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Case Report

Minimal Invasion and Greater Predictability in Extraction using Bioextractor Followed by Immediate Implantation

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Abstract:

Extraction is a common operation in oral surgery, being associated with the loss of alveolar bone, which occurs by both physiological and iatrogenic mechanisms, therefore, no extraction technique is completely atraumatic. The advent of several exciting technological advances in ambulatory oral surgery and extraction techniques in the past decade, so a variety of new instruments and techniques are revolutionizing the fields of oral and maxillofacial surgery and dentistry. This clinical case report aims to demonstrate the use of Bioextractor, a new tooth extraction instrument, which proposes the possibility of performing dental root extraction surgery, with less invasion, reducing harmful changes in the region close to the dental element, offering better maintenance stability the alveolar bone, vestibular person wall and adjacent soft tissue, for immediate installation of osseointegrated implants. In view of the related literature associated with the clinical case presented, we can conclude that the use of the Bioextractor, makes it possible to maintain the structure adjacent to the extracted dental element, facilitating extraction even in situations of greater complexity for stability of the peri -implant complex, even if it is necessary new studies on the use of instruments.

Keywords: *tooth extraction, bioextractor, dental implants*

Introduction

Extraction is a common operation in oral surgery, being associated with the loss of alveolar bone, which occurs by both physiological and iatrogenic mechanisms, therefore, no extraction technique is completely atraumatic (Bosun et al, 2018). ***Weiss et al., 2011***, considered the ad-vent of several exciting technological advances in extraction techniques and outpatient oral surgery in the past decade, so a variety of new instruments and techniques are revolutionizing the fields of oral and maxillofacial surgery in dentistry.[1,2]

According to ***Chappuis et al., 2015***, knowledge of dimensional changes in the underlying facial soft tissues and their contribution to post-extraction bone modeling is scarce and poorly understood. In the analyzes made by the authors of the present study, the pronounced morphological and dimensional changes are described in particular for the buccal bone wall in experimental and clinical investigation, and from their study it was possible to determine this through the analysis of body weight. aesthetic region between teeth 13 and 23, the behavior of defects in three-dimensional measurements after the extraction of only 1 element of com-parison in two tomographies, the interval immediately after extraction and the second 8 weeks after, determined that the interaction with the resorption of the facial bone wall is fundamental for the success of Implantodontics in the aesthetic area. ***Bosun et. al., 2018***, claim that different extraction systems have different strengths and weaknesses, so some auxiliary instruments are still needed during tooth extraction. Still according ***to Bosun et. al., 2018***, conventional tooth extraction techniques involving the use of elevators, dislocators, periotomes and forceps operate the principle of alveolar expansion and, therefore, traumatize the alveolar bone to some extent. [1,3]

The placement of dental implants is very difficult or even impossible in so-me cases, this is because the elevation of the soft tissue close to the periosteum can compromise the periosteal blood supply to the alveoli, leading to loss of marginal alveolar bone, even in relatively non-traumatic cases. Dental extractions, especially if the teeth adjacent to the tooth to be extracted have extensive restorations or crown coverage, where the need for lifting can possibly damage these restorations (Weiss et al, 2011). However, research related to post-extraction dimensional changes focused mainly on bone biology, has a constant search for solutions to correct bone defects, enabling rehabilitation with implant-supported restorations, has be-come common in the practice of Implantology, according to ***Schwarz. et al 2017***.[2,4]

The long-term success of the implants depends on the bone volume available for implantation, so much so that, by chance, several preparation techniques have been suggested for osteointegrated implants, since the reconstruction techniques are related to the bone loss volume, measured in terms of thick, tall, or both. According to ***Leal et. al., 2019*** and ***Mariano et. al., 2019***, consider that currently the use of bone grafts is widely discussed, mainly in relation to its diverse origins, being autogenous, homologous, heterogeneous and synthetic, where in turn, the bone of autogenous origin is considered the gold standard , due to its characteristics such as osteogenic capacity, osteoconductive and less specific immune response, however, observation of serious disadvantages in the use of autogenous graft, due to its availability, where, its complex technique of removing both intra and extra-oral areas, triggers a series of aspects that increase the morbidity of surgical procedures, which leads to the search for options from other sources, such as, for example, bone of homologous origin, whether it is associated or not with the use of heterogeneous or synthetic. bone, or simply by the use of bone of heterogeneous origin in direct application.[5,6]

Case Report

WG patient, 60 years old, presents with impairment of dental elements 11 and 12. Complementary exams were requested and changes were observed (figure 1).

