v. 3, n. 35, 2023

International Journal of Health Science

GUIDED BONE RECONSTRUCTION OF ANTERIOR MAXILLARY, WITH GRAFTS OF PARTICULATE BIOMATERIALS ENRICHED WITH IPRF AND L-PRF MEMBRANE, TENT TECHNIQUE (CLINICAL CASE)

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Abstract: Currently, one of the greatest challenges in implant dentistry is the anterior maxillary area. There is usually a bone resorption characterized by several factors, where the loss of bone height and thickness occurs several times, inhibiting the installation of the dental implant, in the anatomical region of preference. The objective of this work is to report a clinical case of bone reconstruction in the anterior maxilla with particulate biomaterial grafts enriched with IPRF and LPRF membrane, installation of two implants and later construction of two metal-ceramic screw-retained crowns. Female patient, melanoderma, arrived at the private clinic, complaining that whenever she spoke and ate she did not feel firm, impairing her chewing and phonetics, with the clinical picture of absence of dental elements 11 and 21, user of RPD. Severe bone resorption was found in the anterior maxillary region, it was decided to perform guided bone reconstruction (GBR), using a tent screw, particulate biomaterials enriched with platelet aggregates rich in fibrin LPRF and I-PRF. Conclusion After a period of 12 months, computed tomography was performed, where it was observed that the dimension for anchoring the implant had been reached. Subsequently, the implantation surgery of two dental implants with locking of 30 N (Newtons) took place. After all the necessary steps for the installation of metal-ceramic screw-retained crowns. Two metal-ceramic screw-retained crowns were installed on element 11 and 21 in color A3.
Keywords: Bone graft. Reconstructive Oral Surgery. Guided Bone Regeneration. Dental implant.

INTRODUCTION

Currently, one of the greatest challenges in implant dentistry is the anterior maxillary area. There is usually a bone resorption characterized by several factors, where the loss of bone height and thickness occurs several times, inhibiting the installation of the dental implant, in the anatomical region of preference. Alveolar bone resorption resulting from tooth extractions interferes with oral rehabilitation through implant dentistry with regard to difficulties in correct positioning of the implant, as well as the challenges generated in the aesthetic component. (BARRETO et al., 2018)

This loss of bone thickness and height is caused by several factors, arising from traumatic surgeries, physiological bone loss, pathologies and premature dental extractions.

Faced with this major problem, the implantodontist resorts to reconstructive surgeries of bone grafting, with the purpose of reconstructing the bone anatomy of a specific region, with the objective of gaining bone thickness and height. When bone augmentation is successful, it allows you to have an adequate portion of alveolar bone for the installation of the implant and, in addition, provides the stability of the peri-implant tissues over time (SUKEKAVA et al., 2018). However, many times the graft by itself does not ensure the desired bone quality, essential for an excellent locking of the dental implant, planned for that maxillary area.

With the evolution of the studies came the use of growth factors, I-prf fibrin rich in injectable platelets, and membranes of L-prf autologous membrane of concentrate of a fibrin network. With the aggregated use of concentrated platelet-rich fibrin mesh, we have a better predictability of success. When we use platelet-rich fibrin, the biomaterial is enhanced with the patient's growth factors, enabling a graft of good consistency and quality, for greater anchorage and locking of the implant, idealized for that area of reconstruction, with exogenous bone grafting.

White blood cell and platelet rich fibrin (L-PRF) is one of the leading families of

> platelet concentrates for surgical use. It is often used in oral and maxillofacial surgery as a surgical adjunct to enhance healing and promote tissue regeneration. The blood sample is collected in 9 ml tubes without anticoagulant and immediately centrifuged at 2700 rpm for 12 minutes. At the end of the process, a large clot of L-PRF can collect in the middle of each tube. This clot can be used directly to fill the cavity or mixed with bone material, or compressed into a membrane (EHRENFEST et al., 2018, p. 3).

