

# Sinus Augmentation with Simultaneous Implant Placement in Infected Maxillary Sinuses after Cyst Drainage: A Case Report with 2 years Follow-up

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## ABSTRACT

Apart from the common complication of sinus membrane tear, sinus-related pathologies, sinusitis, or infections pose a challenge for implant placement. This case report presented sinus augmentation with simultaneous implant placement in infected maxillary sinus after cyst drainage with a follow-up of 2 years. A direct sinus lift was performed for the placement of implants. Upon opening the window with the piezosurgical unit, the sinus was drained, and fluid was sent for culture. The implants were placed and the graft was filled in the cavity. The patient showed good tolerance towards the procedure and did not show any complications after over a period of 2 years follow-up.

**Keywords:** Cyst drainage, Implant placement, Sinus floor elevation.

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## BACKGROUND

Placement of dental implants in edentulous maxillary space to restore function through sinus lift procedures has become a common practice. However, sinus lift procedures come with their own share of challenges. Apart from the most common complication of sinus membrane tear, sinus-related pathologies, especially chronic sinusitis or infections, pose a challenge for implant placement and its prognosis. But recent comparative studies have concluded that implants placed in the infected and noninfected sites have similar success and that the presence of chronic infection does not affect osseointegration.<sup>1,2</sup>

The same holds true for maxillary sinus cysts. Amongst the most common cysts are the mucocoeles, which are the results of obstructed sinus flow leading to the accumulation of fluid in the mucoperiosteal-lined cavity.<sup>3</sup> These cysts can expand in size, eroding the surrounding bone; thus, proper investigations such as computed tomography (CT) are required. The common cause of their occurrence is injury or trauma, allergies, chronic sinusitis, or sinus surgeries, as the antrum gets divided into walled-off compartments due to scarring, creating conditions ideal for mucocoele formation.<sup>4</sup> Once a window is created to gain access for implant placement, the occurring infection can be removed, and the implant can be placed. Discussed here is a case report done of sinus infected site with implant placement and followed over a period of 2 years.

## CASE DESCRIPTION

A male patient, 57 years of age, reported missing posterior teeth and wanted dental implants in the upper right back region. The patient was medically healthy and a nonsmoker. Intraoral examination showed missing teeth 15, 16, 17, and 18. Radiograph showed an enlarged maxillary sinus and resorbed maxillary ridge (Fig. 1), which required sinus lift and implant placement. On further radiographic examination with cone beam CT (CBCT), the coronal section showed that the sinus mucosa was thickened on the right side as compared to the left, suggesting infection in the right maxillary

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**Conflict of interest:** None

**Patient consent statement:** The author(s) have obtained written informed consent from the patient for publication of the case report details and related images.

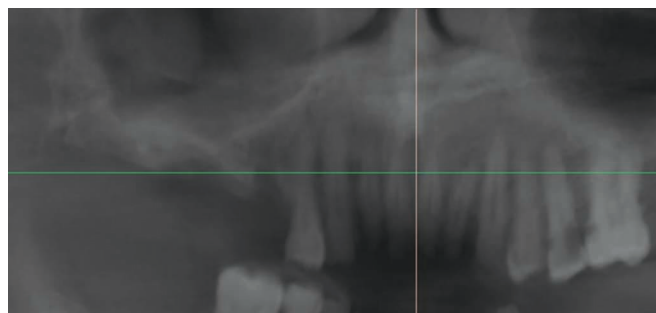


Fig. 1: Radiograph of missing teeth

sinus (Fig. 2). A cystic lesion was also seen on the right maxillary sinus. It was planned to do a sinus lift along with immediate implant placement and consent for the same was obtained from the patient.

Keeping all the aseptic measures into consideration, direct sinus lift was performed in regions 15, 16, and 17. Upon opening the window

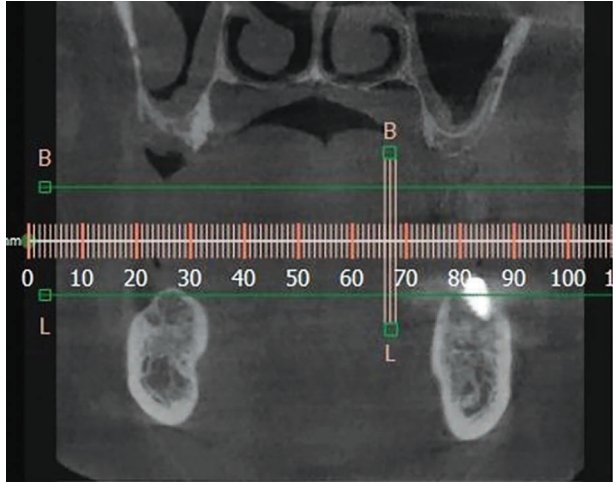


Fig. 2: CBCT showing thickened right maxillary sinus

with the piezosurgical unit, a large bore needle was used to drain the fluid (Fig. 3). The pus discharge collected was sent for culture.

