

Comparative Study of Reconstruction of Nasal Soft Tissue Defects Using Two Regional Flaps

ATEF A. ALLAM, M.D.*; AHMED M. HEGAZY, M.D.* and HOUSSAM E. BADAWI, M.D.**

The Department of Plastic and Reconstructive Surgery, Tanta University and El Sahel Teaching Hospital**, Cairo, Egypt*

ABSTRACT

The nose is the keystone of the human face. Nasal defects can, therefore, alter facial symmetry and balance in a powerful way. This is why nasal reconstruction has developed a long and rich history. A successful nasal reconstruction is characterized by a healthy three dimensional contour, well-concealed scars, and a long-term functional result. Regardless of a nasal defect's location, size, or depth of involvement, its reconstruction poses a challenging and rewarding dilemma to the surgeon. In this study, we tried to evaluate the effectiveness and the aesthetics outcomes of two common regional flaps the forehead and the nasolabial flaps taking into consideration the location and size of the tissue defects. Better results were obtained with nasolabial flaps than with forehead flaps.

Key Words: Nasal soft tissue defects – Two regional flap.

INTRODUCTION

The nose dominates the central face that's why it cannot escape the attention of even the casual observer and when it is deformed it may cause a profound loss of the facial aesthetic and sense of self [1]. It has been described as a separate aesthetic facial unit with its multiple aesthetic subunits and interposed curvatures and convexities [2].

Aesthetic Restoration of acquired nasal defects has intrigued reconstructive surgeons for centuries. Because of the myriad reconstructive options, there is a need for a logical and sequential approach to the decision making process used in choosing the appropriate reconstruction for a specific nasal defect. Historically, 3 basic techniques evolved over the years for major nasal reconstruction. The forehead flap, beginning in India as early as 1000 BC. The classic Indian forehead flap had a midline design with wide pedicle based above the eyebrow. In the 15th century, medical literature in Italy detailed the brachial or arm flap for nasal reconstruction. In the 19th century, the French began reporting their work on the cheek flap for reconstruction of the nose. Today, advances in local and regional flap reconstruction, tissue expansion, and improved methods of providing lining and support

to the nose allow for excellent functional and cosmetic results, without regard to the size of the defect [3,4].

There are numerous options for the varied and often complex nasal deformities that result from the excision of nasal cutaneous malignancies or from traumatic injuries. Nearly every possible and even impossible technique has been attempted as a reconstructive option [5,6].

Nasolabial flap is a pedicled flap with a wide description and application with an excellent blood supply arising mainly from adjacent anastomoses of vessels from the facial and infraorbital arteries [7]. The nasolabial flap has many qualities that make it ideal for nasal reconstruction. Importantly, the tissue of the cheek has similar color and texture to that of the nose, and its proximity provides for easy transposition of the flap. Also, there is very little donor site deformity [8,9].

Forehead flaps are based on one or both supra-trochlear or supraorbital arteries. The flap can be vertical or oblique as per the required length. However, hairline should be excluded in vertical flap. The flaps are usually dissected above the frontalis muscle distally but muscle is included proximally and incision depth is up to periosteum. Paramedian forehead flap is commonly used in reconstruction of nose due to its easy handling and maneuverability. However; midline or median forehead flaps are used for larger area [10].

Reconstruction of acquired nasal defects requires a thorough analysis of the deformity and a complete assessment of repair options. Care must be taken to respect the borders of the nasal subunits and carefully camouflage the incisions within the borders of these subunits. Additionally, proper selection of the appropriate repair to match color, texture, and thickness of the surrounding skin of the defect will ensure a cosmetically pleasing result.

PATIENTS AND METHODS

This study was conducted on 23 patients with nasal soft tissue defects of different causes in the hospitals of Tanta university. Patients with scars or any dermatological problems limiting the use of either both flaps and those with extensive and complex nasal defects involving cartilage or bone have been excluded.

These patients were divided into 2 groups. Group A: Has been reconstructed using the forehead flap. Group B: Has been reconstructed using the nasolabial flap. The reconstructive technique and donor skin site was thoroughly discussed with patients before surgery. An informed consent was obtained from every patient. Photographs had been taken immediately before surgery.

