

Closure of Large Perforation of Sinus Membrane Using Pedicled Buccal Fat Pad Graft: A Case Report

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Although the sinus lift procedure is relatively safe, it does pose some potential problems. The most prevalent intraoperative complication is perforation of sinus membrane. Various techniques and materials have been developed for the repair of the perforated sinus membrane. In this case, pedicled buccal fat pad (BFP) was used for the closure of the large perforation on the sinus membrane and dental implants were placed simultaneously. No serious infections have occurred, and clinical and radiographic findings at the 1-year follow-up were adequate. INT J ORAL MAXILLOFAC IMPLANTS 2008;23:1139–1142.

Key words: buccal fat pad, dental implant, sinus lift

The sinus lift procedure was introduced in the early 1980s to overcome anatomical limitation and gain adequate vertical bone height in atrophic areas of the posterior maxilla prior to the placement of dental implants.¹ This procedure has contributed considerably to the expansion of the application of dental implants. Several modifications to the surgical approach were developed.² In the classical approach, a window was formed at the lateral wall of maxilla, the Schneiderian membrane was freed from the maxilla and elevated, and a graft material was filled in the prepared space.

Though the sinus lift procedure is relatively safe, there are some potential problems related to this procedure.^{3,4} The most prevalent intraoperative complication is perforation of sinus membrane. Perforation of sinus membrane may cause loss of graft materials and early failure of dental implant, as well as disruption of normal sinus physiologic function.^{5,6}

It is very difficult to repair a tear or perforation on a sinus membrane by suturing because of its inaccessibility and the friable characteristics of the lining

membrane of the sinus.⁷ Sometimes, perforation of sinus membrane cannot be detected.⁸ Various techniques and materials have been proposed for the management of perforation of sinus membrane.⁹ For example, repair of sinus membrane perforation may be performed by collagen membrane, fibrin glue, and freeze-dried lamellar bone sheets. To be utilized as a repairing material, an effective seal and easy manipulation are necessary. Also, tissue reaction, including inflammation or foreign body reaction, should be minimal.

A buccal fat pad (BFP) is an autogenous graft material, that has been widely used as an alternative method for the reconstruction of small- to medium-sized intraoral defects in oral and maxillofacial surgery including oroantral fistula. It may be used to manage perforated membrane for its excellent physical and biological properties.¹⁰ However, there were no reports or clinical data on the BFP to evaluate the effectiveness or safety as a repairing material of sinus membrane.

The main purpose of this report was to introduce the sinus lift technique using pedicled BFP to repair sinus membranes and stabilize grafted materials. An additional aim was to show the 1-year result of a case using the pedicled BFP repair technique.

CASE REPORT

A 46-year-old man visited the oral and maxillofacial surgery department of Seoul National University's Bundang Hospital for the rehabilitation of edentulism in the maxillary right molar area with a dental implant. In the radiographic findings, sufficient bony support was not expected due to alveolar bone resorption and pneumatization of maxillary sinus. Therefore, dental implant

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Fig 1 Preoperative panoramic view: For the placement of dental implants, a sinus lift procedure was planned.



Fig 2 During sinus floor elevation, a large perforation was made on the sinus membrane.



Fig 3 Illustrations of the sinus membrane perforation (a) and repair using pedicled buccal fat pad flap (b).



Fig 4 The graft material was placed into the sinus and packed gently against the fat pad. Two dental implants were placed.

placement with sinus lift procedure was planned (Fig 1). The patient was given full information and details of procedures and possible complications before giving preoperative written informed consent. A lateral window approach was used on the surgical site. During sinus floor elevation, a 1.5-cm perforation was made on the sinus membrane (Fig 2). Therefore, a pedicled BFP graft was planned to restore the defect (Figs 3a and 3b). Briefly, a small incision was made on the periosteum of mucosal flap into the buccinator muscle at the level of the zygomatic buttress and buccopharyngeal membrane. Blunt dissection was performed to enter the BFP capsule by direct probing with Kelly forceps. After detection of the BFP capsule, the tissue forceps were used to draw out the contents. Meticulous manipulation was necessary not to rupture the integrity of the BFP capsule. Harvested BFP was draped into the sinus and fixed to the perforated membrane using sutures. Then, the graft material was placed in the sinus and packed gently against the fat pad (Fig 4).