The sinus membrane was carefully elevated and implants (Bioner Top DM, Barcelona, Spain) were placed in regions 15, 16, and 17. Excellent primary stability of the implants was achieved and a bone graft (Ti-oss®, South Korea) was placed (Fig. 4). The bony window, which was removed while making the sinus opening, was placed again over the graft-filled cavity (Fig. 5) and the membrane was placed (Ossix® Plus, Datum Dental Ltd, Israel) (Fig. 6) and fixed with tacs. Sutures (Cytoplast, Osteogenics, United States of America) were placed and the patient was given postoperative instructions. Tablet Augmentin 625 mg, twice for 5 days, was prescribed starting 1 day prior to surgery. Patients have been prescribed the tablet Diclofenac 50 mg and Oxymetazoline nasal drops. At 5 months postoperative (Fig. 7), the CBCT shows good bone formation around the implant. The implants were stable, without any signs of peri-implantitis. The patient did not report any discomfort from the time of the surgery till the follow-up of 2 years (Fig. 8).

## DISCUSSION

Direct or indirect sinus lift procedure is the choice of treatment to increase bone height for successful implant placement. Scientific

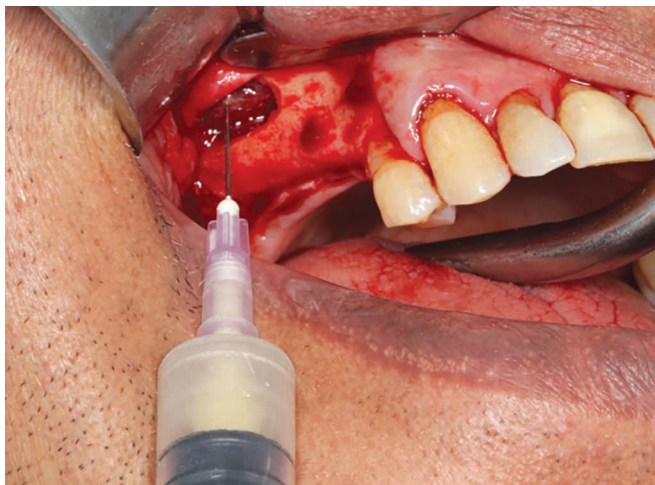


Fig. 3: Pus collection in relation to the first quadrant



Fig. 5: Coverage of grafted sinus cavity

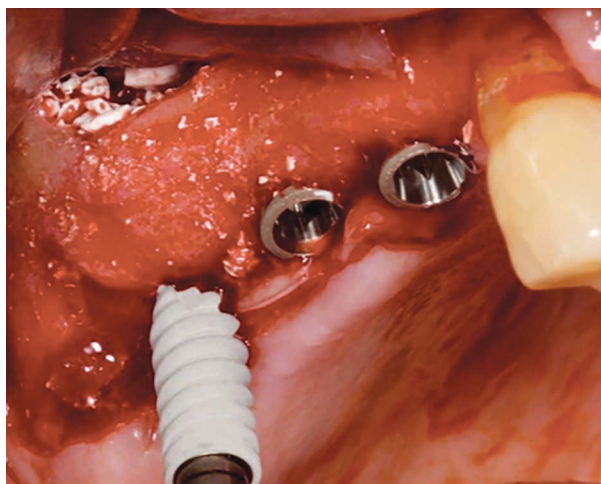


Fig. 4: Immediate implants along with bone graft placed

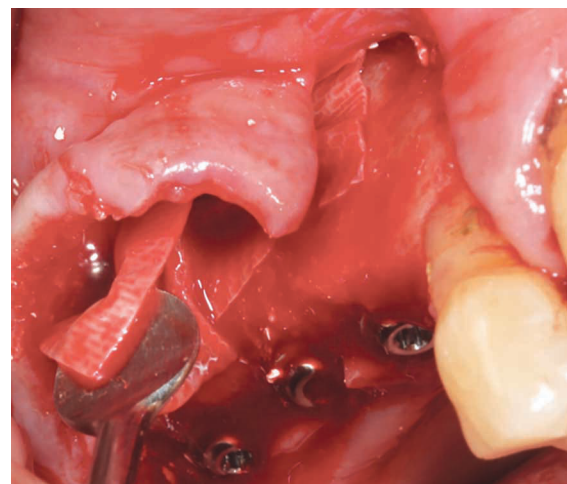


Fig. 6: Placement of membrane





Fig. 7: CBCT at 5 months postoperative

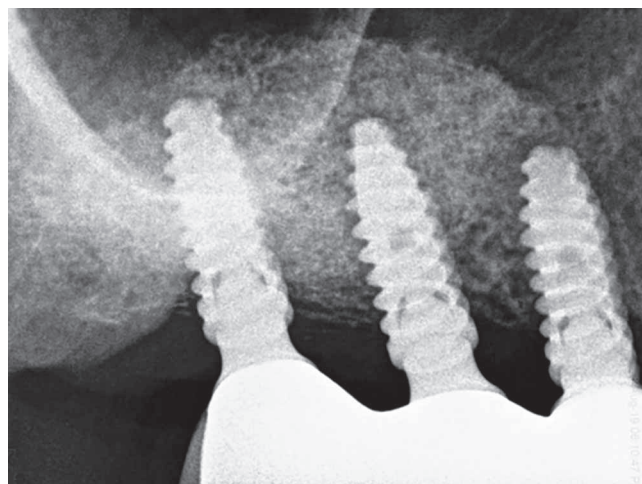


Fig. 8: 2-year postoperative radiograph

data from many years strongly supports the predictability of sinus lift procedures.<sup>5-7</sup> However, as aforementioned, sinus pathologies make the procedure difficult, challenging, and time-consuming, always putting the clinician in the dilemma of the implant's prognosis. But it should be noted that once the pathology or the cyst, as discussed here, has been drained, the cavity becomes infection free and behaves like any other maxillary sinus where the sinus lift procedure can be performed with success. According to Ziccardi and Betts,<sup>8</sup> a maxillary cyst becomes an absolute contraindication for sinus grafting. On the contrary, authors like Mardinger et al.<sup>9</sup> have stated that sinus augmentation is not a contraindication in the presence of pseudocyst/cyst. During sinus lift procedures, around 7.3% of patients showed the presence of an infected sinus. Such lesions are controversial in nomenclature and pathogenesis, making sinus augmentation procedures in the presence of infection/cyst/mucocele a predictable procedure.<sup>9</sup>

Most sinus cysts fall into three categories—antrol pseudocysts, retention cysts, and true sinus mucoceles.<sup>10,11</sup> In a mucocele, there is expansive destruction due to obstruction of the sinus ostia, along with the accumulation of fluid. Obstruction of seromucous glands of the sinus mucosa causes mucus retention cysts and are nothing but mucoid-filled cysts, and the “antrol pseudocyst” is a sessile soft tissue elevation caused by the accumulation of inflammatory exudates surrounded by loose connective tissue.<sup>10,11</sup> As aforementioned, these cysts are most commonly formed due to the closure of sinus ostia and once the infection has been removed, the sinus becomes a sterile cavity where bone grafting can be done safely. Care should be taken that the entire infected lining is removed so that chances of reinfection are nil or none. The sinus lining can be then reformed within 2–3 weeks due to high and rapid reepithelization; however, such formation is usually accompanied by occasional polyp formation.