Nasal reconstruction due to oncological causes, Resection was carried out with 5mm from the margin of the tumor to the surface of the periosteum or the perichondrium. The size of the resection area 5mm wider than the margin of the tumor was measured as the size of the tissue defect resulting from surgery and an immediate reconstruction was performed in the same session. The excised lesions were sent for a histo-pathological examination. On the other hand, patients with traumatic lesions underwent refreshment to the edges and light curettage to the base. Both techniques were performed under local or general anesthesia. All flaps were injected with 1/100,000 epinephrine for hemostatic control and to aid in flap dissection. The flap was marked intra-operatively in all patients.

Steri-strips were applied. Patients were checked at day one for oozing and the viability of the flaps. In the 2nd week visit, sutures were removed and the flap viability was checked beside the process of wound healing.

Antibiotic therapy was prescribed at the induction of the anesthesia and for 7 days after the operation as well as anti-inflammatory agents and analgesics. Our patients were advised to avoid trauma, potential shearing forces to the flap and tobacco products.

At a minimum interval of 3 months following the last completed operative intervention, the aesthetic aspects of the reconstruction were evaluated by three members of our staff regarding four items (color match, flap thickness, donor site and nasal contour and morphology). Patients were asked to assess their level of satisfaction as a separate item. These five items constitute together the evaluation scale for each case.

In the scoring system in each item poor results were given 1 degree, fair were given 2 degrees, good were given 3 degrees and excellent were given 4 degrees. The sum of the scores of the previous five items (total score) was expressed as excellent (20-18), very good (17-15), accepted (14-11), suboptimal (10-8), or poor (7-5). Comparison of the results of the two techniques was done.

RESULTS

Group A included 13 patients and were reconstructed using the forehead flaps (F-flap). Group B included 10 patients and were reconstructed using the nasolabial flap (N-flap). twenty patients (86.9%) were males and 3 were females (13.1%). One was in the forehead group and two were in the nasolabial group. The mean age was 52.7 Y in group A and 56.9 Y in group B.

Sixteen patients in this study were farmers (69.6%). Among the 23 patients, tumors were the cause in 19 patients (82.6%), trauma was the cause in 4 patients (17.4%). We didn't face any other causes during the period of this study. 8 patients had defects on the dorsum (34.7%), 6 on the ala (26.1%), 2 on the base (8.7%) and 7 on the nasal tip (30.4%). The mean size of tissue defects was calculated by multiplying the measurement of the largest two perpendicular lines. The mean size of tissue defect on the dorsum was 119.69cm², 86.67cm² on the ala, 86.25cm² on the base and 104.29cm² on nasal tip. The area of tissue defects was largest on the dorsum and smallest on the base.

The mean size of tissue defects which were reconstructed by F-flap was larger than those reconstructed by N-flap in all nasal subunits (Table 2).

Concerning the relationship between the location of the tissue defects and the method of reconstruction, the base was reconstructed with F-flap alone and the mean total score was accepted (14). In the nasal dorsum both flaps the nasolabial and the forehead flaps were used but the mean total score was better in patients who were reconstructed with N-flaps than those reconstructed by the F-flap (17.1 & 14.6). In the tip, the mean total score was slightly higher in patients who were reconstructed using N-flaps than for those who were reconstructed using F-flaps (13.9 & 13.7). In the nasal ala, the mean total score was accepted in patients who underwent reconstruction using the forehead flap (11), while it was very good in those who were reconstructed using N-flaps (17.4).

The mean score of color match was 3.5 in F-flap and 3.6 in N-flap showing slight differences. However, the mean score of the donor site was 2.2

and 3.5 in F-flap and N-flap respectively showing marked differences. The mean score for flap thickness in the F-flap was 2.5 and in N-flap it was 2.9. The score for patient satisfaction was 3.6 in N-flap and 2.9 for the F-flap.

In addition, the size of the tissue defect and the score were compared in the 13 patient who underwent reconstruction using F-flap. The six patients in which the defects were 105.0cm² or smaller, the mean total score was 15.2 but was 12.3 in the seven patients in which the defects were 135.0cm² or

larger. On the other hand, all patients who were reconstructed by N-flap, the size of tissue defect was 105.0cm² or smaller.

Table (1): Evaluations of flaps.

Total score	Forehead flaps	Nasolabial flaps
Excellent	2	3
Very good	1	5
Accepted	9	2
Suboptimal	1	0
Poor	0	0

Table (2): Analysis of reconstructive methods (mean).

