



# Reconstruction of partial maxillectomy defect with a buccal fat pad flap and application of 4-hexylresorcinol: a case report

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**Abstract** (J Korean Assoc Oral Maxillofac Surg 2016;42:370-374)

Mucoepidermoid carcinoma (MEC) is the most common type of malignant neoplasm in the minor salivary gland. The hard palate is a frequently involved site of MEC. The treatment of low-grade MEC on the hard palate is wide local resection with a tumor-free margin. In the present case, the maxillary defect was reconstructed using a buccal fat pad (BFP) flap, followed by application of 4-hexylresorcinol (4HR) ointment for 2 weeks. The grafted BFP successfully covered the tumor resection defect without tension and demonstrated complete re-epithelialization without any complications.

**Key words:** Mucoepidermoid carcinoma, Minor salivary glands, 4-Hexylresorcinol

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## I. Introduction

Mucoepidermoid carcinoma (MEC) is the most common type of malignant tumor in the salivary gland and comprises approximately 12% to 23% of malignant tumors in the minor salivary gland<sup>1</sup>. The tumor can occur in the minor salivary gland of the lip, buccal mucosa, retromolar region, or tongue and floor of the mouth, but the most frequently involved site is the hard palate<sup>2</sup>. MEC of the hard palate presents as an asymptomatic, fixed, slow-growing swollen area, sometimes appearing red or blue in color, is fluctuant and ulcerative, and invades the underlying bone<sup>3</sup>. MEC is categorized as either low, intermediate, or high based on histology<sup>1</sup>. MEC has diverse biological features and variable clinical symptoms depending on the grade and stage of the tumor<sup>4</sup>. Low-grade MEC is generally slow growing and benign, while high-grade

MEC is more aggressive, invades the tissue, and metastasizes<sup>4</sup>. Treatment of low-grade MEC is wide local resection with a tumor-free margin<sup>3</sup>. When low-grade MEC arises in the hard palate, the tumor is resected along with the involved palate mucosa and any underlying bone<sup>5</sup>.

A posterior maxillary or hard palate defect can be successfully covered with a pedicled buccal fat pad (BFP) flap<sup>6</sup>. BFP has been introduced as a pedicled flap for the closure of oroantral communication<sup>7</sup> and has been successfully used to cover oral defects in the posterior maxilla, hard and soft palate, and retromolar region after tooth extraction, saucerization, and tumor resection<sup>6</sup>. BFP is located in the masseteric space between the buccinator muscle and the mandibular ramus and masseter muscle and receives a rich blood supply from the superficial temporal, internal maxillary, and facial arteries<sup>8</sup>. Due to its anatomic location, the BFP can be easily accessed and harvested via an intraoral approach and applied to the posterior oral cavity<sup>6</sup>.

4-Hexylresorcinol (4HR) is a well-known antiseptic used as an ingredient in mouthwash<sup>9</sup>. Because the oral cavity is a septic area, 4HR can be used to prevent postoperative infection<sup>9</sup>. In addition, 4HR differentiates oral cancer cells by increasing the expression of involucrin and keratin 10<sup>10</sup>. The BFP contains abundant stem cells that can differentiate the oral epithelium<sup>11</sup>. If 4HR could accelerate the differentiation

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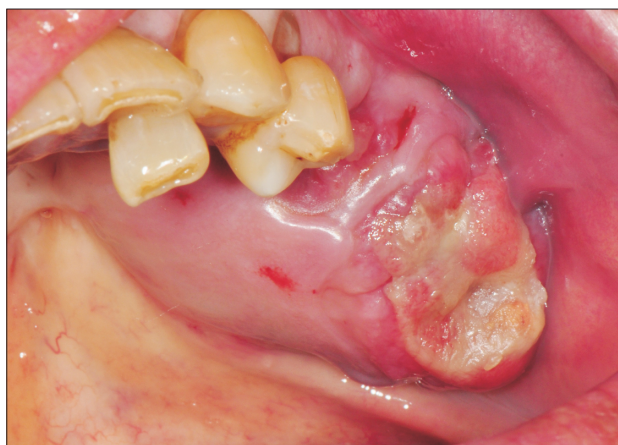
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of BFP-originated stem cells to the oral epithelium, overall healing time would be reduced. Our recent research showed that 4HR ointment suppressed the expression of tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) in burn wounds and increased the epithelialization of skin wounds<sup>12</sup>.

We present a patient diagnosed with low-grade MEC on the left maxillary alveolus and hard palate. The malignant tumor was excised using partial maxillectomy, and the defect was covered with a simple pedicled BFP flap, followed by application of 4HR ointment to heal the wound.

