

## A Hospital Based Observational Study Evaluating Outcomes of Nasal Reconstruction by Local Flaps and Full Thickness Skin Graft

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### Abstract:

**Aim:** The aim of the present study was to assess the outcomes of nasal reconstruction by local flaps and full thickness skin graft.

**Material & Methods:** 20 cases of nasal injury attending to RDJM Medical College & Hospital, Muzaffarpur have been evaluated for the age, sex, size, depth, and etiological factor of these injuries. In this prospective study of nasal reconstruction by local flap v/s full thickness graft, to give the best management protocol to the patient and evaluate the outcome in term of function and aesthetics, e.g. patient satisfaction with a particular management.

**Results:** There were 40% patients who were more than 51 years of age. 75% were male and 25% were females. 70% belonged to rural area. According to etiology, 45% were traumatic followed by malignancy 35%. 50% had tip, Supratic, Part of ala, (Lower 1/3 of the nose) location of defect. 45% had size of defect more than 4 cm. 70% had full thickness in terms of depth of defect. In 50% cases, forehead flap was used followed by nasolabial flap. For method of internal lining, in 71.42% hinge flap was used. In the present study, 60% showed excellent results followed by 20% who showed good results.

**Conclusion:** It can be concluded that the local flap is the most versatile and reliable tool for reconstruction of small to large nasal defects but one cannot ignore the usefulness of FTSG in nasal reconstruction. One must consider the patient's condition, functional needs as well as their expectations regarding the result. Additionally, the patient's tolerance for single –or multi-stage procedures should be determined. The patients should be allowed to have active role in decision making, particularly if it involves undertaking a complex multi-stage procedure.

**Keywords:** Nasal Reconstruction, Local Flaps, Full Thickness Skin Graft

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### Introduction

Reconstruction of nose is a challenging task to the reconstructive plastic surgeon. Given the vital function of nose in everyday life, it is extremely important that the reconstruction of nasal defects preserve the integrity of complex facial function and expression, as well as facial symmetry and pleasing aesthetic outcome. When planning the reconstruction of surgical defects a surgeon must carefully consider a number of characteristics unique to the nose, as the inherent complexity of the nose with convex and concave surface in close proximity, the symmetry of the nose, the limited laxity of the nasal skin, and the sebaceous composition of the distal nasal skin. Finally the function of the nose must be maintained by preserving or replacing the bony and cartilaginous frame work, nasal mucosal lining and by never compromising a patent airway. [1]

Once considered inferior by plastic surgeons, FTSG reconstruction is becoming widely accepted as a go-to technique for certain types of nasal soft tissue defects. A FTSG is well established for the treatment of dorsum and sidewall defects, but its usefulness for lower third defects is often underappreciated. Lower third defects, for instance complete alar or complete tip defects, have established algorithms that often call for nasolabial or forehead flap reconstruction. [2] However, with disciplined patient selection and donor-site selection, a FTSG is gaining an increasing role in reconstruction of lower third nasal defects. [3]

A skin graft is unique from other forms of nasal reconstruction, in that it does not have its own blood supply. Instead, a skin graft must recruit blood supply from the surrounding tissues at the recipient site. There are several stages involved in this process. [4]

The bridging phenomenon allows a skin graft to be used to cover a relatively avascular surface. As long as a portion of the defect is well vascularized, a skin graft can recruit vessels from this area to supply blood vessels to the graft overlying the avascular recipient site. [5]

Whatever the cause of the defect, the nose presents a unique challenge because reconstructive surgery must achieve adequate preservation of function (to allow nasal airflow) and form (maintaining the cosmetically acceptable contoured structure and skin texture and thickness). A reconstructive ladder or treatment algorithm for nasal defect repair typically includes options such as healing by secondary intention, primary closure, delayed primary closure, skin grafting, random pattern flaps, and pedicled flap repair. [6] Conventional thought and study results have noted that local flaps may provide cosmetic outcomes superior to those of skin grafts. To date, there is little evidence to prove that either option, local flaps or grafts, provides better cosmetic outcomes than the other in reconstructing nasal skin defects. Our hypothesis is that in select cases, skin grafts can provide aesthetic outcomes equal to those of local flaps and with fewer adjunctive procedures.

