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Immediate implant placement after maxillary sinus lift using the side window technique: clinical case report

Colocação de implante imediato após levantamento de seio maxilar através da técnica de janela lateral: relato de caso clínico

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Abstract

Aim: The aim of this study was to report a maxillary sinus lift surgery associated with the installation of an immediate implant associated with late loading in edge with 3.5 mm in height. **Methods:** The sinus lift surgery was performed using the lateral window technique, followed by the immediate installation of the implant and subsequent manufacture of a screw-retained single prosthesis. **Results:** Through the technique of breast lift, it was possible to promote local bone formation in a vertical direction, enabling local dental rehabilitation. **Conclusions:** Following a solid and meticulous planning, even in crests with less than 5 mm in height, a transcrestal technique can be used predictably with an adequate clinical and radiological outcome, giving patients excellent stability of the grafted material and excellent clinical results.

Keywords: Maxillary sinus; Sinus floor augmentation; Dental implantation.

Resumo

Objetivos: O objetivo deste estudo foi relatar uma cirurgia de levantamento de seio maxilar associada a instalação de implante imediato associado a carga tardia em rebordo com 3,5 mm de altura. **Métodos:** A cirurgia de levantamento de seio foi realizada através da técnica de janela lateral, seguida da instalação imediata do implante e posterior confecção de prótese unitária aparafusada. **Resultados:** Através da técnica de levantamento de seio, foi possível promover uma neoformação óssea local no sentido vertical, possibilitando a reabilitação dentária local. **Conclusões:** Seguindo um planejamento sólido e meticuloso, mesmo em cristas com menos de 5 mm de altura, a técnica de janela lateral pode ser usada de forma previsível com um resultado clínico e radiológico adequado, dando aos pacientes excelente estabilidade do material enxertado e excelentes resultados clínicos.

Descritores: Seio maxilar; Levantamento do Assoalho do seio maxilar; Implantação Dentária.

Introduction

Dental implants have been widely used in implant dentistry, bringing as a main advantage the possibility of rehabilitation edentulous or partially edentulous arches in a fixed way, giving the patient the proper function and aesthetics. And even with the evolution of surgical techniques and implant systems, some anatomical limitations are encountered, as the presence of extensive maxillary sinuses (1). Several procedures are currently used to overcome this problem and the most commonly used are sinus lifting techniques, ranging from the use of autogenous bone grafts (particulates or blocks) or combinations of various types of allografts or biomaterials (2).

The installation of implants simultaneously with maxillary sinus augmentation could be recommended when the vertical height of the residual bone is greater than 5 mm, since in cases of residual height less than 5 mm (SA-4), primary stability may not be achieved increasing the risk of fibro integration and consequent implant loss, having the risk of implant migration to the maxillary sinus (3).

However, even with the lower predictability of initial stability, which may be a critical issue for sinus lifting with simultaneous implant placement (4), recent clinical studies suggest that implant placement simultaneously with maxillary sinus elevation in sites with enough remaining bone, but less than 5 mm, may be a viable treatment (5,6). In addition, the morbidity and cost are lower, and the treatment can be reduced by an up-to-6-month period, since there is no need for a second or third surgery (7).

Thus, the aim of this study was to report a clinical case of an unitary rehabilitation from the posterior maxillary region, and describe the maxillary sinus lift surgery with immediate implant placement.

Case Report

A 41-years-old, female, without systemic alterations, showing absence of the right first molar, entered the clinic with the desire to rehabilitate the damaged mastication. After clinical (Figs. 1 and 2) and tomographic examination, planning for implant-supported rehabilitation was performed. Based on the information obtained by the computerized tomography, a sinus lifting surgery was indicated simultaneously with the implant placement, since the patient had only 3.5mm of vertical bone height (Figs. 3 and 4).