Guided bone reconstruction (GBR) is considered a form of barrier to prevent the unwanted growth of tissue cells, such as connective tissue, epithelial cells and to maintain spatial bone formation, allowing the population of only desired cells in the site of the application (MARÂNDOLA, P. S et al., 2020). The GBR forms a barrier through membranes, and can be used in two stages for maintenance, right after tooth extraction, being placed over the alveolus, thus preventing connective tissue from forming in that region, or, associated with bone grafting, usually autogenous, thus improving bone formation, which will happen more quickly (MALPARTIDA-CARRILLO, V. et al., 2019; CASTRO-RODRÍGUEZ, Y. 2019).

This technique is commonly used by implant dentists, because at this point when studying the guided bone regeneration technique, Oddó, et al., (2020) mentions its use in situations of preservation of the alveolar ridge soon after tooth extraction, thus avoiding the eventual local bone resorption and spread of unwanted connective tissue into the space in which the clot will then be preserved and new bone formation will take place.

Angulo-Serrano, et al., (2018) exposes the effectiveness of immediate implant placement, in sites with severe horizontal and vertical bone resorption, when using titanium mesh associated with particulate bovine bone and growth factors (PRF membranes), thus obtaining a faster tissue recovery, in addition to promoting greater stability for the graft and the implant through the titanium. Still analyzing the growth factors, Ramos, et al., (2019) cites satisfactory results in their studies when their use is associated with other grafting techniques, using materials such as xenogeneic and alloplastic grafts, in increases in the alveolar ridge, both mandibular and jaw.

CASE REPORT

Female patient, melanoderma, arrived at the private clinic, complaining that whenever she spoke and ate, she felt unsteady, impairing her chewing and phonetics. She came to us with the intention of placing fixed teeth on implants, anamnesis and clinical examination were carried out and it was found that the removable partial denture (RPP), which covered the upper central incisors, the dental elements (11 and 21). It did not provide stability, comfort and aesthetics. A battery of tests were ordered: computed tomography (CT), complete blood count and coagulogram.

In the second consultation, with the computed tomography in hand, severe bone resorption was found in the anterior maxillary region (fig. 1 A and B), where there was no height and bone thickness for the installation of two implants, it was decided to perform the reconstruction guided bone (ROG), using a tent screw, particulate biomaterials enriched with platelet aggregates rich in fibrin L-PRF and I-PRF.

At the beginning of the surgery, a bilateral infraorbital nerve block was performed at the bottom of the sulcus, a relaxing incision was made from element 13 to 23 and the flap seen in (Fig. 2 A) was reflected, retentions were made with spherical surgical drills for better adhesion of the bone grafts, 4 Screws were installed in the maxilla for the GBR tent technique (Fig 2 B). Six tubes of blood were collected, 5 in brown to make the L-PRF, and one in white for the I-PRF.

They were taken to the centrifuge, then the centrifugation cycle starts at the first moment for 9 minutes, the cycle is interrupted and the white tube was collected and the I-PRF liquid was collected, later dripped into the biomaterial, the centrifuge continued with the click until reaching 12 minutes, where the 5 brown tubes were collected from where they were pressed in the kit for dehydrating the L-PRF membrane (fig 3 A and B).

The L-PRF membrane was perforated in the Bio-Oss® xenogeneic biomaterial and the I-PRF was dripped onto it for polymerization and formation of the (stick bone), which is the bone mass that was grafted into the receptor bed, which is the region of the anterior maxilla, the graft was covered with the L-PRF membrane (fig 3 C), then covered with the Jason membrane (Institut Straumann AG, Switzerland) has a natural multilayer structure, originates from porcine pericardium and offers a function of prolonged barrier of 04 to 06 months, which guarantees a successful regeneration, mainly for larger procedures. This membrane, which is based on collagen type III, and synthesis was performed (Fig 3D).