The aim of the present study was to assess the outcomes of nasal reconstruction by local flaps and full thickness skin graft.

#### Material & Methods

A prospective study includes 20 cases of nasal injuries, congenital nasal defect, skin cancer affecting nose or disease affecting nose attended the plastic surgery emergency and Out Patient Department of RDJM Medical College and Hospital. The cases referred from orthopedic, general surgery, skin and oncology department of RDJM medical college and hospital were also taken up for the study. The cases were later followed in the outdoor for long term.

#### Methods:

Detailed history of the case were recorded including name, age, sex, occupation, address and socio-economic status of the victim, mode, type and cause of injury, duration of injury or deformity and any type of other associated injury or deformity. History of hypersensitivity to drug or presence of any hormonal or systemic disease was also noted. The patient was examined for the evidence of cyanosis, clubbing, pallor icterus, oedema, dehydration, lymphadenopathy, obstruction to respiratory passage. Pulse and blood pressure were noted, any associated injury to brain, lung, and abdomen were ruled out. Detailed local examination was done with reference to:

- a) Location of defect.
- b) Size of defect.
- c) Depth of the wound (partial thickness or full thickness).

- d) Exposed deeper tissue (bone, cartilage, vessels).
- e) Condition of surrounding area and donor area.
- f) Condition of the wound (clean or contaminated).
- g) Skin colour, texture and temperature.
- h) Grazes and bleeding sites.

Routine Investigation including Complete Blood Count (CBC), Bleeding time & Clotting time, Blood glucose (Fasting & Post prandial), Blood urea & Serum creatinine, Serum electrolyte and Test for Hbs Ag, HIV, HCV. Radiographic examination including ECG, Chest X-ray PA view and X-ray nose - AP & Lateral view was done.

Special Investigation was done

- a) Plain radiograph of face: Done to evaluate any associated fracture, foreign body.
- b) Biopsy of the tissue: To know the nature of the lesion.
- c) Doppler of the local area to know the potency of the vessels.
- d) Wound culture especially of traumatic injuries that are badly contaminated.
- e) CT scan and MRI done to rule out any other soft tissue injury as and when referred.

#### Procedure

The management of the cases varied with the condition of the patient, type of injury, any associated injuries and time elapsed since injury. In acute cases, attention was focused on maintaining the ABC of the patient i.e. Airway, breathing, and circulation.

In delayed traumatic injury, through debridement and toileting of wound was done under anaesthesia. Any infection if present was controlled by appropriate antibiotic administration after pus culture and sensitivity. In old ulcerative condition, the ulcer was examined carefully, and biopsy was done to know the nature of the ulcer.

In majority of cases local anaesthesia was preferred. The patient was placed on the operating table in supine position. Before any flap design, defect should be defined in its whole complexity, i.e. size, depth, location, loss of supporting structure and internal nasal lining. Scarred nasal tissue, if present, should be released. If more than 50% tissue of a subunit was lost, the entire subunit reconstruction needed.

The individual planning of more commonly used local flaps and FTSG:

#### 1. Bilobed nasal skin flaps (Zitelli modification):

Used for partial thickness losses of less than 1.5 cm of the lateral aspect of the nose, ala, and tip area.

A Burrow triangle should be excised on the base of the pedicle, over defect to make a “tear drop” shape of the defect. Two semicircles were made, one placed at the apex of the wound and other midway of the original defect. Two lines drawn from the base of the wound one placed at 45° and the other 90° from the axis of the wound. Two lobe drawn starting and ending at the inner semicircle, passing through outer semicircle at its central axis. The lobes are incised, elevated and rotated to the defect and stitched there.

**2. V – Y bipedicle flap:**

Used for transverse partial thickness defect of supratip region up to, 1.5 cm in diameter.

A V shaped flap with apex high in the glabellar area, coming down a side of the nose and extending out over cheek in the border between the cheek and the eyelids skin was incised on both side of the nose. V – Y bipedicle flap was undermined over the entire surface of the nose. The flap was advanced to the defect and sutured. The donor defect was closed.

**3. Lateral nasal skin flap (Miter Flap):**

Used in partial thickness defect on or near the nasal tip or on the dorsum of the nose in midline up to, 2 cm in diameter.

