

Reconstruction of Depressed Dorsum including Tip of Nose by Autogenous Materials: Our Experience

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ABSTRACT

Reconstruction of nose is a very challenging task. It has been practiced since ancient ages. Since, then various techniques have evolved. We have used forehead and nasolabial advancement flap for reconstruction of skin defect over iliac crest bone or conchal cartilage grafts. In small gap we used composite graft from pinna. In this article we share our experience with various grafts and flaps, their success and failures and methods to avoid or treat them.

Keywords: Reconstructive rhinoplasty, Flaps, Grafts, Esthetic result, Follow-up.

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INTRODUCTION

Nose is the most projecting feature of face.¹ Mutilation of nose is bound to affect the personality as well as psychological attitude of the victim. With increasing incidence of road traffic accident (RTA), physical assault and other injuries on forehead which leads to gross deformity need for careful reconstruction is increased. Some present to ENT Department due to nasal trauma while others attend other departments like surgery, neurosurgery for other injuries which need priority treatment. When the patient has recovered from major injuries, he strives to survive with mental depression due to facial asymmetry. When the patient comes to us in ENT OPD with facial asymmetry our goal is not only to give normal and attractive appearance of nose but also to restore function of nose.² Rhinoplasty was first developed in ancient India, by Sushruta (ca. 800 BC), who described reconstruction of the nose in the Sushruta samhita (ca. 500 BC). Sushruta and his medical students developed and applied surgical techniques for reconstructing noses, genitalia, earlobes, etc, that were amputated as religious, criminal or military punishment. Sushruta also developed the forehead flap rhinoplasty procedure that remains contemporary plastic surgical practice.³ Reconstruction of the nose again emerged in 1597 when Tagliacozzi published a technique of a staged transfer of skin from the arm to rebuild the nose. The emergence of these techniques in history undoubtedly is related to the savagery of hand-to-hand combat and the practice of cutting off the nose as a

punishment for crimes.⁴ Indian rhinoplasty technique was rediscovered by Western medicine in the eighteenth century, during the Third Anglo-Mysore War (1789-1792) of colonial annexation, by the British against Tipu Sultan, when the East India Company surgeons Thomas Cruso and James Findlay witnessed Indian rhinoplasty procedures at the British Residency in Pune.⁵ The classic median forehead flap supplied by paired supratrochlear vessels was popularized in the United States by Kazanjian in 1947, however, this flap was not optimal because it was not long enough.⁶ To solve the problem of the short median forehead flap, its design was modified so that central forehead tissue could be transferred on a unilateral paramedian blood supply.⁷ Since the 19th century, a variety of nasal reconstruction procedures that use local tissue from the nose, cheek, and forehead have been described. Reconstruction of the nasal skeleton using grafts from the nasal septum, ear, rib, hip, and calvaria also was introduced.⁸ We used different techniques like forehead and nasolabial rotation or advancement flap, conchal cartilage, iliac crest graft either alone or in combination and assessed the results.

MATERIALS AND METHODS

We conducted our study at ENT Department, NRS Medical College from July 2008 to June 2011. Those cases having depression of dorsum and tip of nose with or without overlying soft tissue loss due to maldevelopment and trauma (accident, assault or iatrogenic) were included. Accident may be RTA, fall from height, fall of heavy material over nose or injury by animals, etc. Iatrogenic trauma may be due to submucosal resection of septum, accidental cauterization of tip of nose during submucosal diathermy of turbinate, etc. Patients having other deformities like crooked nose, bulbosity of tip and cancer were excluded from our study. Cases which came with acute trauma were treated at first conservatively with antibiotics, analgesics, tetanus prophylaxis and regular wound dressing. All cases were operated after doing proper planning and investigations. Patients were counseled showing their photographs and what could be done by surgical technique to reconstruct their nose cosmetically acceptable by drawing sketch and showing postoperative results of other patients as well. A history was taken about use of anticoagulants which increase the risk of intraoperative or postoperative bleeding. These agents should be stopped if the prescribing

