

PLATELET-RICH FIBRIN (L-PRF), TREATMENT OPTION FOR CLOSING OROANTRAL COMMUNICATION IN AN ONCOLOGIC PATIENT: A REVIEW AND CASE REPORT.

ABSTRACT

Leukocyte- and Platelet-Rich Fibrin (L-PRF) is an autologous biomaterial used in grafting procedures. It consists of a fibrin matrix enriched with leukocytes, platelets, leukocyte-derived cytokines, and growth factors, all obtained from a simple blood sample. This case report aims to present the clinical application of L-PRF in the treatment of oroantral communication in an oncology patient. A 59-year-old female patient undergoing chemotherapy presented with right maxillary sinusitis and a fractured maxillary first molar (tooth #3), which exhibited a periapical lesion in continuity with the maxillary sinus. The proposed treatment involved the extraction followed by closure of the resulting oroantral fistula. To minimize invasiveness, the treatment strategy focused on obliterating the communication between the oral cavity and the maxillary sinus by filling the extraction socket with an autologous L-PRF membrane. After four months of follow-up, the patient showed complete resolution of the maxillary and alveolar infection, with no evidence of persistent communication between the oral cavity and the sinus. The use of L-PRF resulted in satisfactory outcomes, including new bone formation and the prevention of maxillary osteonecrosis. This case demonstrates that L-PRF can be a viable and effective option for the management of oroantral communication, particularly in oncology patients where minimally invasive approaches are preferred.

Keywords: Platelet-Rich Fibrin; Bone Regeneration; Oroantral Fistula.

Introduction

Due to the pneumatization of the maxillary sinus in the region of the upper molars and the anatomical characteristics of this area, oroantral communications may occur during extraction procedures of these teeth. Their resolution should be immediate or as early as possible, given the risk of postoperative sinusitis and oroantral fistula, with treatment varying according to the size of the communication¹. However, when oroantral communication occurs in patients with systemic conditions that impair the healing process, treatment should be more conservative.

One factor contributing to systemic impairment is the risk of osteonecrosis caused by bisphosphonate-based chemotherapeutic agents in oncology patients. Bisphosphonates are indicated for various conditions, including tumor-induced hypercalcemia, breast carcinoma,

multiple myeloma, heterotopic ossification, and stabilization of bone loss in cases of osteoporosis².

As members of a drug class that interacts with bone remodeling, prolonged use of bisphosphonates may compromise bone quality due to excessive suppression of bone repair. In recent years, osteonecrosis of the jaws has been reported as a significant complication of chronic bisphosphonate use. This complication frequently occurs following oral surgical procedures, primarily extractions³.

As a result, a series of studies have been initiated to explore adjunctive therapies that support the healing process in such procedures. Platelet aggregates have emerged as a promising biomaterial in oral surgery^{4 5}. Among the types of concentrates, the slow and progressive polymerization of L-PRF enhances the incorporation of chemical mediators, leukocytes, platelets, leukocyte-derived cytokines, and growth factors into the fibrin mesh^{6 7}. It is considered the closest to a natural clot, as it is obtained from pure blood and promotes satisfactory bone regeneration^{8 9}.

The biological properties of L-PRF have the ability to accelerate physiological healing, and when combined with bone grafts, they enhance the bone regeneration process¹⁰. L-PRF can be obtained in its polymeric phase, forming a membrane, and in its monomeric phase, which initially presents as a liquid and becomes gelatinous upon polymerization¹¹. The aim of this study was to present a clinical case in which L-PRF was chosen as a treatment option for oroantral communication in an oncology patient.

Literature Review

Oroantral communications are defined as a passage between the oral cavity and the maxillary sinus, which may occur due to trauma, pathological conditions, or oral surgeries such as tooth extractions. If the perforation is small (up to 2 mm), it may close spontaneously¹². However, it is difficult to accurately estimate its size; therefore, once the perforation is detected through the Valsalva test, closure should always be performed immediately or as early as possible to prevent the formation of an oroantral fistula or chronic maxillary sinusitis¹³.

Various surgical techniques are available for treating these communications, with the most commonly used being buccal advancement flaps, palatal rotational flaps, and the Bichat

fat pad flap^{14 15}. However, in cases where rehabilitation is needed in patients with systemic compromise, a more conservative approach is required—such as in patients undergoing bisphosphonate-based treatment.

Bisphosphonates are drugs used in the treatment of cancer-related conditions, improving the quality of life for patients undergoing such therapies². However, studies have shown a correlation between the use of bisphosphonates and the development of medication-related osteonecrosis of the jaws (MRONJ)^{3 16}. This condition depends on three diagnostic criteria: current or previous treatment with bisphosphonates; exposed bone in the maxillofacial region persisting for more than eight weeks; and no history of radiation therapy to the jaws¹⁷. It may directly affect the maxillary sinus, leading to oroantral communications. Since bisphosphonates impair bone healing, in cases of oroantral communication in oncology patients treated with these drugs, a more conservative therapeutic adjunct is necessary to enhance healing—such as platelet-based biomaterials^{18 19 20}.

Different types of platelet concentrates are used in oral surgery, including platelet-rich plasma (PRP) and platelet-rich fibrin (PRF). Within this field, leukocyte- and platelet-rich fibrin (L-PRF) is a compound that includes, in addition to platelets and fibrin, leukocytes. Each of these components plays an important role in the healing process. The fibrin clot that forms acts as a provisional matrix in which platelets are trapped, responsible for releasing various growth factors, chemokines, and inflammatory mediators that directly influence the healing process⁷.