An incision was made starting from the defect well down on the lateral side of the nose passing through medial canthus of the eye on to the forehead in the glabellar region, where a back cut is made keeping broad base on the other side of the nose. Flap was elevated on broad base and rotated to the defect and sutured there, donor defect was closed.

**4. Superiorly Based Nasolabial Flap:**

Used for repair of small defect of ala or alar lining. The planning in reverse was done. Incision was given in the nasolabial fold and over cheek, keeping the base along medial canthus. Flap was elevated and transposed over the defect and sutured. Donor site closed primarily.

**5. Median Forehead Flap:**

This is a two-stage procedure, used for defects more than, 2 cm, full thickness or partial thickness losses.

An exact foil template was made of the defects of nose. Axis of median forehead flap was identified, and then planning in reverse done and flap outlined marked over forehead keeping axis in the mid of the forehead flap. Incision was given at the distal end and proceeded proximally deep to frontalis muscle. The flap was elevated and transferred to the defect by 180° and sutured. The pedicle was dissected after 21 days and further refinement was done.

**6. Full Thickness Skin Graft (FTSG):**

Advocated for partial thickness nasal defect where aesthetic consideration is not the prime concern. The donor area can be any part of the body, but pre-auricular, post-auricular, forehead and supraclavicular etc.

The subunit was defined. Remaining tissue in the subunit was excised. The pattern of the defect taken over the lint and, we have to marked on the donor area. Then incision was given, FTSG elevated through sub-dermal plain. Sub-cutaneous tissue, if any present trimmed off from the graft.

Graft placed over the defect and stitched a bolus dressing applied over the graft. Donor site closed primarily after adequate under mining.

**Post operative management:**

Following parameters are observed carefully in the post operative period:-

1. Post operative bleeding. If present, was searched for active bleeding point and ligated.
2. Air way obstruction was managed by stenting the nasal opening.
3. Colour of the flap was monitored and appropriate measures were taken, if any sign of vascular compromise present i.e. releasing tension over the pedicle.
4. Oedema –measure to control oedema were taken.
5. Margin of the flap for signs of ischemic necrosis.
6. Dressing of the recipient site and donor site till wound hilling was done.
7. Suture removal after 5-7 days.
8. Prophylactic antibiotic ointment on the site of the operation was applied to avoid infection to the site.

**Follow-up:**

All cases were examined in OPD on regular interval according to the injury and the treatment given. Post operative complication i.e. hypertrophic scar was managed by scar steroid injection, silicon sheet application and pressure massage.

In case of pedicled flap, the inseting of pedicle is done after 21 days, and further refinement for aesthetic purpose done after 3 months.

**Results**

**Table 1: Patient characteristics**

Age in years	No. of cases	Percentage
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10-20	1	5%
21-30	4	20%
31-40	3	15%
41-50	4	20%
>51	8	40%
<b>Sex</b>		
Male(M)	15	75%
Female(F)	5	25%
<b>Background</b>		
Rural	14	70%
Urban	6	30%
<b>Etiology</b>		
Congenital	2	10%
Traumatic	9	45%
Malignancy	7	35%
Electric burn	1	5%
Thermal burn	1	5%

There were 40% patients who were more than 51 years of age. 75% were male and 25% were females. 70% belonged to rural area. According to etiology, 45% were traumatic followed by malignancy 35%.

**Table 2: Location, size and depth of defect**

<b>Location of defect</b>		
Collumela	1	5%
Lower ala	6	30%
Tip, Supratic, Part of ala, (Lower 1/3 of the nose)	10	50%
Upper dorsum	3	15%
<b>Size of the defect</b>		
<2cm	4	20%
2 – 4cm	7	35%
>4cm	9	45%
<b>Depth of defect</b>		
Partial thickness	6	30%
Full thickness	14	70%

50% had tip, Supratic, Part of ala, (Lower 1/3 of the nose) location of defect. 45% had size of defect more than 4 cm. 70% had full thickness in terms of depth of defect.