Location	Flaps	Cases	Defects Cm ²	Color	Thickness	Donor	Contour & morphology	Satisfaction	Total
Base	F	2	86.25	4	2.5	2	2.5	3	14
	N	0	—	—	—	—	—	—	—
Dorsum	F	5	140.5	3.4	3.2	2.4	2.8	2.8	14.6
	N	3	85.0	3.6	3.3	3.6	3	3.6	17.1
Tip	F	4	115.0	3.3	2.3	2.3	2.3	3.5	13.7
	N	3	90.83	3.3	2.3	3	2.3	3	13.9
Ala	F	2	102.5	3	2	2	1.5	2.5	11
	N	4	78.75	3.8	3	3.8	3.3	3.5	17.4
Mean			118.46	3.5	2.5	2.2	2.3	2.9	13.6
			84.0	3.6	2.9	3.5	2.9	3.6	16.6

Fig. (1): Patient with B.C.C on the nasal ala. The defect was reconstructed with N-flap.





Fig. (2): Patient with B.C.C on the nasal dorsum. The defect was reconstructed with F-flap.



Fig. (3): Patient with B.C.C on the dorsum. The defect was reconstructed with N-flap.

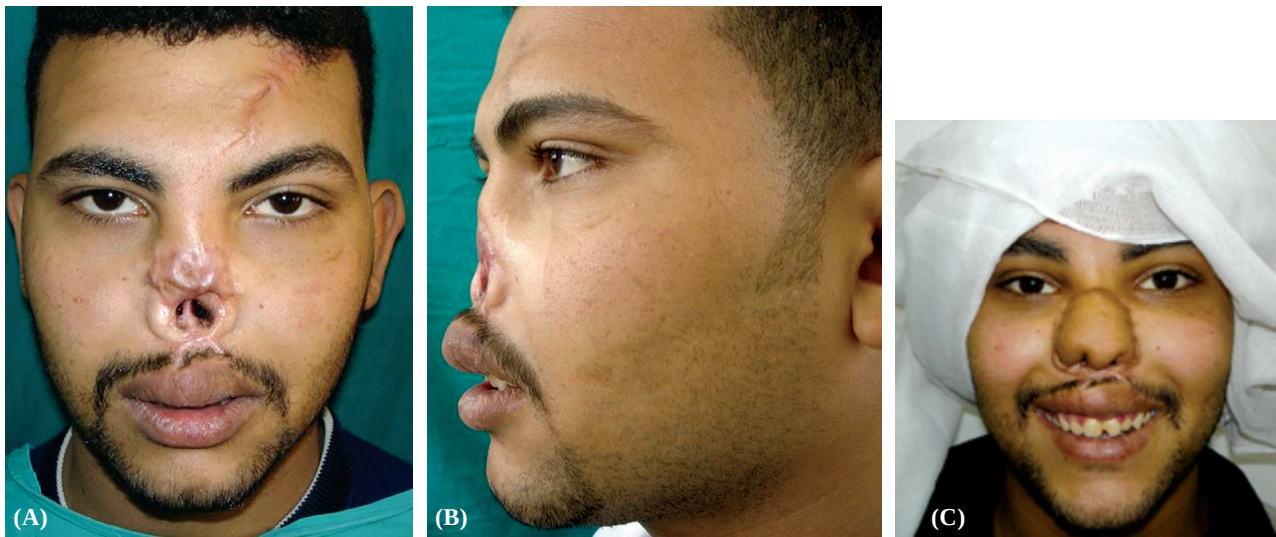


Fig. (4): Patient with nasal trauma involved the tip and part of the dorsum. The defect was reconstructed with F-flap.



Fig. (5): Patient with B.C.C on the nasal ala. The defect was reconstructed with N-flap.

