.
- [19] Carnio J, Antonio AT, Nakanishi FA. Aumento de gengiva inserida: enxerto livre epitelizado palatal x retalho reposicionado apical modificado. *Rev PerioNews*. 2010; 4(4):341-47.
- [20] De Abreu FAM, Grossi VL de O, Zampa RC, et al. A regeneração periodontal guiada (RPG) no tratamento das recessões periodontais: revisão de literatura. *Arq Bras Odonto*. 2007; 92-103.
- [21] Lang NP, Becker W, Karring T. Alveolar bone formation. In: Lindhe J, Karring T, Lang NP. *Clin Periodontol and Implant Dent*. 3ª edition. Copenhagen; 1997.
- [22] Alpiste-Ilueca FM, Buitrago-Vera P, De Grado-Cabanilles P, et al. Periodontal regeneration in clinical practice. *Med Oral Patol Oral y Cirurg Bucal*. 2006; 11: 382-92.
- [23] Hardwick R, Hayes BK, Flynn C. Devices for dentoalveolar regeneration: an up-to-date literature review. *J Periodontol*. 1995; 66(6):495-505.
- [24] Salomão M, Alvarez FK, De Siqueira JTT. Regeneração óssea guiada em defeitos extensos pós-exodontias utilizando membrana exposta ao meio bucal. *Rev Implantnews*. 2010; 7(6):753-9.