## II. Case Report

A 61-year-old male was referred from a local clinic for continuous swelling of his left maxillary edentulous area after a tooth extraction. He had asymptomatic swelling on the

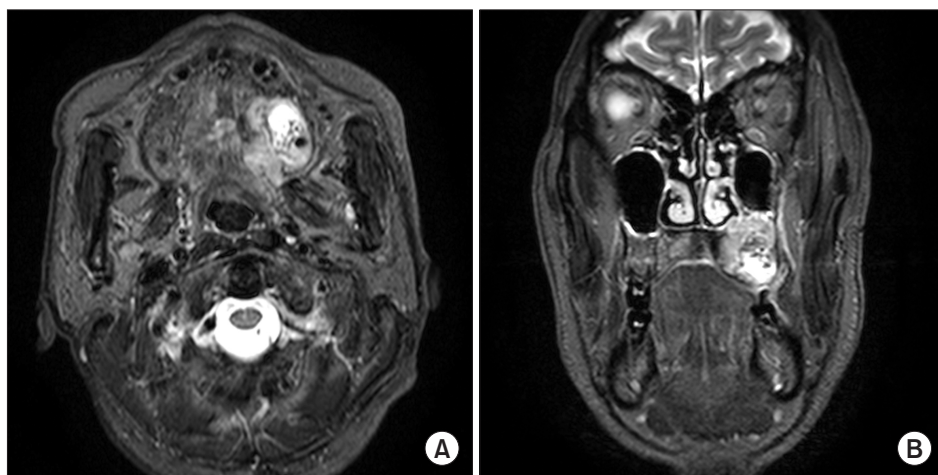


**Fig. 1.** Clinical photograph showing the swelling and ulceration of the left maxillary alveolus and hard palate.  
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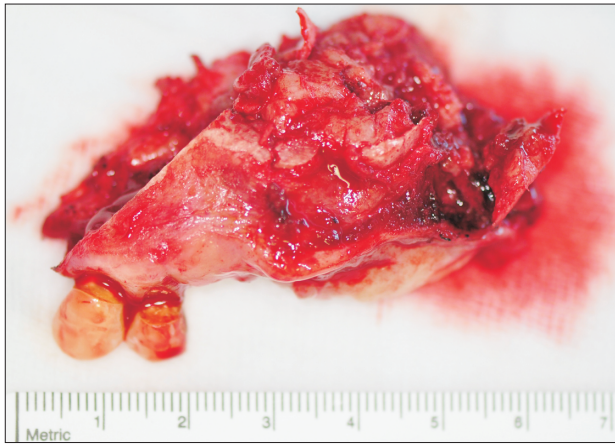
left hard palate and an ulcerative lesion on the left maxillary alveolus.(Fig. 1) A panoramic view showed generalized bone destruction in the left posterior maxillary area, and incisional biopsy was performed for further evaluation. On histological examination, neoplastic proliferation of the epithelial cells, which contained mucous cells, was observed. Tumor cells showed low-grade cellular malignancy. The biopsy result was low-grade MEC on the left hard palate. Magnetic resonance imaging (MRI) was performed, and the mass was observed with central necrosis in the left hard palate.(Fig. 2. A) The mass had destroyed the alveolar process of the maxilla and extended into the soft palate, left maxillary sinus, and inferior wall of the left nasal cavity.(Fig. 2. B) Multiple nodular-shaped lymph nodes were observed around the submandibular gland on contrast-enhanced computed tomography (CT). Metastasis of the lymph nodes was suspected in the submental, submandibular, and upper jugular areas based on positron emission tomography (PET) CT (PET-CT).

Under general anesthesia, a partial maxillectomy was performed from the left maxilla canine to the posterior maxillary tuberosity. The resected tumor mass was approximately 6×4×3 cm.(Fig. 3) An elective neck dissection was performed to remove the left submental, submandibular, and upper jugular lymph nodes. Evidence of nodal metastasis was not observed in the frozen biopsy. After surgical resection, the BFP was harvested and advanced to the defect. The left maxillary sinus and hard palate were successfully covered without tension. (Fig. 4)

Upon histological examination, mucin-producing cells mixed with epithelioid tumor cells were evident in the main tumor mass. A small microcystic formation was also observed. Histological diagnosis confirmed low-grade MEC. We applied 4HR ointment on the BFP-grafted area 1 day af-