**Table 3: Method of resurfacing, Method of internal lining**

Method of Resurfacing	No. of cases	Percentage
Forehead flap	10	50%
Nasolabial flap	6	30%
Full thickness graft	4	20%
<b>Method of internal lining</b>		
Hinge Flap or Turnover Flap	10	71.42%
Nasolabial Turnover Flap	4	28.57%

In 50% cases, forehead flap was used followed by nasolabial flap. For method of internal lining, in 71.42% hinge flap was used.

**Table 4: Assessment of end result based on patient satisfaction**

Result	percentage	No. of cases
Excellent	60%	12
Good	20%	4
Fairly good	10%	2

Partial Flap Necrosis	10%	2
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In the present study, 60% showed excellent results followed by 20% who showed good results.

### Discussion

The nose is arguably the most prominent aspect of the face, primarily an organ of respiration, its aesthetic function is not less important. It occupies a prominent place in the centre of the face, making it a structure of obvious aesthetic significance. Its defects lead to facial disfiguration that cannot be easily hidden with clothing or apparel. Its reconstruction involves alteration of aesthetic details that is not much easy to do. In reality, recreating the nose is impossible. What nature has fabricated in a mother's womb is not reproducible, thus, the reconstructive surgeons task can only be to fashion bits and pieces of expendable tissue into a facsimile of cover, lining, and support to give the visual impression of a normal nose.

Various deformities of the nose can be brought about due to trauma, infections, as well as iatrogenically through the excision of skin malignancies that has to be reconstructed for proper function and aesthetic results. In our clinical study there were 20 cases of nasal defects among which 15 out of 20 cases i.e. 75% were males and 5 out of 20 cases i.e. 25% were females. The reason for this seems that in our country it is the male population that do their work out door and get maximum exposure to sun light, a predisposing factor for skin malignancies and involved in physical assault that lend them in traumatic injuries of nose. As far as, the age of the patients is concerned, this study shows that most of the patients were above the age of 40 yrs (12 out of 20 patients) i.e. 60%.

The finding of present study also shows that most of the people who undergo nasal reconstruction were from rural background, 14 out of 20 cases i.e. 70% and urban population was 30% (6 out of 20 cases). Majority of cases in this study were due to trauma and nasal malignancies extirpation. 5 out of 20 cases i.e. 25% were due to physical assault injuries, and 3 out of 20 i.e. 15% were due to RTA. 8 out of 20 i.e. 40% were due to nasal malignancies extirpation. Byrd et al<sup>7</sup> (2007) has shown such type of result in their study, with nasal cutaneous malignancies extirpation is the leading cause of nasal reconstruction in Asians, although not as common as in the Caucasians.

Majority of cases had full thickness nasal defect 14 out of 20 i.e. 70%, and partial thickness nasal defect 6 out of 20 i.e. 30%. This is in accordance with the study done by Bhatt Y et al [8] (2005), which has shown that full thickness nasal defect is more common than partial thickness nasal defect in Indian context. However, when the defects are large and with full thickness loss, patient does understand the

magnitude of the problem and expects an equally difficult reconstruction. But the problem comes when defects are small and superficial, patient see such problem as small and think that the reconstruction should be simple, and when patient suffering from some medical problem which does not permit multi-stage operation. In such situation comes the role of FTSG, and also when patient is not much concerned with aesthetic appearance.

Burget GC [9] has shown that it is easy to reconstruct upper half of nose, which has thin, nonsebaceous and mobile skin with FTSG with acceptable aesthetic result. Preauricular FTSG is preferred compared to post auricular, as long advocated for the nose, stands out as a pink patch long after transfer. He noted that a secondary operation is necessary at FTSG recipient site for better result. He also noted that, if the primary FTSG fails, the second graft always seems to survive. Dimitropoulos et al [10] (2005) advocated that forehead skin is a optimal donor site for FTSG in nasal reconstruction, in term of colour, texture and skin thickness match. He also found that donor site camouflaged within a forehead rhytid.

Gillies H D [11] (1920) has found that the nasal reconstruction lacking nasal lining contract over time resulting in distortion of nasal shape and nasal airways stenosis. He then revisited the time honored turnover or hinge over flap for nasal lining, but later on Menick F. [12] (2009) found that the turnover flaps are relatively poorly vascularized, although they usually survive if less than 1.5 cm in length. Scar along the periphery of the defect contract compromising the airways and also does not support the supporting grafts due to poor vascularity.