<sup>12,13</sup> Also, there are reports of the development of sinusitis postaugmentation, which depends upon the closure of the ostium, thus creating drainage disturbances.<sup>14</sup> The position of ostium depends from patient to patient, so it cannot be stated that every patient will develop postoperative sinusitis after maxillary sinus augmentation, and its prevalence recorded in the literature is between 3 and 20%.<sup>15,16</sup>

For the very same reason, the patient was followed up for a period of 2 years and reported no signs of discomfort or sinusitis. The bone graft used here has been well tolerated and so far, there are no reports of any infection occurring from any graft material used in dentistry.<sup>17</sup> Our results are consistency with several other authors, such as Tang et al.<sup>18</sup> suggested that treatment is necessary only in case

of clinical symptoms where significant expansion is noticed. Celebi et al.<sup>19</sup> reported no complications and successful osseointegration of implants in four patients who underwent direct or indirect sinus lift. Liu et al.,<sup>20</sup> in a case series of 14 patients treated with simultaneous placement of dental implants with maxillary sinus elevation in the presence of antrol pseudocysts, stated that all the implants placed showed successful osseointegration post a 1-year follow-up, implants did not show any mobility, and none of them was lost.

The next question comes to the prognosis of immediate implants placed in case of infection and does the kind of bacteria affects the prognosis of implants. Surprisingly, we found the presence of *Escherichia coli* (*E. coli*) in the histopathology of sinus cysts. *E. coli* is usually found in cases of chronic rhinosinusitis (CRS), and the microbiology is polymicrobial.<sup>21</sup> Other predominant organisms were also found with *E. coli*, which includes *Staphylococcus aureus*, coagulase-negative *Staphylococcus*, *Haemophilus influenzae*, and various gram-negative organisms, such as *Pseudomonas aeruginosa* and *Stenotrophomonas maltophilia*.<sup>22</sup> The authors believe that the patients must have suffered from CRS, even if they did not have an active infection at the time of the surgery.

A recent study identified that about 30% of bacteria have the biofilm-forming capacity; in the study, over 150 consecutive CRS patients were assessed by an *in vitro* biofilm-formation assay.<sup>23</sup> Bacteria in biofilms show difficulty in culture and remain resistant to the host defense mechanism.<sup>24</sup> This can be easily correlated with the current case report, as the patient treated did not show active infection at the time of the surgery, nor the defense mechanism of the body could heal the sinus involved, as there was pus discharge upon opening the site, which on culture showed presence *E. coli*.

From the case discussed here, it can be concluded that once all the infection has been removed from the sinus cavity, the site can be grafted if there is it lies within the capacity of bone augmentation and implant placement procedure. Long-term studies and or histopathology of the grafted site are needed to confirm the absence of any microorganism; nonetheless, clinically, the grafted site, until 2-year postoperative showed no signs or symptoms of complication.

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