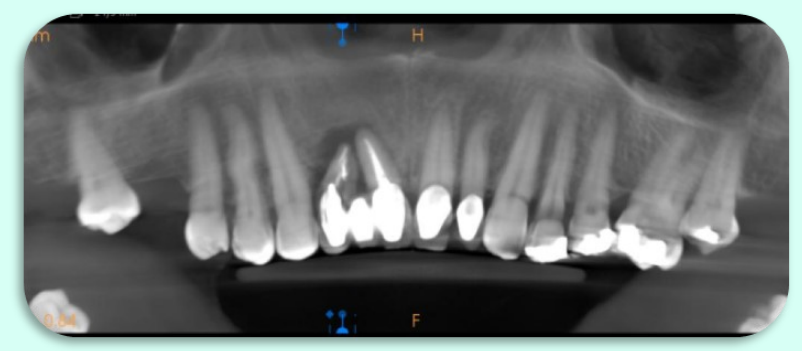
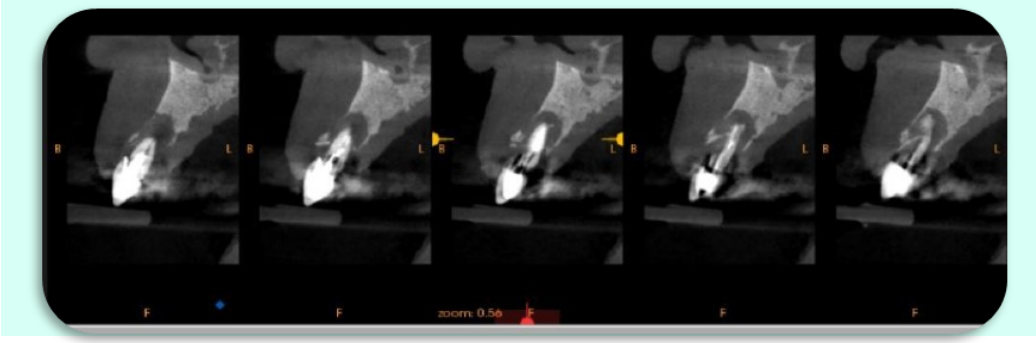


Figure 1: *Initials X-rays a) Panoramic view;*



b) Computed tomography of the compromised region

After initial analysis in Computed Tomography, type Cone Bean, during the analysis, we verified the need to remove elements 11 and 12 (figure 2,3).

Figure 2: *Initial Clinical Aspect (Front view)*

Figure 3: *Initial clinical appearance after crown removal (Front view)*

We opted for removal using the minimally invasive root extractor with the Bioextractor (Bioextractor and Quinelato, Brazil) (figure 4, 5) and as an option chosen by the patient, immediate rehabilitation with implantation of titanium (figure 6).

Figure 4: *Atraumatic extraction process a) inserted the 2 mm diameter fixing screw of the bioextractor; b) installation of the bioextractor; c) tooth extraction with bioextractor; d) tooth extraction with bioextractor (approximate view) and e) dental elements after atraumatic extraction with bioextractor*

