

# Successful Epithelialization Using the Buccal Fat Pad Pedicle in Stage 3 Bisphosphonate-Related Osteonecrosis of the Jaw

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Bisphosphonate-related osteonecrosis of the jaw (BRONJ) is defined as exposed necrotic bone without evidence of healing for at least 8 weeks in the maxillofacial area in a patient with history of bisphosphonate use. Obtaining complete coverage of the hard tissue by soft tissue in BRONJ patients is especially important. Therefore, managing the mucosa is one of the key factors in a successful outcome, but this is especially hard to achieve in BRONJ patients. Various applications of buccal fat pad in oral reconstruction—including the closure of surgical defects following tumor excision, repair of surgical defects following the excision of leukoplakia and submucous fibrosis, closure of primary and secondary palatal clefts, coverage of maxillary and mandibular bone grafts, and lining of sinus surface of maxillary sinus bone graft in sinus lift procedures for maxillary augmentation—have been studied. Eliminating all potential sites of infection and post-operative infection control is crucial in BRONJ. We present a case using the buccal fat pad pedicle for a stage 3 BRONJ defect. Uneventful total epithelialization of the buccal fat pad regardless of size was noted. In summary, the buccal fat pad has versatile application and various recipient sites for surgical utilization. It is an easy technique, with promising overall success rates. With careful selection and handling, buccal fat graft can resolve problems with soft tissue coverage in stage 2 or 3 BRONJ patients.

**Key Words:** Bisphosphonate-associated osteonecrosis of the jaw; Buccal mucosa; Fat pad; Pedicled flap

## Introduction

Bisphosphonate-related osteonecrosis of the jaw (BRONJ) is defined as exposed necrotic bone

without evidence of healing for at least 8 weeks in the maxillofacial area in a patient with history of bisphosphonate use. It was first described by Marx in 2003<sup>1)</sup>. Since then, various treatment

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protocols have been established, with some authors preferring aggressive resections<sup>2</sup>. Still, conservative management and minimal surgical debridement may be the most reasonable treatment of choice to date<sup>3</sup>. Eliminating all potential sites of infection and post-operative infection control is crucial. Obtaining complete coverage of the hard tissue by soft tissue in BRONJ patients is especially important. Therefore, managing the mucosa is one of the key factors in a successful outcome.

In 1732, Heister first recognized the buccal fat pad, terming the perceived glandular structure as 'glandula molaris'<sup>4</sup>. In 1802, Bichat better described the anatomy. It was not until Egyedi<sup>5</sup> first reported the use of the buccal fat pad for oral reconstruction in 1977 that it has been extensively used and studied. Adeyemo et al.<sup>6</sup> and Toshihiro et al.<sup>7</sup> discussed the various applications of the buccal fat pad in oral reconstruction including the closure of surgical defects following tumor excision, repair of surgical defects following the excision of leukoplakia and submucous fibrosis, closure of primary and secondary palatal clefts, coverage of maxillary and mandibular bone grafts, and lining of sinus surface of maxillary sinus bone graft in sinus lift procedures for maxillary augmentation.

We present a case using the buccal fat pad pedicle in a stage 3 BRONJ defect.

## Case Report

A 54-year-old male visited the Department of Oral and Maxillofacial Surgery, Kyung Hee University Hospital at Gangdong in April 2008 with complaints of periodontitis and pain after extraction of #16, #17, #18, and #27 10 months earlier. The patient presented history of breast cancer diagnosed in 2006 and treatment with zoledronate (4 mg intravenous [IV] once every month, Zometa; Novartis, Basel, Switzerland) for 24 months, from 2006 till 2008. Zoledronate administration was stopped on April 29.

The intraoral examination showed swelling, infection, and bone exposure at the #16, #18, and #27 extraction sockets. Panoramic radiographs and computed tomography were initiated, revealing haziness in both maxillary sinuses and sequestrum formation in both left and right maxillary molar areas (Fig. 1).

