Several reports demonstrate successful use of the buccal fat pad (BFP) as pedicled graft in reconstructing small to medium sized maxillary defects. BFP harvesting has so far been shown to be an easy, well-tolerated, and uncomplicated technique for oral reconstruction. This case report proposes the use of BFP for repairing of the perforated sinus membrane during sinus augmentation.

Key Words: sinus augmentation, Schneiderian membrane, graft

INTRODUCTION

Loss of maxillary molar teeth leads to rapid loss of bone in the alveolus and increases the size of the maxillary sinus. Bone loss can extend to the alveolar process, leaving only a thin wall of bone between the maxillary sinus and the oral cavity. Augmentation of the maxillary sinus floor is a well-documented technique and is generally accepted as an implantology procedure to facilitate placement of dental implants in the posterior atrophic maxilla. The classic procedure for maxillary sinus floor augmentation entails preparation of a trap door including the Schneiderian membrane in the lateral sinus wall. Pikos reported that perforation of the Schneiderian membrane is the most common complication that occurs during the sinus elevation augmentation. Its prevalence is between 20% and 60%. Perforation of the Schneiderian membrane is most likely to happen at sharp angle and ridge lines, septa, and spines. It can also happen when the membrane is being elevated off the inferior and anterior bony aspect of the sinus and can occur due to irregularities of the sinus floor. Previous sinus surgery, which often results in a tissue scar, and absence of alveolar bone are also possible risk factors. Many methods have been advocated for treatment of perforation of the Schneiderian membrane during the sinus floor elevation and augmentation.

A pedicled graft of the buccal fat pad (BFP), which enables the closure of oral defects even up to an area of $60 \times 50$ mm and a thickness of 6 mm, has often been used for the reconstructions of intraoral defects. The BFP is an encapsulated, rounded, biconvex fatty structure located between the buccinator medially and the anterior margin of the masseter muscle and the mandibular ramus and zygomatic arch laterally. Recently, Stajcic reported the successful use of the BFP for the closure of an oro-antral fistula in 56 cases. Wong found that by using the BFP for additional and immediate blood and nutrition supply and protection of the graft, the quality of bone could be improved for other parts as well. Adult subcutaneous fat tissue is an abundant source of multipotent cells. Recently, several publications have reported that adipose tissue contains a population of cells able to differentiate into different cell types, including adipocytes, osteoblasts, myoblasts, and chondroblasts. Previous studies have shown that adipose-derived adult stem cells express bone marker proteins,
including alkaline phosphatase, type I collagen, osteopontin, and osteocalcin, and produce a mineralized matrix as shown by alizarin red staining.\(^{21}\) By placing the BFP between fast-growing fibrous tissue and the defect itself, slow-growing osseoprogenitor cells can migrate into the bone defect and lead to the reossification of this area.\(^{22}\)

Large perforations represented in the literature an absolute contraindication to continuation of the surgery, especially if the graft material is in granules or chips. The presence of foreign bodies that are free to move inside in the sinus appears to create the situation for initial pathologies of the mucosa.\(^{9}\)

This article reports the use of a pedicled BFP graft for closing a large perforated sinus membrane at the same time as sinus augmentation with bone graft material.

**Clinical Case**

A 49-year-old man was referred to a prosthodontist with a complaint of discomfort with missing teeth. The posterior portions of maxilla were edentulous and lacked sufficient bone for implant placement without sinus augmentation. The alveolar height in the posterior maxillary area was less than 3 mm (Figure 1). Oral examinations showed that his oral hygiene was appropriate, with no lesions noted. His past medical history included no remarkable disease. Because the patient strongly wished to have fixed prosthesis, placement of osseointegrated implants after sinus augmentation was planned. Patients did not display signs and symptoms of sinus or intraoral diseases.

Local anesthesia was performed with lidocaine hydrochloride (Ecocain 2%, Molteni Dental, Scandicci, Italy) with 1:50 000 epinephrine.