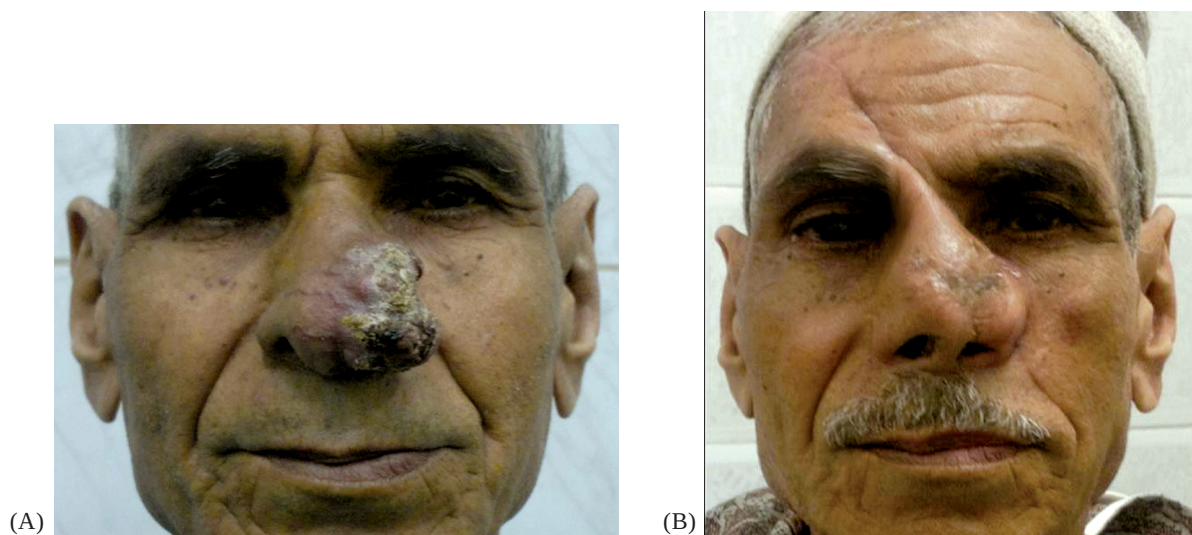


Fig. (6): Patient with B.C.C involved the nasal dorsum and ala. The defect was reconstructed with F-flap.

DISCUSSION

Aesthetic and functional reconstruction of soft-tissue nasal defects involves many options. Although the topographic nasal subunit principle of Burget and Menick [11] is important in preoperative analysis and planning of the reconstruction, other aesthetic considerations such as skin texture, color, and contour are also crucial [12,13]. A balance must be achieved among these various factors and the patient's medical condition, adjacent tissue availability, skin history, and expectations [12,14].

The reconstructive modality of choice will depend largely on the location, size, and depth of the surgical defect. Nevertheless, reconstructive plans should be customized and not be based solely on the size or location of the defect. Patient expectations can influence reparative concerns. For example, a young woman may want optimal cosmetic results, whereas an older man may not have as many cosmetic concerns [13].

Arden et al., [15] reported that in smaller or single subunits losses, the selection process may be tempered by anatomic features and life style choices of the patient. In a younger patient with a shallow or poorly developed nasolabial crease, donor site scar becomes slightly noticeable. Theoretically, a patient with a history of heavy smoking or prior irradiation to the face may also benefit from enhanced viability of the forehead flap, which possesses a true axial blood supply. By contrast, a patient who would have significant daily living problems being unable to wear eyeglasses following first-stage transfer (because of flap pedicle overlying nasofrontal region), may be better suited for a N-flap repair.

In this study, among the 23 patients, tumors were the cause of the defects in 19 patients (82.6%). Sixteen patients of them were males (84%) and all were farmers which spend the majority of their occupational time outside. That is why farmers have higher incidence of developing various forms of skin cancer (Bernhardt & Langley [16] and Marlenga & Lee [17]).

We also noticed that eight patients in our study presented with tumors on the dorsum (34.7%) followed by 7 on the nasal tip (30.4%), the ala 6 patients (26.1%), 2 on the base (8.7%). This didn't match previously published distributions of skin cancer on the nose. For example, in a recent study of BCCs in China, (13.6%) were located on the ala and (9.9%) on the dorsum (the nasal bridge), (8.1%) on the tip [18].

In particular, the tip and the alar regions are the most outwardly protruding area on the face. It is not surprising that all cases presented with trauma in our study were on the tip and alar regions, likely owing to their prominent position.

In our experience, the largest area of tissue defects was on the dorsum and the smallest was on the base. This did match with Uchinuma et al 1997 [19] who stated the same. In this study, the mean size of tissue defects reconstructed using the forehead flap was much bigger than the defects reconstructed using the nasolabial flap (118.46cm² & 84.0cm² respectively). Both the forehead and medial cheek were used as donor sites. They can provide a preferable source of soft tissue for surface reconstruction of nasal subunit losses. When the surface losses were large and involve multiple nasal subunits, the more limited tissue provided by the nasolabial flap favored the use of the forehead flap. Agreed by Gilman et al., 2010 [20] who stated that using nasolabial flaps in large defects caused distortion and sometimes was insufficient.

