

## Case Report



# A Patient who Underwent Reconstruction of Nasal-Alar with Auricular Helix Composite Graft and Application of bFGF

Kazuhide MATSUNAGA, Shinichi ASAMURA, Hirohisa KUSUHARA,  
Mitsuhiro WADA, Yoshihito ITANI and Noritaka ISOGAI

Department of Plastic and Reconstructive Surgery, Kinki University School of Medicine

### Abstract

The patient was a 24-year-old male with traumatic nasal defect on the right side. We performed reconstruction of the nasal defect with a forehead flap 4 months after injury. However, the patient chose not to attend our outpatient clinic for follow up. Then the patient consulted our hospital 8 months after the reconstruction due to stricture of the nasal cavity on the right side. The length of the nasal cavity on the right side was half as long as that on left side. We performed reconstruction of the nasal-alar with an auricular helix and cartilage composite graft (20×12 mm) 9 months after the initial reconstruction. Perioperatively, we applied basic fibroblast growth factor (bFGF) in order to promote vascularization between the stump of the composite graft and the alar tissue. The composite graft took and the shape of nose was fairly good postoperatively. This outcome suggests that perioperative application bFGF to the stump of the soft tissue was a useful method to promote take of the composite graft.

**Key words:** nasal-alar, auricular helix composite graft, basic fibroblast growth factor (bFGF)

### Introduction

For appropriate cosmetic and functional reasons, it is necessary for patients who have lost nasal tissue

to undergo reconstruction of nasal defect. Nasal defects have been classified into seven areas<sup>1)</sup>. Methods of reconstructing nasal defect differ with the nasal area. There have been many reports in which nasolabial cheek flap, island subcutaneous pedicle flap or auricular helix composite graft were considered appropriate for reconstruction of nasal-alar<sup>1-5)</sup>, and forehead flap or auricular helix free flap were considered appropriate for reconstruction of a large nasal defect<sup>1,6-9)</sup>.

We encountered a patient who underwent reconstruction of nasal-alar and nasal-apex defects with a forehead flap. However, stricture of the nasal cavity on the reconstructed side was observed postoperatively. And then, we performed salvage reconstruction of the nasal-alar with auricular helix composite graft. There have been reports that bFGF can play a role as an accelerator of neovascularization to promote vascularization of soft tissue<sup>10,11)</sup>. To promote take of the composite graft, we applied bFGF to the stump of the composite graft and the alar tissue perioperatively, then sutured the composite graft. We report the clinical course and discuss this case.

### Case

The patient was a 24-year-old male. During an epileptic seizure, he lost consciousness and fell into a gutter in April 2006. He sustained multiple soft tissue wounds of the face and was brought to our hospital the same day. **Fig. 1** shows the facial view at the initial examination. With regard to nasal wound, the nasal-alar and nasal-apex on the right side was turned over and connected with the alar base on the right side. Blood flow in the nasal tissue was poor (**Fig. 1A**). Further, we observed many wounds of the upper lip, lower lip, labial mucosa, gingival mu-

Received: November 2, 2009/Accepted: December 2, 2009

Correspondence to: Kazuhide Matsunaga  
Department of Plastic and Reconstructive Surgery,  
Kinki University School of Medicine, 377-2 Onohi-  
gashi, Osakasayama, Osaka 589-8511, Japan

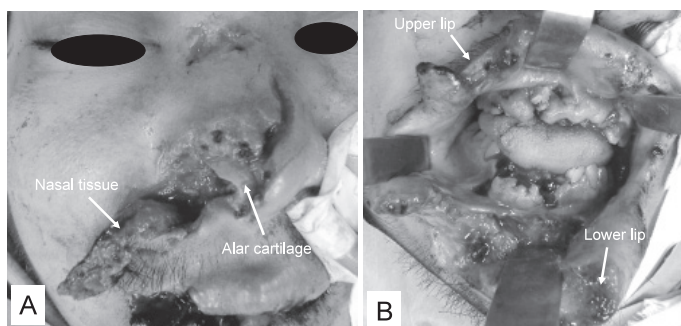


Fig. 1 Facial findings at the initial examination.

A : nasal findings.

