

Prefabricated Flaps for Complex Defects Nasal Reconstruction

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Abstract

Background: Reconstruction of acquired defects of the nose remains one of the most challenging tasks for the plastic surgeons. There are several reconstructive options for nasal defects including primary repair, skin grafts, local flaps, regional flaps, or distant and free flaps. In complex defects, the nasal reconstruction requires restoration of the osseous and cartilaginous framework, altogether with reconstruction of the skin and inner nasal lining. This study aimed to evaluate the use of prefabricated flap in reconstruction of complex defects of the nose.

Methods: A total of 20 patients with different complex nasal defects (involving mucosa, cartilaginous support, and nasal skin) were operated upon, they were divided into 3 groups according to byramicli scoring: Group 1; (9 patients with Type Ib defects), Group 2; (7 patients with Type II defects, Group 3; (4 patients with Type IIIa defects). Prefabricated Flaps used were paramedian forehead flaps, nasolabial flaps, cheek advancement flaps, altogether grafts. Evaluation was done preoperatively and postoperatively through clinical examination, photographing, and patient observer questionnaire for the aesthetic results.

Results: Flap survival was excellent in 16 cases and only 4 flaps showed minor complications treated conservatively. The aesthetic results were excellent in 13 patients, good in 2 patients, while they were poor in 5 patients. 70% of patients were satisfied with the results.

Conclusion: The use of prefabricated flaps can be successfully used to manage different nasal defects with good results and minimal complications possible. Also, even in the presence of free flap reconstructions, the prefabricated flaps still can be a good alternative technique and have a great role and still compete with the free flaps in reconstruction of the nose.

Keywords: Nasal reconstruction; Prefabricated flaps

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Introduction

The nasal reconstruction represents a true challenge to plastic surgeons as it requires restoration of the osseous and cartilaginous frameworks, the underlying nasal lining and the overlying skin coverage. This requires careful preoperative assessment of the nasal defect and understanding the nasal and facial aesthetics [1].

Being in the midposition of the face the nose can be involved in any trauma to the face. On the other hand, being exposed to sun light, it is a common site for skin malignancy. Nasal tissue defects can be caused by tumor removal, trauma or by any other insult to the nose, like burn, developing an irreversible sequel.

The goal of nasal reconstruction is to create an aesthetically acceptable nose while preserving the functional aspect. That's why; the surgical treatment is extremely difficult with the combined defects of skin, cartilage, and nasal mucosa. This can be achieved only by providing sufficiently and anatomically adapted cartilage and bone support, followed by covering the inner part with tissue closely resembling mucosa and the outer part using skin compatible with the surrounding skin [2].

The reconstruction of the nasal contour where skeletal support has been lost is usually done with autogenous bone such as the iliac crest, the outer cortex of the cranium, or rib grafts [3]. Many techniques were used to reconstruct the skin of the nose.

For reconstruction of small nasal defects Rhombic bilobed flap, and other advancement flaps can be used. Reconstruction of the defects involving the ala, the collumella and the soft triangle can be done using nasolabial flaps (Figure 1). On the other hand, the paramedian forehead flaps are considered the mainstay for reconstruction of large defects of the nose up to reconstruction of the whole skin envelop of the nose [4]. In recent years, flap prefabrication has played an important role in the development of reconstructive procedures. Autogenous or alloplastic material implantation and grafting are the basic prefabrication methods [5]. This work is a prospective study to evaluate the versatility and the outcome of prefabricated pedicle flap for nasal reconstruction in complex partial or total nasal defects in different parts of the nose (Figure 2).

Patients and Methods

From the beginning of February 2017 to the end of February 2019, 20 patients (16 males and 4 females) with different complex nasal defects were operated upon. All operations were done in Beni-Suef University hospital, and Ahmed Maher teaching hospital. The age of patients was ranging from 10-72 years with a mean age of 37.7 years. The main cause of the defects was trauma (12 patients), defects due to oncologic resections (5 patients with BCC). Other causes included burn sequel and post radiotherapy Osteonecrosis (3 patients) (Table 1). All patients were subjected to complete history taking, full clinical examination, radiological examination, and photographing

Patients with defects affecting mucosa, cartilaginous support, and nasal skin defects (more than one layer) were considered to have complex nasal defects and were eligible for reconstruction. Patients also had complex defects in one or more aesthetic nose subunits, secondary to oncologic resection or due to trauma were included in the study (Figure 3).

Patients were divided into 3 groups according to Byramicli score; as follows:

Group 1 (Patients with Type Ib defects): 9 patients (one or two adjacent skin subunits + underneath framework). Prefabricated nasolabial flaps were used in 4 patients and prefabricated paramedian forehead flaps were used in 5 patients. A septal cartilage graft was used to reconstruct the depressed alae columella and tip.