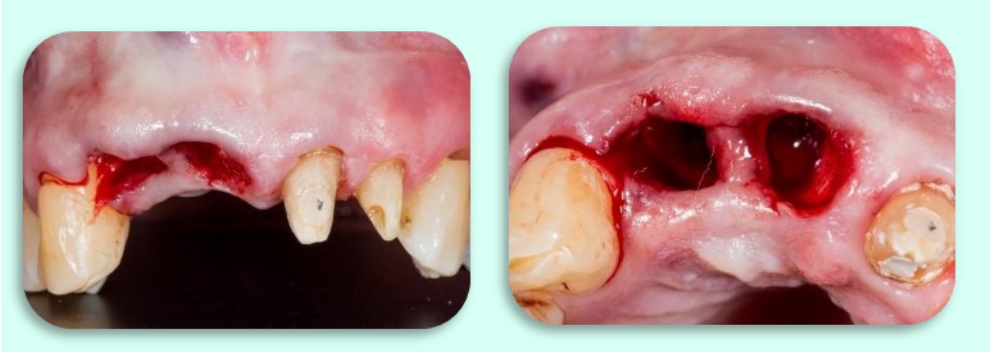


Figure 5: *Clinical appearance after atraumatic extraction with bioextractor a) Front view*

As an option, it was performed after extraction, immediate installation of titanium dental implant (Straumann, Germany), Bone Level Tempered (BLT) 12mm X 4.1mm and subsequent 12mm x 3.3mm, followed by the placement of a heterogeneous bone graft (Lumina Porous Large Granulation of the Bio-materials Criteria, Brazil), maintenance and stability of the gingival phenotype with autogenous conjunctive graft removed from the palate region (figure 7). Preoperative 2g of amoxicillin was prescribed, along with 4mg of dexametasone, both 1 hour before the surgical procedure, as a preoperative pro-phylactic element.