B : lip and intra-oral findings.

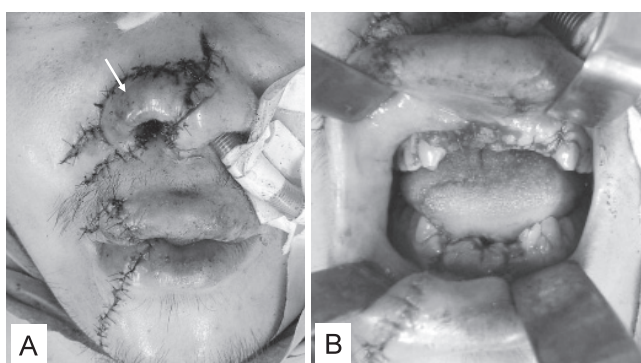


Fig. 2 Findings immediately after reduction.

A : nasal and extra-oral findings (arrow : The blood flow was poor).

B : intra-oral findings.

cosa and tongue as well as the loss of teeth (Fig. 1B).

### Surgical Procedure and Postoperative Course

We performed reduction of the nasal tissue, upper lip, lower lip, labial mucosa, gingival mucosa and tongue tissue during the initial examination (Fig. 2A, B). Blood flow in the reduced nasal tissue did not seem good immediately after reduction (Fig. 2A). Although we expected blood flow recovery to occur postoperatively, most of the reduced nasal tissue became necrotic 7 days after reduction (Fig. 3A). We observed traumatic nasal defect on the right side 3 months after reduction (Fig. 3B). Therefore, we performed reconstruction of nasal defect on the right side with a forehead flap 4 months after reduction (Fig. 4A). We performed separation

of the flap 20 days after the reconstruction (Fig. 4B). Although, the take of the flap was good after the reconstruction, the patient chose not to attend our outpatient clinic for follow up. As a result, the patient returned to our hospital 8 months after the reconstruction due to stricture of the nasal cavity on the right side. Fig. 5 shows the findings of the bilateral nasal cavities 9 months after reconstruction. The length of the nasal cavity on the right side was 15 mm, while the length of the nasal cavity on the left side was 30 mm. The length of the nasal cavity on the right side was half as long as that on the left side (Fig. 5). We performed salvage reconstruction of the nasal-alar with auricular helix and cartilage composite graft 9 months after the initial reconstruction in order to expand the nasal cavity. First, we removed the scar at the alar base on the

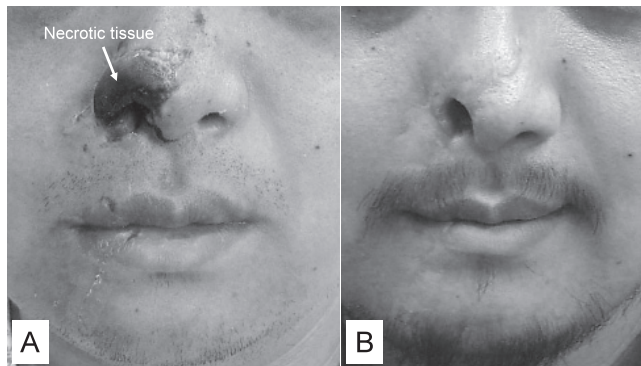


Fig. 3 Nasal findings after reduction.

A : 7 days after reduction.

B : 3 months after reduction.

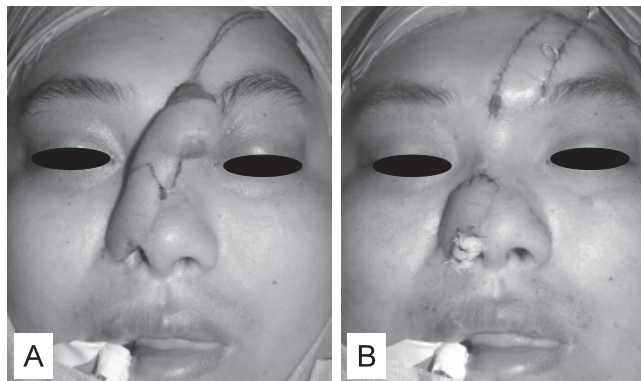


Fig. 4 Surgical findings at reconstruction.