Group 2 (Patients with Type II defects): 7 patients (more than one skin subunits + more than one underneath framework). Prefabricated Paramedian flaps were used in all patients as two stages procedures.

Group 3 (Patients with Type IIIa defects): 4 patients (more extensive affection of multiple skin subunits and underneath frameworks). Prefabricated Paramedian flap was used to reconstruct 2 cases as a two stages procedure and 2 cases cheek advancement flap as one stage. Cartilage grafts taken from the septum or the auricle were used to reconstruct missed parts of the cartilaginous frameworks. All patients were followed



(A) (B)
Figure 1 (A) Pre-operative animal bite in right ala, (B) Post-operative photo.



(A) (B)



(C)

Figure 2 (A) Post-traumatic nasal defect affecting Tip and columella, (B) Elevation of forehead flap, (C) Postoperative one week after separation of the flap.

up postoperatively for viability of the flaps, postoperative complications, patient satisfaction and postoperative aesthetic

Table 1 Classification of nasal defects.

Defect types	Score range (points)
Type I	
Type 1a	1-3
Type 1b	4-6
Type II	6-10
Type III	
Type IIIa	11-15
Type IIIb	16-20
Type IV	21+



Figure 3 (A) Basal cell carcinoma affecting the rt. Lateral side wall of the nose, (B) Intraoperative after excision of the tumour and reconstruction with cervicofacial flap, (C) 3 months Postoperative with good aesthetic result and no affection of the eyelids.



Figure 4 (A) Preoperative basal cell carcinoma affected left nasal ala, Lt. half of the dorsum, and lateral side wall of the nose, (B) Anterior view postoperative after.

results. All patients were photographed after completeness of reconstruction.

The patient satisfaction was evaluated by using questionnaire design scale answered by the patient itself if his answering is 0 or 1 (meaning unsatisfied), if 2,3 or 4 (meaning patient satisfied) (Figures 4-6).

Results

The demographic data of the patients are shown in Table 2. The postoperative complications occurred only in 4 flaps (20%) of cases. All were minor complications in the form of slight dehiscence or infection and were treated conservatively. Regarding patient satisfaction; 14 patients (70%) were satisfied, while 6 patients (30%) were unsatisfied. Regarding easthetic results; The easthetic results were excellent in 13 patients (65%), good in 2 patients (10%), while they were poor in 5 patients (25%). The overall results are shown in Table 3.

Discussion

Prefabrication may be considered as a generic method for creating a tailored flap. Using the concept of prefabrication, more reliable vascularization can be achieved and the availability of donor materials can be maximized before transfer of the flap [6]. We agree with Salgarelli et al. [7] who stated that, in cases of defects with a 1.5- to 2.0-cm diameter that involve the alar lobules, the nasolabial flap is useful for reconstruction of this difficult area and that the Larger defects often require a forehead flap.



Figure 5 (A) Post-traumatic nasal defect affecting dorsum, Tip and columella, (B) Intra-operative with debridement and elevation of forehead flap, (C) Post-operative paramedian forehead flap before separation.



Table 2 The demographic data of the patients.

Case number	Aetiology	Age	Sex	Site of defect	Score	Type of defect	Reconstructive procedures
1	Basal cell carcinoma	72	M	Tip and both alae	6	II	PMFF
2	Basal cell carcinoma	63	M	Nasomaxillary buttress + alae of the nose	13	IIIa	CAF
3	Trauma	44	F	Tip and both alae	7	II	PMFF
4	Trauma	45	M	All dorsum of the nose + tip	13	II	PMFF + folding
5	Trauma	10	M	Ala of the nose	4	Ib	NLF+ Auricular chondrocutaneous composite graft
6	Trauma	39	M	Dorsum of the nose	8	II	PMFF
7	Burn	70	M	Ala of the nose	4	Ib	NLF + MP septal graft
8	Human bite	28	M	Tip and columella	4	Ib	PMFF
9	Basal cell carcinoma	70	F	Side wall + Nasomaxillary buttress	7	IIIa	CAF flap
10	Trauma	33	M	Tip and columella	5	Ib	PMFF

Case number	Aetiology	Age	Sax	Site of defect	Score	Type of defect	Reconstructive procedures
11	Radionecrosis	65	M	Dorsum+ Side wall + Nasomaxillary buttruss	13	IIIa	PMFF
12	Trauma	10	M	Ala of the nose	4	Ib	NLF
13	Basal cell carcinoma	50	M	Dorsum of the nose + tip	9	II	PMFF
14	Trauma	25	M	Ala of the nose	4	Ib	NLF
15	Human bite	45	F	Tip and columella	5	Ib	PMFF
16	Basal cell carcinoma	55	M	Tip and ala of the nose	5	Ib	PMFF + Folding
17	Trauma	30	M	Tip and columella	5	Ib	PMFF
18	Burn	34	F	Dorsum of the nose	7	II	PMFF
19	Trauma	38	M	Tip and dorsum of the nose	8	II	PMFF
20	Trauma	40	M	Dorsum of the nose + tip + ala of the nose	11	IIIa	PMFF + MP Septal graft

Table 3 The overall results of the study.

