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MAXILLARY SINUS LIFT AND USE OF L-PRF WITH A DELAYED INSTALATION OF IMPLANTS - CASE REPORT

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ABSTRACT

Introduction: The technique of sinus lift is intended to rehabilitate edentulous areas in posterior regions of the maxilla, in situations of bony resorptions, other than being a predictable surgical procedure that allows the installation of dental implants.
Aim: To demonstrate through a delayed implant installation, the technique of sinus lift associated with a graft of leukocyte and platelet rich fibrin in the posterior region of the maxilla, through a case report.
Case Report: Patient A.A.M., male, 45 years old, attended to the Centro Caririense de Pós-Graduação (Cecap), complaining that "the roof of the mouth was too deep, feeling ugly because he did not have teeth in his mouth and wanted the installation of implants". At the clinical examination, it was noted a severe loss of bony structures and the presence of the dental elements 17 and 28. The planning for the surgical procedure encompassed a maxillary sinus lift, preceded by blood collection (L-PRF) and delayed implant installation.
Conclusion: The posterior region of the maxilla is the area of choice for the performance of maxillary sinus lift procedure, when the installation of implants in a single sessionis necessary, associated with the use of a graft above the implant region, which in some situations is essential.

INTRODUCTION

The maxillary sinuses are pneumatised cavities, delimited by a thin membrane, with a pyramid shape, in most cases reinforced by intra-sinus septa and lined by ciliated pseudo stratified epithelium, known as Schneiderian membrane. It is found adhered to the subjacent bone, formed by the union of four processes: Frontal, zygomatic, horizontal palatine and alveolar (Correia *et al*., 2012). The technique of maxillary sinus lifting is a technique used with the purpose of rehabilitation of edentulous areas in the posterior region of the maxilla in situations of bony resorption.

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It is as predictable surgical procedure that allows the installation of dental implants, once it is necessary to use materials or grafts in the space between the alveolar ridge and the new position of the sinus membrane (Raja, 2009). The osseointegration of the implants placed in the maxilla associated to the lifting of the maxillary sinus, takes into account the height of the remaining bone, the size of the access window to the maxillary sinus and the selection of biomaterials that will be used for that procedure (Dubrul, 1991). The bone height is one of the fundamental conditions for the performance of maxillary sinus lifts, which can be: When the remaining alveolar bone of the posterior maxilla is between 1 to 4mm. In these cases, it is most indicated to perform the traumatic sinus lift, wait for the graft cicatrisation and then install the implant (lack of primary stabilisation

necessary for the process of osseointegration); the second situation is when the amount of bone is between 5 and 7mm, being an indication for the installation of the implant associated with a maxillary sinus lift (amount of bone that assures the primary stability); the third situation is when the height of the remaining bone is equal to 8mm, which allows the use of osteotomes for the a traumatic sinus lift (Canullo, 2009). Therefore, the current work aims to demonstrate through a delayed implant installation, the technique of sinus lift associated with a graft ofleukocyte and platelet rich fibrin in the posterior region of the maxilla, through a case report.

Case Report

Patient A.A.M., male, 45 years old, attended to Centro Caririense de Pós-Graduação (Cecap), complaining that "the roof of the mouth was too deep, feeling ugly because he did not have teeth in his mouth and wanted the installation of implants". At the clinical examination, it was noted a severe loss of bony structures and the presence of the dental elements 17 and 28.

Fig.1. Initial orthopantomography of the patient

In view of the clinical condition, complementary radiographic exams were required (Figure 1), such as panoramic radiographs and computed tomography, to allow a tridimensional analysis of the maxillomandibular morphology, location of noble structures and anatomical variations of lesions, relationship between anatomical structures and occlusal planes, evaluation of bone quality andquantity, quality of spatial resolution, less production of artifacts in the presence of metals and low dose of radiation received. After the anamnesis, clinical and radiographic examinations of the patient, the planning for the surgical procedure was started, and it involved a maxillary sinus lift, preceded by the collection of blood through a venous puncture in the antecubital fossa area.