After 20 days, the patient returned to remove the stitches, and was instructed to return after 12 months. Upon returning, the patient presented excellent clinical status, without complications and in relation to the peri-implant tissues, a new computed tomography scan was requested to assess how the region where the surgery was performed was. When performing the new requested examination, total success was observed, an expected gain in height and bone thickness in the anterior maxilla region (Fig 4 A and B). With the bone height gain, surgery was performed in the desired region, 02 Norse Cone implants were installed and the graft screws were removed. And a period of 4 months was waited for the placement of the prosthesis on the implant.

After 4 months had passed, the patient returned to the dental clinic to follow the steps of the proposed treatment. Upon arrival at the site, the reopening surgery was performed, where the implant was exposed and the cover implant was removed. Subsequently, two healing components were installed in the region of the implants and synthesis was performed on site.

After 25 days, the patient returned to the clinic to remove the healing components. Then, the installation of the pillars and the correct angulation were performed (Fig 5).

Subsequently, the implant was molded using the open tray technique, which consists of:

- Installation of the provisional prosthesis in the mouth with the working screw;
- Manipulation of molding material, using light and heavy simultaneously;
- Insertion of the tray with the heavy material in the patient's mouth;
- Perform access to the working screw;
- Wait the time necessary for setting, loosening the screw until it is possible to remove it;
- Removal of the impression from the patient's mouth;
- Installation of the analogue by tightening the working screw;
- Isolation of the area where the artificial gum will be made;
- Insertion of the artificial gingiva in the intended place;
- Leakage in plaster type IV;
- Screw loosening until the moment it is possible to remove it;
- Removal of the model from the impression.

The plaster model was taken to the laboratory for the coping to be made, the procedure for inclusion in a casting coating, according to the work to be developed. These

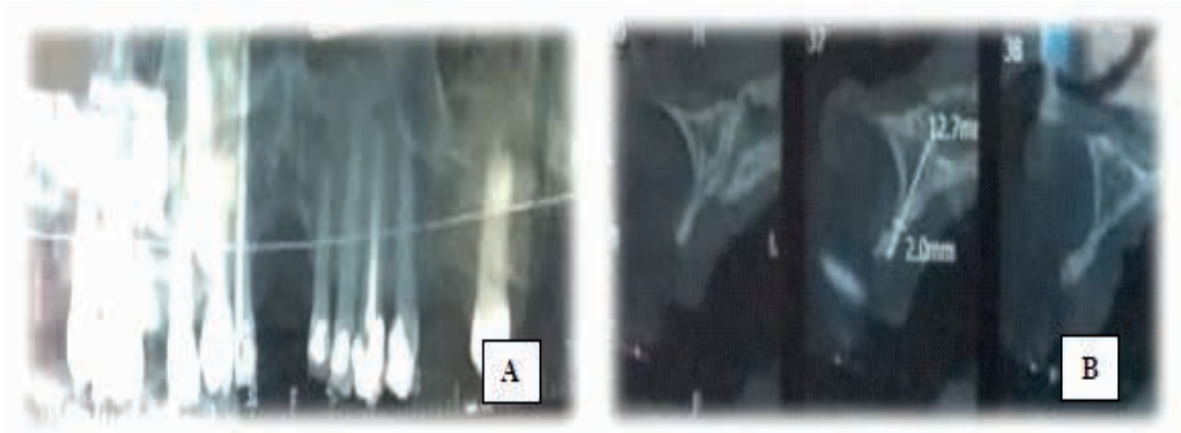


Figure 1: A – Severe bone resorption in the anterior maxilla region covering the area of the upper central incisors 11 and 21. B – Vertical and horizontal bone loss.

Source: Personal archive (2020).

