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International Journal of Current Research
Vol. 10, Issue, 06, pp.70900-70903, June, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

MAXILLARY SINUS LIFT WITH SIMULTANEOUS INSTALLATION OF OSSEOINTEGRATED IMPLANT

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ARTICLE INFO

Article History:
Received 04th March, 2018
Received in revised form
27th April, 2018
Accepted 24th May, 2018
Published online 30th June, 2018

Key words:

Maxillary Sinus,
Graft,
Implant.

ABSTRACT

Introduction: After the loss of the dental element, the process of bone loss and adaptation of the soft tissues begins, allowing a remodeling of the edentulous area, creating defects in height and width of the residual bone, which may lead to pneumatization of the maxillary sinus, impairment the aesthetics, function and oral health of the patient. The quality and quantity of tissue and bone graft and conjunctive membrane are considered to be fundamental to the successful implantation of the implant. The technique of maxillary sinus lift and the installation of osseointegrated implants has made it possible to recover the aesthetics and function for the patient. **Case report:** Patient R.L.M.S., 43, female, leucoderma, sought care in a private clinic reporting dissatisfaction with the absence of dental elements and the aesthetics of her smile and desire to perform dental implants. At the clinical examination, it was observed low in the cortical bone at the height of the element 15 due to the loss of it and accommodation of the soft tissues on the region. Radiographically and tomographically, bone remnants are observed at reduced height and width, in addition to pneumatization of the maxillary sinus in the region of 15. **Final considerations:** It is corroborated that the technique of maxillary sinus lift, assisted with bone graft and heterogenous membrane for immediate installation of the osseointegrated implant in the posterior region of the right maxilla, it is configured as an optimal reconstructive technique, since it does not allow the accomplishment of two surgical steps for the patient, lower costs, and reduced treatment time.

Citation: Georgia Maria Granja Aureliano, Jaqueline Alves do Nascimento, Severino, Alexandre Barbosa da Silva, Maria Michele Viana de Souza, *et al*, 2018. "Maxillary sinus lift with simultaneous installation of osseointegrated implant.", *International Journal of Current Research*, 10, (06), 70900-70903.

INTRODUCTION

The process of oral rehabilitation of partially or totally edentulous patients with dental implants results in a relevant improvement in their quality of life, both from a functional and aesthetic point of view, and is associated with a low rate of surgical failure and minimal postoperative complications (Franceschetti *et al*., 2017).

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DOI: https://doi.org/10.24941/ijcr.30618.06.2018

The pneumatization of the maxillary sinus after loss of dental elements in the posterior region of the maxilla comprises one of the main obstacles in the process of prosthetic rehabilitation using osseointegrated implants, since it restricts the amount of maxillary bone structure available for implant placement. Other functional and anatomical limitations that directly affect the surgical procedures of dental implants, diminishing their primary stability, infer the process of reabsorption of the edentulous alveolar bone, due to the absence of occlusal masticatory load application in the periodontium of sustentation, and the presence of bone tissue remaining of the spongy type of very low density (Aldelaimi, 2016).

Because it is a relatively easy surgical technique, minimally invasive and with high clinical success rates, several professionals point out the maxillary sinus survey, using grafting materials, as a viable alternative for the increase of the bone dimension in posterior edentulous regions of the jaw. According to several clinical approaches over the last decades, it is known that such procedure requires satisfactory scientific knowledge inherent to anatomical and physiological aspects, as well as those related to surgical techniques adopted (Aldelaimi, 2016).The sinus or maxillary antrum consists of a pyramidal cavity composed of four walls, internally coated by the sinus membrane, also called the Schneiderian membrane, whose communication with the nasal epithelium occurs through the osteo located in the middle nasal meatus. The lateral nasal wall comprises the base of the sinus cavity, which has an apex directed to the zygomatic region, and its anterior wall covers the region of canines and premolars. Innervation of the maxillary sinus is effected by the second division of the trigeminal nerve, the maxillary nerve, through the terminal branches of the superior alveolar nerve. Its blood supply is quite diverse, coming from the infraorbital, posterior superior alveolar, major palatine and internal maxillary artery ends (Aldelaimi *et al*., 2016).

