

# Selection of nasal defect reconstruction techniques after removal of basal cell carcinoma

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**Abstract:** The most common facial skin cancer among Japanese is basal cell carcinoma, occurring most commonly in the nose area (25.5%). BCC of any type and stage will eventually need surgical removal with a minimum safety margin of 4 mm to reach the optimal cure rate. This procedure leads to important considerations concerning the reconstruction technique after removal by a plastic surgeon. The nose is a unique subunit of the human face due to its functional and aesthetic importance. A proper reconstruction technique suited to the lesion location, defect size and nasal defect is thus necessary for each case. Over the past 14 years and 50 patients, we performed 6 surgical techniques including bilobed flap, Limberg flap, axial frontonasal flap, angular flap, nasolabial flap and skin graft. We also did conservative treatment using artificial dermis and ointment in some cases when the defect size was under moderate and the granulation active. Nasolabial flap is the technique that we used the most, as it is applicable to the nasal defect at multiple subunits area. We herein report cases using nasolabial flap in different areas and a case of conservative treatment following BCC removal in our department.

**Keywords:** Basal cell carcinoma, head and neck reconstruction, head and neck local flaps

## Introduction

Basal cell carcinoma (BCC) is the most common type of skin cancer among Japanese, accounting for about 24% of all skin cancers. Every year, approximately 4 new BCC cases per 100,000 people are reported.<sup>1</sup> BCC is commonly found in elderly patients, and 70% of lesions occur on the face, especially the nose (25.5%).<sup>2-5</sup> These findings are linked to exposure to ultraviolet (UV) radiation from sunlight. Other risk factors include hair-bearing skin, light skin, trauma, chronic skin damage, >65 years old and male gender. However, recently, the incidence in women has been increasing because of a culture shift toward engaging in outdoor activities or outdoor-associated occupations.<sup>1,6</sup>

While metastasis cases are rare, BCC can progress locally and destroy the surrounding bone as well as soft tissue if left untreated. The nose is a unit of the human face and maintains a central position with functional and aesthetic importance. It is made from convex and concave surfaces, separated from one another by ridges and valleys. In addition, the nose has a three-layered structure consisting of external skin and muscle, supported by a skeletal framework of cartilage and bone and an internal lining. The aesthetic subunits of the nose, defined by Burget and Menick, are used to guide nose reconstruction due to the characteristic skin quality, contour and border outline of each subunit. These subunits are the dorsum, tip,

columella and paired sidewalls, alar lobules and soft triangles.<sup>5,7-9</sup>

There are many treatments of choice for BCC, including curettage and electro-desiccation, cryosurgery, 5-fluorouracyl, Mohs surgery and conventional surgical techniques. When conventional surgical is chosen, a safety margin of 4.0 mm for primary BCC <20 mm in diameter and 5.0 mm for that  $\geq 20$  mm in diameter is considered sufficient to reach a 95% cure rate.<sup>1,6,10-12</sup>

After the removal procedure, appropriate reconstruction is needed to replace the missing layers with similar tissue, maintain airway patency, minimize morbidity and optimize aesthetics. The nose has a complex and unique structure, which makes it challenging for plastic surgeons to perform reconstruction after removal of BCC from the nose.<sup>9</sup>

We herein review our 14-year experiences with nasal reconstruction after BCC surgical removal and chose some cases that are interesting to be discussed. Surgical defects were repaired in each subunit with consideration of the surrounding skin quality, tone and texture when choosing the reconstruction technique.