The forehead flap provides a sufficient surface covering for large defects with skin of similar characteristics to the nasal skin in terms of color and texture. This was reflected by very great number of authors such as Arden et al., [15], Danahey et al., [21], P. Belmar et al., [22] and Salgarelli et al., [23].

Kelly et al., 2008 [24], in a study of the paranasal region demonstrated the existence of a rich anastomotic arcade formed by the supratrochlear artery, infraorbital artery and branches from the facial artery; this ensures a rich blood supply to the paramedian forehead flap even with a narrow pedicle with its base at the level of medial canthus. In this way, the pedicle of the forehead flap was extended to enable the reconstruction of more distal or larger area without affecting the viability of the flap and making it possible to perform other procedure in the same operation such as reconstruction of the lining of the nose which was agreed by park S.S et al., [25].

In our experience, six patients presented with tissue defects that involved the nasal ala. Nasolabial flaps were used in four cases and forehead flaps were used in two cases. The mean total score was 17 and 11 with N-flap and F-flap respectively. This was due to the minimization of problems related to the flap, such as color, texture and donor sites that are acceptable to the patient. In addition, the nasolabial fold can supply enough skin to resurface the ala. Beside, the contractility of the nasolabial flap during the wound healing simulated the round

and expected bulge of the normal ala. This provided contour advantage over the more unyielding forehead tissue. This was in agree with Hindy A.M. [26], Zitelli et al. [27], Shalaby et al. [28], Kakinuma et al. [29], S.A. Barker [30] and Cook et al. [31].

The unavoidable suture line of the donor site from the nasolabial flap is relatively easy to camouflage in the natural expression lines of the face resulting in a relatively high score for the donor site in this study. The marked differences in the donor site rating between both groups favored the use of the nasolabial flap. Also, ratings of the flap thickening and total nasal contour and morphology also favored the nasolabial reconstructions.

Shalaby et al., [27] in his study of alar reconstruction using nasolabial flap reported favorable results such as a near natural appearing, appropriately positioned ala and suture line well camouflaged in the alar crease and tip-alar junction. Uchinuma et al., [18] compared the nasolabial and forehead flaps and concluded that the nasolabial flaps achieved better results in alar reconstruction. Arden et al., [15] described esthetic and functional outcomes following Mohs ablative surgery involving the alar subunit, using a paramedian or melolabial flap in 38 patients and got the same results.

In this study, both forehead and nasolabial flaps were employed to resurface the defects on the nasal tip and both were good choices for reconstruction. Four cases were reconstructed by the F-flap and three cases were reconstructed by the N-flap. The total mean score was 13.7 and 13.9 for the F-flap and the N-flap respectively.

Uchinuma et al., [18] obtained excellent results in nasal tip reconstruction using nasolabial flap in contrast with low results with the forehead flap. On the other hand, Multiple authors such as James et al., [7] and Rohrich et al. [32] didn't prefer the N-flap especially in younger patients with a shallow or poorly developed nasolabial crease. James F. et al., [7] also stated that the soft and spongy nature of the N-flap was poor subunit for the firm convexity of the nasal tip.

Both flaps the forehead and the nasolabial were employed for surface recovery on the nasal dorsum. Five cases were reconstructed by the F-flap and three cases were reconstructed by the N-flap. The total mean score of tissue defects reconstructed using the N-flap was higher than the forehead flap (17.1 and 14.6 respectively). In agree with Cameron et al. [8] and Giebfried et al., [33]. However, Rohrich et al., [34] stated that the thin skin on the nasal dorsum made the contractility and the bulging of

the N-flap during the wound healing process relatively noticeable which can affect the outcomes. Klingensmith et al., 1994 [35] observed that the Midline forehead flap is the first choice for dorsal defects and reported excellent results.

Only forehead flaps were used for nasal base reconstruction and obtained a good score. It was difficult to use N-flaps in basal reconstruction which was also stated with Uchinuma et al. [18].