In the anterior region of the elbow, on the arm, a disposable needle with a safety device to seize the blood was used, allowing the blood to be released with pressure to the region that the collection was being performed, because if this device is not used, the venous puncture will be impaired. The management of the sinus lift was started in order to allow a gain in vertical and horizontal height of the cortical bone. The protocol performed generated images that could be used for prototyping (3D impressions) of biomedical models and surgical guides prototyped for implants, favouring a greater security and fidelity for the planning.The procedure was started with the antisepsis of the professional and patient with chlorhexidine 2% and 0,12% forintra-oral mouthwash; meanwhile the antisepsis of the surgical location was performed with hydrophilic cotton and ethyl alcohol 70%. Then, a tourniquet was used to allow a greater pressure of blood, which consequently, was collected through vacuum tubes, connected to the disposable needle with its respective adaptor. The samples were collected from a centrifuge (Spinplus-500-8) for 10 minuted with a rotation of 2500. Collection of 6 (six) vacuum tubes (blue coloured lid) of blood was performed. These presented an additive of citrate, to get the plasma samples that are used for cases needing platelet grafts. After the final manipulation, the platelets were collected and stored in a sterile aluminium box for the fabrication of plugs and an autologous membrane (Figure 2).

Fig.2. Leukocyte and platelet rich fibrin membrane

Finishing this step, the hydration therapy of the collagen membrane with the collected plasma was started. The bony heterologous graft (Straumann ® BoneCeramic) was manipulated with the same plasma previously collected, material of choice because it stimulates bone neoformation, allowing volume gains, hydrophilic capacity, body corresponding pH and easy manipulation. On the other hand, the price is higher when compared to others existing in the national market. Through a conservative technique, wear was made in the region where the implants will be installed, finishing with the aid of osteotomes. Expansion in horizontal and vertical direction was performed in the region of the recently operated alveolus (Figure 3).

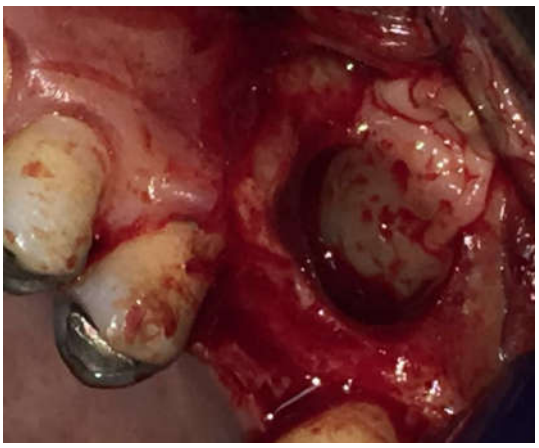

Fig. 3:Surgical window of the maxillary sinus with allocation of platelet materials

Some cautions should be taken, in order to avoid bone fenestration and thus impair the implant installation. The procedure started with a little pressure, using an instrument placed in the region of smallest diameter following to the larger diameter ones. Then, a sinus curette #24 was used to do a soft insertion, putting a little strength to elevate the Schneiderian membrane and consecutively the sinus. Immediately after establishing a region that offers sufficient space for the graft installation and posteriorly the implant, the

insertion of the bone graft (Straumann ® BoneCeramic) was started, and after filling all the gaps with this material, a collagen membrane (Brand Geistlich, type Bio-Gide® - Resorbable bilayer membrane, presenting a size of 25mm x 25mm) was placed on the area that presented bone tissues. The membrane was also coated with platelets, allowing a gain in bone volume. Posteriorly, the implant Straumann ® was installed, with a follow up of thepatientfor 8 (eight) months, to observe the bone gains (Figure 4).

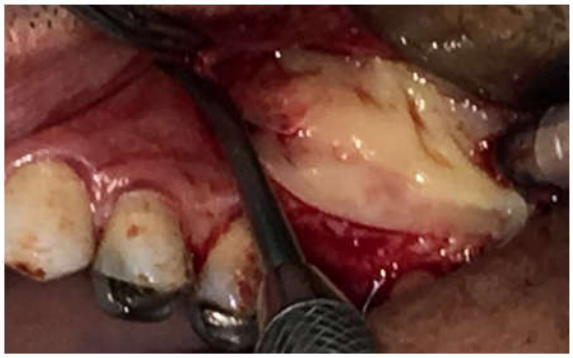

Fig.4. Adaptation of the L-PRF membrane

The protocol for getting platelet factors was followed to guarantee right parameters such as speed, time, inclination, centrifuge tubes and even temperature. All of these points must be respected, in order to produce a high endurance membrane, with a variety of indications (Figure 5). The production of plugs has as main indications the precise closure of the exposed alveoli after a performed extraction and obtainment of a liquid full of growth factors that is used in the agglutination of biomaterials, offering a greater volume for the remaining bone, other than being cheap and easy to manipulate.