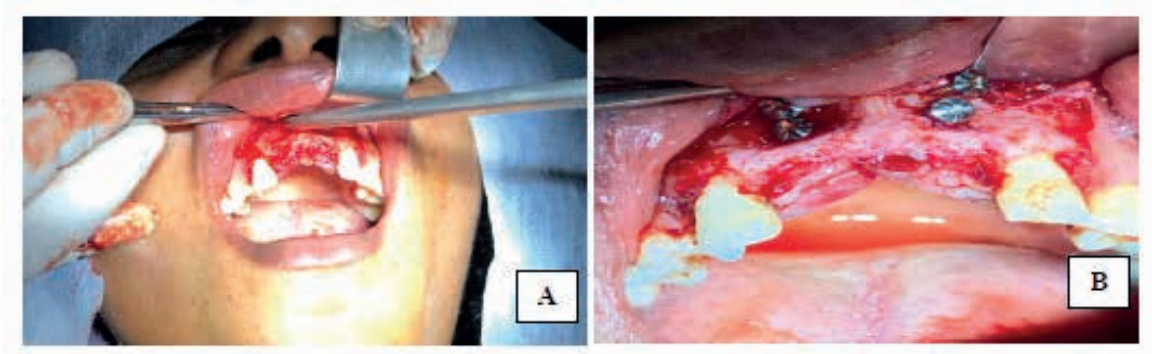
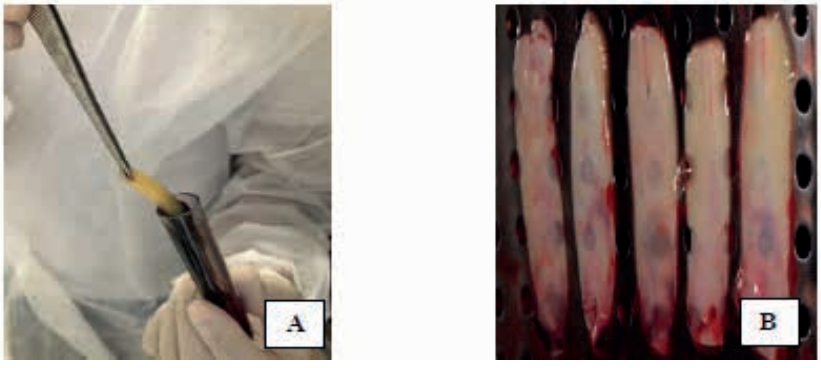


Figure 2: A – Relaxing incision with the flap folded back. B - Installation of 4 screws for the ROG tent technique.

Source: Personal archive (2020).