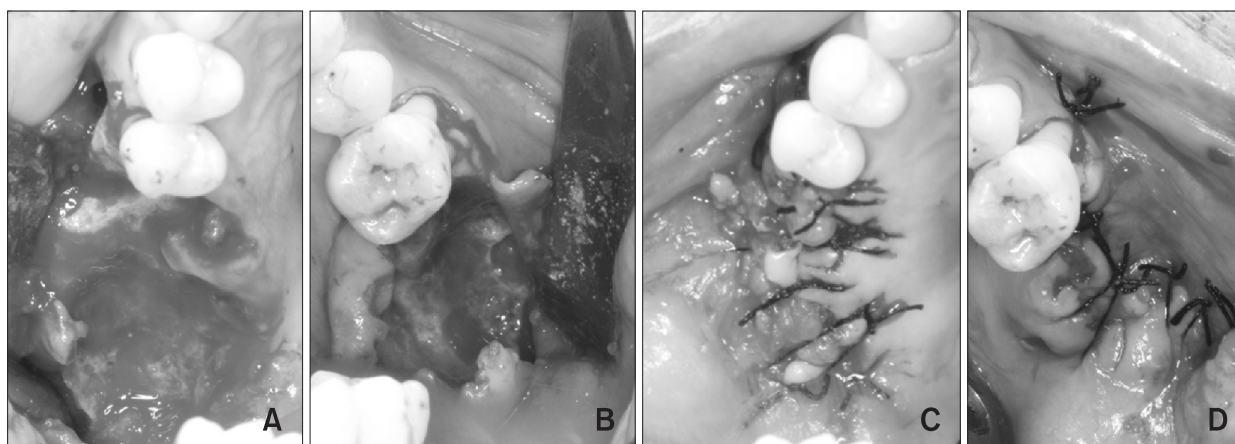
A clinical stage classification according to the presence of lesions, complications such as bone sequestrum, and skin fistulas by Ruggiero et al.<sup>8</sup> was used to diagnose the patient as stage 3 BRONJ.

Surgery was decided according to the American Association of Oral and Maxillofacial Surgeons guideline<sup>3</sup> following sequestrectomy and bone debridement with buccal fat pad pedicle under general anesthesia (Fig. 2A, 2B).

Buccal fat pad was obtained by vestibular incision about 10 mm from the gingiva at the level of the



**Fig. 1.** Pre-operative period. (A) Intraoral photo of bone exposure and infection of the buccal and palatal right maxilla in the patient diagnosed with stage 3 bisphosphonate-related osteonecrosis of the jaw (BRONJ). (B) Intraoral photo of bone exposure of the left maxilla with BRONJ. (C) Panorama view of the maxilla before tooth extraction on the right and left with bone sequestrum (arrows). (D) Computed tomography-axial view of the right and left maxilla with bone sequestrum (arrows).



**Fig. 2.** Peri-operative period. (A) Intraoral photo showing the remaining right maxilla after the removal of the bisphosphonate-related osteonecrosis of the jaw (BRONJ) sequestrum. (B) Intraoral photo showing the remaining left maxilla after the removal of BRONJ sequestrum. (C) Buccal fat pedicle sutured on the right maxilla covering the remaining bone. (D) Buccal fat pedicle sutured on the left maxilla covering the remaining bone.

upper second molar exposing the periosteum and buccal fat pad. Blunt dissection was made to rotate and cover the maxillary defect. The overlying mucosa was sutured over the buccal fat pad in tensionless state, and a biopsy of the excised bone was initiated (Fig. 2C, 2D).

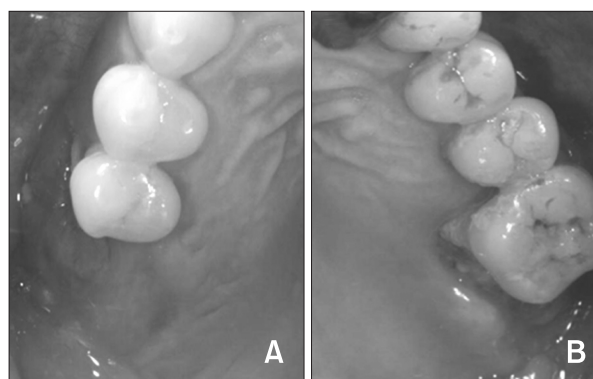
Hospitalization lasted for 8 days postoperation with intravenous administration of cefazedon (3.0 g/d) and saline gargle. For an additional 5 days after hospitalization, cefradine (1.0 g/d) and saline gargle were used.