Variables		Group I	Group II	Group III	Total	%
Post-operative complications	With	2	1	1	4	20%
	Without	7	6	3	16	80%
Patient satisfaction	Satisfied	6	6	2	14	70%
	Unsatisfied	3	1	2	6	30%
Aesthetic Results	Excellent	6	5	2	13	65%
	Good	1	1	-	2	10%
	Poor	2	1	2	5	25%

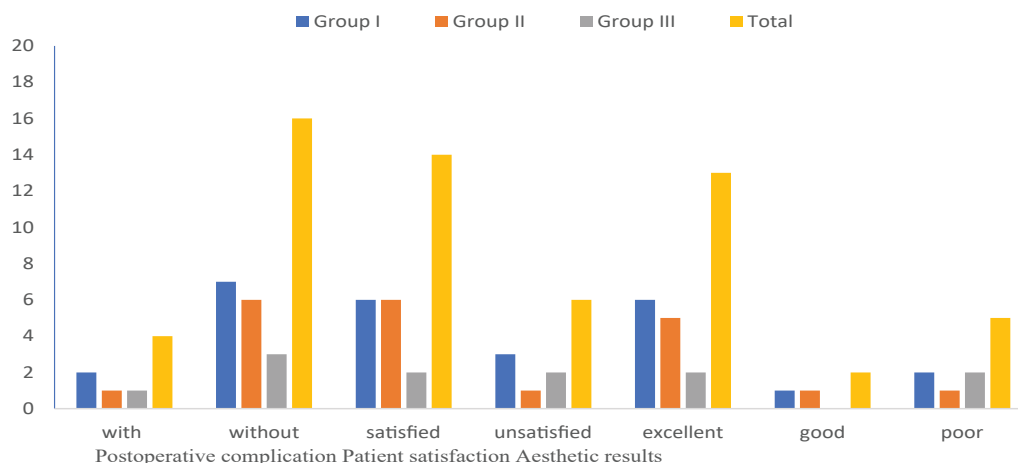


Figure 7 The graph represents overall results of the study.

In our study all the nasolabial flaps were healthy without any complication. This conforms to the study [8], that they used nasolabial flap for reconstruction of 24 defects. They reported that all the 24 nasolabial flaps were healthy and passed without any complication.

The forehead flaps are used mostly in larger nasal defects [9]. During our study, 16 defects involving the different subunits of the nose were reconstructed using Prefabricated Paramedian forehead flap. All patients accomplished successful nasal resurfacing although 4 patient suffered minor complication in the form of wound infection and dehiscence along the distal 2-mm border of the skin paddle. This area was treated conservatively

and re-epithelialized uneventfully. No flaps suffered full-thickness necrosis or congestion that required intervention. This is comparable with the results of Stephen and Park [10], who repaired 10 patients with prefabricated forehead flap reconstruction and only 1 patient suffered epidermolysis.

We also agree with Millard [11], who stated that for nasal reconstructions, the midline prefabricated forehead skin flap can serve as a cover for any nasal reconstruction from tip and alar loss to a total nasal defect. Using this flap, aesthetic and functional reconstruction can be achieved by creating a nose that blends well with the face. It appears that in the recent history of head and neck reconstruction, prefabricated pedicled and free flaps

were used for the same indications and that their use, in some cases, can be mutually exclusive (**Figure 7**).

Still, free flaps are considered the reference standard for many cases of head and neck reconstruction; however, a significant body of data has been increasing slowly but steadily in which prefabricated pedicled flaps have been used in comparable settings. In many instances, prefabricated pedicled regional or microvascular soft tissue flaps compete for the same indication, each technique with its advantages and disadvantages [6]. Comparing different case series with each other can only provide an idea of flap reliability. Also, if we compare these case series, it appears that prefabricated pedicled and free flaps are equally reliable [12].

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Conclusion

We conclude that with the use of prefabricated flaps we can successfully manage different nasal defects with good results and minimal complications possible. Also, we also conclude that even in the presence of free flap reconstructions, the prefabricated flaps still can be a good alternative technique and have a great role and still compete with the free flaps in reconstruction of the nose. We believe also that prefabricated local and regional pedicled flaps can avoid some problems met with the free flap such as bulkiness of flaps, expensive costs, donor morbidities, long postoperative follow up periods, need for expensive instruments and need for high surgical expertise.