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Case Report

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Use of the CAS Kit for Implant Placement in Remaining Bone After Closure of Odontogenic Oroantral Communication – Case Report and 1-Year Follow-Up

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Oroantral communication; Dental implant; Sinus floor elevation; CAS Kit; Cone-beam computed tomography (CBCT); Bone graft

1. Abstract

This case report describes the treatment of an oroantral communication (OAC) prior to dental implant placement. A 33-year-old female patient presented with painful sensitivity in the metal-ceramic crown of tooth #14. Following medical history assessment and cone-beam computed tomography (CBCT) examination, a root fracture and opacification of the maxillary sinus were identified. Tooth #14 was extracted, and an OAC was confirmed. A membrane was placed over the roof of the communication, and the socket was filled with blood clot. Later, with 4mm of residual bone height as assessed by CBCT, the CAS kit was used for sinus floor elevation, followed by the placement of a biomaterial. A 5x10mm implant was subsequently positioned. A definitive lithium disilicate crown on a titanium abutment was then installed. The patient showed no tissue changes after 12 months of follow-up.

2. Introduction

Oroantral communication (OAC) serves as a pathological pathway for bacteria and can result in maxillary sinus infection, further impairing the healing process as it represents an unnatural communication between the oral cavity and the maxillary sinus [1]. Oroantral fistula (OAF) develops when OAC remains open and becomes epithelialized. OAF may originate from iatrogenic complications, dental infections, trauma, radiotherapy, or osteomyelitis [2]. The goal of managing OAC and OAF is to close the defect and prevent the penetration of oral bacteria and food debris into the sinus. Oroantral communication can lead to sinus contamination, resulting in infection, impaired healing, and chronic sinusitis [3]. A small OAC, less than 2 mm in diameter, without epithelialization and in the absence of sinus infection, may spontaneously heal following the formation of a blood clot [4]. However, defects larger than this or those persisting for more than three weeks rarely heal spontaneously and typically require surgical intervention [5]. Another factor to consider is the desired outcome, such as the selection of bone grafting or bone substitute techniques if a dental implant is planned in the near future. Depending on the closure technique used and local anatomical conditions, the newly formed bone in the region may or may not suffice for the conventional placement of an osseointegrated implant [6]. A possible scenario is the formation of residual alveolar ridge height requiring bone grafting within the maxillary sinus cavity. In this context, the use of the CAS Kit (Osstem, Seoul, South Korea) may enable a crestal approach to access and elevate the sinus membrane when the remaining bone height is at least 4 mm, allowing grafting and the placement of conventional implants [6-9]. The aim of this study was to present a clinical case, with a one-year follow-up, of an innovative and minimally traumatic approach for the closure of an odontogenic oroantral communication. This approach facilitated the formation of sufficient alveolar ridge bone for the use of the CAS Kit and dental implant placement, along with its prosthetic completion.

3. Case Report

Patient C.B.F.J., a 33-year-old leucodermic non-smoker in good systemic health, reported painful sensitivity during mastication in tooth #14, which had undergone endodontic treatment, place-