Fig. 1. Intraoral view demonstrating the absence of the #3

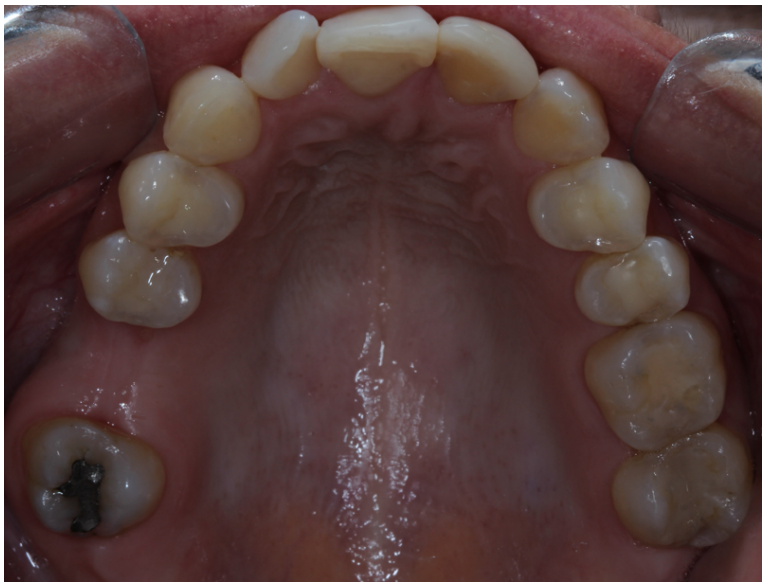


Fig. 2. Lateral intraoral view

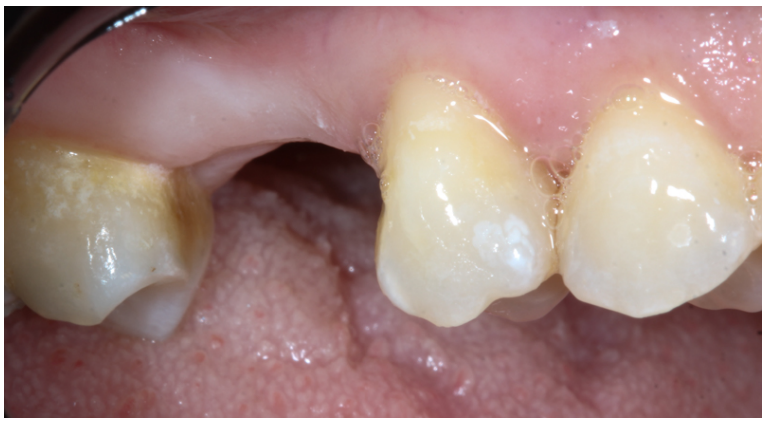


Fig. 3. CT scan showing the area to be operated

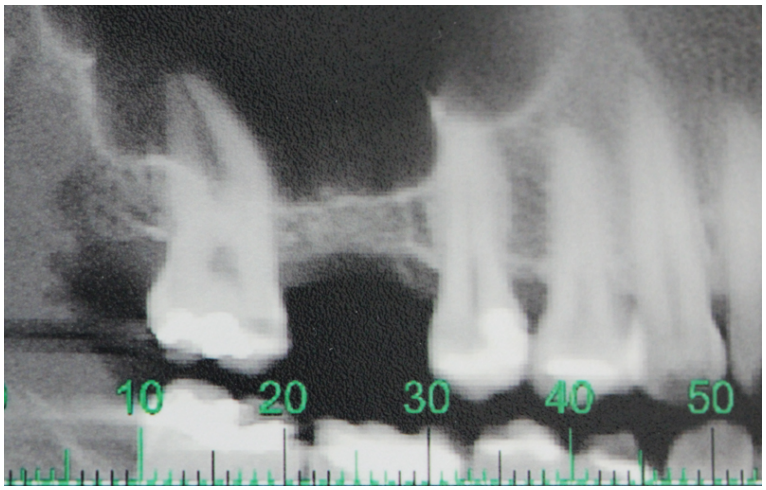
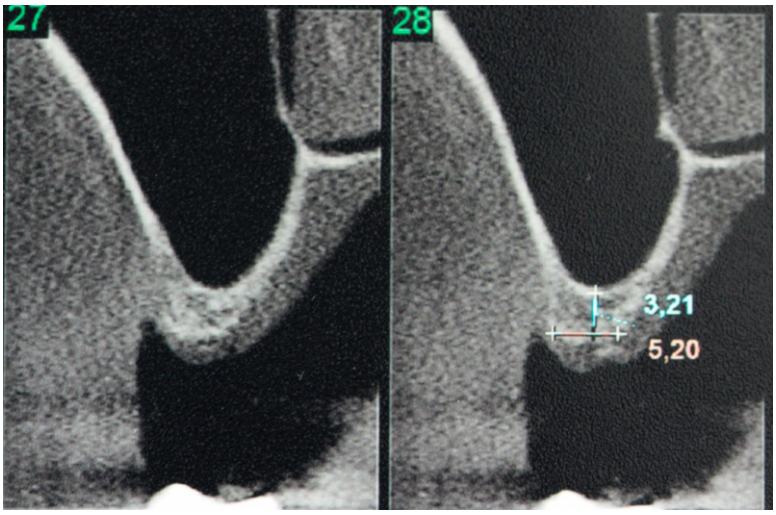


