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Immediate implant with immediate loading in the anterior region using L-PRF to preserve gingival aesthetic profile

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Abstract— *One of the challenges of the immediate immediately loaded implantation technique in aesthetic areas is the preservation of aesthetic support structures such as marginal ridges and soft tissues. In order to preserve the peri-implant structures and maintain the aesthetic volume of the alveolar process and thus the emergence profile of the implant prosthesis. Bone grafts, connective tissue grafts and use of biological membranes can be employed to cover the surgical bed to protect and preserve the volume of the socket, maintaining the prosthetic aesthetic profile safely and predictablyThis paper aims to present a clinical case of a patient with tooth root fracture 21. Atraumatic tooth extraction was performed with immediate implant installation. For the preservation of the peri-implant structures and maintenance of the gingival aesthetic profile, a bone graft was performed, with i-PRF agglutinated xenograft, collagen membrane and covering the gap, the L-PRF membrane and immediately loaded using a plastic ucla abutment and a tooth. made with an additional silicone wall. The case was evaluated at 7 days and 30 days and immediately afterwards the definitive prosthesis was performed and 90-day follow up was performed. Based on the initial results obtained, it can be concluded that the treatment had benefits providing a favorable prognosis with longer implant survival at the end of the osteointegration period.*

Keywords— ***Immediate implants, Platelet-rich fibrina, Maxilla, Implants.***

I. INTRODUCTION

Modern implant dentistry in recent years has sought minimally invasive procedures with rapid resolution and practicality. In this context, immediate implant placement in the extracted tooth alveoli has been an alternative to reduce treatment time and cost, preserve height, alveolar bone thickness and soft tissue size, and promote bone-implant contact (PAL et al., 2011).

However, some factors are considered determinant for obtaining a positive result in the treatment of implant placement placed immediately in the alveoli of teeth extracted traumatically in the anterior region of the maxila (SONI et al., 2019). These include preservation of the bony margins of the socket during extraction, primary implant stability in the apical portion or along the walls of the socket, strict control of the tissue flap, close closure adapted to the neck of the implant, vertical resorption of the implant vestibular bone crest during the healing process and the presence of a horizontal bone defect, gap (VIGNOLETTI; SANZ, 2014).

In order to improve the techniques, several materials are incorporated in order to increase the biological, physiological and mechanical connections responsible for the implant success and the health of the surrounding tissues since the relationship between them is paramount to the success of these treatments (PARITHIMARKALAIGNAN; PADMANABHAN, 2013).

In an attempt to preserve the tissue dimensions of the dental socket immediately after extraction and fill the space between the implant and adjacent tissues, grafting has been the technique of first choice. Being aware of some limitations of autografts, the market has developed biomaterials in order to replace and provide clinically satisfactory results (NATALE JÚNIOR et al., 2018; POMINI et al., 2019a).

In this context, xenografts have gained space in implant dentistry because they have osteoconductive properties and help in maintaining the three-dimensional structure during the bone repair process (POMINI et al., 2019b).

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Many previous reports have justified the use of this bone substitute with blood derivatives in order to provide a synergistic action in the tissue healing process. Among these blood products, fibrin-rich plasma, PRF stands out for its osteogenic properties, due to the presence of growth and angiogenic factors (JEE, 2019).

Thus, in order to preserve and maintain aesthetic results in the procedures, accelerate the process of tissue regeneration and protect the surgical site, it is possible to use a practical and low cost access technique with biological membranes, platelet rich fibrins, L –PRF (CHOUKROUN et al., 2006).

The present case report presents the clinical application of immediate implant placement with the combined use of i-PRF agglutinated xenograft, PRF membrane and immediate prosthetic load in the anterior maxilla.

II. CASE REPORT

A 55-year-old male patient sought a private practice complaining of tooth sensitivity and discomfort 11 during chewing or palpation. On clinical examination the tooth presented percussion pain, but no sign of change in hard and soft tissues (Figure 1A-B), radiographically only a suspected root fracture, with no significant changes in periodontal tissues.

A cone beam computed tomography, CBCT was requested to complete the diagnosis of root fracture. Upon completion of the diagnosis, treatment options were given to the patient who decided to perform an immediate implant with the possibility of immediate loading (Figure 1C-D).

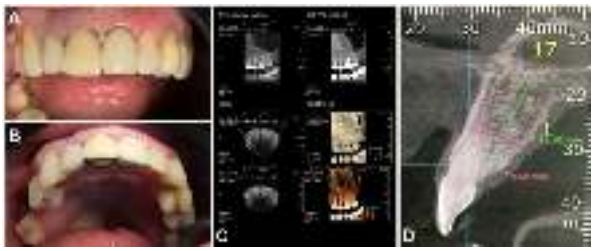

Fig.1. A) Pre-treatment frontal aspect; B) Occlusal view pretreatment; C-D) CBCT images of jaws.

