LONGITUDINAL EVALUATION OF THE LATERAL SINUS LIFT TECHNIQUE AND SIMULTANEOUS IMPLANT PLACEMENT

AVALIAÇÃO LONGITUDINAL DA TÉCNICA DE LEVANTAMENTO LATERAL DE SEIO MAXILAR E COLOCAÇÃO SIMULTANEA DE IMPLANTES

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ABSTRACT: The aim of the present study was to evaluate the clinical and radiographic results of maxillary sinus floor lifting, performed by a lateral approach, with simultaneous implant placement. Thirty-seven patients participated in the study, they were treated with lateral sinus lifting procedure and simultaneous placement of 80 implants. Implants were evaluated clinically and radiographically, and were followed up for six months. The criteria used to assess the success of this technique were: Radiographic aspect suggesting implant osseointegration with the bone tissue (absence of radiolucent alveolar areas); absence of pain on percussion and torque on implants; implant immobility checked by torquemeter. The descriptive data analysis showed no presence of painful symptoms or mobility in any of the evaluated implants. Nevertheless, 1 or 2 mm of bone loss was observed around the alveolar bone crest in 9 implants (11.3%). The results demonstrated that the maxillary sinus floor lifting, performed by a lateral approach, with simultaneous implant placement technique was possible and sucessful.
KEYWORDS: Maxillary sinus. Autologous transplantation. Dental implants.

RESUMO: *O objetivo deste estudo foi avaliar a elevação do assoalho do seio maxilar, pela técnica de abertura de janela lateral, e instalação simultânea de implantes. Participaram desta pesquisa 37 indivíduos homens e mulheres com idade acima de 40 anos, não fumantes, leucodermas, com presença de área doadora de enxerto intraoral à cirurgia de levantamento de seio maxilar e foram submetidos a um total de 80 implantes. Os implantes foram avaliados clínica e radiograficamente após seis meses. Os critérios clínicos verificados foram dor e mobilidade, por meio de percussão e torquímetro (20N) respectivamente; e critérios radiográficos, avaliados através da presença ou ausência de radiolucidez entre o ombro do implante e a crista óssea alveolar, como um indicativo de perda óssea, avaliadas por meio de radiografias periapicais. A análise descritiva dos dados demonstrou que não houve presença de sintomatologia dolorosa e mobilidade em nenhum dos implantes avaliados, no entanto, observou-se presença de radiolucidez na região de crista óssea alveolar em 9 implantes (11,25%), sendo que 7 implantes (8,75%) evidenciaram perda óssea de 1 mm e 2 implantes (2,5%) mostraram perda óssea de 2 mm. Por meio dos resultados, foi possível concluir que 88,75% dos implantes instalados simultaneamente à elevação do seio maxilar pela técnica de abertura de janela lateral, obtiveram ausência de dor, de mobilidade e de perda óssea na altura da crista óssea alveolar.*
PALAVRAS-CHAVE: *Seio Maxilar. Transplante Autólogo. Implantes dentários.*

INTRODUCTION

The posterior maxillary is a region in the oral cavity that presents difficulties to surgically place and maintain implants. After loss of the posterior maxillary teeth, the alveolar process undergoes gradual resorption, aggravated even further by pneumatization of the maxillary sinus[1].

In addition, there are other aspects of implant placement to be considered, such as the difficulty of surgical and reconstructive access, great demand of occlusal forces, low bone density at the site and the region being difficult for the patient to clean, as these cause quantitative and qualitative bone and morphological alterations in the region[2]. These are some of the eventualities that could limit or make it difficult to plan surgical prosthetic implants[3].

An alternative treatment for these cases is the augmentation of the posterior maxillar by sinus lifting augmentation, performed by a lateral approach allowing osseointegrated implants to be installed simultaneously, and prosthetic rehabilitation to be done later. The use of autogenous, allogenous and alloplastic materials have improved the results

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of this surgical technique and made them more predictable.[3,4,5] The surgical sinus floor elevation technique[5,6] through a lateral access window, enables one to place implants with a vertical height gain of up to 12mm[6].

Whereas the maxillary sinus inferior wall lifting technique is more conservative and enables implants to be placed with a maximum gain of 4mm height, simplifying the lifting technique and reducing the costs[7].

To place implants simultaneously with the two above-mentioned techniques, there must be a minimum of 5mm of remaining alveolar bone[1,4,6-11].

Simultaneous implant placement in extremely pneumatized maxillary sinuses is advantageous in patients' treatment by reducing their morbidity with fewer surgical interventions and the implants are more safely stabilized[12].

Autogenous bone is deal in comparison with other materials, because it is highly osteogenic, osteoinductive and osteoconductive. Autogenous bone may be collected from the iliac bone anterior crest, cranial cap, tibia, ribs or intraoral regions, such as the mandibular symphysis, mandibular ramus and maxillary tuberosity[3-5].