Generally, N-flap obtained higher score than the forehead flap in all items except for the color match which was close to each other. The total mean score was higher in patients who were reconstructed with the N flap (This difference is significant since ($p>0.05$)). The presence of a vertical scar in the forehead was a big disadvantage of the forehead flap resulting in a low score for donor site and patients satisfaction. This is in agreeing with multiple previous authors such as Arden et al [15] and Salgarelli et al., [22]. However, Belmar et al., [21] stated that this was not particularly unsightly. On the other hand, no patient in the nasolabial group commented negatively on his or her donor site.

In our experience, we found that patient satisfaction depends on three main factors. The first is the preoperative lesion, the worse and bigger the lesion, the lower the expectation of the result. That is why patients with large defects which involved multiple nasal subunits-especially traumatized patients- had a high satisfaction score. The second factor is the number of stages. We found that patients whose defects were reconstructed by the 2 stages forehead flap also obtained a low score. The final factor is the donor site scar. Patients who underwent reconstruction of tissue defects using N-flaps achieved a higher patient satisfaction score than those reconstructed using F-flaps.

Conclusion:

In this study, we tried to evaluate the effectiveness and the aesthetics outcomes of two common regional flaps; the forehead and the nasolabial taking into consideration the location and size of the tissue defect.

We found that the large surface losses and those which involved multiple nasal subunits, the more limited tissue provided by the nasolabial flap favored the use of the forehead flap. In smaller or single subunits losses, Nasolabial flaps were better than Forehead flap in the nasal dorsum and ala. On the tip, they were close to each other. On the base only forehead flaps were used. The larger the defects, the less favorable aesthetic outcomes

obtained. The presence of a vertical scar in the forehead was a big disadvantage of the forehead flap resulting in a low score for donor site and patients satisfaction. Also, multi-Stage procedures are less preferred.