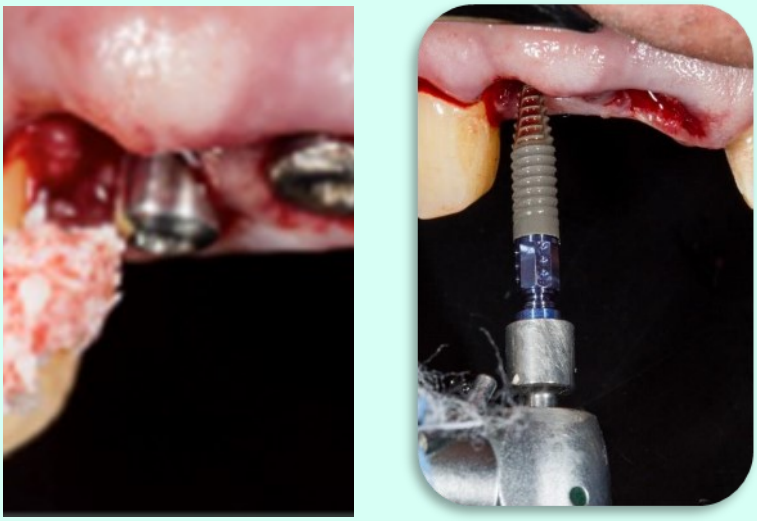


Figure 6: *Immediate Installation of Titanium Dental Implant*

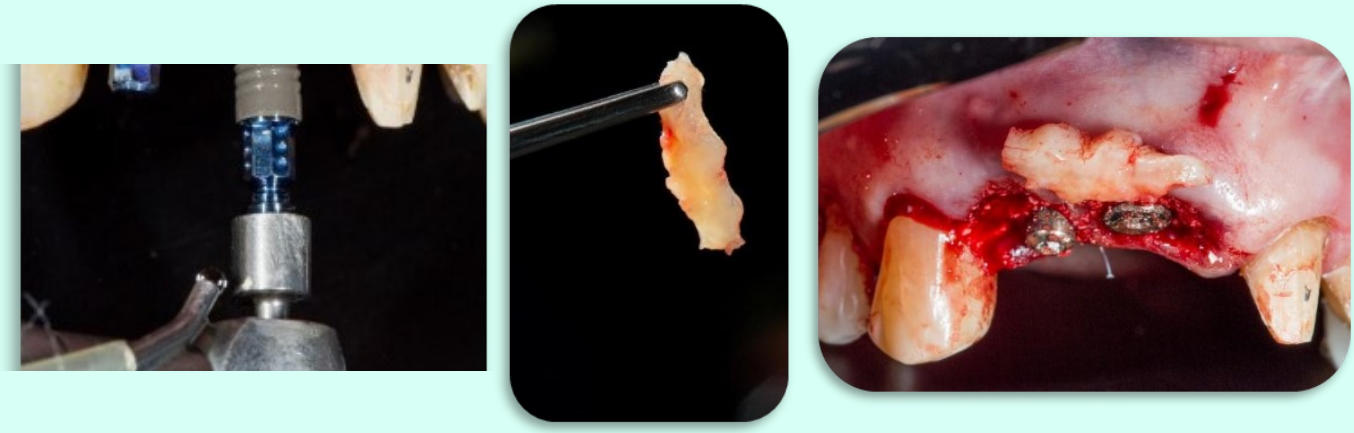


Figure 7: *Tissue graft removed from the palate region*

Extra-oral antiseptics were performed with 2% chlorhexidine. We performed an infiltrative anesthetic technique with articaine anesthetic salt (dilution of 100.000: 1). We did not observe the need for opening flaps, as well as any detachment or syndesmotomy, dislocation or rupture by instruments other than the Bioextractor itself, where we performed and initial mil-ling with a FG2 hanger drill, in the center of the tooth, following the line of the intraradicular conduit. Subsequently, we inserted the 2 mm diameter fixing screw of the bioextractor into the drilling created previously with the carbide drill with a torque wrench, until reaching a total of 20ncm of torque. In sequence, we installed the bioextractor, adjusting the flexible shoes searched by plastic protections, on the 12 tooth and on the adjacent implant in the region of 21, we installed the bioxtractor, adjusting the flexible shoes searched by plastic protections in the region of the tooth 11 and the tooth 13.

We apprehended the extraction equipment, according to the manufacturer's instructions, thus carrying out the minimally invasive extraction. We perform curettage to remove any fragmentary residue, in addition to stimulating the sacrality of the alvelolar process. The socket was drilled with an initial spherical cutter, followed by a 2.2 mm thick cylindrical cutter, followed by a 2.8 mm cylindrical cutter, all using a 20: 1 contra-angle at 1200 RPM and constant irrigation, as instructed by the manufacturer implant. We performed the insertion of the implant at the level of the alveolar crest with a rotation not exceeding 35RPM and torque of 35NCM. After the implant insertion, a transmucosal scar with a width of 3.3 mm by 4 mm was implanted on tooth 12 and implantation of a calcined and protected temporary to-oth on tooth 11. Then, we filled the space in the slope between the teeth. vestibular wall and implant with bone graft of heterogeneous origin, with closure with connective tissue graft removed from the palate region. We performed the suture with 5-0 polypropylene micro suture thread (Microsuture, Brazil), in continuous technique, after, we made the provisionals with bisacrylic resin (Structor 2 VOCO, Germany) using a model previously performed, during the surgical planning and cementation in the abutments made with prosthetic preparation on elements 13, 21 and 22 and calcinable abutment on 11 and 12 (figure 8,9). We performed post-operative analyzes after 3, 7, 15, 30, 60 days. We ordered a new 120-day CT scan.

Figure 8: *Provisionals made with bisacrylic*

Figure 9: *Panoramic X-ray with the provisionals with bisacrylic resin in position*

We reopened 120 days after the first intervention(figure 10), 2g of amoxicillin were prescribed in the preoperative period, together with 4mg of dexametasone, both 1 hour before the surgical procedure, as a preoperative prophylactic element. Extra-oral antisepsis was performed with 2% chlorhexidine. Anesthesia using an infiltrative technique with anesthetic salt articaine (dilution 100.000: 1), we proceed with the reopening of implant 12 with a circular incision exactly in the region of implant 12 and removal of the provisional prosthesis 11. Implant 12, in the torque and percussion test, proved to be fibrointegrated. We opted for immediate removal, curettage and suture. 30 days after we carried out the installation of a prosthetic transfer abutment for transfer molding, and manufacture of customized anatomical abutments with Uclas with a CrNi base (Riellens, Brazil), and subsequent insertion of crowns made of metal-ceramic in elements 11 together with 12, 21, 22, 24, 25 and 26, facets in fedelspathic ceramics in elements 13, 14, 15 and 23 (figure 11).