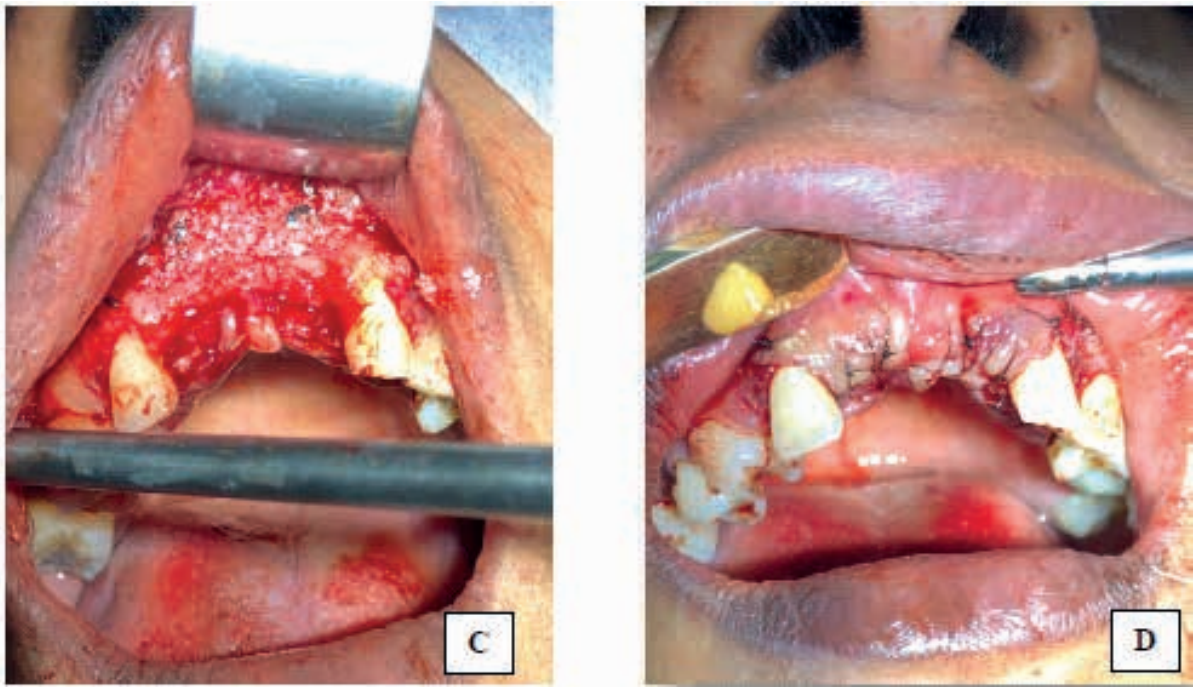
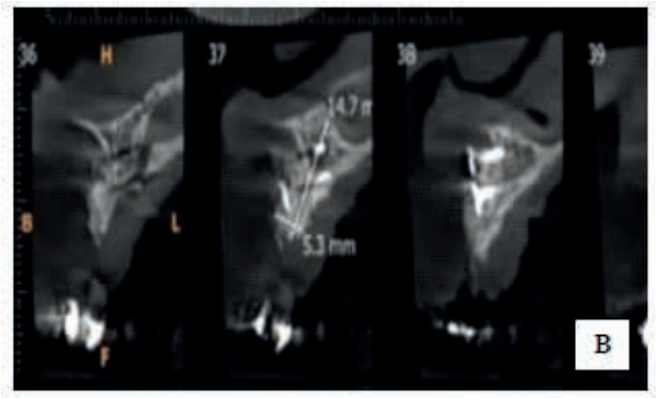


Figure 3: A - Removal of the L-PRF membrane from the tube after centrifugation. B: L-PRF membrane pressed in the case for dehydration. C - Insertion of the sticky bone in the receiving bed. D - Synthesis of the region, with a continuous scalloped suture.

Source: Personal Archive (2020)

Figure 4: A - Gain in height and bone thickness in the anterior maxilla region. B - Vertical and horizontal bone mass gain

Source: Personal Archive (2020)



Source: Personal archive (2020).

Figure 5: Installation of pillars and angulation.

Source: Personal archive (2021).

Figure 6: A – Installation of two metal-ceramic crowns on elements 11 and 21, in color A3. B patient's final result.

Source: Personal archive (2021)

metal-based cylinders are used as abutments for the screw-retained prosthesis.

After 15 days, the patient returned to the clinic for the implant coping test, the bite registration was also carried out and the color selection of the metal-ceramic crowns was carried out, the color of choice was A3 from the Vita color scale. After these procedures, the coping returned to the laboratory to make the crowns. In the last appointment, the adaptation and installation of the metal-ceramic crowns was performed (Fig 6 A and B).

DISCUSSION

Among the materials used to replace the autogenous graft, allogenic or homogeneous bone appears as a viable alternative, with high success rates in guided bone regeneration procedures, and can also be used alone or used in combination with xenogeneic or alloplastic bone (MOLON et al., 2009).

Molon (et al., 2009), rehabilitated a patient who had severe maxillary atrophy and wanted oral rehabilitation with dental implants, not accepting a second surgery to perform an autogenous graft. A reconstruction of the maxilla was performed using a graft with human bone frozen in block to restore bone thickness, thus enabling rehabilitation with dental implants. Six months after graft fixation, the fixation screws were removed, and the implants were installed.