Pre-procedure medications were broad spectrum antibiotic, amoxicillin 500 mg (generic medicine, Medley, SP, Brazil), 2 tablets 1 hour before the procedure, steroidal anti-inflammatory dexamentasone 4 mg (DecadronTM, Aché, SP, Brazil), 1 tablet 1 hour before the procedure and mouthwash with 02% chlorhexidine digluconac.

During the procedure, the patient was properly prepared with aseptic control and anesthetized with 2% mepivacaine + 1: 1000000 epinephrine, with vestibular and palatine infiltrates. The extraction of tooth 11 was done atraumatically, using a double periotome. After extraction it was possible to observe the fracture in longitudinal oblique direction (Figure 2A).

The implant of choice for immediate implantation was the Drive CM 3.5 x 13 implant (NeodentTM, PR, Brazil) implant with aqua surface treatment. Milling for implant installation occurred in a more palate position in relation to the dental socket, this allows a better positioning for the emergence of the prosthetic screw. The implant was installed with a torque of 50N/cm. A prosthetic component, CM conical abutment (NeodentTM, PR, Brazil) was installed over the implant to perform the immediate, provisional prosthesis. (Figure 2B-C).

Fig.2. A) Atraumatic tooth extraction 11; B) CM 3.5 x 13 Drive Implant Installation; C) Occlusal view of upper arch after implant installation.

To close this gap and preserve the emergence profile of the prosthesis over the implant, the stick bone, xenograft + i-PRF + collagen membrane Lumina-CoatTM + L-PRF membrane technique was performed.

Plasma processing followed the following protocol (Figure 3A):

1) 9mL Red Tube to obtain L-PRF;
2) 9mL white tube for i-PRF;
3) Centrifugation: 1300rpm for 14 min.

Obtaining the i-PRF and applied to the particulate bone (Lumina boneTM - Criteria, SP, Brazil), this graft polymerization was expected, approximately 14 min for application in the gap (Figure 3B-C). With a disposable syringe and suction tip, we collected the i-PRF from the white tube and then applied it to the particulate bone, left over from the i-PRF was applied to the bovine collagen membrane.

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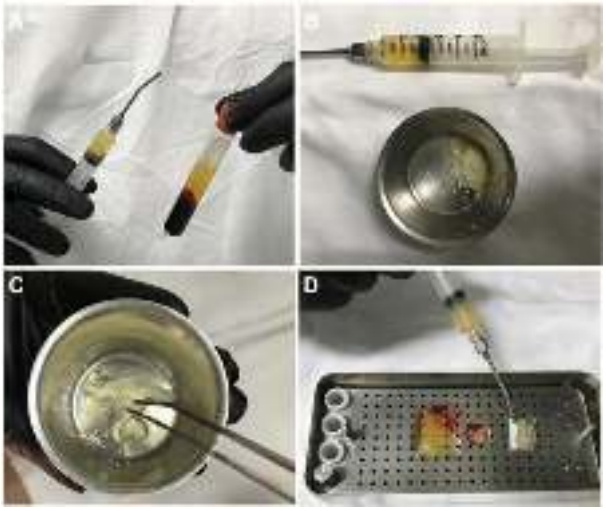

Fig.3. A) Obtaining the PRF; B) i-PRF plus xenografto; C) I-PRF polymerized xenograft; D) L-PRF membrane manufacturing.

An L-PRF membrane was also obtained for later application to the graft. The PRF clot was pressed over the grid of the PRF kit (Thimon™, Surgical Instruments, SP, Brazil) for 1 min (Figure 3D).

With the aid of forceps and a periotome, the stick bone was carefully adapted, filling the gap between the implant and the bone table (Figure 4A-B).

The collagen membrane was seated over the bone graft and extended into the gap, fully protecting the bone graft, avoiding soft tissue contact with the graft (Figure 4C).

Over the collagen membrane, the L-PRF membrane was placed and adapted with the aid of the periotome, adapting it over the entire length of the graft (Figure 4D).

Mattress-type sutures were performed using EthiconTM Mononylon 5-0 suture (Johnson & Johnson, SP, Brazil) to stabilize membranes and graft material under the tissues.

A conical abutment was used over the conical abutment to make the immediate provisional. To make this temporary a mock up system with the natural tooth was performed. Using a silicone wall and bisacrylic resin, Protemp 4TM (3M from Brazil, SP, Brazil) was made provisional. After finishing and polishing the patient was released. The suture was removed at 10 days.