A surgical approach to the antral cavity of the jaw commonly adopted today, and performed for the first time in 1974 by the American Hilt Tatum, consists of the lateral antrostomy technique, as it provides the process of regeneration of the maxillary bone tissue and allows a vertical increase subantral greater than 9 mm. In this procedure the osteotomy of the lateral wall of the maxillary sinus, located near the zygomatic pillar region, is performed, followed by detachment and consequent lifting of the sinus membrane. This approach also allows the immediate increase of bone height at the surgical site by the placement of graft material (Aldelaimi, 2016). Unlike the respiratory mucosa, the sinus mucosa has a lower thickness and lower blood supply, and its rupture during the procedure of maxillary sinus elevation comprises one of the most frequent factors of complication and surgical morbidity, presenting an incidence rate around 23, 5% (Al-Dajani, 2016). The patient's involvement due to sinusitis, the reduction of the level of bone neoformation, infectious processes and loss of the bone graft are some of the consequences of Schneiderian membrane perforation. However, adequate management and treatment of the perforated antral membrane allows a prognosis equivalent to an integral membrane in relation to the survival rate of dental implant placement.

Although several recent studies have pointed to the effectiveness of maxillary sinus membrane elevation, without the use of any graft materials, in the process of increasing the underlying bone structure (Falah, 2016) clinical and histomorphometric analyzes demonstrate that bovine bone matrix allografts are considered biocompatible and efficient in the sinusal survey method, presenting a high documented clinical success rate. The use of allogeneic grafts provides bone height and volume, as well as the stability required to optimize osseointegration of implants. In addition, in the long term, the remodeling process guarantees the replacement of the grafting material by new bone tissue of the host, through the osteogenic activity promoted by the synthesis of mature lamellar spongy bone (Berberi, 2016). In this way, the present study aimed to report a clinical case of maxillary antral floor elevation using the lateral anthrostomy technique using a freeze-dried bovine bone matrix allogenic graft, followed by concomitant placement of a dental implant in the maxillary posterior region.

Case report: A female patient, leucoderma, 43 years old, normossemic, presented as main complaint the absence of dental elements and aesthetic dissatisfaction with her smile. After performing a clinical examination, panoramic x-ray and computed tomography (Fig. 1), loss of alveolar bone height and extensive antral pneumatization were diagnosed, and the need for performing the right maxillary sinus survey was diagnosed in the region corresponding to the element tooth 15, in order to enable the placement of the dental implant. The anesthetic of choice for the surgical procedure was mepivacaine at 2% with epinephrine 1: 100,000, making the blockage of the upper alveolar nerve mean. A total thickness mucoperiosteal flap was obtained from an adjacent mesial relaxing incision of element 14, intrassulcular incisions in elements 14 and 16, and a supracrestal incision in the respective edentulous region (Fig. 2). Following the folding of the flap, the bone window was constructed in the lateral wall of the sinus cavity (lateral antrostomy), located near the zygomatic pillar region, using a high rotation spherical diamond drill, with sterile external irrigation (Fig. 3). After the end of the osteotomy, curettes and sinus elevators were cautiously used to detach and erect the exposed maxillary antrum membrane in relation to the sinus floor (Fig. 4). For implant installation, a maxillary sinus lift curette was chosen to protect the maxillary sinus from possible perforation of the drill bits that will contour the bone to receive the implant (Fig. 5).