In our study, a variant of nasolabial flap i.e. turnover nasolabial flap were applied in 4 cases out of 14 cases of full thickness nasal defect i.e. 28.57%, to reconstruct full thickness defect of nasal ala, that serves as an internal nasal lining as well as skin coverage for the defect in a single operative procedure, this flap makes an attractive alternative to the traditional staged repairs used for difficult full thickness wounds in this area. The results were satisfactory to the patient without any conspicuous scar over the donor areas. This result was consistent with the study of Spear et al [13] (1987), who initially described turnover variant of nasolabial flap and found that it is the most useful flap for the reconstruction of nasal alar defect.

In our study, superiorly based nasolabial flap was applied in 6 cases out of 20, i.e. 30%. In 4 cases out of 6 cases, i.e. 66.66%, superiorly based nasolabial flap was used to reconstruct lower alar partial thickness defect with good result. A modified form of Da Silva superiorly based nasolabial flap was

used in 2 cases out of 6 cases, i.e. 33.33% for total columellar defect. The forehead and scalp are richly perfused by the supraorbital, supratrochlear, superficial temporal, post auricular, and occipital vessels. These axial vessels permit its safe and effective transfer on multiple individual vascular pedicles, as the principle laid by McCarthy et al [14] (1985), If the forehead flap elevated as obliquely or transversely, there is gain of extra length to the flap, but the distal skin paddle loses its axial pattern and become as random pattern, predisposing to distal flap necrosis. In our study, forehead flap was applied in 10 cases, out of 20, i.e. 50% of total nasal reconstruction done. Midline forehead flap applied in 6 cases out of 10 cases, i.e. 60% of cases and Paramedian forehead flap in 2 cases out of 10, i.e. 20% of cases, the oblique forehead flap in 2 cases out of 10, i.e. 20% of cases. The donor defect closed primarily in 8 cases out of 10 cases, i.e. 80% of cases. 3 cases were left to heal by secondary intention that can be managed later. There was marginal necrosis of flap in 2 cases out of 10, i.e. 20% of cases, that is due to vascular impairment. In this study more attention was given to the recipient site compared to the donor site as stated by H.D. Gillies and D.R. Millard. [15] Manick.F [16] (2009) in their article he has stated that, if the defect is large requiring hair bearing scalp skin for proper nasal reconstruction that can be applied over the nose. Hair can be plucked, depilated, or lasered later on. It is better to have a normal nose with a little hair than one with a poor shape.

The resultant facial scars in our study were acceptable in most cases though it was not as good as those of Caucasians. This is due to the thicker skin with abundant subcutaneous tissues in Asian skin. A second stage operation to achieve a better aesthetic outcome was performed in 1 case only, which is much less frequent than Caucasians. This is attributed to, that the patients either were satisfied with the initial results, or did not want additional surgery for aesthetic improvement. This was due to the age of the patient. Most elderly individuals tend towards not pursuing an aesthetically perfect result. Nasal valve collapse was less frequent in this study, as advocated by most of the authors in their study. This was due to broad nasal valve in Asians than Caucasians. The findings observed in our study are in accordance with the finding advocated by the Jin HR et al [17] (2009) in their study on nasal reconstruction of cutaneous defects in Asians. The overall result in our study were excellent in 60% (n=12), fairly good in 10% (n=2) and good in 20% (n=4) based on patient satisfaction to their reconstructed nose. Distal marginal flap necrosis were seen in 10% (n=2) cases, one in Paramedian and another in oblique pattern of forehead flap

### Conclusion

It can be concluded that the local flap is the most versatile and reliable tool for reconstruction of small to large nasal defects but one cannot ignore the usefulness of FTSG in nasal reconstruction. One must consider the patient's condition, functional needs as well as their expectations regarding the result. Additionally, the patient's tolerance for single –or multi-stage procedures should be determined. The patients should be allowed to have active role in decision making, particularly if it involves undertaking a complex multi-stage procedure. Therefore, it is important to provide appropriate reconstructive algorithms that are individualized to each patient. The surgeon should be well versed in the principles of both subunit and defect-only approach of nasal reconstruction to give optimal result to the patients regardless of simple or complex procedure executed, because principles of nasal reconstruction is a tool not a rule.

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