Within 30 days the patient underwent a new x-ray to confirm implant stability and transfer impression was performed. At 45 days the patient performed the installation of the definitive prosthesis.

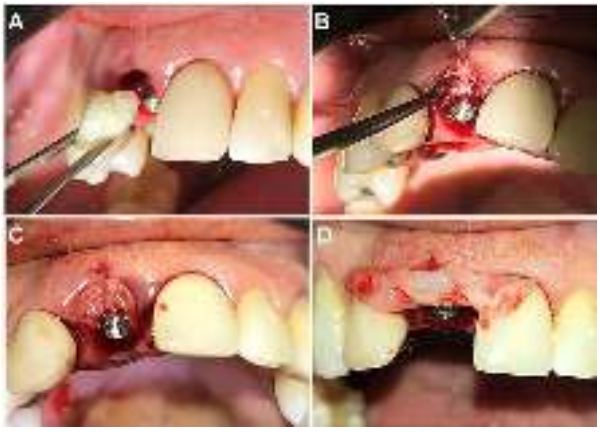

Fig.4. A) Stick bone installation; B) Stick bone adapted in the gap between implant and bone table; C) Collagen membrane seated over bone graft and extended into the gap; D) L-PRF membrane adapted over the entire graft extension.

III. RESULTS

The use of PRF in the installation of immediate implants with its application on the implant surface and in filling the gap presented satisfactory clinical results. After 7 days, during the postoperative consultation, the gum over the implant was completely preserved, without inflammatory aspects and the patient reported no pain or discomfort (Figure 5A, C).

At 30 days postoperatively during the transfer impression procedure, the implant showed optimal stability and good periimplant health, with only slight tissue irritation under the provisional prosthesis.

At 45 days, the definitive prosthesis was installed, with the torque recommended by the manufacturer; CM abutment 32N / cm and implant prosthesis 10N/cm (Figure 4B).

Radiographically the implant presented good adaptation with the bone structures and full filling of the gap space between the implant and the alveolar walls.

Fig.5. A) 7 days after surgery; B) 45 days after surgery; C) Periapical radiography at 30 days.

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IV. DISCUSSION

Knowledge about the phenomenon of tissue remodeling after tooth extraction is crucial to determine treatment planning and favorable prognosis. Thus, implant dentistry has improved in the search for procedures that provide alveolar bone regeneration with high implant survival rate and aesthetic patient satisfaction. (MITTAL; JINDAL; GARG, 2016).

Implant stability and periimplant tissue health decrease during the first weeks of healing due to changes occurring in bone and soft tissue, which cause aesthetic and biological concerns. Thus, it is necessary to establish a treatment protocol that provides the maintenance and preservation of periimplant tissues, with the focus on the installation of immediate loading implants (SEHGAL et al., 2018).

It is in this context that immediate load implants have been occupying more space in surgical procedures, in recommended clinical cases. Thus, the initial results of the present case report confirmed the benefits of the technique, providing a favorable prognosis with longer implant survival at the end of the osteointegration period (KOH; RUDEK; WANG, 2010).

Immediate placement of the implant with immediate loading offers advantages over bone preservation of the alveoli, reduction of trauma, as it is only a surgical procedure. However, there are some limitations regarding unpredictable site morphology, potentially limited amount of soft tissue and the risk of failure due to residual periosteal infection (SABIR; ALAM, 2015).

Despite these possible disadvantages, immediate implant placement and immediate implant loading were favorable in maintaining or increasing bone height around implants, especially when associated with the use of bone grafts (CHUNG; MCCULLAGH; IRINAKIS, 2011).

In an attempt to optimize the filling of gaps by bone substitutes, many authors have suggested combined use with blood derivatives, especially PRF, in the tissue repair and accelerating the osteointegration period, providing increased implant survival rate (CHOUKROUN et al., 2006). In addition, the use of the PRF membrane, called platelet and leukocyte rich fibrin (L-PRF), is a second generation of autologous platelet concentration and has a fibrin mesh composed of leukocytes, growth factors, proteins and cytokines (CORTESE et al., 2016).

It has been successful in bone reconstruction due to its dense three-dimensional fibrin structure, which reduces the risk of bacterial invasion and the presence of leukocyte, the immune system cell. In addition, it has a gradual release system of various growth factors for at least one week up to 28 days after implantation. This ensures a microenvironment conducive to tissue growth in the early stages of healing (ANITUA et al., 2013).

V. CONCLUSION

Based on the initial results obtained and corroborated by previous studies, it is possible to conclude that immediately loaded implants successfully replaced central incisor in the maxillary region and the combined use of i-PRF and L-PRF for the maintenance of bone and soft tissue at the implant site. provided an adequate clinical condition for better aesthetics associated with immediate placement of the prosthesis.

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