## Methods

### 1. Patients and Methods

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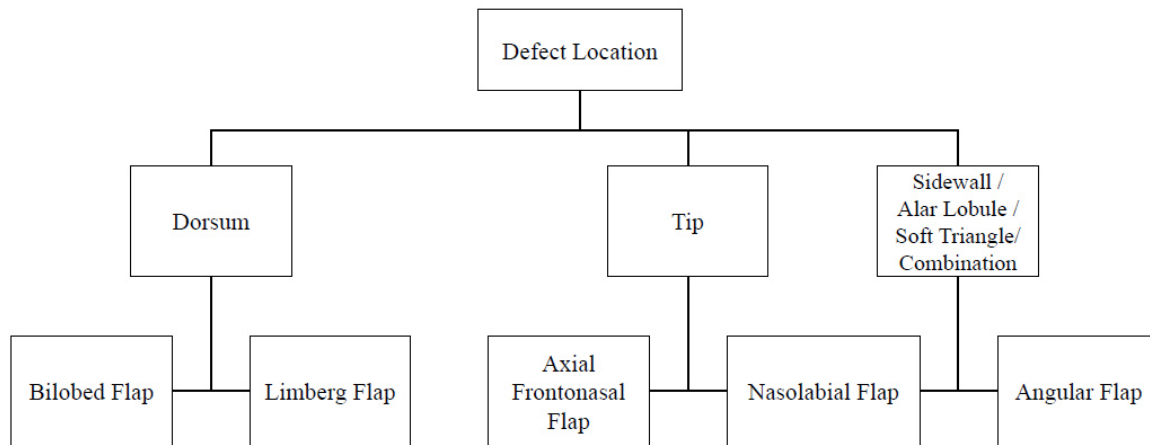


Figure 1. Reconstruction operative technique consideration based on the defect area

Consecutive patients (n = 50) from our Plastic and Reconstructive Surgery Department referred for excision of BCC on the nose from April 2006 to December 2019 were included. All patients entering our hospital provide consent to allow publication of their photos and data. They comprised 26 males and 24 females, 34 to 95 years old. The BCC lesion size ranged from 1 to 20 mm. Based on aesthetic subunits, the most involved part is the sidewall (31%), followed by the tip (28%) and alar lobule (28%). The BCC lesion was located in a single or combination of subunits. We did not find any BCC lesions in the columella area.

The techniques for reconstruction surgery performed at our facility were bilobed flap, Limberg flap, axial frontonasal flap, angular flap, nasolabial flap and skin graft. The reconstructive modality of choice largely depended on the location, size and depth of the surgical defect. Based on the defect locations, we performed various flaps for each subunit, as presented in Figure 1. The most patients were reconstructed using nasolabial flap and conservative treatment (18 patients for each technique). Therefore, we describe representative cases in this article.

## 2. Surgical Technique

When a BCC diagnosis was suspected based on a physical examination or prior biopsy, we performed surgical excision in the operation room under local or general anesthesia. According to the Japanese guideline for BCC, we excised the lesion with a 4-mm surgical margin.<sup>12</sup> In several cases in which the BCC had developed within a short period or had shown a deep ulcer or thick lesion, we performed an excision with a larger surgical margin of up to 6 mm. In a particular type of morpheiform BCC, a margin of 10 mm is needed, but we encountered no cases of this type of BCC in our experience. During surgery, we examined whether or not the BCC was invasive to determine which layers to excise. The depth of the defect was skin only or with underlying cartilage/bone and/or inner lining mucosa. All specimens were subjected to a histological examination.

Immediately after BCC excision, wounds were managed using artificial dermis. The excised tissue was pathologically confirmed to be tumor-free at the side margin and the bottom. The silicone sheet of artificial dermis was removed about two or three