Some types of bone grafts for the reconstruction of maxillary atrophies such as: homologous, heterogeneous, alloplastic and autogenous, which is the first choice, as it is considered the gold standard by dentists due to its biocompatibility, osteoinduction and osteoconductivity, providing greater bone integration, being more predictable, faster and with a new dense and mature bone formation between 6 and 12 months after its grafting.

In the case presented, the use of particulate biomaterials enriched with I-PRF and L-PRF membrane was indicated, due to the need for a large volume of material. Because it is a reconstruction of the anterior maxilla with severe atrophy, autogenous materials IPRF and L-PRF membrane were chosen. Because they provide a large amount of bone tissue and assist in maxillary reconstruction. Implants were installed after 12 months.

The application of the ROG technique in the anterior maxillary region, associated with the installation directly associated with the bone graft, made it possible to obtain a high primary stability for our implants, immediate loading and a better bone volume in the anterior region of the maxilla. With this, adequate support for the lip becomes possible, facilitating hygiene and allowing the patient's experience with the prosthesis to be more comfortable, associated with quality of life.

In general, GBR requires a wider flap elevation and sometimes a second surgical site for harvesting the autogenous bone, which can potentially increase morbidity for the patient and is often indicated as a stepwise procedure. In addition, GBR has a significant financial impact on the patient, and a longer total treatment time is expected. Flap dehiscence and membrane barrier exposure are common complications of GBR, affecting the amount of final new bone formation. However, GBR is highly indicated in clinical actions where it is extremely important to be able to increase the bone in both the horizontal and vertical directions, and when the bone deficiency extends to the lingual/palatal face (SUKEKAVA et al., 2018)

The cumulative survival rate of immediate implants placed using GBR for fenestration and dehiscence defects ranged from 96.1% at 5 years after placement to a reduced survival rate of only 76.8% for the maxilla and 83.8% for the mandible.

However, most authors agree that the installation of implants in grafted areas seems to have success and survival rates similar to those of implants placed in previously untouched bone. In a systematic review, they suggested that step-by-step GBR has higher success rates than immediate GBR procedures (SUKEKAVA et al., 2018).

The PRF protocol offers numerous advantages. First, it has the competence to gradually release autologous growth factors and shows a stronger and more durable effect on osteoblast differentiation and proliferation. Second, it can be easily reshaped to create a membrane that serves as a matrix to accelerate wound healing, improve bone formation, and decrease the healing time of graft materials. Third, it's easy to prepare and handle, and it's inexpensive. Furthermore, it plays a crucial role in suppressing inflammatory reactions, acting as a regulator of the immune response through the release of anti-inflammatory cytokines. (LUI et al., 2019).

To enable bone grafting, whether with autogenous or exogenous bone, a biological connector between the different parts of the material is necessary. This can be achieved by mixing such material with blood concentrates such as PRF (CHENCHEV et al., 2017). For this purpose, it was decided to use the dripping with the I-PRF liquid and the L-PRF membrane was perforated to allow the agglutination with the xenogeneic biomaterial, thus producing the stick bone, as well as the use of the I-PRF membrane. L-PRF, for covering and subsequent stabilization of the grafted material.

Due to these advantages, it was chosen to be used as a component of the graft, in combination with a xenogeneic graft, aiming at the reconstruction of the alveolar bone in the anterior region of the maxilla, for the placement of dental implants in a second surgical procedure.

The patient had an excellent postoperative period, with good soft tissue healing, little pain and swelling, and no signs and/or symptoms of infection. After 12 months of the surgical procedure, it can be verified during clinical and tomographic reassessment that the alveolar bone is viable and of satisfactory thickness to proceed with the planning and execution of dental implants in the region.