ment of intraradicular metal posts, and a metal-ceramic crown (Figure 1a and 1b). Cone-beam computed tomography (CBCT) was requested, revealing an image suggestive of a root fracture in the furcation region, discontinuity of the maxillary sinus cortical bone, and partial opacification of the left maxillary sinus (Figure 2). Extraction was performed, confirming the presence of an oroantral communication (Figure 3). After curettage of the socket, without attempting to remove the sinus cystic lesion, a resorbable bovine-derived membrane, GenDerm (Baumer S.A., Mogi Mirim, Brazil), was trimmed and positioned at the base of the socket to obliterate the bone discontinuity and prevent soft tissue cells from the sinus cavity from invading the alveolar region (Figure 4). The socket was fully filled with the patient's blood clot (Figure 5) and sealed with a non-resorbable polypropylene barrier (Bone Heal, São Paulo, Brazil) (Figure 6), to prevent gingival fibroblast invasion into the socket. After two weeks, the polypropylene barrier remained stable and was subsequently removed, revealing osteogenic granulation tissue (Figure 7a, 7b). At a six-month follow-up, the patient exhibited clinically keratinized mucosa over the alveolar ridge (Figure 8). Upon flap elevation, a healthy alveolar ridge with slight buccal thickness loss was observed (Figure 9). CBCT and periapical radiography indicated more than 4 mm of newly formed bone height and the absence of sinus pathology (Figure 10a, 10b), supporting the use of the CAS Kit (Osstem, Seoul, South Korea). Careful drilling with CAS drills created a controlled perforation of the maxillary sinus cortical bone without damaging the sinus membrane (Figure 11). Using the hydraulic pressure system for saline injection (Figure 12), the sinus membrane was elevated, and the resulting space was filled with bovine bone graft material, Orthogen (Baumer S.A., Mogi Mirim, Brazil) (Figure 13). A 5.0 x 10 mm TS III osseointegrated implant (Osstem, Seoul, South Korea) was placed (Figure 14). Three months later, the site was reopened, a connective tissue graft from the palate was placed on the buccal side, and a healing abutment was installed (Figure 15). After one month, a provisional restoration was placed to establish the proper gingival emergence profile (Figure 16). A scanning abutment (Osstem, Seoul, South Korea) was then used to perform digital impression using the Medit scanner (Seoul, South Korea). A lithium disilicate crown on a titanium abutment was fabricated and screw-retained onto the implant with a torque of 30 Ncm (Figure 17a, 17b). A final periapical radiograph confirmed implant osseointegration, stability of the sinus bone graft, and excellent prosthetic adaptation (Figure 18).

Figure 1a: Initial condition.

Figure 1b: Initial radiograph.

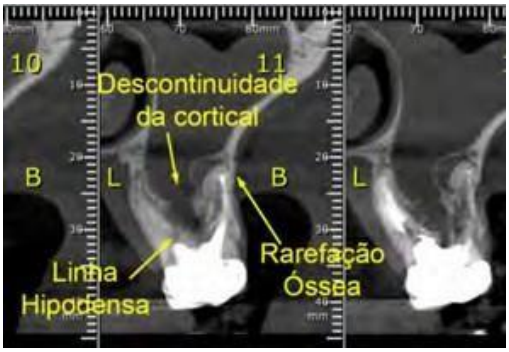

Figure 2: Initial cone-beam computed tomography (CBCT) scan.

Figure 3: Oroantral communication.

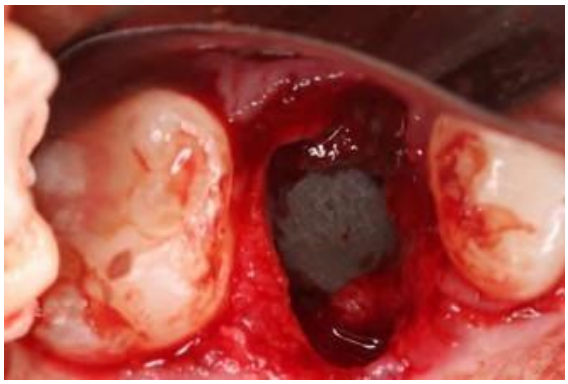

Figure 4: GenDerm barrier positioned, obliterating the oroantral communication.

Figure 5: Socket filled with a blood clot.

Figure 6: Sealing of the socket with a polypropylene barrier.

Figure 7a: After 2 weeks (barrier stable).

Figure 7b: After 2 weeks, granulation tissue filling the socket.

Figure 8: Clinical appearance after 6 months.

Figure 9: Appearance of the healed bone ridge after 6 months.

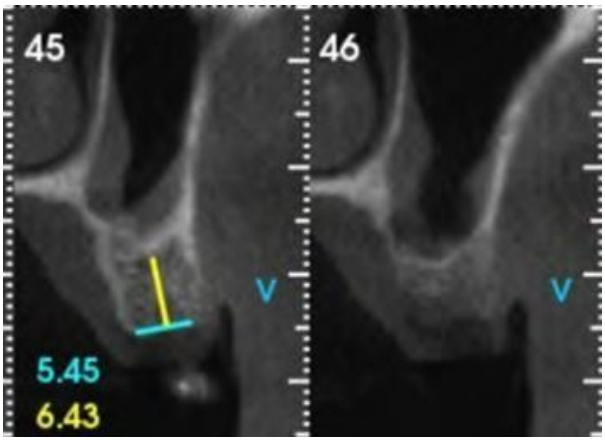

Figure 10a: Tomographic image after 6 months.