physician approves. Extra-attention was given to meticulous hemostasis and the careful application of pressure dressings. An honest history of cigarette smoking was taken as it is the bane of skin flap and skin graft survival. Less thinning of a flap was considered in a patient who smokes, and they were informed that the risk of flap necrosis is significantly greater than that of an individual who does not smoke. For missing nasal tips that were less than 1 cm in greatest dimension were repaired with composite graft from pinna. Defect of the donor site was repaired with sutures. For missing nasal tips that were more than 1 cm in greatest dimension and missing alar cartilage we used conchal cartilage with perichondrium (Fig. 1) on one side at least. If the support of the medial crura was absent, a columellar strut was inserted and attached at the level of the anterior nasal spine. For defects in dorsum of nose, we used bone graft with periosteum from iliac crest (Fig. 2). They were reshaped and sutured at appropriate place according to need. Defect of skin and soft tissue was repaired with forehead and nasolabial flaps by rotation or advancement. In forehead rotation flap, pedicle composed of the supraorbital and supratrochlear vessels was identified at the base of the flap adjacent to the medial brow between the midline and the supraorbital notch (Figs 3 to 7). Length of the flap was determined by placing a gauze from the pedicle base to the most distal point of the defect in a tension-free manner. A template of the defect is designed and outlined at the distal end of the flap with marker. The flap is incised and elevated in a plane between the frontalis muscle and subcutaneous fat. Meticulous hemostasis was obtained, and the sides and distal end of the flap are sutured into the defect in a layered manner. The donor site was covered by split thickness skin graft. In case of stenosed nostril we used nasolabial rotation flap. Size and shape of the flap was made in a similar fashion to forehead rotation flap. The flap was incised and elevated between the subcutaneous fat and muscle fascia in an inferior-to-superior direction. The flap then was reflected and sutured into the defect. The donor site was closed primarily. Where the defect was close to forehead we used forehead advancement flap. Similarly, soft tissue defect over dorsum of nose was also closed by nasolabial advancement flap. Patients were advised not to rub their nose and avoid further trauma to nose. Sterile, nonadherent, absorbent dressings were applied postoperatively, and patients were instructed to leave the bandages in place until their next visit. Usually, rotation flaps were divided and inset after approximately 4 weeks. After flap division and inset, the patients were instructed to remove the dressings daily and gently clean the area with soap and water. Sterile ointment (e.g. mupirocin) and a nonadherent dressing were applied to the wound and secured with paper tape. Sutures were

removed on the next visit in 7 days. If the surgical site appeared to be healing well, a follow-up visit was scheduled 4 weeks later and 4 to 6 months thereafter for rechecking.

RESULTS

In the study period we treated 30 such patients. Male to female ratio was 1.1:1.9 indicating that females are more concerned about their cosmetic problems. The mean age was 27.067 years (range from 6 to 55 years). The most common cause was accident followed by RTA and iatrogenic trauma. We divided all patients into seven groups according to different techniques used for reconstruction (Table 1).

Patients were asked to grade their postoperative result as 0 to 9. 0 is for no satisfaction and 9 for full satisfaction. Likewise we also graded the results. The patients were followed up after 3 weeks, 2 months, 6 months, 1 and 2 years (Table 2). Most of the patients were highly satisfied. Few patients were satisfied to some extent. In some patients though they were satisfied we think that betterment can be done. Complete dissatisfaction was not reported in any case.

In two patients in group A there were some reddening and swelling of dorsum of nose in immediate postoperative period due to infection of the suture material. It was settled with antibiotic treatment. In one case there was only swelling of dorsum in immediate postoperative period which was due to putting extra cartilage. It was also settled after 6 months due to some cartilage absorption. In another case even after 6 months follow-up the swelling on dorsum persists and not much accepted by the patient. We planned to reduce the extra cartilage later on. There was no case of cartilage displacement or complete absorption. In group B in one case the bone graft became displaced in upper part due to wider tunnel. There was no case of bone resorption. In group C both the patients have good uptake of composite graft from pinna. In initial 2 months there were some discoloration of skin of the graft but it became normal within 6 months. In group D in one case there was still some deformity in the lobule which we thought could be better done with folding of the forehead flap inwards and suturing it correctly. In one case there was visible scar mark in the donor area of forehead. In one case there was color mismatch at the donor area in early postoperative stage which settled within 6 months. In group E in one case the lower portion of dorsum can not be elevated properly due to lack of support near tip area. We realize later that putting columellar strut at tip area could do well here. In group F in one case there was insufficient elevation of dorsum of nose due to less amount of bone graft as the patient was only 10 years old child. In one case there was some gap in the suture line due to tension of the flap. The gap healed by secondary intention in 6 months. In group G in one case the flap was bulky. In