Figure 10: *Aspect after 120 days the first intervention and prosthetic preparation on elements 13, 21 and 22.*

Figure 11: *Final appearance after rehabilitation with crowns made of metal-ceramic in elements 11 together with 12, 21, 22, 24, 25 and 26, facets in fedelspathic ceramics in elements 13, 14, 15 and 23, and panoramic x-ray final with 1 year follow up.*

Results & Discussions

The search for alveolar preservation after tooth extraction is still one of the themes constantly researched in dentistry. Its importance is due to the search for the reduction of bone remodeling after extraction, given the interest in maintaining sufficient bone support for future rehabilitation through implant-supported restorations or not according to ***Bezerra, et. al., 2021*** because according to ***Basualdo et. al., 2018*** after a tooth extraction, a resorption process occurs in the alveolar bone. Anatomically and histologically, the alveolar bone corresponds to a dentition-dependent structure, which develops in conjunction with the eruption of the teeth.[1,7,8,9,10] . For this, conventional approaches with flap release and osteotomy facilitate tooth removal according to ***Martins, et. al., 2020*** but, the use of a flapless technique for tooth removal as a way to prevent vestibular bone loss can guarantee lower compression rates volume of the rim, even in the adjacent teeth, according to ***Araujo et. al 2009***.[2,11,12]

So according to ***Blus, 2013. and Martins et. al., 2020*** it is recommended that an atraumatic technique be performed with bioextractors, periotomes and endodontic files for root removal, in addition to the use of piezo surgery. In the case above, the minimal trauma presented is the main objective of the minimally invasive tooth removal device known as Bioextractor, which applies a vertical force to remove the root without damaging the adjacent tissue and without the need to elevate the flap.[11, 13]

The present case, the immediate implantation technique was used, as according to ***Del Fabro et. al., 2015***, the immediate implant placement technique is currently a routine procedure with success rates similar to those of installing a conventional implant. According to ***Leal et. al, 2019*** the long-term success of the implants depends on the volume available for implantation and this is maintained by the minimally invasive technique used.[14, 15]

In addition, the immediate implant technique associating the use of biomaterials, has been presented as an excellent alternative for preservation of alveolar ridge dimensions and maintenance of underlying soft tissues, in view of its predictability, reduction in the number of necessary surgical interventions, decrease in morbidity by the patient and also the treatment time.[7,16,17]

In accordance with ***Leal et. al, 2019***, the exogenous graft has been shown a promising alternative for reconstruction procedures of bone defects. The particulate deproteinized mineral bovine graft has been widely used and studied for tissue regeneration guided with membranes and maxillary sinus lift procedures due to its osteoconductive properties and biocompatibility. Therefore, it is used to improve horizontal bone augmentation and contribute to better stabilization of the immediate implant.[15,18,19]

Following the results of studies and research on the subject of alveolar bone preservation through by minimally invasive extraction using the bioextractor, it was performed in this case report the technique of immediate implant installation after extraction associated with the use of biomaterials. Several studies have used similar minimally invasive techniques, associated to biomaterials for bone maintenance and augmentation of the region. In their results, as in the present case, this association promoted adequate healing, maintenance of the alveolar ridge volume, good maintenance of the bone crests and low risk of infection, since the maximally preserved the dental alveolus and decreased the surgical steps. The results found in the literature corroborate with those found in this case report, which would justify the use of the bioextractor its use when considering post-extraction alveolar preservation.

Conclusion

Based on the literature and clinical case presented, we can conclude that the use of the Bioextractor, makes it possible to maintain the structure adjacent to the extracted dental element, facilitating extraction even in situations of greater complexity for stability of the peri-implant complex, even if new ones are needed. Studies on the use of instruments.

Conflict of Interest

The authors declare no conflict of interest.

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