Vertical incisions were extended to the anterior and posterior vestibule. The trapezoidal buccal mucoperiosteal flap was then reflected from the alveolar process and the lateral wall of the maxilla. The lateral wall of maxillary sinus was fenestrated with a round diamond bar with saline solution irrigation to mark the limits of a rectangular area (15 × 10 mm), and a door in the lateral wall was prepared. The Schneiderian membrane was freed and separated from the lateral wall of the sinus using blunt instruments. Although care was taken to preserve the mucosal lining, the sinus membrane was torn. The BFP was exposed by a 2-cm, horizontal periosteal incision lateral to the maxillary buttress extending backwards above the maxillary second molar tooth. Blunt dissection through the buccinator and loose surrounding fascia allowed the BFP to herniate into the mouth. The body of the BFP and the buccal extension were gently mobilized by blunt dissection, taking care not to disrupt the delicate capsule and vascular plexus and to preserve as wide a base as possible. Pressure on the cheek helped to express the fat into the mouth (Figure 2). After the pad had been dissected free from the surrounding tissues, it was grasped with vascular forceps, gently teased out, advanced, and expanded over the defects. A hole was created with a fissure bur (702) through the window into the maxillary bone transsinusally. An 18-gauge needle passed through the bur hole, and the penetration site in the palatal mucosa was marked. Then a suture needle was passed through the palatal mucosa and grasped with forceps when it appeared in the elevated sinus, and the BFP was pulled to the sinus floor. Then the needle passed through the palatal bone through the osteotomy site, and the suture was folded in the palatal gingiva (Figure 3). BFP covered the remaining part of the Schneiderian membrane and acted as a barrier between the sinus antrum and the site of graft material placement. A 2:1 mixture of autogenous bone and bovine xenograft (Bio-Oss, Geistlich Pharm AG, Wolhusen, Switzerland) was used as the graft material, and the sinus was then filled with graft mixture (Figure 4). The mucoperiosteal flap was repositioned and sutured (Figure 5). No surgical splint or dressings were used.

Postoperative antibiotic (amoxicillin, 1.5 gm for 10 days) and mouthwash (chlorhexidrine digluconate, 0.2% for 6 weeks) were administered. Postoperatively, the decrease of the depth of the vestibular sulcus gradually improved and was restored almost to the preoperative form about 2 months after the operation. The patient was followed for 4 months after augmentation (Figure 6). After that, posterior maxillary alveolar bone was enough for implant placement.

**Figure 1.** Panoramic view of enlarged right sinus.
Discussion

Anatomically, the BFP consists of a central body and 4 extended processes. It possesses favorable characteristics for the reconstruction of intraoral defects, especially in the posterior maxillary region. The blood supply to the BFP is derived from the buccal and deep temporal branches of the maxillary artery, the transverse facial branch of the superficial temporal artery, and from some small branches of the facial artery. This rich blood supply of the pedicled BFP suggested that it could provide critical vascular support to the mucus membrane covering and to the bone grafts compared to the bioresorbable membranes, which promote both calcified and soft-tissue healing.

This flap is easy to prepare, modify, and relocate, demonstrates a strong ability to resist infection, can be associated with other pedicled flaps, has a minimal incidence of failure when properly performed, completes its epithelialization in a few weeks, needs no microvascular anastomosis, will not lead to perceivable deformity in the donor site (cheek), and causes minimal discomfort for patients.

The limitations of BFP pedicled flap should not be overlooked. This flap can only cover a soft-tissue defect of limited area. Reduction in oral opening, partial necrosis, infection, excessive scarring, and...
sulcus obliteration might also be some complications. Since the size of the defect in sinus augmentation is not that large and its location is near the donor site, these problems are of little importance and were not seen in this case. As the cost is less than the traditional use of resorbable membranes, further studies could be designed to compare the effect of the BFP with collagen membranes.

REFERENCES