A biopsy of the excised specimen confirmed acute and chronic osteomyelitis with sequestrum formation, bacterial colonies, and sulfur granules.

Overall, uneventful coverage of the mucosa with total epithelialization of the buccal fat pad regardless of size in the maxilla was noted. Since the treatment was effective, however, the patient did not show up in the next appointment for follow-up treatment. The patient did not take any post-operative radiograph.

## Discussion

In a study by Gallego et al.<sup>2)</sup>, 3 maxillary-stage BRONJ patients were surgically treated with se-



**Fig. 3.** Post-operative period. (A) Intraoral photo showing successful gingival healing of the right maxilla at 1-month follow-up. (B) Intraoral photo showing epithelialization of the soft tissue covering the defective hard tissue of the left maxilla at 1-month follow-up.

questrectomy and reconstructed using the pedicled buccal fat pad and primary mucosal closure, showing satisfactory results. This was consistent with our findings at the 1-month follow-up (Fig. 3).

Tideman et al.<sup>9)</sup> did the first comprehensive study detailing the anatomy of the buccal fat pad, operative technique, and vascular supply. The buccal fat pad seems to have its own mechanism of lipolysis independent of the subcutaneous fat<sup>9)</sup>. It is considered a pedicled graft with axial pattern having rich blood supply.<sup>10)</sup> This may be the reason

for the quick epithelization of the fat<sup>4,10,11</sup> and high success rate. Stuzin et al.<sup>12</sup> found the buccal fat pad to be unrelated to the general adiposity of the cadavers, with even cachectic patients with little subcutaneous fat having buccal fat pads that are normal in weight and volume. The average weight and volume were 9.3 g and 9.6 ml, respectively<sup>12,13</sup>. Therefore, such findings have led to better comprehension and utilization of this pad.

The advantages of buccal fat pad are as follows:

1. Simple skilled technique
2. High success rate
3. Easy access and mobilization of the pad
4. Excellent blood supply
5. Minimal donor site morbidity
6. Versatile application (especially BRONJ)
7. Less disturbance and scarring than other flaps (i.e., buccal advancement flap, palatal rotational flap)
8. Used in combination with other flaps or grafts
9. Minor to no complications
10. Wide pool of patient selection regardless of general condition and age

Despite the high success rates ranging from 96.7%<sup>14</sup> and 98%<sup>10</sup> to 100%<sup>11</sup> some complications have been cited in previous literature, such as limited mouth opening<sup>10,11,15</sup>, prolonged pain<sup>10</sup>, cheek deformity<sup>10,11</sup>, and prosthetic problems due to change of vestibule<sup>10</sup>, partial loss of flap<sup>10,13-16</sup>, hematoma and hemorrhage due to a pedicle of the flap<sup>17</sup>, and recurrent oroantral communications<sup>10,11,13</sup>. Most of these complications have been attributed to low experience or invasive surgery<sup>18</sup>. Buccal fat must be exposed by blunt dissection and handled carefully so that the small blood vessels of the thin capsule are not damaged, thereby reducing hemorrhage and swelling<sup>18,19</sup>. In addition, knowledge of the pad's size limitation is crucial. It is capable of covering defects with diameter of about 4 cm<sup>4,12,15</sup>. Some authors have successfully used it for wider defects measuring 7×5×2 cm and seen successful healing<sup>11,13,16</sup>, but most authors recommend 5×4

cm medium-sized defects<sup>11</sup>. Tension-free sutures must be produced to avoid partial necrosis at the edges, and tension-free precise margins, to reduce unfavorable intraoral esthetics<sup>20</sup>. Taking several factors into consideration, we found no major complications after the surgery.

In summary, the buccal fat pad has versatile application and various recipient sites for surgical utilization. It is an easy technique, with promising overall success rates. The only disadvantage is that it can be used only once, and that defect size must be taken into consideration. With careful selection and handling, buccal fat graft can resolve problems with soft tissue coverage in stage 2 or 3 BRONJ patients.

## Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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