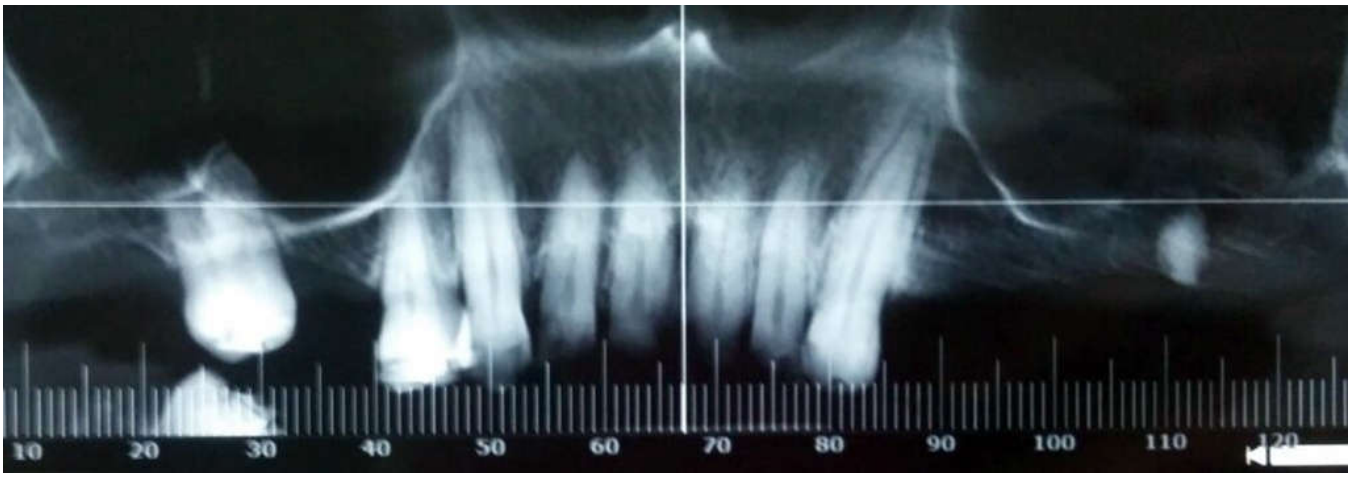

Figure 1. Computed tomography evidencing the pneumatization of the right maxillary sinus in the region of the element 15

Figure 2. Mucoperiosteal flap with adjacent mesial relaxing incision of element 14, intrassulcular incisions in elements 14 and 16, and a supracrestal incision in the respective edentulous region.

Figure 3. Bone window in the lateral wall of the sinus cavity (lateral antrostomy), located near the zygomatic pillar region of the edentulous area

Figure 4. Cures and sinus elevators to detach and erect the exposed maxillary antrum membrane in relation to the sinus floor

The space between the intact sinus membrane, positioned superiorly, and the patient's native alveolar bone was filled with 0.5 grams of lyophilized bone graft of Straumann bovine origin, followed by placement of the dental implant (Fig. 6).

Figure 5. Maxillary sinus lift cureta protecting the maxillary sinus from the implant drill

Figure 6. Filling with 0.5 grams of lyophilized bone graft of Straumann bovine origin, which was followed by placement of the dental implant

Figure 7. Mucoperiosteal retail was repositioned and sutures performed with non-resorbable yarn

DISCUSSION

Loss of posterior teeth results in progressive bone remodeling, loss of height and bone density, and subsequent increase of maxillary sinus pneumatization, due to absence of periodontium stimulation. The extent of pneumatization increases with age, varies from person to person, and leads to alveolar bone atrophy, which can directly affect the rehabilitation of patients with osseointegrated implants.

In performing a comparative biomechanical analysis, the antral floor elevation approach was considered as the first treatment option among alternative procedures, such as inclination and decrease of the length of dental implants, and the use of cantilever of distal prosthesis, in the rehabilitation process of posterior atrophic maxilla, in which the limited amount of residual alveolar bone makes impossible the placement of implants of adequate dimensions. As a way to ensure a better prognosis and patient care, an accurate preoperative evaluation should be performed through clinical exams and imaging (panoramic radiography and computed tomography). An adequate surgical planning allows the identification of anatomical variations and pathological alterations that may become post-surgical morbidity factors, such as sinus membrane perforation, the incidence of which may be related to previous sinusitis, or a reduction significant difference in membrane thickness, among other factors (Al-Dajani, 2016). The apical displacement of the sinus floor of the maxilla, with joint use of allogenic bone graft material to fill the space created between the internal bone walls and the antral membrane, provides satisfactory height and volume to the edentulous alveolar ridge for the immediate placement of the dental implants (Franceschett *et al*., 2016). In addition, it guarantees a primary stability necessary to the osseointegration process, which occurs in the long term, around 6 months, when the lyophilized bovine bone graft will be totally replaced by bone tissue of the host itself, which occurs through the induction of osteogenic activity, ensuring the clinical success of previously performed procedures.

Conclusion

It can be concluded from this study that: The surgical procedure of maxillary sinus floor elevation, with the concomitant use of bovine bone allograft material, it is an excellent alternative to enable the implant-supported prosthetic rehabilitation process in posterior maxillary regions that present advanced antral pneumatization and height insufficient bone to place implants of adequate length and diameter in the clinical case. Because it is associated with a low rate of surgical failure and minimal postoperative complications, this approach contributes to a significant improvement in oral health, both in aesthetic and functional aspects, since it allows the placement of dental implants, generating a positive impact on the quality of life.

Conflicts of interest: The authors declare that there are no conflicts of interest.

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