Fig. 4. CT scan demonstrating the remaining bone height



A surgical procedure was performed under local anesthesia with 4% articaine and epinephrine 1: 100,000 using the technique of local palatal infiltration and blocking of the middle and anterior superior alveolar nerves. The incision was made with 15C blade, with total thickness flap and two relaxants, one in the pre-molar region and the other in molars, creating a wide field of view. In addition, for the maxillary sinus lateral wall osteotomy a diamond spherical drill Nº. 10 (Fig. 5) was used under irrigation. Then, the maxillary sinus membrane lifting was made with specific curettes for sinus lift (Straumann®, Basel, Switzerland) and the graft with bovine bone biomaterial (Bio-Oss®, Geistlich Pharma, Wolhusen, Switzerland) was placed in the medial region. After that, perforations for implant installation were made following the manufacturer's recommendations and a surgical guide for optimal 3D positioning, a 4.3 x 9mm implant was installed (Arcsys®, FGM, Joinville, Brazil) achieving a primary stability of 35N. Next the fixing of implant (Fig. 6) protection cap was done followed by the application of biomaterial Geistlich Bio-Oss® around the implant and placement of an absorbable collagen membrane in the side window (Fig. 7). After a 6-month period, the osseointegration was evaluated and the implant was reopened.

Fig. 5. Side window opening with diamond drill

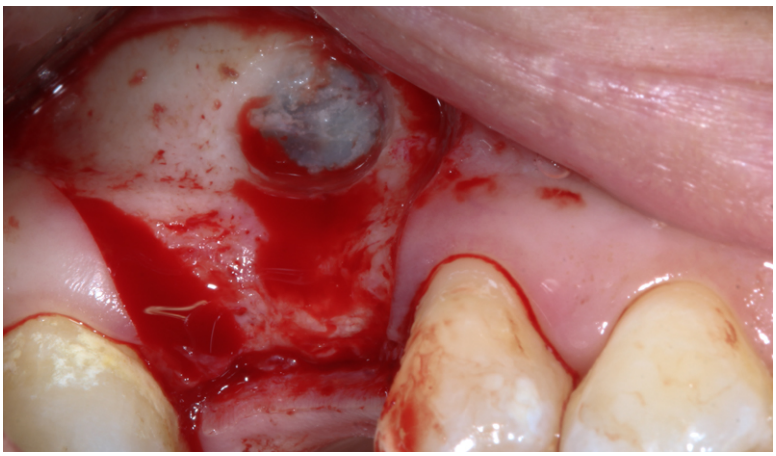


Fig. 6. Implant placement

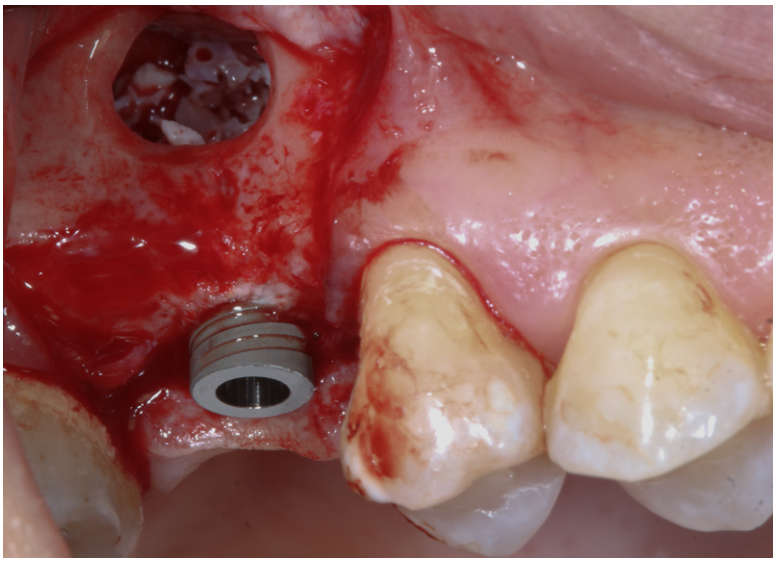
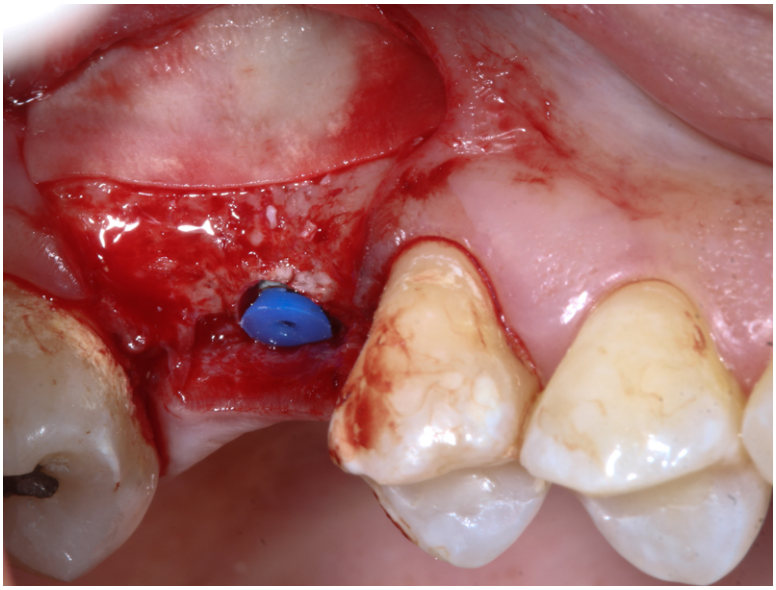
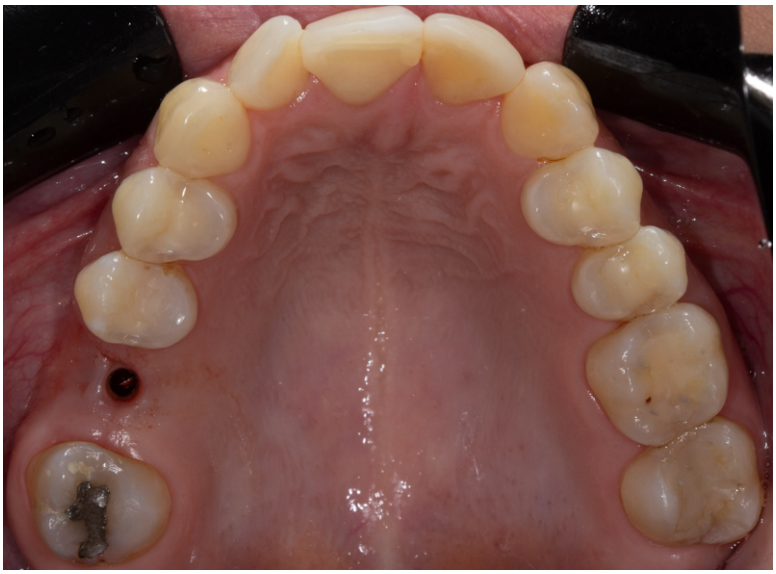


Fig. 7. Implant installed with protective cap and placement of an absorbable collagen membrane in the side window



Fifteen days past of the implant reopening, the gingival profile was healthy and ready to start the implant-supported prosthesis (Fig. 8).