FINAL CONSIDERATIONS

After a period of 12 months, computed tomography was performed, where it was observed that the dimension for anchoring the implant had been reached. Subsequently, the implantation surgery of two dental implants with locking of 30 N (Newtons) took place. After all the necessary steps for the installation of metal-ceramic screw-retained crowns. Two metal-ceramic screw-retained crowns were installed on elements 11 and 21 in color A3. As seen in the case, the stick bone associated with the I-PRF and the L-PRF membrane can be an excellent alternative for bone grafting, resulting in more comfort and an excellent postoperative period for the patient, and allowing the recovery of aesthetic areas to be be rehabilitated with dental implants.,

REFERENCES

ANGULO-SERRANO, Aldo; QUIJANDRIA-BRICEÑO, Diana; ALVARADO-MENACHO, Sergio. **Rehabilitación Integral de un paciente con reabsorción ósea horizontal, mediante regeneración ósea guiada simultánea a la colocación de implantes.** Revista Estomatológica Herediana, v. 28, n. 2, p. 115-124, 2018.

BARRETO, Bruna Rodrigues et al. **Enxerto ósseo para implante dentário em região anterior de maxila.** ARCHIVES OF HEALTH INVESTIGATION, v. 7, 2018.

Chenchev IL, Ivanova VV, Neychev DZ, Chalakova RB. **Application of Platelet-Rich Fibrin and Injectable Platelet-Rich Fibrin in Combination of Bone Substitute Material for Alveolar Ridge Augmentation -a Case Report.** Folia Med (Plovdiv)2017;59(3):362-6.

DE MOLONI, Rafael Scaf et al. **Reconstrução de maxila atrófica utilizando enxerto ósseo homógeno.** 2009.

DOHAN EHRENFEST, David M. *et al.* **O impacto das características centrífugas e protocolos de centrífugas nas células, fatores de crescimento e arquitetura fibrina de um coágulo e membrana rico em leucócitos e plaquetas (L-PRF).** Plaquetas, v. 29, n. 2, p. 171- 184, 2018.

JIMENEZ-VALDIVIA, Ludy Marileidy et al. **Avaliação da fase de maturação da sutura média em adolescentes e adultos jovens utilizando tomografia computadorizada de cone- feixe.** Progresso na ortodontia, v. 20, n. 1, p. 1-7, 2019.

Liu R, Yan M, Chen S, Huang W, Wu D, Chen J. Effectiveness of Platelet-Rich Fibrin as anAdjunctive Material to Bone Graft in Maxillary Sinus Augmentation: **A Meta-Analysis of Randomized Controlled Trails.** Biomed Res Int.2019;2019;01-10.

MALPARTIDA-CARRILLO, V.; TINEDO-LÓPEZ, P.L.; GUERRERO, M.E.; MARÂNDOLA, P.S.; FREITAS, G.B.; ROCHA, M.D. SAUSAGE TECHNIQUE
MAXILLARY ANTERIOR DEFECTS–CASE REPORT. The Open Brazilian Dentistry Journal, v. 1, n. 1, p. 68-78, 2020.

ORTIZCULCA, F. **Influência de lasper foraciones corticales em regeneración ósea guiada: Revisión de la literatura.** Revista clínica de periodoncia, implantología y rehabilitación oral, v. 12, n. 1, p. 37-40, 2019.

PRÍNCIPE-DELGADO, Yuliana; MALLMA-MEDINA, Adrián; CASTRO-RODRÍGUEZ, Yuri. **Efectividad del plasma rico en fibrina y membrana de colágeno en la regeneración ósea guiada.** Revista clínica de periodoncia, implantología y rehabilitación oral, v. 12, n. 2, p. 63-65, 2019.

RAMOS, M. R. V.; GÓMEZ, R. O.; CORREIA, F. **Regeneraciónósea guiada (ROG): Plasma rico enfactores de crecimiento vs. Autoinjerto dental particulado, revisión bibliográfica.** Odontología Vital, v. 31, p. 45-52, 2019.

SUKEKAVA, Flávia et al. **Técnica de divisão de rebordo e regeneração ósseca guiada: indicações e previsibilidade.** Journal of Clinical Odontologia & Research, v. 15, n. 3, 2018.