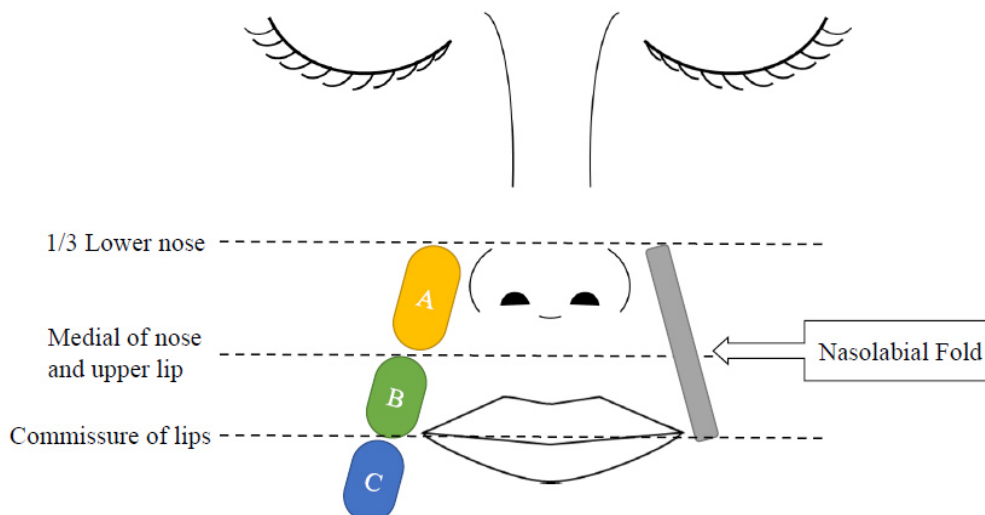
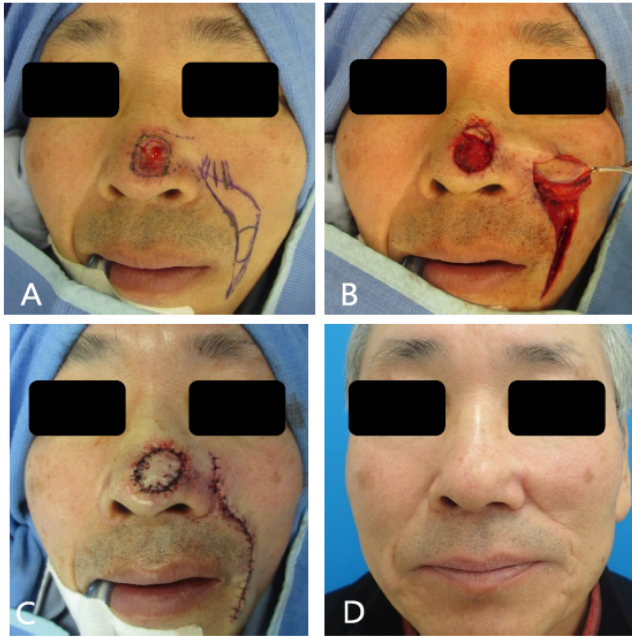


Figure 2. Nasolabial flap classification based on the donor site.



**Figure 3.** Nasolabial flap B for nasal tip defect reconstruction. An 18-mm BCC seen at the nose tip area. The flap was designed with the incision line at the nasolabial fold (A). Parts of the flap were denuded to adjust the defect size. The flap was then rotated to cover the defect area (B, C). Results after two years (D).

weeks after the application, and new granulation tissue was seen beneath. We then either performed reconstructive surgery or continued wound treatment at the outpatient clinic. While we took into consideration the patient's age, health condition for second surgery and preferences, it should also be noted that wound treatment with ointment at the outpatient clinic could only be performed when the defect involved the skin layer alone.

## Results

### a. Nasolabial flap

The nasolabial flap is a widely used technique for nasal reconstruction and can be very useful for rematching the skin tone and convexity of the nose. Donor closure is adjusted to the nasolabial fold, as planned in the preoperative design, resulting in an unmarked scar and normal form around the nasolabial area. Indications for the nasolabial flap include reconstruction of the nasal alar, soft triangle, tip and dorsum.<sup>13,14</sup>

Based on the donor site of the nasolabial flap, we divide this flap into A, B and C, as shown in **Figure 2**. The area used depends on the defect location, size and depth. When the defect is located close to the nasolabial fold, we use donor site A. Combination of A and B is used when large and thick donor tissue is needed. Long pedicle flaps for distant defects are closed with donor site B. Defects after full thickness excision of invasive BCC usually need conchae

cartilage graft and have a substantial volume and area of the donor site. For such defects, we extend the nasolabial flap to donor site C. In order to indicate nasolabial flap for nasal reconstruction, angular artery or vascular plexus at the alar base is generally included in the pedicle. Especially when using the donor site B plus C, the vascular plexus is better to be included in the flap pedicle. We present a case using the nasolabial flap donor site B for defect at the tip area. Another case is using extended donor site A, B and C for invasive BCC which cartilage graft is needed to replace the inner lining.