Fig. 8. Clinical aspect after the implant reopening



The prosthetic component for screw-retained unitary prosthesis was selected (2.5mm Mini abutment) (Arcsys®, FGM, Joinville, Brazil) and the mini abutment / implant connection was activated by the transfer of energy promoted by the action of the system hammer (Fig. 9). Then, an open tray transfer was installed (Fig. 10) and the single-step addition polyvinyl siloxane impression (3M ESPE, Minnesota, USA) was performed using an opened plastic tray (Fig. 11) and the mini abutment analogue was adapted on the transfer and sent to the laboratory to start the crown fabrication (Fig. 12).

Fig. 9. Mini abutment / implant connection installed

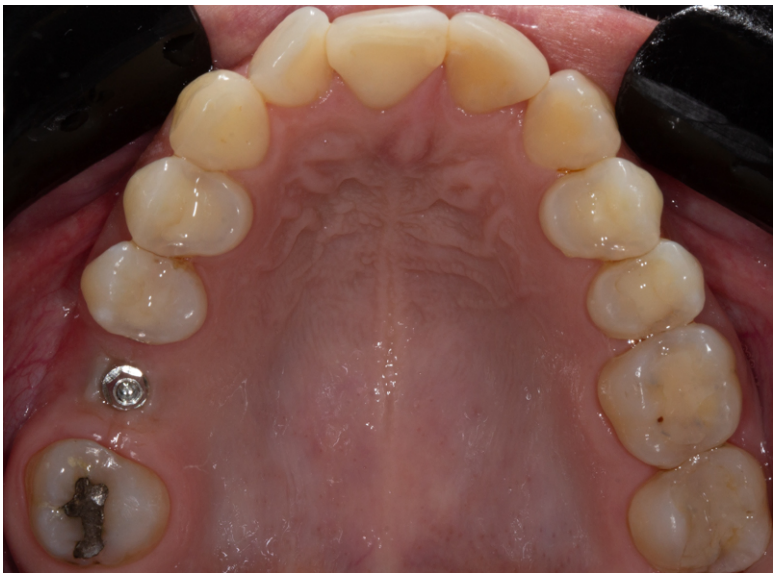


Fig. 10. Open tray transfer installed

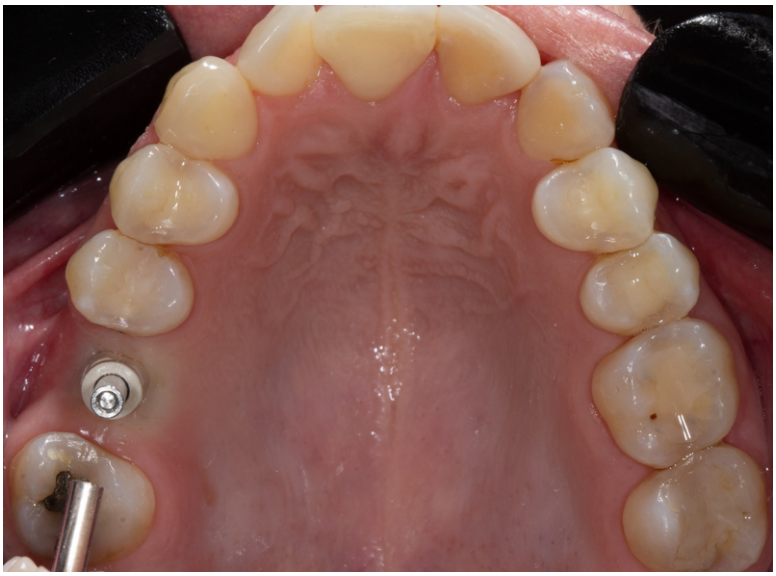


Fig. 11. Single-step addition polyvinyl siloxane impression