Table 1: Different techniques used for reconstruction							
Serial no.	Groups	Number of patients	Type of defect	Age (years)	Sex	Etiology	Materials of reconstruction
1	A	5	Depressed dorsum of nose (lower 1/3rd)	19	F	Assault	Conchal cartilage
2				22	F	iatrogenic	
3				18	M	Developmental	
4				29	M	RTA	
5				26	F	iatrogenic	
6	B	5	Depressed dorsum of nose (upper 2/3rd)	26	M	RTA	Iliac crest
7				28	F	Accident	
8				30	F	iatrogenic	
9				43	F	Accident	
10				24	F	Developmental	
11	C	2	Loss of tip of nose less than 1 cm in diameter	45	M	Accident	Composite graft from pinna
12				29	F	Accident	
13	D	6	Loss of tip and alar cartilage of nose	55	F	Accident	Conchal cartilage + forehead rotation flap
14				6	M	Accident	
15				38	F	Assault	
16				32	M	Assault	
17				36	F	RTA	
18				12	M	Accident	
19	E	4	Depressed dorsum of nose (upper 1/3rd) with loss of skin over it	35	M	RTA	Iliac crest + forehead advancement flap
20				26	M	RTA	
21				19	F	Accident	
22				27	F	Accident	
23	F	4	Depressed dorsum of nose (lower 1/3rd) with loss of skin over it	10	F	Accident	Iliac crest + nasolabial advancement flap
24				29	M	RTA	
25				23	F	Assault	
26				34	F	Accident	
27	G	4	Stenosed nostril	34	M	iatrogenic	Nasolabial rotation flap
28				14	F	iatrogenic	
29				25	F	Accident	
30				18	F	iatrogenic	

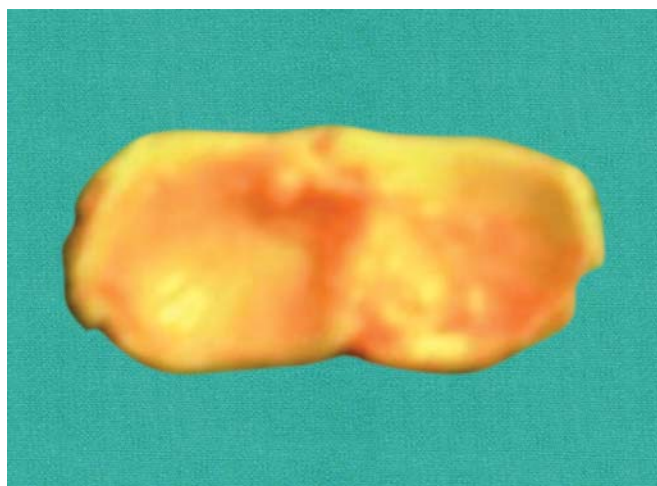


Fig. 1: Conchal cartilage



Fig. 2: Iliac crest bone graft

none of our cases there was flap failure, as we carefully kept the vascular pedicle intact in all cases.

DISCUSSION

The choice of method depends on many factors like depth and vascularity of defect, choice and experience of the surgeon.⁹ We replaced missing parts with tissue that is

similar in quality and quantity. We replaced nasal lining with lining, cartilage with cartilage, bone with bone, and skin with skin that is the closest match in color and texture. Cartilage grafts from conchal bowl and antihelix are excellent donor sites for alar rim due to their convexity. Cartilage can be easily cut, shaped, shaved and molded and has little or no resorption.¹⁰ It is always better to keep