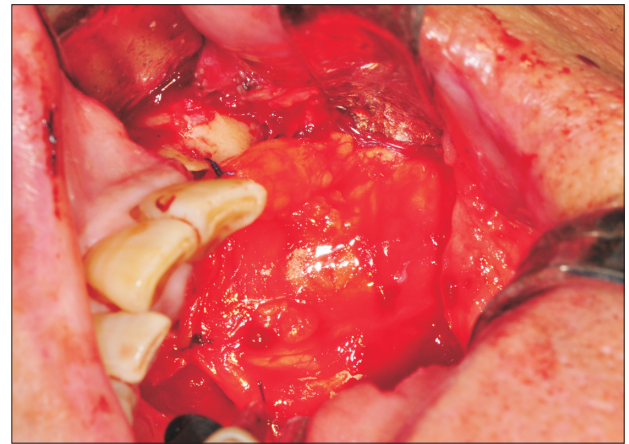


**Fig. 2.** Magnetic resonance imaging of the left hard palate. A. Tumor mass with central necrosis on the left hard palate. B. Extension of the tumor to the soft palate, left maxillary sinus, and inferior wall of the left-side nasal cavity.  
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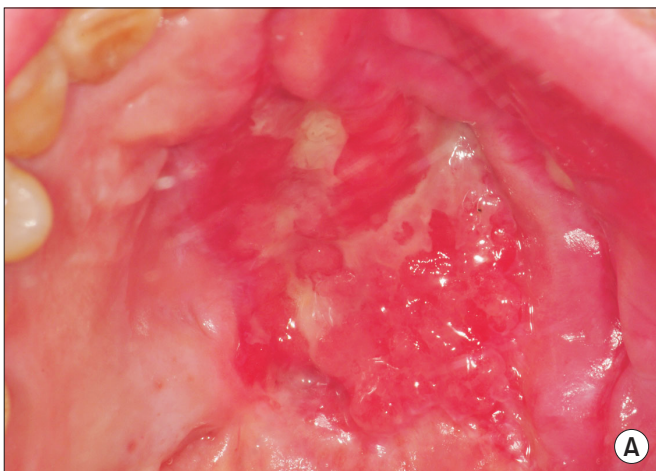
**Fig. 3.** Excised specimen was approximately 6×4×3 cm in size. Histological diagnosis was low-grade mucoepidermoid carcinoma.

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**Fig. 4.** Coverage of the buccal fat pad flap to the tumor resection defect without tension.

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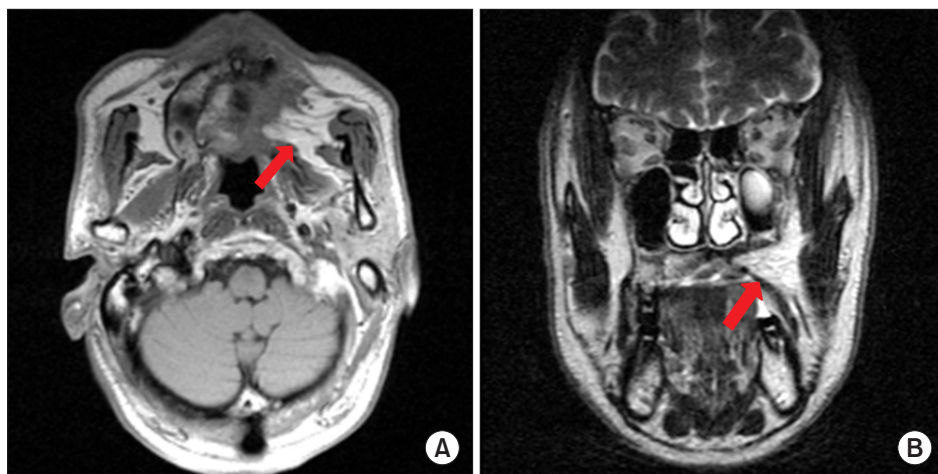
**Fig. 5.** Re-epithelialization of the grafted buccal fat pad 20 days (A) and 8 weeks (B) after surgery.

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ter surgery to promote re-epithelialization. A palatal stent was then applied to prevent the loss of ointment. 4HR ointment was applied once a day for 2 weeks. Re-epithelialization of the grafted BFP was observed 20 days after surgery (Fig. 5. A), and the defect was completely covered without any complication 8 weeks after surgery.(Fig. 5. B) MRI showed that the BFP was located in the left maxillary alveolus and hard palate defect.(Fig. 6) Evidence of recurrence and distant metastasis were not observed on PET-CT at the 5-month follow-up visit.

### III. Discussion

MECs are classified into low, intermediate, and high grades depending on the relative portion of cell types<sup>4</sup>. MEC is composed of various types of cells including mucous-producing, squamous, and intermediate<sup>1</sup>. Low-grade MEC has abundant mucous-producing cells, cystic structures, and few squamous cells<sup>3</sup>. Intermediate-grade MEC is histologically between low-grade and high-grade MEC and has fewer cysts and more prominent intermediate cells with a minor degree of mitotic activity and cellular atypia<sup>1</sup>. High-grade MEC has a relatively high proportion of squamous cells, a greater degree of mitotic activity, and infrequent mucous-producing cells or



**Fig. 6.** Axial (A) and coronal (B) views showing the grafted buccal fat pad located in the left maxillary alveolus and hard palate defect (arrows) at the 8-week follow-up.