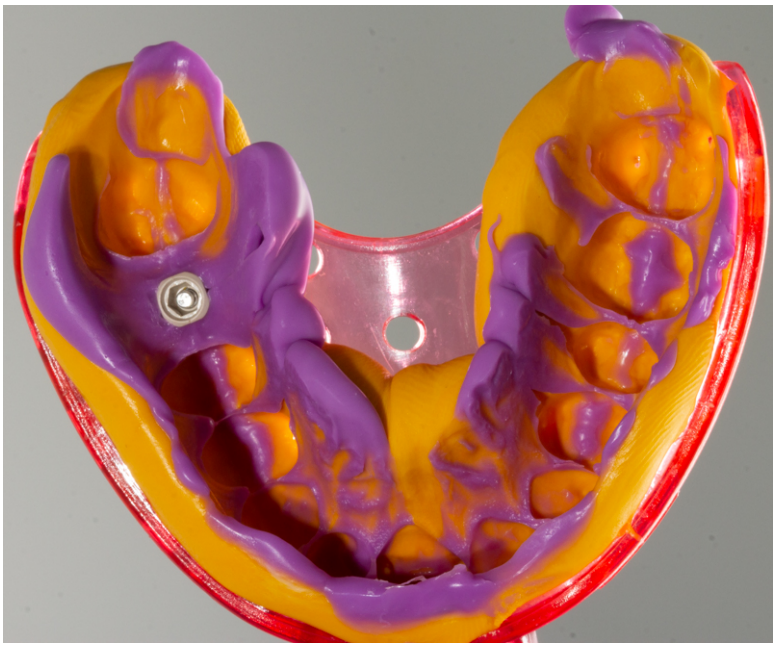
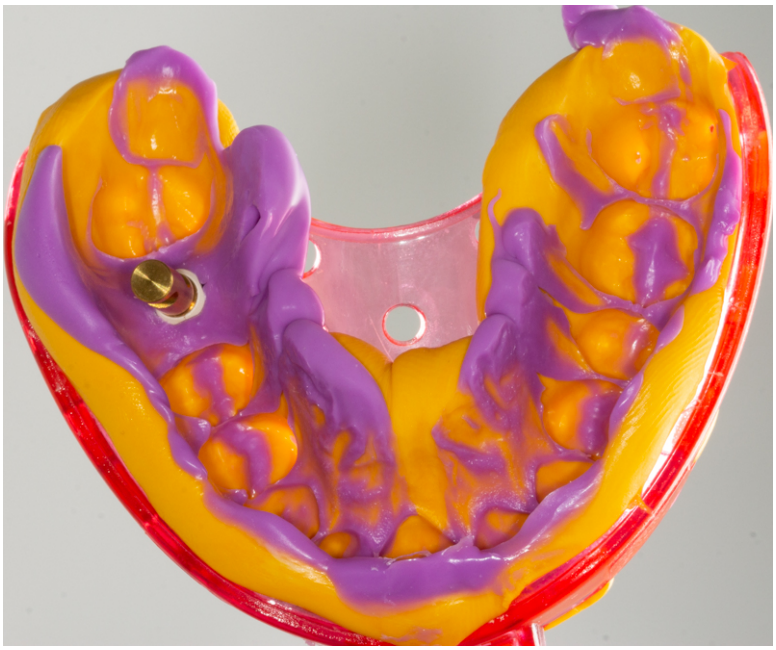


Fig. 12. Mini abutment analogue adapted on the transfer



As soon as the laboratory sent the metal framework back, it was tested (Fig. 13) and a periapical radiography was made to verify the structure/component adaptation. Moreover, a bite record with rigid material (GC America, Illinois, USA) was performed and the prosthesis was sent again to the laboratory for the ceramic application.
The case was finished with a 15N torque on the prosthesis screw and a restoration with composite resin to mask the screw passage (Figs. 14 and 15) and a periapical radiography (Fig. 16) was realized to record the case finished. The patient returned for follow-up in 30 days, 3 and 6 months showing signs of implant and gingival health and, no painful symptoms.

