CASE REPORT

PERI-IMPLANT PRESERVATION IN IMMEDIATE POSTERIOR IMPLANTS WITH PERSONALIZED HEALING: CLINICAL CASE REPORT

PRESERVAÇÃO TECIDUAL PERI-IMPLANTAR EM IMPLANTE IMEDIATO POSTERIOR COM CICATRIZADOR PERSONALIZADO: RELATO DE CASO CLÍNICO

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Resumo

A manutenção da dentição natural, em ótimas condições de função, saúde e estética é o objetivo principal dos tratamentos odontológicos, porém quando as possibilidades terapêuticas se esgotam, surge a necessidade de extrações dentárias. A remodelação óssea decorrente do processo de cicatrização alveolar pós-exodontia pode resultar em alterações de volume na região. Este tema é assunto recorrente em renomadas publicações científicas odontológicas e diversos pesquisadores recomendam procedimentos regenerativos e buscam soluções para corrigir as alterações que ocorrem nesta região. Dentre estes procedimentos, pode-se afirmar que a instalação imediata de implantes pós exodontia, sem deslocamento de retalho, constitui-se como uma alternativa que garante benefícios funcionais e também estéticos no resultado final da reabilitação. O presente trabalho tem como objetivo apresentar um caso clínico que representa uma alternativa terapêutica prática e viável para cicatrização alveolar adequada. Neste caso clínico, a utilização de implante imediato e cicatrizador personalizado com resina fluida, reduziu as alterações do processo de cicatrização alveolar e permitiu a preservação da arquitetura gengival e a obtenção de um perfil de emergência ideal para realização da prótese definitiva suportada por implante.

Palavras-chave: Implantes Dentários. Extração Dentária. Alvéolo Dental.

Abstract

The maintenance of natural dentition under optimal function, health and aesthetics conditions is the main objective of dental treatments, but when therapeutic possibilities are exhausted, dental extractions become necessary. Bone remodeling due to post-extraction alveolar healing may result in volume changes in the region. This topic is common in renowned dentistry scientific publications and several researchers recommend regenerative procedures and seek solutions minimize volume reduction. Among these procedures, the immediate installation of implants in post-extraction sockets without flap elevation is an alternative that guarantees functional and aesthetic benefits in the final result of the rehabilitation. This paper presents a clinical case that shows a practical and viable alternative therapy for adequate alveolar healing. In this clinical case, the use of immediate implants and personalized healing abutments with flowable resin composite reduced alveolar healing remodeling and allowed the preservation of the gingival architecture and to obtain an ideal emergency profile for performing the permanent prosthesis supported by implant.

Keywords: *Dental Implant. Extraction. Alveolar Process.*

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INTRODUCTION

The loss of one or multiple teeth has a direct impact on the quality of life of patients. However, under specific circumstances, dental extraction becomes inevitable and, after such a procedure, a remodeling process takes place which results in a pronounced reabsorption of several components of the alveolar process (1, 2).

After tooth extraction there is loss of alveolar bone, which is highly dynamic and supports the tooth and its surrounding structures. The tooth's absence in the socket triggers a series of biological events that cause significant natural and irreversible anatomic changes. The fasciculated bone, part of the dental insertion tissue, has no established function after exodontia and is eventually reabsorbed (2-4).

Most of the dimensional changes that constitute the healing occurring in the socket appear more intensely during the first three months, continuing gradually after this period (4,5). The extent and magnitude of the bone remodeling process may vary depending on the site and systemic factors, but it usually results in a certain degree of reduction of the horizontal and vertical alveolar crest, with it being larger on the buccal face compared to lingual/palatal (3-5).

Studies report that 50% of the original width of the ridge can undergo a remodeling process and in the molar region the reduction is more significant. According to individual studies, during the post-extraction healing period, bone loss is higher in terms of width than height, both clinically and radiographically, and horizontal bone loss is higher than vertical (3-6). The atrophy of the bone has impacting consequences in dental rehabilitation, results in the PRA being of extreme importance (4,7).

Attempting to mitigate the sequelae of the biological process of bone remodeling following the teeth loss, several therapies have been proposed in the last 20 years, such as guided bone regeneration, partial tooth extraction and filling. In general, they present a regenerative approach, among them PRA techniques immediately after dental extraction, which have effective action, limiting the physiological reduction of the crest compared to only extracting the tooth (7,8).