- Nasolabial Flap B

Nasolabial donor site B is located at the same level as the upper lip (**Figure 2**). This site is used to cover medium-size defects in distant areas that need a long pedicle. We encountered a 66-year-old male with an 18-mm BCC at his nose tip. The BCC was removed as far as the subcutaneous layer. A nasolabial flap was then used to cover the defect, with only site B as the donor site, since it fit the defect size. Excellent results with regard to skin color and texture matching were seen at two years after surgery (**Figure 3D**).

- Extended Nasolabial Flap

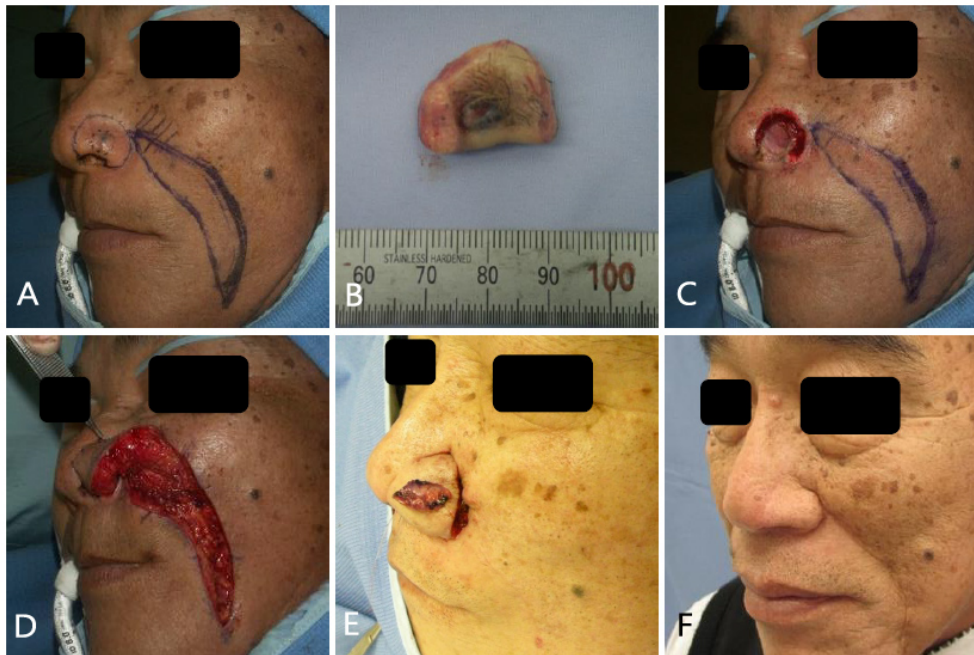
In **Figure 2**, area of donor site C extends outside of the nasolabial fold. We extend the incision of nasolabial flap to this level when a long and thick donor site with a sufficient pedicle, which includes the vascular plexus at the alar base, is needed. As a representative case (**Figure 4**), a 64-year-old male with 7-mm invasive BCC located at the left alar area is described.

We removed full-thickness tissue, as the BCC had invaded the inner lining mucosa (**Figure 4B**). An extended nasolabial flap supported by a concha cartilage graft was used to prevent the collapse of left nostril, and the distal tip of the flap was folded to cover the cartilage and the roof of the nostril vestibule. An excellent result was seen at two years follow up (**Figure 4F**).

### b. Artificial dermis and ointment

Artificial dermis is widely used in Japan for general wound treatment. The artificial dermis that we used was either Terudermis® (Mesh Reinforced Type; Olympus Terumo Biomaterials Corp., Tokyo, Japan) or Pelnac® (Gunze Co., Ltd., Japan). Artificial dermis can be used to protect the wound while waiting for the next surgery or as a treatment itself. It consists of collagen sponge covered with a silicone layer. The cells from the basal and surrounding tissue can then grow into the collagen sponge, degrading the collagen