Fig. 13. Metal framework

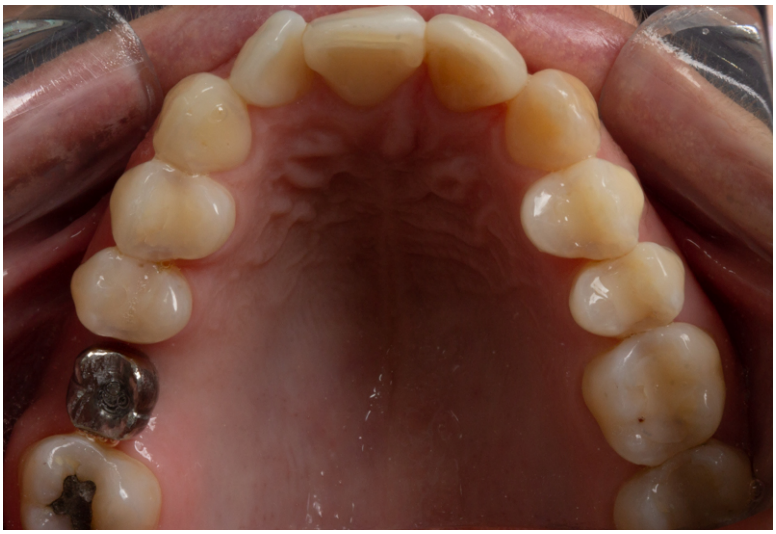


Fig. 14. Intraoral view of the definite implant prosthesis installed

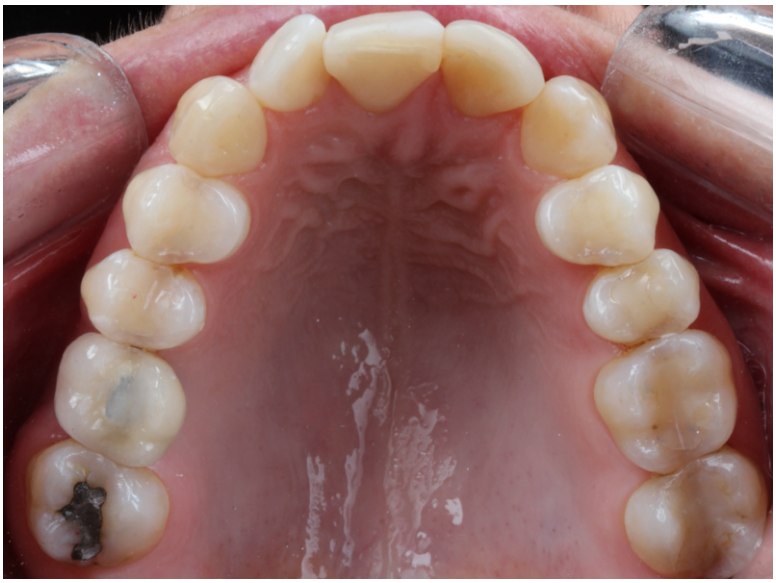


Fig. 15. Lateral view of the definite implant prosthesis installed

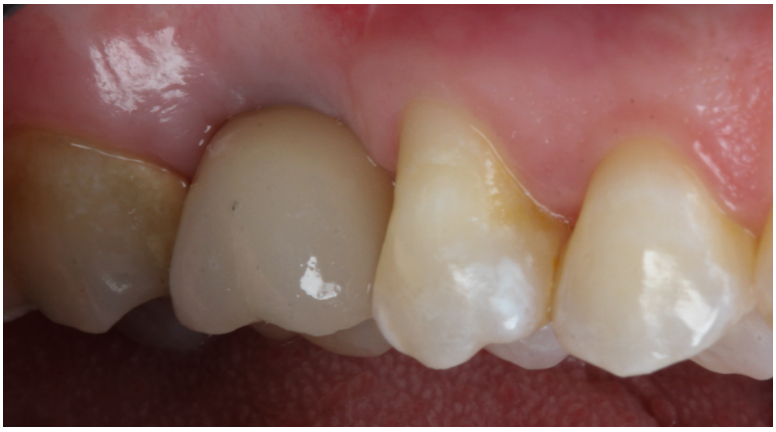
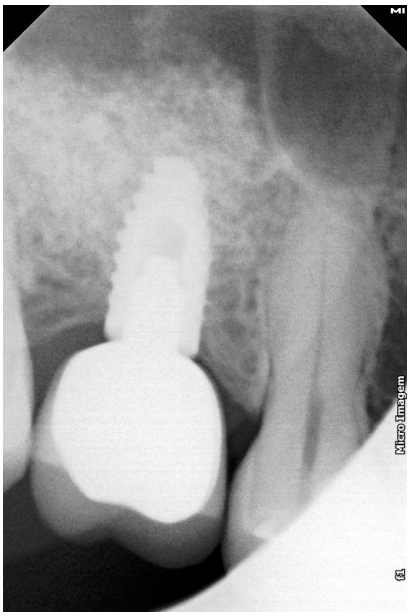