The ideal time for rehabilitation with implants is very discussed in the literature. At the third Consensus conference of the International Team for Implantology (ITI) a classification on when to install the implant was defined according to the desired clinical outcome of the wound healing process. This classification suggests that the Type 1 stage refers to the installation of implants on the same day of extraction through a single surgery without the healing of the soft and hard tissues. The Type 2 stage occurs when the implant is installed after the healing of the soft tissues, but before any significant bone filling occurs within the socket (4 to 8 weeks). In contrast, the Type 3 stage is defined as the installation of an implant clinically and radiographically following the bone filling of the socket (12 to 16 weeks). During stage Type 4, the implant is installed in a fully healed place (above 6 months of healing) (9,10).

Clinical and experimental studies report the survival rate of immediate implants (type 1) similar to historical delayed placement data (6 months after exodontia) (9,11). Although it is not possible to fully prevent alveolar remodeling, the reabsorption of the ridge can be decreased and when paired with tooth extraction, immediate installation of the implant, grafting and mechanical barrier shows promising results (4-6, 9-11).

Anatomical scarring made with flowable composite resin can be considered as an alternative treatment to preserve the original contour of the peri-implantable tissues and to minimize the process of dimensional changes related to dental extraction (12,13).

These customized healing abutments presents technical ease, low cost and good acceptance among patients, with no previous laboratory steps. They help reduce gingival height loss, mechanically stabilize the clot and create favorable biological conditions for bone regeneration (12-14).

When used in immediate implants they avoid a second surgical stage of wound reopening and accelerate the conditioning phase of the soft tissues, maintaining the critical and sub-critical contour allowing an individualized and favorable emergency profile. Customized healing abutments works simplifying the steps and allowing more predictable results, contributing that the future prosthetic crown fully meets its functional and aesthetic requirements (11-16).

CASE REPORT

A female patient, 39 years old, Caucasian, without any systemic diseases, attended the Odontoclínica Central da Marinha, Rio de Janeiro, Brazil, on September 11, 2018, directed by the Policlínica Naval Nossa Senhora da Glória. She received initial assistance from the Semiology Service, reporting spontaneous pain in tooth 36 that was stronger when chewing. Tooth 36 had previously undergone endodontic treatment.

A periapical X-ray examination was performed that found the presence of a radiolucent image in the periapical region of the tooth, suggesting periapical lesion (Figure 1 A). The patient was referred to the Endodontics Clinic to evaluate the possibility of endodontic retreatment. She was served there and the metallic restoration was removed, during which a crack from the mesial walls up to the distal region of the tooth was observed, characterizing an unfavorable prognosis, with possible rupture of the floor of the pulp chamber, invalidating the possibility of endodontic retreatment. Once the exodontia indication was verified, the patient was referred to the Surgery and Dental Implants Clinic to have her case evaluated and the therapeutic possibilities analyzed. On September 28, 2018, panoramic X-ray examinations of the jaws and computed tomography (CT) of tooth 36 were requested for case study (Figure 1 B, C).