A : reconstruction with median forehead flap.

B : separation of the flap 20 days after reconstruction.

right side, then rotated the nasal mucosa to the median side in order to expand the nasal cavity. Then we harvested the auricular helix with cartilage ( $20 \times 12$  mm) on the right side (**Fig. 6A**) and grafted the tissue to the alar base on the right side (**Fig. 6B**). Then we took neovascularizational accelerator of the composite graft into consideration, we applied the bFGF to the stump of the composite graft and the alar tissue and we sutured the composite graft. With regard to postoperative treatment, we took vasodilation of peripheral blood vessels in the alar tissue into consideration and administered Prostaglandin E1,  $120 \mu\text{g} / 1$  day for 4 days<sup>12)</sup>. We also maintained the composite graft wet with Prostaglandin ointment for 2 weeks postoperatively. The composite graft took postoperatively. We directed the patient to maintain the nasal tube

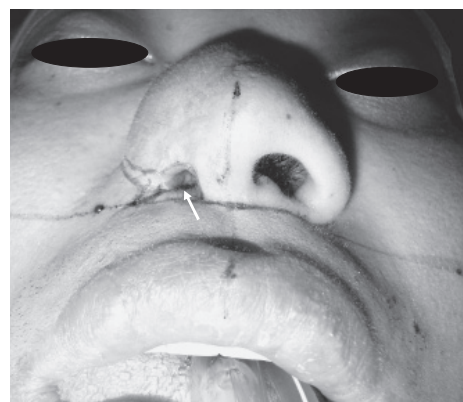


Fig.5 Findings of the nasal cavity 9 months after reconstruction.

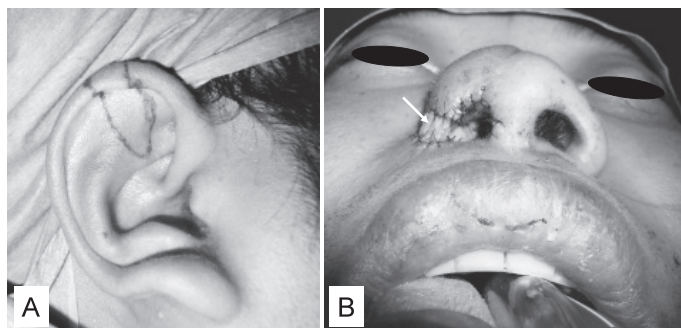


Fig. 6 surgical findings of the auricular helix with cartilage composite graft.

A : auricular helix with cartilage (12×20 mm).

B : composite graft (arrow).

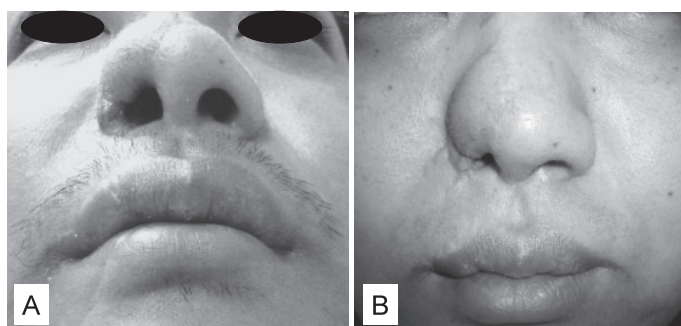


Fig. 7 Nasal findings after composite graft reconstruction.

A : 6 months after reconstruction.

B : One year after reconstruction.

in place for 6 months in order to prevent stricture of the nasal cavity. **Fig. 7A** and **Fig. 7B** show the nasal findings 6 months and one year postoperatively, respectively. There was no stricture of the nasal cavity on the right side and the shape of nose was fairly good.

## Discussion

We performed reconstruction of the nasal-alar. There have been some reports that a local flap, such as a nasolabial flap, nasolabial cheek flap or island subcutaneous pedicle flap, and auricular helix composite graft are appropriate for reconstruction of the nasal-alar<sup>1-5)</sup>. With regard to the local flap, we considered that blood flow in the soft tissue would be poor because of traumatic scar in this case and that we would not be able to reconstruct the cartilage to provide supportive tissue. Therefore, we selected reconstruction with auricular helix composite graft.