Fig. 16. Periapical radiography of the end of the case



Discussion

Sinus floor elevation with bone augmentation of the maxillary sinus is now a well-accepted procedure used to increase bone volume in the posterior maxilla, with high level evidence supporting this technique (8,9). In the present case, on tomographic examination, the available bone height in the posterior region was found to be nearly 3.5 mm from the maxillary sinus lining. Since the patient had a missing right first molar for years, there was atrophy of the edentulous area. This could have caused continuous loss of bone height and density and an increase in antral pneumatization (10,11).

Moreover, the primary implant stability is guaranteed by the quality and/or amount of remaining bone. On the maxillary sinus region, generally a type III or IV bone is available, so the amount of remaining bone is important to obtain a satisfactory primary stability (12).

On the present case, although, the small bone height didn't jeopardize the 1-stage treatment, since after 6 months of postoperative the patient presented satisfactory osseointegration and healthy tissue aspect. This is in accordance with the studies of Kher, 2014 (10) and Lo Giudice, 2015 (13) that show a reduced vertical bone crest height seems not to negatively influence on the implants osseointegration. Some authors also consider that the essential condition for the simultaneous installation of the implant during maxillary sinus augmentation is the adequate primary stability of the implant and not a minimum bone height of the collar (14).

In this case a bone substitute was used (Bio-Oss®, Geistlich Pharma, Wolhusen, Switzerland) to perform the bone graft, justified by the results of a recent systematic review (15), which evaluated 234 sinus augmentation procedures performed with conventional lateral approach, reductions in augmentation volumes during early healing of were about 45% using autogenous bone. The reductions ranged from 18% to 22% in cases using bone substitutes, with no significant differences between grafting materials. In addition, the bone substitute used (Bio-Oss®, Geistlich Pharma, Wolhusen, Switzerland) has excellent osteoconductive properties that lead to a predictable bone regeneration retaining their volume in long term (16).

The survival rate of dental implants placed after sinus lifting on a 1-stage surgery is ranged between 96.3%- 99.7%, on three long term follow-up studies, with no significative bone loss on the mesial and distal areas of the dental implant (6, 10, 13).

The main potential disadvantage with the 1-stage procedure is the possibility of being unable to stabilize implants in minimal bone heights with the additional risk of implants to falling inside the sinus (17). This suggests that the risk is real, therefore, if an implant is unstable or there is a suspicion that it would be difficult to stabilize, it is always possible to postpone implant placement to wait for graft healing (2-stage procedure). On the other hand, the main advantages of 1-stage procedures are that one operation is

avoided, and the healing time can be shortened by at least 50%. It is therefore a choice left to the operator (and the patient) to decide which option to choose (2,18).

Furthermore, it is important to highlight that this study is a case report and the result should be interpreted with caution and data should not be extrapolated to all cases, which is a limitation of the study.

Conclusions

Following a meticulous planning and solid surgical protocol, even in crests with 3.5 mm in height, a transcrestal technique can be used predictably with a long-term clinical and radiological outcome, giving patients excellent stability of the grafted material and healthy clinical results.

Acknowledgements

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