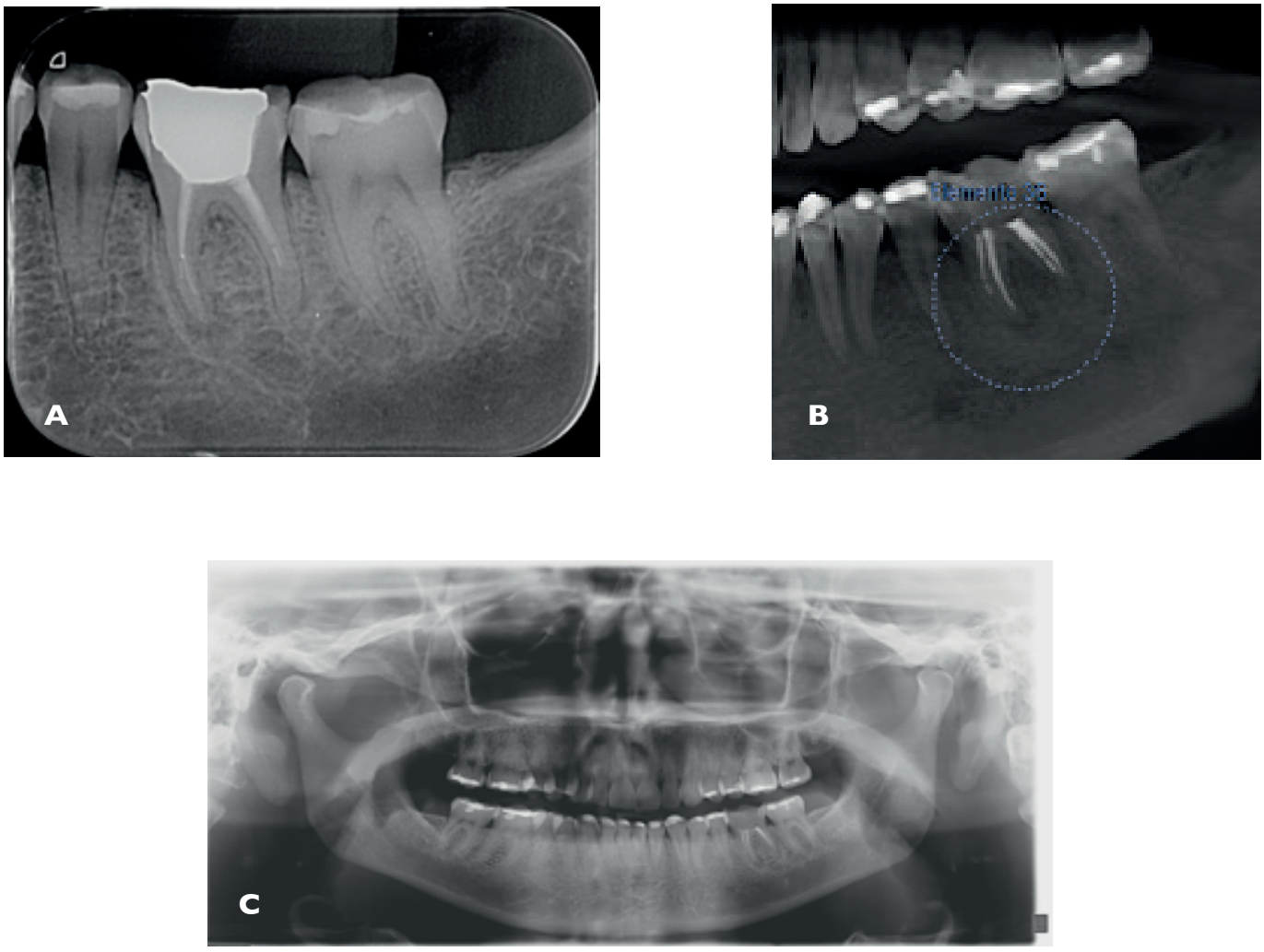

Figure 1 - A- initial periapical radiography; B -image from computed tomography (2018); C - initial panoramic radiography.

The CBCT scan showed favorable conditions that would allow the exodontia of the tooth and the immediate installation of the implant. The patient received the preoperative guidelines and the medication protocol used by the Dental Implant Clinic which consists of: two 500 mg amoxicillin capsules, one hour before surgery and one capsule every eight hours for seven days, two dexamethasone tablets one hour before surgery and one 500 mg dipyrone tablet every four hours in case of pain, for site hygiene a 0.12% chlorhexidine solution is recommended for ten days three times a day in the form of colutorium.

Among the rehabilitation possibilities of the region, the patient chose to perform the treatment with dental implant and filled the informed consent term. The rehabilitation plan presented was: minimally traumatic exodontia without flaps in order to preserve the integrity of the socket, the interdental papillae, and subsequent immediate installation of the implant. If the implant reached the required primary stability (torque above 30 N.cm) a custom healing abutment would be made with flowable resin.

Treatment began on October 8, 2018. Exodontia was performed with as minimum trauma as possible, with the aid of periotome to break the fibers of the ligament and avoid changes in the gingival margins, easing the action of elevators and maintaining the papillae and the surrounding bone tissues. The socket was then prepared for installation of the implant in the proper three-dimensional position. In the planning stage, a 4.3 mm diameter implant of Unitite® line from the implant system S.I.N Implant System® (São Paulo, SP) was selected for the case. Milling was then performed in the septum region, with the drill sequence corresponding to the manufacturer's recommendation regarding the diameter of the selected implant. Instrumentation occurred with constant irrigation of physiological saline and subsequent installation of the implant (S.I.N UNITITE 4.3x11.5 mm) that achieved initial anchoring greater than 30 N.cm, ensuring primary stability and allowing to continue with the initial planning of using the custom healing abutment. The remaining alveolar space between the implant and the bone walls was filled with a slow resorption xenogenic bone graft (Geistlich Bio-Oss®, Pharma AG, Switzerland, SWI).

