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### Case report

# Aspergillosis associated with migration of a dental implant into the maxillary sinus: A case report

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### ABSTRACT

Migration of dental implants into the maxillary sinus and related sinusitis are serious complications of dental implant placement. Inadequate implant preparation in an atrophic maxilla can easily lead to these complications.

We report an unusual case of aspergillosis associated with migration of a dental implant into the maxillary sinus. Four years after placement of the dental implant, the symptoms of sinusitis appeared. Panoramic radiograph showed the migration of the dental implant into the left maxillary sinus. The migrated dental implant, which was surrounded by a friable brownish–yellow mass, was removed from the left maxillary sinus. Histopathological examination of the brownish–yellow mass revealed hyphae of *Aspergillus*. We preserved the function of the natural ostium and sinus membrane by artificial oroantral fenestration, and avoided its progression to invasive and fulminant fungal sinusitis. Finally, we closed the oroantral fistula by a new method with two layers of the oral and sinus sides.

Despite high success rates of dental implant placement, placement failures and complications still occur in some cases. The failure to achieve sufficient primary stability, especially, causes the migration of dental implants into the maxillary sinus and related sinusitis. Therefore implants that fail to osseointegrate should be removed immediately, in order to prevent the development of invasive and fulminant fungal sinusitis.

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### Introduction

Dental implants are currently the most popular modality for tooth replacement. Many longitudinal studies have shown high success rates of dental implant placement; however, placement failures and complications still occur in some cases. Migration of dental implants into the maxillary sinus and resulting sinusitis are serious complications associated with dental implant placement [1,2]. Chiapasco et al. [3] reported that among 27 patients in whom dental implants had migrated into the maxillary sinus, maxillary sinusitis was observed in 13 patients. Scarano et al. [4] suggested that maxillary sinusitis may develop if the migrated implants are not removed. Therefore, dental implants that have migrated into the maxillary sinus should be removed immediately.

It has been suggested that 6–9% of all the paranasal sinusitis cases are affected by fungal infection [5]. Ever since Plaignaud [6] published the first report of possible fungal sinusitis in 1791, fungal infection of the paranasal sinuses has been recognized and reported with increasing frequency. *Aspergillus* is the most common fungal pathogen that causes paranasal sinusitis. *Aspergillus* causes aspergillosis through allergic reaction, airway dissemination, lung invasion, or cutaneous infection. It has been reported that more than 10% of all patients with chronic sinusitis had an aspergilloma [7].

Fungal sinusitis is classified as invasive and non-invasive. Patients with invasive fungal sinusitis are unresponsive to conservative management and require appropriate antifungal treatment with local debridement. Non-invasive fungal sinusitis includes allergy and fungal ball, and does not require extensive surgery. Clinically, patients with both types of fungal sinusitis present with similar symptoms such as headache, orbital pain, sneezing, nasal bleeding, nasal congestion, and chronic sinus pain. Non-invasive sinusitis usually results in symptoms of refractory sinusitis, whereas ocular and neurological complications are seen in invasive sinusitis. The cause of the progression of non-invasive to invasive and fulminant sinusitis is not clear. Some predisposing

☆ Asian AOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

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factors have been proposed, such as long duration of the disease, improper treatment of non-invasive sinusitis, immune status of the patient, and presence of local obstructive lesions of the paranasal sinus [8]. The diagnosis and treatment of local obstructive lesions of paranasal sinusitis are expected to decrease the mortality and morbidity rates by preventing the disease from progressing into its invasive form.

In this report, we present an unusual case of aspergillosis associated with migration of a dental implant into the maxillary sinus, which was successfully treated by creating an artificial oroantral fenestration. Finally, the natural ostium was opened, maxillary sinusitis was relieved, and the original sinus mucous membrane was conserved. The artificial oroantral fistula was closed by a new method involving two layers of the oral and sinus sides, which was found to be more secure than the traditional flap method.

### Case report

A 59-year-old Japanese woman, without any relevant medical history, was referred by her private dentist to our hospital on November 14, 2011. The patient had been complaining of continuous nasal drip and nasal congestion for one month. On clinical examination, there was posterior nasal drip and left nasal congestion; however, spontaneous pain, remarkable gingival swelling, fluctuation, and pus discharge from the left posterior maxilla were not noted. Four years earlier, her private dentist had concurrently placed eight dental implants in the maxilla without sinus bone grafting. However, sufficient primary stability was not obtained in one of the dental implants in the molar region. The dentist had completely covered the dental implant by suturing the epithelium and waited to achieve successful osseointegration. Fortunately, the surgical site had healed superficially with epithelization, without any infection. After two years, he took a plain panoramic radiograph for evaluation of the dental implants (Fig. 1A). The dental implant, which had not obtained sufficient primary stability, had not displaced into the maxillary sinus. No subsequent plain panoramic radiographs were taken, because the prosthetic device for missing teeth was fabricated without using the dental implant. He finally decided not to remove the dental implant, because the patient was asymptomatic. The plain panoramic radiograph showed a radiopacity in the shape of the dental implant in the left maxillary sinus (Fig. 1B) and a computed tomography scan showed that the left maxillary sinus was filled with a homogeneous mass with soft tissue density, including a metallic-dense deposit. However, no defect in the thickness of the maxillary sinus wall or calcification in the maxillary sinus were seen (Fig. 1C). A clinical diagnosis of chronic maxillary sinusitis with migration of the dental implant into the maxillary sinus was made.