However, several complications during and after conclusion of a sinus graft procedure have been demonstrated in the literature. The commonest complication is perforation of the maxillary sinus membrane, classified by researchers as being commonly treatable with the use of collagen membrane. The formation of mucocele, chronic sinusitis, infection, loss of graft material and implant non-osseointegration are other complications reported[1,9-11,13,14].

Therefore, the aim of this study was to verify the clinical and radiographic success of the maxillary sinus lift technique with lateral window opening and simultaneous implant placement.

METHODS AND MATERIALS

A sample of unrelated, healthy, non-smoking subjects, over the age of 40 years, leucoderms, with presence of intraoral graft donor area and need of sinus augmentation to implant placement, were recruited for this study. The patients signed consent forms approved by the ethical committee in Research at São Leopoldo Mandic Dental School (#1256). These patients were submitted to implants surgeries, with the intention of clinically and radiographically evaluation of the maxillary sinus lift technique, with lateral window opening and simultaneous implant placement.

After six months post-surgery, the criteria used to assess the success of the maxillary sinus lifting technique with lateral window opening and simultaneous implant placement were as follows: Radiographic aspect suggesting implant osseointegration with the bone tissue (absence of radiolucent alveolar areas, by periapical radiographic measurements of the implant shoulder up to the alveolar bone crest comparing with the initial radiograph); absence of pain on percussion and torque on implants; implant immobility checked by torquemeter (3i Implant Innovations, Inc).

Panoramic and periapical radiographs were used to diagnose sinus pneumatization and alveolar bone loss.

Pre-operatively, the following drugs were prescribed: Dexamethasone (Decadron®) injectable, 2mg, intramuscular: 1h before surgery (anti-inflammatory); Azytromicine 500mg: two tablets 1h before surgery (antibiotic); Alprazolan (Frontal®) 2mg: half an hour before surgery (anxiolytic); assepsia of the face and intraoral regions with 2% Chlorhexidine Digluconate.

The incisions consisted of a mid-crestal incision and two beveled vertical incisions to the height of the vestibule. After completely exposing the maxilla lateral wall, either U-shaped, rectangular, circular or oval osteotomy was performed (Figure 1A). While using the diamond burr, it was delicately "painted" over the bone, thus preserving the integrity of the Schneider membrane, and abundant irrigated with sterile saline solution.

During osteotomy, the buccal plate was green-stick fractured and the sinusal membrane was displaced. Care was taken not to perforate the sinusal membrane, which was carefully displaced with special curettes. The periosteal elevator was used to withdraw the membrane from the vertical anterior wall, floor and middle vertical wall to a height of 8 to 11 mm from the edge of the crest.

An autogenous graft was chosen from the mento region or the retromolar area, depending on the case, together with freeze-dried bone. The implant was introduced into the previously made surgical alveolus, halfway up to the implant length. This material was mixed and condensed against the anterior and posterior maxilla (Figure 1B) in order to mold the graft against and over the implant to a height of 10 to 12 mm. During this procedure the implant was kept in a position that would not compromise the subsequent prosthetic restoration.

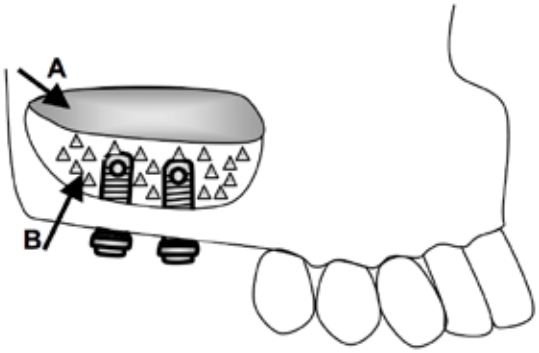

Figure 1 – ***A***: "U"– shaped lateral surgical window; ***B***: Graft material filling the space formed by sinusal membrane elevation and simultaneous implant placement.

A collagen membrane was placed over the sinusal membrane as a prophylactic measure against possible micro-perforation and a reabsorbable membrane was placed to cover the access window and implants; the tissues were brought together so that the periosteum on each side of the primary incision could establish contact, without intervening graft material or tissue tension. Interrupted suture was used. Panoramic and periapical radiographs were taken 6 months after surgery.

As post-operative medication, the following drugs were prescribed: Azytromicine 500mg: 1 tablet per day, for 15 days (antibiotic); Etoricoxib (Arcoxia®) 120mg: 1 tablet per day, for 4 days (anti-inflammatory); Paracetamol 750mg: 1 to 2 tablets every 6 hours, in case of pain (analgesic); Fexofenadine chloride 60mg plus Pseudoephedrine Chloride 120 mg (Allegra D®): 1 tablet every 12 hours, for 7 days (decongestant); Complex B 5000 units (Citoneurim®): 2 tablets per day, for 15 days; 0.12% Chlorhexidine Digluconate applied to the region twice a day for 1 minute, for 5 days, afterwards use mouthwash twice a day for another 10 days. The data were submitted to statistical exploratory analysis.