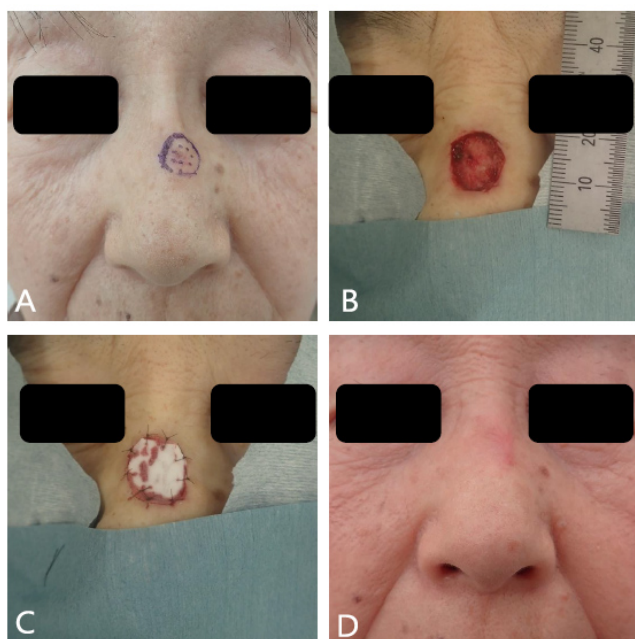
**Figure 4.** Extended nasolabial flap including donor sites A, B and C with a conchae cartilage graft for full-thickness nasal alar defect reconstruction. A 7-mm invasive BCC seen at the left alar area. The flap was designed with the incision line at the nasolabial fold (A). The BCC had invaded the inner lining mucosa (B). A full-thickness defect was seen (C). The flap was then transposed to the defect area (D) with an adjunct conchae cartilage graft (E). Appearance of the nose two years later after BCC removal surgery (F).

over time and replacing it with new granulation tissue. The silicone layer is there to prevent evaporation and keep the wound moist.<sup>15</sup>

After removing BCC lesions that include cutis and subcutaneous layers, we applied artificial dermis followed by ointment treatment at the outpatient clinic, generally until a tumor-free had been pathologically confirmed. We usually investigated the wound healing at the defect at this occasion, and if it was found to be poor, flap reconstruction was indicated along with the

original plan. In cases with good wound healing, however, conservative treatment using ointment or more artificial dermis was continued. We performed this approach for BCC lesions ranging from 1 to 15 mm in size and usually for older patients.

A-73-year-old female with a 5-mm BCC lesion on the dorsal side is described in **Figure 5**. Artificial dermis was applied right after BCC removal (**Figure 5C**). Treatment was performed using antibiotic ointment in the outpatient clinic. The defect then fully healed with a good appearance, as seen in **Figure 5D**.



**Figure 5.** Artificial dermis with ointment treatment for skin defect after BCC removal. A 5-mm BCC was seen at the dorsum area (A). Skin defect after excision of BCC (B). The defect was covered with artificial dermis (C). Results after six months of ointment application (D).

### Discussion

Nasal soft tissue has certain characteristics, being generally thick and rigid. Our basic policy for managing nasal defects after removal of BCC is thus flap reconstruction. A local flap from the surrounding area of the nose is the most preferable, due to the close skin texture match. However, a free skin graft is indicated in older patients, those with a poor general condition or whenever best suited to the patient. We performed a free skin graft from the glabella to reduce deep wrinkling (figures not shown in this article). When a patient is contraindicated for surgery, ointment treatment after two weeks of artificial dermis application can also achieve good results. The wide range of choices in reconstructive technique can sometimes make choosing difficult. Considering the defect location based on the nose aesthetic subunit can help surgeons imagine the pedicle length. The donor site area and volume availability are also important for repairing structural loss defects. Cartilage grafts are important for preventing nostril collapse after full-

thickness alar lobule removal. When designing the flap, it is also important to consider the closure of the donor site and minimize visible scarring after surgery. When the nasal defect is wide, modification of the basic reconstructive technique is also possible, as with the extended nasolabial flap (**Figure 4**).

## Conclusion

The modality of nasal defect reconstruction is not limited to a single technique for each location or defect size. Plastic surgeons must consider the defect condition, donor condition and patient's general condition before choosing the right technique.

## Conflicts of interests

The authors have no conflicts of interest.

## Acknowledgements

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