Table 2: Follow-up results

Case number	Patient's satisfaction grade					Surgeon's satisfaction grade				
	3 weeks	2 months	6 months	1 year	2 years	3 weeks	2 months	6 months	1 year	2 years
1	8	9	9	9	9	9	9	9	9	9
2	6	6	7	8	8	6	6	7	8	8
3	6	7	8	9	9	6	7	8	9	9
4	6	7	8	9	9	6	7	8	9	9
5	8	7	8	8	8	7	7	7	7	7
6	9	9	9	9	9	9	9	9	9	9
7	6	6	6	7	8	6	6	6	7	7
8	8	7	6	6	6	8	7	6	6	6
9	8	8	8	8	8	8	8	7	7	7
10	9	9	9	9	9	9	9	9	9	9
11	7	7	8	9	9	7	7	8	9	9
12	7	7	8	9	9	7	7	8	9	9
13	7	6	6	6	6	7	6	6	6	6
14	7	7	8	8	8	8	8	8	8	8
15	9	9	9	9	9	9	9	9	9	9
16	8	8	8	8	8	8	8	8	8	8
17	8	7	8	8	8	8	7	8	8	8
18	9	8	8	8	8	9	8	8	8	8
19	6	6	6	6	6	6	6	6	6	6
20	7	7	8	8	8	7	7	8	8	8
21	8	8	9	9	9	8	8	9	9	9
22	9	9	9	9	9	9	9	9	9	9
23	7	6	6	6	6	6	7	7	7	7
24	6	6	7	8	8	6	6	7	7	8
25	8	8	8	8	8	8	8	8	8	8
26	9	9	9	9	9	9	9	9	9	9
27	9	9	9	9	9	9	9	9	9	9
28	8	8	8	8	8	8	8	8	8	8
29	6	6	6	7	7	6	7	6	7	7
30	8	8	8	8	8	8	8	8	8	8



Fig. 3: Bone graft displaced in upper part



Fig. 4: Swelling due to extra-cartilage



Fig. 5: Two months postoperative result of conchal cartilage and forehead rotation flap

perichondrium on one side so that it does not get absorbed. In all of our cases we keep it and no case of cartilage failure occurs. They should be properly folded according to desired shape and sutured at appropriate place without much tension so that they do not become misplaced. Many surgeons now do not like to use bone grafts in the nose due to its rigidity, difficulty in shaping and securing and morbidity to harvest. Some believe that most part of the bone graft absorbed in

long term.¹¹ We have used iliac crest bone grafts to augment the bony dorsum of the nose. Our experience with bone graft is quite good. We harvested bone graft from iliac crest keeping the periosteum of at least one side intact. We fixed it rigidly in position so that it does not get misplaced later. The patients were counseled prior to operation that there will be some pain in the donor area which all of our patients tolerated well.



Fig. 6: One week postoperative result of nasolabial rotation flap for stenosed nostril



Fig. 7: Six months postoperative picture of iliac crest bone graft for saddle nose

We considered the esthetic subunits of the nose whenever planning a reconstruction. The borders of the subunits are an ideal location for the placement of scars.¹² The skin and underlying soft tissues of the ala form a semirigid unit that maintains the graceful curve of the alar rim and the patency of the anterior nares. To preserve this shape and patency, reconstruction of the ala must include a cartilage graft for support.¹³ For soft tissue defect we prefer skin flaps to skin grafts because they generally provide a superior match in color and texture, are resistant to contracture, and are able to provide vascular covering to the nasal skeleton.^{14,15} The template for replacing missing parts is created using a firm but malleable material, the foil of an empty suture packet is an ideal material. With a unilateral defect, such as the alar lobule, the contralateral side becomes the model, and the foil is molded directly over the normal anatomy. For total nasal reconstruction previous normal photograph is the best model.¹⁶

CONCLUSION

The reconstruction of nose is one of the most challenging anatomic facial areas to achieve an optimal, esthetic and functional result. It is a learning curve which has to be learned by regular cadaveric dissection and assisting of experts in operation theater. Every nose is different and every nasal wound is also different. Plans must be made prior to operation that must be discussed with the patient also. Photographs and diagrams of each step of the process obtained from textbooks or previous patients are very helpful in explaining the procedure. Always consider the patient's priorities. Ask each patient if he or she prefers a procedure that the surgeon believes produces the best esthetic result, even if it is the most complex and riskiest, or if he or she prefers a simpler, low-risk procedure that may produce a lesser result. Consider medical risk factors especially history of anticoagulant intake and cigarette smoking, especially when longer or multiple-stage procedures are contemplated. Risks, such as bleeding, infection, flap necrosis, and scarring should be discussed before the operation. Outcomes, both functional and cosmetic, are generally good to excellent with both cartilage and bone grafts and flaps. Periodic and long term follow-up is necessary with photographic documentation of the defects, repair and postoperative results to evaluate the pitfalls and what can be done to come across these.

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