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cysts<sup>1</sup>. High-grade MEC has local infiltration and grows aggressively, similar to squamous cell carcinoma<sup>4</sup>. Radiologically, high-grade MEC has irregular, poorly-defined margins and infiltrative adjacent tissue, while low-grade MEC demonstrates a well-delineated mass similar to a benign tumor<sup>3</sup>.

The MEC treatment varies based on the tumor location, clinical stage, and histological grade<sup>3</sup>. If MEC occurs in the parotid gland, a parotidectomy is performed, and the facial nerve will be excised<sup>4,13</sup>. MEC of the minor salivary gland in the hard palate is treated with wide local resection<sup>3</sup>. Low-grade MEC is surgically excised in a single piece along with the involved underlying mucosa and bone for an adequate tumor-free margin<sup>5</sup>. High-grade MEC has local infiltration and regional lymph node metastasis<sup>14,15</sup>, requiring wider surgical resection with postoperative radiotherapy or chemotherapy<sup>1,16</sup>. Lymph node metastasis can occur in low-grade MEC<sup>1</sup>.

The biopsy result of the present case was low-grade MEC, and a reactive lymph node was suspected around the left submandibular gland based on contrast CT. Therefore, elective neck dissection was performed along with tumor resection. Low-grade MEC has a favorable prognosis; the 5-year survival rate is 76% to 95%, and recurrence has rarely been reported<sup>17</sup>.

The BFP has been widely used as a pedicled flap in the oral cavity for closure of an oroantral fistula, coverage of a sequestrectomy defect in osteomyelitis, regenerative treatment of peri-implantitis, and treatment of oral submucous fibrosis<sup>6,8</sup>. Reconstruction using the BFP is considered a reliable technique due to an excellent blood supply, minimal morbidity, easy harvest, and simplicity<sup>18</sup>. The posterior maxilla, hard palate, and retromolar trigone are the ideal defects for reconstruction with the BFP due to anatomical proximity

to these areas<sup>6</sup>. The BFP provides a 7×4×3 cm pedicled tissue when proper dissection and advancement are performed<sup>11</sup>. Many authors recommend reconstructive surgery using the BFP with defects smaller than 4×5-cm size<sup>18</sup>. Our patient's MEC specimen measured approximately 6×4×3 cm.(Fig. 3) The involved defect area was the left maxillary canine to the tuberosity, the hard palate, and the sinus mucosa floor. We carefully harvested and advanced the BFP flap and successfully covered the defect without tension.(Fig. 4)

Epithelization of the grafted BFP begins 1 week after surgery, and complete healing is noted within 4 to 6 weeks<sup>6</sup>. This is accomplished by migration of the epithelial cells from the surrounding tissue in the flap margin<sup>19</sup>. At first, the superficial layer of the BFP is replaced with granulation tissue; however, this eventually turns into stratified squamous epithelium<sup>18</sup>. Histologically, parakeratotic squamous epithelium covers the healed site, and dense fibrous connective tissue is present in the subcutaneous stroma<sup>18</sup>. To promote re-epithelialization of the large graft area, we applied 4HR ointment on the BFP area due to its antiseptic and broad-spectrum antibacterial properties<sup>10</sup>. 4HR inhibits foreign body giant cell formation via the diacylglycerol kinase (DAGK)-mediated pathway<sup>20</sup> and suppresses the expression of TNF- $\alpha$ <sup>12</sup>. In a recent study, 4HR ointment was applied to a burn wound, and rapid epithelialization and collagen regeneration occurred<sup>12</sup>. In the present study, we applied 4HR ointment on the graft area for rapid re-epithelialization. The large graft area was re-epithelialized 20 days after surgery.(Fig. 5. A) During the healing process, minimal complications such as infection, hematoma, or partial necrosis were noted<sup>11</sup>. However, these complications have rarely been reported, and as in our previous study, most cases of BFP flap successfully covered the saucerization defect without any complications<sup>14</sup>. In the pres-

ent case, the grafted BFP was completely epithelialized and covered the defect.(Fig. 5. B)

The hard palate is a frequently involved site of low-grade MEC<sup>14</sup>. We surgically resected low-grade MEC on the left maxillary alveolus and hard palate and successfully covered the large defect with a BFP flap. 4HR ointment was applied to the fat graft area for rapid re-epithelialization and wound healing. The grafted BFP was completely re-epithelialized without complication. Based on the results from this case, we confirmed that BFP grafting is a simple, reliable, and minimally complicated technique for reconstruction of posterior palatal defects, and 4HR is a clinically useful ingredient to promote re-epithelialization of fat.

### Conflict of Interest

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

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