Leukocytes are divided into three groups: granular cells, lymphocytes, and monocytes. Among the granular cells are neutrophils, basophils, and eosinophils, which also include polymorphonuclear leukocytes (PMN and PML). Lymphocytes are divided into B and T cells, and monocytes migrate into tissues, maturing into macrophages. The primary role of these leukocytes is to produce inflammatory cytokines and various growth factors, promote wound repair, protect against bacterial infections, maintain tissue integrity, and enhance the effects of platelets^{6 21}.

L-PRF is produced by collecting approximately 9 ml of the patient's blood into glass tubes without anticoagulants, using standard venipuncture nursing techniques. Immediately after collection, the blood is placed into a centrifuge⁴. There are different protocols for

centrifugation, with rotation speeds ranging from 1500 to 3300 rpm for 10 to 12 minutes, depending on the centrifuge used²².

During centrifugation, the coagulation process is activated, forming a clot with a three-dimensional fibrin network where platelets and other cells are trapped⁵. Unlike other platelet aggregates, this occurs without the addition of anticoagulants, which typically induce rapid fibrinogen polymerization with low mechanical strength. In L-PRF, fibrinogen polymerization occurs naturally, resulting in a membrane with good clinical handling and mechanical resistance^{4 23}.

Case Report

The patient, a 58-year-old female undergoing chemotherapy for the management of metastatic tumors secondary to breast cancer, presented with complaints of right maxillary sinusitis. Clinical and radiographic examination revealed a root perforation of tooth #3, with a periapical lesion in continuity with the maxillary sinus, as well as opacification of the right maxillary sinus (Figures 1 and 2).

Following consultation with the oncologist responsible for the patient's treatment, the recommended approach was the extraction of tooth #3 and closure of the oroantral fistula to resolve the odontogenic infection. Considering the patient's systemic condition and the risk of osteonecrosis associated with her oncologic therapy, it was proposed obliteration of the communication using an autologous L-PRF membrane in its polymeric phase, combined with antibiotic therapy—Amoxicillin with Potassium Clavulanate 875mg administered preoperatively and continued for 14 days postoperatively.

At the beginning of the procedure, 18 ml of venous blood were collected into two 9 ml glass tubes containing an activator (silica). The tubes were placed in a centrifuge (KASVI - K14-0815®) at 2200 rpm for 10 minutes. At the end of the process, the L-PRF in its polymeric phase was decanted and placed into the extraction socket (Figure 3).

The procedure was performed with the patient conscious under local anesthesia. Following anesthetic administration, tooth #3 was extracted using a minimally traumatic technique to preserve the surrounding soft tissues. This was followed by vigorous curettage of the socket to remove all periapical lesion tissue, copious irrigation with 0.9% saline solution, and filling of the socket with folded L-PRF membranes in their polymeric phase. Tissue

closure was achieved using 5-0 nylon sutures to ensure stabilization of the L-PRF within the socket (Figure 4).

The patient was monitored weekly, and no signs of surgical site infection were observed (Figure 5). Sutures were removed three weeks postoperatively, and a Valsalva maneuver was performed, yielding a negative result, confirming successful closure of the oroantral communication.

After four months of follow-up, there was complete resolution of the infectious condition affecting both the maxillary sinus and the alveolar region. No clinical signs of alteration or continuity between the oral cavity and the maxillary sinus were observed. Radiographic evaluation revealed evidence of new bone formation in the area of the extraction socket of tooth #3 (Figure 6).

Discussion

Oroantral communications require immediate or early intervention to ensure successful resolution, as exposure of the maxillary sinus to the oral environment can lead to chronic sinusitis¹³. Several treatment options have been proposed, with the most conventional approaches involving vestibular or palatal flaps with suturing, or alternatively, obliteration of the communication using the Bichat fat pad^{14 15}.

Given the compromised systemic condition of the patient described in this case, a more conservative surgical approach was necessary, as her healing capacity was affected by oncologic treatment involving bisphosphonate-based drugs, which have been widely reported to carry a significant risk of maxillary osteonecrosis²⁰.

With this in mind, the chosen treatment was the use of an L-PRF membrane, instead of a flap, to close the oroantral communication and promote both soft tissue and bone healing in the region. Studies have shown that the slow and progressive polymerization of L-PRF leads to the aggregation of leukocytes, neutrophils, leukocyte-derived cytokines, and growth factors within a fibrin network, which are released gradually and continuously at the site⁶. This promotes healing and helps prevent local infections, making it effective in such cases^{24 25}.

It is important to note that the communication described in this case was of moderate size (between 3 and 4 mm), making it suitable for closure using the L-PRF membrane. In

cases of larger communications, the L-PRF membrane may lack sufficient structural support, and additional materials such as autologous bone grafts or collagen membranes may be required to achieve satisfactory results²⁵.

Conclusion

After four months of follow-up, the patient showed complete resolution of the infectious condition in both the maxillary sinus and alveolar region, with no evidence of continuity between the oral cavity and the maxillary sinus. Thus, the use of L-PRF proved to be a satisfactory treatment option, promoting new bone formation and preventing the occurrence of maxillary osteonecrosis.

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