The provisional pillar was adapted into the immediately installed implant and the filling of the socket concavity was performed by increments with flowable resin (Opallis Flow® - FGM, Joinville - SC), quickly polymerized to avoid excessive flow to the socket undergoing surgery, respecting the vertical and horizontal contour of the area.

The provisional titanium cylinder was removed, and the remaining space was then filled; the emergency profile was defined outside the mouth with the same resin used to make the healing abutment (Figure 2).

The excess was removed, and the part was subsequently finished, polished and disinfected with a chlorhexidine 0.12% solution. After the last adjustments, the custom healing abutment was screwed to the implant (Figure 3).

Figure 2 - A - healing abutment, immediately after conditioning the emergency profile performed outside the mouth; B and C - after finishing and polishing. Source: Personal archive - Professor Gonçalo Pimentel.

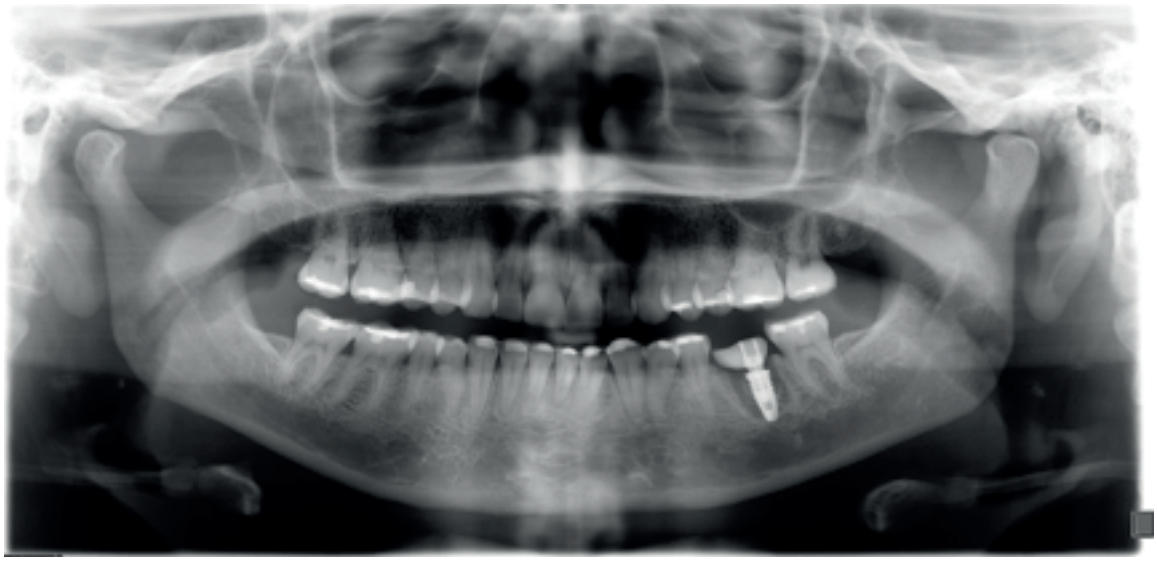

Figure 3 - Postoperative overview, indicating the presence of the screwed custom healing abutment upon immediate implant (2018).

After 15 days the patient returns for postoperative evaluation without having the healing abutment removed for monitoring and evaluation showing clinical signs of normality.

After 120 days, on February 25, 2019 (period required for implant integration), healing was complete. After removing the healing abutment, the resulting peri-implant soft tissue profile and the emergency profile were better observed (Figure 4).