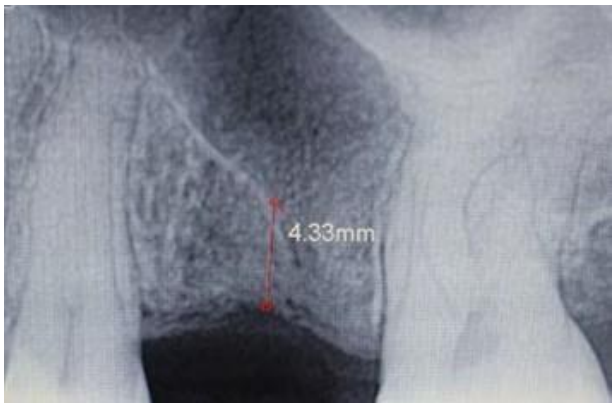

Figure 10b: Periapical radiograph after 6 months.

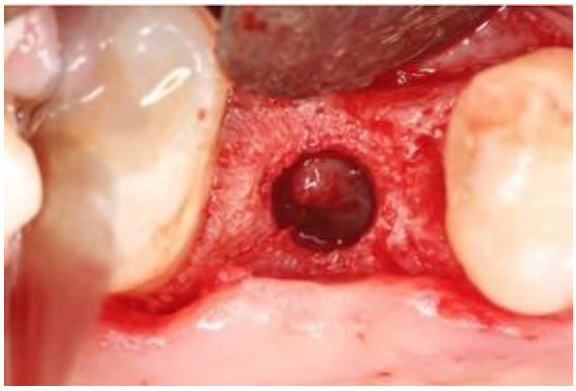

Figure 11: Drilling with the CAS-Kit system and integrity of the sinus membrane.

Figure 12: Sinus membrane elevation using hydraulic pressure.

Figure 13: Filling of the sinus cavity with xenogeneic bone graft.

Figure 14: Placement of Osstem 5.0 x 10.0 mm implant.

Figure 15: Reopening and placement of healing abutment with connective tissue graft.

Figure 16: Placement of the provisional restoration.

Figure 17a: Lithium disilicate crown on a titanium abutment.

Figure 17b: Placement of the definitive crown.

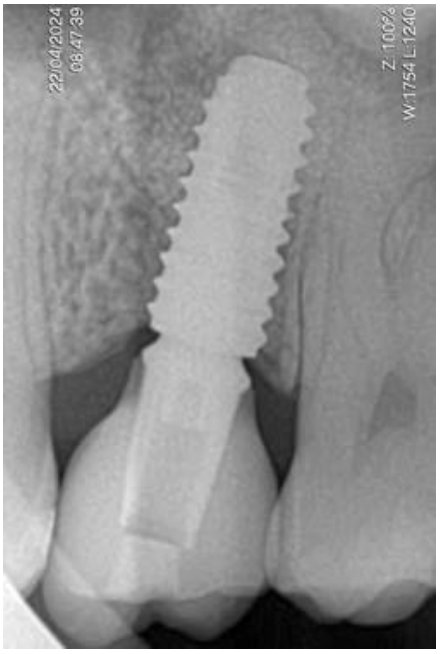

Figure 18: Final radiograph.

4. Conclusion

4.1. Within The Scientific Limitations Inherent To A Case Report, We Can Conclude That:

1. Minimally traumatic techniques and the appropriate use of resorbable and non-resorbable barriers can not only prevent oroantral communication following tooth extraction but also promote the formation of bone tissue in the alveolar ridge.

2. The use of the CAS Kit is a viable alternative for sinus elevation via the crestal approach, provided that a minimum of 4 mm of residual bone height is present.

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