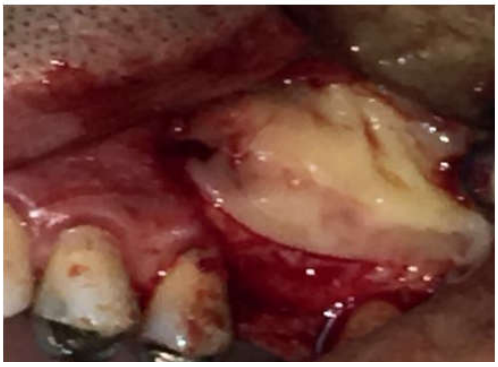

Fig.5. L-PRF membrane adapted in the surgical cavity

DISCUSSION

In regions that offer and legally permit the performance of rehabilitant measures by implants, the success is more related to the use of osseointegrated implants, taking various surgical principles as a reference, until the final prosthesis (Paiva *et al*., 2014). Important characteristics should also be taken into account, such as the ethical principles of dentists, micro structure aspects of zirconia implants and essential factors to promote an optimal osseointegration of the operated area, once there are factors capable of changing the bone reparation, such as relative ischemia, use of topic application products and increase of local temperature (Pinto, 2011).

The rehabilitation of the posterior region of the maxilla requires the presence of two factors considered essential: Amount of remaining bone and quality of the tissues. During the procedure, some cautions should be taken to avoid complications involving the maxillary sinuses, in view of the proximity of the alveolar ridge with the sinus floor. When the matter is rehabilitation of the posterior region of the maxilla, it is necessary to take measures that facilitate the success in the case (Fugazzoto, 1998). Studies point out that there are two types of techniques for implant installation: Delayed and immediate. The first is used when there is a presence ofremaining bone greater than 5 mm, decreasing the process of morbidity and reducing time for the proposed treatment.

In contrast, a remaining bone smaller than 5 mm presents a high risk for infectious processes in the bone tissues grafted on the exposed region (Summers, 1994). Regarding the use of osteotomes, there are a few advantages when used for type III and IV bones. They include an increase in bone density in the remaining maxillary bone, promoting a superior primary stability for the implants, conserving and compacting bone, instead of removing it through the use ofdrills (Bränemark *et al*., 1969). Posterior regions of the maxilla present,in most of the cases, insufficient bone in terms of quantity (pneumatisation of the maxillary sinus and remodelling of the edentulous alveolar ridge) and quality when regarding prosthetic implant-supported rehabilitation. In this case, the use of L-PRF (leukocyte and platelet rich plasma) has as one of its main functions the maintenance of the sinus membrane lifted, contributing to the success of the case (Crotti *et al*., 2004). L-PRF (leukocyte and platelet rich plasma) is a matrix of fibrin, in which cytokines, platelets, growth factors and some cells remain stuck, working as a resorbable membrane (Sani, 2008; Hürzeler *et al*., 1996; Lekholm *et al*., 1985). It is basically considered as concentrated growth factors, other than other agents that promote wound cicatrisation and, in this case, it works as a tissue regenerator (Pjetursson, 2008). Due to being a material rich in platelets and growth factors, it contributes for the process of osteoconduction, which will provide cell stimuli from patients themselves and generate a regenerating response (Agrawal, 2014; Tunali *et al*., 2013). The use of this biomaterial contributes for the increase of bone tissues, favouring the installation of implants, once a lack of adequate thickness and proximity to the maxillary sinus are situations often found (Adell *et al*., 1981).

Conclusion

It can be concluded from this study that

The posterior region of the maxilla is the area of choice for the performance of sinus lift procedures, when it is necessary to install implants in a single session, associated to the use of a graft in the implant region, once it is essential in some situations. The use of devitalised or freeze-dried bone grafts placed on the gap formed by the lifting of sinuses, does not present differences between delayed and immediate installation of implants with sinus lift, even when the procedure is divided in two surgical stages. However, for such results it is fundamental to follow a sequence of procedures, respecting the indication of materials within each case

Conflicts of interest

The authors declare that there are no conflicts of interest.

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