The patient was treated with levofloxacin (500 mg orally) for seven days followed by clarithromycin (400 mg orally) for seven days. An antifungal drug was not given to the patient because fungal infection had not been confirmed at this stage. On November 28, 2011, under general anesthesia, the dental implant was removed from the left maxillary sinus, and was found to be surrounded by a friable, brownish-yellow mass (Fig. 2A). During the Caldwell-Lac procedure in the maxillary sinus, the natural ostium was found to be stenosed by thickened mucous membrane of the maxillary sinus, but was not completely closed. Therefore, the thickened mucous membrane of the maxillary sinus was not removed in its entirety, and a nasoantral window was not made. We performed the bone sounding procedure to confirm the bony defect in the part of the migrated dental implant. We excised mucosa over this bony defect, and excised thickened sinus membrane of the size of the bony defect. An artificial oroantral fenestration of approximately 5-mm was made at the alveolar crest of the molar region in the max-

illa, and irrigation of the maxillary sinus through this fenestration was carried out every day, starting on the first day after the operation. A histopathological examination of the brownish-yellow mass samples stained with hematoxylin and eosin identified hyphae of *Aspergillus* and granulation tissue (Fig. 2B). However, no fungal infection was detected by bacteriological examination of the maxillary sinus membrane. In the post-operative follow-up after one month, the patient was found to be free of symptoms. A computed tomography scan of the maxillary sinus conducted three months post-operatively showed improvement in the thickness of the sinus membrane, opening in the natural ostium of the maxillary sinus, (Fig. 1D), and closure of the oroantral fistula. After administration of 2% lidocaine with adrenaline for local anesthesia, bone sounding procedure was performed to determine the size of the bony defect in the oroantral fistula, which was found to be approximately 5-mm. We made 2 mm wide oral side full-thickness mucoperiosteal flaps around the oroantral fistula with the sinus membrane. We turned around these flap to the sinus side, and repaired the sinus lining by suturing with absorbable sutures. Following this, a buccal full thickness mucoperiosteal flap was raised and advanced to cover the defect of oral side by periosteal reduction incision. We closed the oroantral fistula with two layers of the oral and sinus sides. There was no evidence of recurrence of the lesion after 12 months of follow-up.

### Discussion

Dental implant placement is an important treatment modality for partially and totally edentulous patients. Many longitudinal studies have shown high success rates of dental implant placement; however, placement failures and complications still occur in some cases, even in patients who present with appropriate clinical conditions. The failure rate of dental implants is generally greater in the maxilla than in the mandible [2]. Inadequate implant preparation can easily lead to complications related to the maxillary sinuses. The accidental migration of dental implants into the maxillary sinus and related sinusitis are infrequent but serious complications of dental implant placement [1–4]. In the premolar and molar regions of the maxilla, especially, there is a high risk of development of maxillary sinusitis by penetration through the maxillary sinus membrane. These regions of the maxilla are often atrophied, and the alveolar ridge does not have sufficient bone quality and quantity. Judging from plain panoramic radiographs in this case, we have considered that the migrated dental implant did not obtain sufficient primary stability due to the atrophic maxilla, and penetrated into the maxillary sinus through the sinus membrane from dental implant placement site. However, penetration of the dental implant into the maxillary sinus membrane does not necessarily induce maxillary sinusitis. Maxillary sinusitis may develop even if the maxillary sinus membrane is not penetrated during dental implant placement [9]. The important factor for the development of maxillary sinusitis is the function of the natural ostium. That is why adequate sinus drainage and aeration are important for successful treatment of maxillary sinusitis [2,9].

In this case, the computed tomography scan showed a partially radiolucent area in the left maxillary sinus. The natural ostium was stenosed by thickened sinus membrane, but was not completely obliterated. During the Caldwell-Lac procedure in the maxillary sinus, we did not remove the sinus membrane. Furthermore, we did not make the nasoantral window, but made an artificial oroantral fenestration of approximately 5 mm at the alveolar crest of the molar region in the maxilla for adequate sinus drainage and aeration. We tried to maintain the physiological drainage and aeration functions of the natural ostium and original sinus membrane. After three months post-operatively, the computed tomography scan

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