However, it is necessary to use a neovascularizational accelerator of tissue considering the size of composite graft. Millard<sup>13)</sup> suggested that size of composite graft should be 1 cm or less. Uchida et al<sup>14)</sup> and Hirase et al<sup>15)</sup> suggested that composite graft in 1.5 cm or 2.0 cm could be taken when the composite graft was covered with aluminum foil and chilled on ice for 72 hours. Furthermore, they administered Prostaglandin E1, which promotes vasodilation of the peripheral blood vessels of the donor tissue, postoperatively<sup>14,15)</sup>. In this case, we performed reconstruction with the composite graft in 2.0 cm. There have been reports that bFGF can play a role as accelerator of neovascularization to promote vascularization of soft tissue<sup>10,11)</sup>. Therefore, we used bFGF contained in particulate gelatin perioperatively. We applied bFGF to the stump of the composite graft and the alar tissue, then we sutured the composite graft. And then, we administered

Prostaglandin E1 to promote vasodilation of peripheral blood vessel in the alar tissue postoperatively. The composite graft took postoperatively.

It is suggested that the composite graft took because bFGF promoted vascularization between the stump of the composite graft and the alar tissue and administration of Prostaglandin E1 promoted vasodilation of the peripheral blood vessels in the alar tissue.

This outcome suggests that perioperative application of bFGF to the stump of the soft tissue and postoperative administration Prostaglandin E1 were useful for promoting take of the composite graft.

## References

- 1) Matsui M, Ninomiya K, Kurihara K : Nasal reconstruction following malignant tumor excision. *Jpn J Plast Surg* 46 : 927-935, 2003
- 2) Rohrich RJ, Conrad MH : The superiorly based nasolabial flap for simultaneous alar and cheek reconstruction. *Plast Reconstr Surg* 108 : 1727-1731, 2001
- 3) Yitsuyanagi T, Yamashita K, Urushidate S, et al : Nasal reconstruction based on aesthetic subunits in orientals. *Plast Reconstr Surg* 108 : 794-796, 2001
- 4) Iwao F : Alar reconstruction with subcutaneous pedicled nasolabial flap : difficulties, considerations, and conclusions for this procedure. *Dematol Surg* 31 : 1351-1354, 2005
- 5) Vural E : Reconstruction of the retracted nasal alar margin. *J Craniofac Surg* 18 : 442-445, 2007
- 6) Menick FJ : Nasal reconstruction with a forehead flap. *Clin Plast Surg* 36 : 443-459, 2009
- 7) Kobayashi S, Honda T, Kashiwa K : Reconstruction of the nasal lining and framework. *Jpn J Plast Surg* 46 : 909-915, 2003
- 8) Tanaka Y, Ki-chul, Oda A, et al : Nasal reconstruction with an auricular helix free flap. *Jpn J Plast Surg* 46 : 901-908, 2003
- 9) Sakai A, Ueno A, Yokoyama M, et al : A case report of nasal cancer successfully resected with reconstruction of nasal defects using an auricular helix free flap. *Jpn J Pica Otologica* 100 : 187-191, 2007
- 10) Tabata Y, Nagano A, Ikada Y : Biodegradation of hydrogel carrier incorporating fibroblast factor. *Tissue Eng* 5 : 127-138, 1999
- 11) Ikada Y, Tabata Y : Protein release from gelatin matrices. *Adv Drug Deliv Rev* 31 : 287-301, 1998
- 12) Jacen N, Ake W : Influence of indomethacin and of prostaglandin E1 on total and regional blood flow in man. *Acta Physiol Scand* 102 : 484-491, 1978
- 13) Millard DR : Reconstructive rhinoplasty of the tip. *Clin Plast Surg* 8 : 507-520, 1981
- 14) Uchida M, Hirase Y : Reconstruction of the nasal tip using a composite graft from the antitragus. *JJTOM* 43 : 590-593, 1995
- 15) Hirase Y, Uchida M : Ice-water cooling method in composite graft for nasal-alar reconstruction. *JJTOM* 41 : 87-89, 1993