RESULTS

A total of 80 implants were installed in 37 patients (17 men and 20 women) ranging in age from 41 to 87 (mean age 57.4 years). The results, after 6 months evaluation, showed absence of painful symptoms and mobility in any of the assessed implants, however, radiolucence was observed in the alveolar bone crest region in nine implants (11.3%), as described in Table 1.

Bone loss of 1 and 2 mm was observed between the implant shoulder and the alveolar bone crest, assessed by measurements in periapical radiographs. As described in Table 2, seven implants (8.7%) presented 1 mm of bone loss and two implants (2.5%) showed 2 mm of bone loss.

Table 1 – Absence or presence of the assessed criteria

Criteria Assessed	Absence		Presence		Total
	n	%	n	%	
Pain	80	100	0	0	80
Mobility	80	100	0	0	80
Radiolucence	71	88.7	9	11.3	80

Table 2 – Frequence of bone loss, assessed radiographically, between the implant shoulder and the alveolar bone crest.

Loss (mm)	Comparison with implants that had bone loss			Comparison with total implants		
	n	%	total	n	%	total
1	7	77.8	9	7	8.7	80
2	2	22.2	9	2	2.5	80

DISCUSSION

The commonest complication associated with sinus lifting is sinusal membrane perforation[1,4,13]. Moreover, it was related a case of excessive Schneider member elevation during the bone graft procedure, causing the maxillary sinus to be partially obliterated. In this study, no perforation of the Schneider membrane, or any other complication occurred[14].

A sufficient amount of pre-existent bone in the maxilla is required for a single stage maxillary sinus lifting with simultaneous implant placement. The height between the remaining bone crest up to the maxillary sinus must be at least 5 mm; and the minimum bone thickness between 6 and 7 mm[15]. If there is insufficient remaining bone to stabilize the implant, two-stage surgery is recommended, with the bone graft being done first and then the implants.

Autogenous bone grafting is used to create and maintain a space between the sinusal membrane surface and the exposed implant surface, and thus keep the integrity of the membrane. Clinical and histological evidences indicate that the use of autogenous bone graft is favorable during maxillary sinus lift procedures, as it demonstrates good osteogenic, osteoinductive and osteoconductive properties[3,4].

Among the most requested bone donor areas the mento and ascendant mandible ramus can be used.[5] The use of mandibular bone as graft in maxillary sinus lifting has grown. Of particular importance, intraoral grafts are associated with less bone reabsorption as compared to grafts of extraoral origin, such as the iliac crest[8]. Other advantages associated with intraoral grafts include the use of local instead of general anesthetic, shorter operating time without the need to hospitalization, less morbidity at the donor site and lower costs.[4] Based on these findings autogenous bone graft from the mandibular ramus and mandibular symphysis or mento, associated with freeze-dried bone were chosen for this research.

In the present study, no pain on percussion and torque on implants was detected, nor implant mobility checked by torquemeter (20N), in six months, resulting in clinical success up to the present time.

Radiographically, the results indicated 88.7% success as regards bone loss, evidenced by measurements of periapical radiographs performed six months after maxillary sinus lifting surgery with immediate implant placement. It was found that 11.3% of the cases presented bone loss, assessed from the implant shoulder to the alveolar bone crest, and seven implants (8.7%) evidenced bone loss of 1 mm and two implants (2.5%) showed bone loss of 2 mm.

Bone graft of the maxillary sinus floor with autogenous bone for implant insertion was considered a safe treatment modality with good long term results[9,10], however, infection

during healing of the grafted site reduced the success and subsequent osseointegration of the implant[9].

In another study the authors[11] assessed 38 implants by measuring the distance between the top of the implant shoulder and the first implant contact and radiographically visible bone on the mesial and distal sides. The last exam showed a mean bone loss of 1.65 mm on the mesial and 1.68 mm on the distal side. The implant success rate was 76.3%, as three implants (7.9%) were lost. The implant loss was associated with surgical membrane exposure.

The Maxillary Sinus Consensus Conference report of 1996, stated that the various materials commonly used for grafts in the maxillary sinus all aim for an acceptable performance of around 90% success, if used alone or in combination[16]. In this study freeze-dried bone was used in association with autogenous bone. Freeze-dried bone has been shown to possess slower revascularization and a greater reabsorption rate than autogenous bone, which may probably have caused alveolar bone loss around the implants, particularly when the tooth elements were extracted in the same session as the implant, autogenous and freeze-dried bone graft placements.

Adequate bone volume and quality at the surgical site is a prerequisite for a favorable long-term prognosis in osseointegrated implants. As shown by the results of the present study (no implant with mobility), correct bone increase is essential for good endosseous implant stability. Without this bone increase, implantodontic treatment may be compromised and lead to loss of the implant.

CONCLUSIONS

According to the results obtained in this study, it was possible to conclude that:

- In all the cases there was absence of pain and mobility after 6 months.
- Radiographic observation showed alveolar bone loss of 1 or 2 mm in 11.3% of the implants after the same period of observation.
- Lateral sinus lift in conjunction with implant placement allowed prosthetic rehabilitation in patients with severe posterior maxilla atrophy.

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