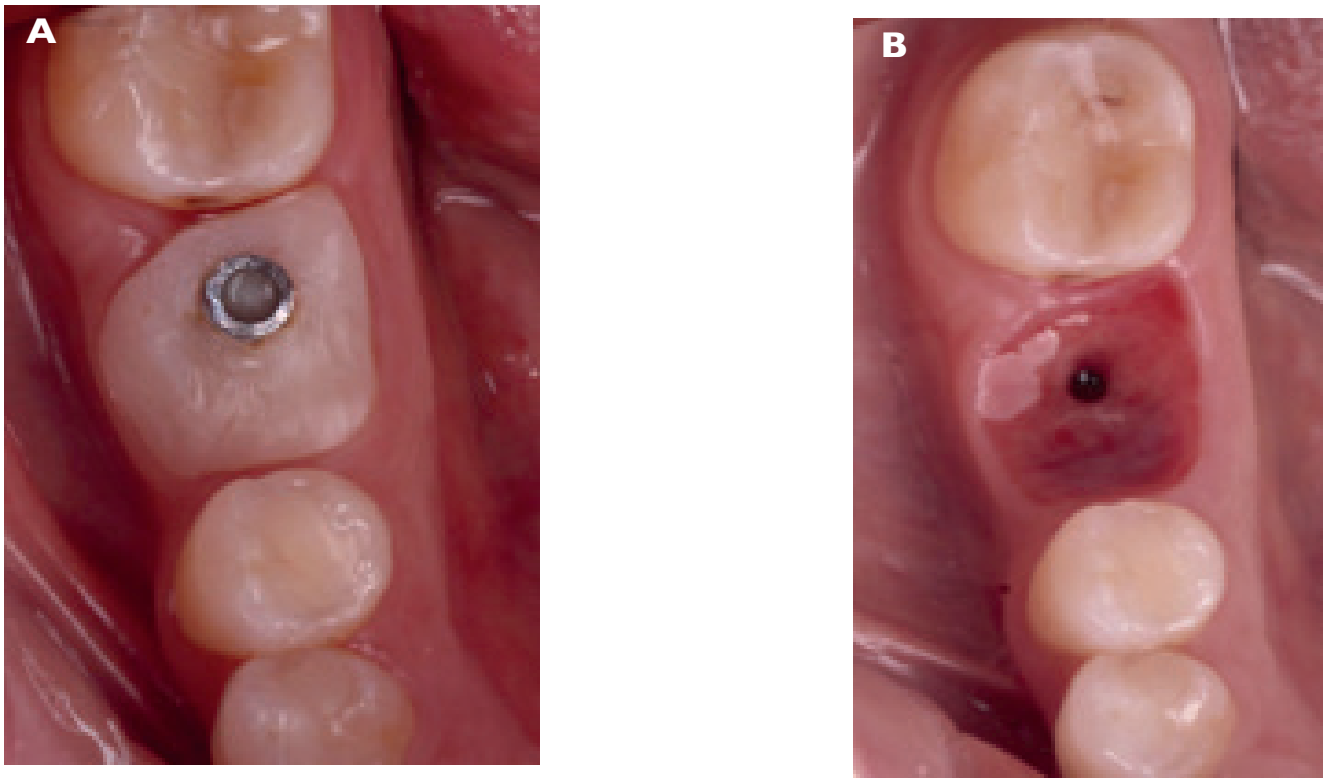

Figure 4 - Intraoral photography (2019). A - custom healing abutment in position; b - clinical situation immediately after removal of the custom healing abutment, keeping the contour of the soft tissues three months after healing. Source: Photographic record - Professor Alexandre Montenegro.

The initial gingival margin maintained by the custom healing abutment was again copied with flowable resin for closed dental impression, right over the implant (Figure 5 A, B). The impression was performed in two steps using condensation silicone based materials (Zhermack®, Badia Polesine RO, Italy) as material of choice (Figure 5 C). The original tissue architecture and the emergency profile were maintained and they coincided with the custom healing abutment.

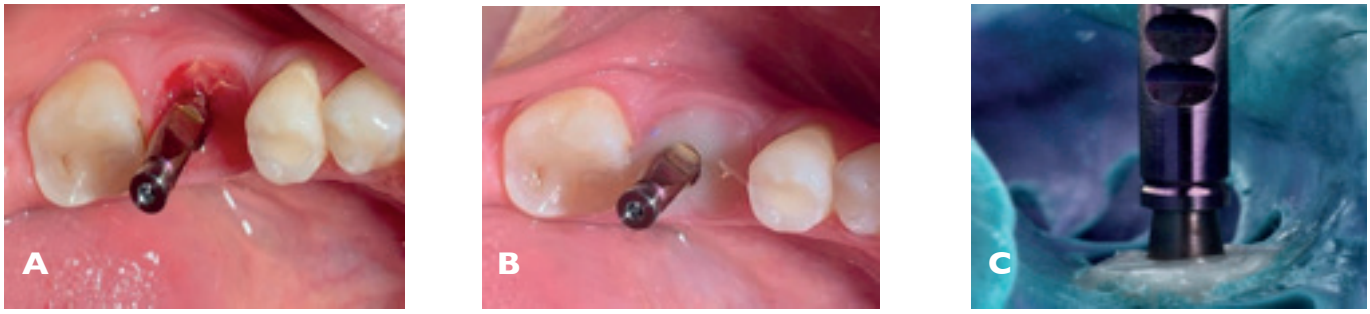

Figure 5 - Intraoral photography (2019). A - positioning of the screwed implant transfer; B - copy of the emergency profile with fluid resin to retain the transfer in the impression; C - photograph of the dental impression. Source: Photographic record - Professor Alexandre Montenegro.