DISCUSSION

The application of dental implants to the atrophic maxilla is often problematic because of anatomical limitation.¹¹ In the past, onlay bone grafts using rib or iliac crest^{12,13} were applied for the augmentation of an atrophic ridge. However, resultant deficiency of vertical height made prosthetic problems worse in some cases. To solve these dilemmas, the sinus lift procedure with bone grafting in the maxillary sinus was designed to provide the bony structure adequate for placement of dental implants.

Since 1980, when Boyne and James first published about sinus lift procedure, a number of studies have been carried out.^{14,15}

The most commonly reported complication of sinus augmentation is membrane perforation.¹⁶ Preferred management of membrane perforations is not clearly defined in the literature. Small perforations usually do not need treatment because the membrane folds itself during the elevation.⁸ Large perforations are usually managed by use of a membrane, use of a block graft instead of a cancellous graft, or abandonment of the procedure.^{8,17}

Some of the studies reported on complications with this procedure.^{4,18} Chanavaz¹⁹ classified complications into several categories: soft tissue perforation, sinus infection, hemosinus, and so forth. Also, Chanavaz recommended interruption of the procedure if the size of perforation was more than 3 mm. Perforation of sinus membrane can usually be handled with resorbable collagen membrane.^{20,21} There have also been other attempts to classify membrane perforations. Vlassis and Fugazzotto classified perforations of the sinus membrane as 5 groups based on location and difficulty to repair.²² Pikos described sinus perforations by size: small (5 to 10 mm) and large (greater than 10 mm).²³

The clinical significance of sinus perforation is controversial. The success of sinus grafting is dependent primarily on the neovascularization of the graft mass, which is reported to derive mainly from the sinus floor. Consequently, it is assumed that the regenerative result of the bone grafting procedure is inferior following sinus membrane perforations.²⁴ It is recommended that simultaneous implant placement not be carried out following repair of severe perforations.²⁵ However, some researchers proposed that sinus membrane perforation played an insignificant role in complications of the bone graft.^{26,27}

BFP is special fat tissue that is different from subdermal fat. Anatomically, buccal fat pads are easy to harvest in the course of dental surgery. In 1802, BFP was introduced by Bichat. Since Egyedi²⁸ used pedicled BFP for the closure of oroantral fistula and



Fig 5 Postoperative 1-year view: There was no problem in masticatory function.

oronasal fistula in 1977, it has been widely used as an alternative method for the reconstruction of small- to medium-sized intraoral defects in oral and maxillofacial surgery.²⁹ In plastic surgery, BFP has also been used for the correction of facial contouring such as zygomatic depression or midface depression.^{30,31} Kim reported the successful result of pedicled BFP application for the coverage of a denuded bony surface in a primary palatorrhaphy case.³²

It is difficult to apply layered sutures to intraoral wounds; therefore, a high risk of infection is related to wound dehiscence. If intraoral wound dehiscence is highly expected at the time of bone graft, orthognathic surgery, and dental implant surgery, double closure using some kind of local flaps or other procedure is recommended for the prevention of wound dehiscence.³³ It is known that BFP is an easy, well-tolerated, uncomplicated technique for oral reconstruction.³⁴ Excellent clinical outcomes of pedicled BFP, in terms of quick epithelialization and high success rate, are partially due to its rich blood supply from the maxillary, superficial temporal, and facial arteries.³⁵ Pedicled BFP also has many advantages. It shows less necrosis or absorption than free fat graft. Furthermore, preoperative chemotherapy and postoperative radiotherapy did not seem to jeopardize survival of the graft although these treatments do delay epithelialization.³⁶

Occasionally, there are some postoperative complications such as partial necrosis, fibrosis, shrinkage, retraction, and distortion of variable degree.³⁴ To minimize the incidence of postoperative complications, it is suggested that the BFP is applied adequately to cover the entire surgical defect and that it should be fixed to surrounding structures without tension.³⁷ Also, it is necessary to manipulate carefully so as not to injure the long buccal nerve branches of

the facial nerve traveling in the fascial space with Stenson's duct, as well as the BFP itself.³⁸

In this case, pedicled BFP was used successfully for the closure of the large perforation on the sinus membrane and dental implants were placed simultaneously. No serious infections have occurred and clinical and radiographic findings at the 1-year follow-up were adequate (Fig 5).

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