The test of the metallic structure and the evaluation of the adaptation confirmed with examination of periapical radiography were subsequently performed. The soft tissue margin contour was found unchanged (Figure 6 A, B).

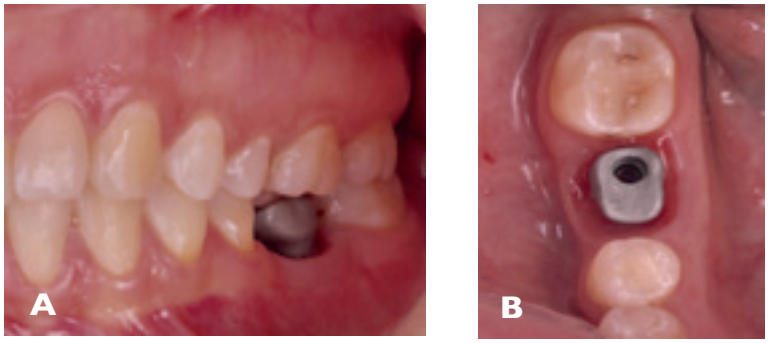

Figure 6 - A - photographic record in occlusion of the metal structure test; B - occlusion record evidencing the maintenance of the emergency profile. Source: Photographic record - Professor Alexandre Montenegro.

A photographic record was made and sent to the laboratory to assist in the color selection for the ceramics veneering applied (Figure 7A). The metaloceramic prosthetic crown was then installed on the region with an anatomical profile already defined and close to the original gingival contour. It received a torque of 20 N.cm and the occlusal prosthetic bolt hole was sealed with polytetrafluoroethylene tape and composite photopolymerizable resin color A3 (Figure

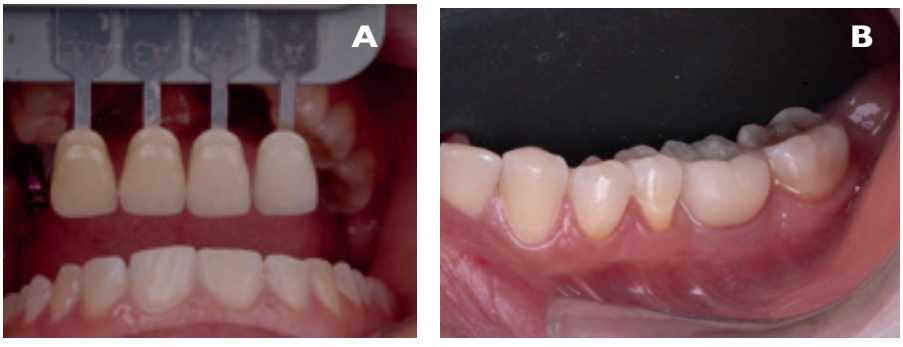

Figure 7 - Photographic record using a color scale to assist the laboratory in selecting the color of the ceramics to be applied; B - intraoral photography after installation of the definitive prosthesis. Source: Photographic record - Professor Alexandre Montenegro.

7B).Imaging tests confirmed bone regeneration and maintenance of hard tissue volume. Clinically satisfactory aesthetic and functional results were observed (Figure 8).

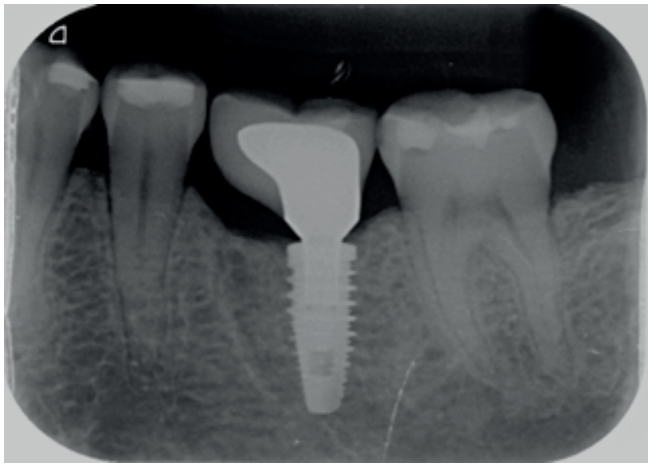

Figure 8 - **Periapical X-ray (2019). Radiographic control performed after 01 year of treatment, indicating maintenance of alveolar ridges and presence of bone regeneration in the peri-implant region.**

DISCUSSION

Aesthetics has been a dominant factor concerning the development of dental implants in recent times, covering not only the natural appearance of restorations with implants, but also the unaltered states of the surrounding peri-implant tissue architecture (12,16).

Considering the possible dimensional changes of tissues, to limit the adverse functional and volumetric changes related to the consequences of dental extraction, several techniques have been analyzed and proposed over the years. The adoption of PRA was proposed as a method to significantly improve the aesthetic result of implants, reducing the risk of bone loss and influencing the final prosthetic result (3-5).

The predictability of immediate implants is already well-verified in the literature. The installation of implants in post extraction sockets, namely Type 1, according to the ITI consensus, presents obvious advantages; it promoters bone preservation in the extraction area and decreases the number of surgeries and as a consequence the total treatment time. In addition to the advantages presented, recent systematic reviews show that the survival rate of Type 1 implant placement is similar to that of a late placement approach. Studies in humans, however, show that the preservation of the anatomy and volume of the socket may not be achieved with implant installation alone. Factors such as flaps absence, connective tissue graft, bone grafts and provisionalization can prevent bone resorption and ensure better aesthetic results (4,5,9,11,14,17).

In the present case, as a form of treatment, the immediate installation of the implant was carried out with a custom healing abutment with flowable resin and the filling of the alveolar space with xenogenic bone with slow resorption. This association was suitable for PRA (3,4,9,11,14,15,17).

The healing abutment is maintained at the gingival level, suffering reduced chewing loads during the critical period of bone integration. Therefore, the peri-implant bone receives progressive loads and shows less crestal bone loss than the bone around the implants conventionally placed with full functioning (9,15).

Usually, immediate implants receive standard screws or abutments and, regardless of being submerged or exposed, do not prevent the disfigurement of the cervical contour in natural dental crowns, thus deeming temporary conditioning of the soft tissue prior to the installation of the definitive implant supported prosthesis. In the reported case, with the use of the anatomical healing abutment, the tissue architecture was kept similar to the original, prior to dental extraction. The region is copied by fluid resin that preserves the gingival margin, conditioning the soft tissues (9-11,13,14,16).

In the case performed, the use of the anatomical healing abutment was well-received by the patient and shows ease of cleaning. Its production was low cost, requiring only a temporary cylinder and a flowable resin, and its technique does not present many challenges (12-14).

It also worked as a protection of the bone graft in the alveolar cavity, ensuring its stability. When grafting and healing abutment are paired, they act as a mechanical barrier, reducing the loss of volume in the gingival margin (4,5,7,13,14).

The anatomical healing abutment sealed the area of the implant, shielding it from trauma during the period of bone integration and serving as a barrier to protect the coagulum, creating favorable biological conditions for bone regeneration in the region. Its use in the immediate installation of the implant reduced the number of surgical and prosthetic steps, leading to reduction in treatment time. At the end of the biological period of bone integration, an aesthetic and functional emergency profile was observed after the healing abutment was removed (4-7,9,11,14-16).

Aiming tissue preservation and maintenance of aesthetics in the peri-implant region, the manufacture of the custom healing abutment was shown to be a practical therapeutic alternative, as it is an efficient technique with wide clinical acceptance. The advantages of the technique lead to the desired goal, maintaining the gingival architecture and allowing for an adequate emergency profile to receive the definitive prosthesis, optimizing the final result (11,14-16).

CONCLUSION

In Conclusion, the most relevant part of the technique using an anatomical healing abutment customized with flowable composite resin is its simplicity, biocompatibility, ease of acceptance on the part of the patient, reduced cost, reduced treatment time and the evidence on the maintenance of the original contour of the peri-implant tissues.

This technique was shown to be a viable alternative for preserving gingival architecture and, when performed with careful planning, is convenient and provides comfort to the patient. Further clinical studies are needed to confirm the results.

The authors declare that there is no conflict of interest or clear disclosure of any economic or nature interests that could cause embarrassment if known after the publication of the article.

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