REFERENCES

- 1- R.M. Kline: Aesthetic reconstruction of the nose following skincancer. *Clin. Plastic Surg.*, 31: 93-111, 2004.
- 2- Burget G. and Menick F.: The subunit principle in nasal reconstruction. *Plast. Reconstr. Surg.*, 76: 239-247, 1985.
- 3- Mazzola R. and Marcus S.: History of total nasal reconstruction with particular emphasis on the folded forehead flap technique. *Plast. Reconstr. Surg.*, 72: 408-414, 1983.
- 4- McDowell F., Valone J. and Brown J.: Bibliography and historical note on plastic surgery of the nose. *Plast. Reconstr. Surg.*, 10: 149-185, 1952.
- 5- Barton F.: Aesthetic aspects of partial nasal reconstruction. *Clin. Plast. Surg.*, 8: 177-191, 1981.
- 6- Zitelli J. and Fazio M.: Reconstruction of the nose with local flaps. *J. Dermatol. Surg. Oncol.*, 17: 184-189, 1991.
- 7- James F. Thornton and Williams M. Weathers: Nasolabial flap for nasal tip reconstruction. *Plast. Reconstr. Surg.*, 122: 755, 2008.
- 8- Cameron R.R., Latham W.D. and Dowling J.A.: Reconstructions of the nose and upper lip with nasolabial flaps. *Plast. Reconstr. Surg.*, 52: 145, 1973.
- 9- McClaren L.R.: Nasolabial flap repair for alar margin defects. *Br. J. Plast. Surg.*, 16: 234, 1963.
- 10- Strauch B., Vasconez L.O. and Hall-Findley E.J.: *Grabb's Encyclopedia of flaps* (Isted). Little, Brown and Company: Boston, 1, 1990.
- 11- Burget G.C. and Menick F.J.: Repair of small surface defects. In: Burget G.C., Menick F.J., eds. *Aesthetic Reconstruction of the Nose*. St. Louis: Mosby-Year Book, 117, 1994.
- 12- J. Rustemeyer, L. Günther and A. Bremerich: Complications after nasal skin repair with local flaps and full-thickness skin grafts and implications of patients' contentment, *Oral and Maxillofacial Surgery*, Vol. 13, No. 1, pp. 15-19, 2009.
- 13- D.K. Hoasjoe, F.J. Stucker and R.E. Aarstad: "Aesthetic and anatomic considerations for nasal reconstruction," *Facial Plastic Surgery*, Vol. 10, No. 4, pp. 317-321, 1994.
- 14- M. Asgari, D. Bertenthal, S. Sen, A. Sahay and M.M. Chren: "Patient satisfaction after treatment of nonmelanoma skin cancer", *Dermatologic Surgery*, Vol. 35, No. 7, pp. 1041-1049, 2009.
- 15- Arden R.L., Nawroz-Danish M., Yoo G.H., Meleca R.J. and Burgio D.L.: Nasal alar reconstruction: A critical analysis using melolabial island and paramedian forehead flaps. *Laryngoscope*, 109 (3): 376-82, 1999.
- 16- Bernhardt J. and Langley R.: "Agricultural hazards in north Carolina" *North Carolina Medical Journal*, Vol. 54, pp. 512-515, 1993.
- 17- Maelenga B. and Lee B.: Barriers to skin cancer screening follow up in farmers. *Journal of Agromedicine*, Vol 3, pp. 5-16, 1996.
- 18- V. Chow, J. Chan, R. Chan, J. Chung and W. Wei: Basal Cell Carcinoma of the Head and Neck Region in Ethnic Chinese, *International Journal of Surgical Oncology*, Volume 2011, Article ID 890908, 7 pages, 2011.
- 19- Uchinuma E., Matsui K., Shimakura Y., et al.: Evaluation of the median forehead flap and the nasolabial flap in nasal reconstruction. *Aesthetic Plast. Surg.*, 21: 86-9, 1997.
- 20- L. Gilman and G. Fisher: Adjunctive Use of Primary Nasal Tip Closure, *Dermatol. Surg.*, 36: 2053-2056, 2010.
- 21- Danahey D.G. and Hilger P.A.: Reconstruction of large nasal defects. *Otolaryngol. Clin. North Am.*, 34: 695-711, 2001.
- 22- P. Belmar, E.de Eusebio, C. Sanchez, A. Veragra and A. Juanes: Paramedian forehead flap for the reconstruction of extensive nasal defects. *Actas Dermosifiliogr.*, 102 (3): 187-192, 2011.
- 23- C. Salgarelli, P. Bellini, A. Multinu, C. Magnoni, M. Francomano, F. Fantini, U. Consolo and S. Seidenari: Reconstruction of Nasal Skin Cancer Defects with Local Flaps, Vol. 2011, Art. ID 181093, 2011.
- 24- Kelly C., Yavuzer R., Keskin R., Bradford M., Govila L. and Jackson I.: Functional anastomotic relationship between the supratrochlear and facial arteries: An anatomical study. *Plast. Reconstr. Surg.*, 121: 458-65, 2008.
- 25- Park S.S.: Reconstruction of nasal defects larger than 1.5 centimeters in diameter. *Laryngoscope*, 110: 1241 50, 2000.
- 26- Hindy A.M.: A study of different types of repair of the defects following excision of rodent ulcer of the face. M.s Thesis, Faculty of Medicine, Tanta University, 1989.
- 27- J.A. Zitelli: "The nasolabial flap as a single-stage procedure," *Archives of Dermatology*, Vol. 126, No. 11, pp. 1445-1448, 1990.
- 28- Shalaby H.A., Higazi M., Mandour S., EL Khalifa M., Ayad H. and Gaber A.: Medially based nasolabialfor reconstruction of the nasal ala. *EJPRS*, 15: 38-42, 1991.
- 29- H. Kakinuma, U. Iwaswa, M. Honjoh: Composite nasolabial flap, *Dermatologic surgery*, 28: 237-240, 2002.
- 30- S.R. Baker: *Local Flap in Facial Reconstruction*, Mosby, St. Louis, Mo, USA, 2nd edition, 2007.
- 31- Cook J.L.: The lateral ala's volume and position are critical determinants of aesthetically successful nasal reconstruction: A photographic case series. *Dermatol. Surg.*, 35: 667-673, 2009.
- 32- Rohrich R.J., Griffin J.R., Ansari M., Beran S.J. and Potter J.K.: Nasal reconstruction: Beyond aesthetic subunits. A 15-year review of 1334 cases. *Plast. Reconstr. Surg.*, 114: 1405, 1998.
- 33- Giebfried J.W., Urken M.L., Lawson W. and Biller H.F.: Reconstruction of nasal defects with a nasolabial island flap. *Arch. Otolaryngol. Head Neck Surg.*, 113: 295-8, 1987.
- 34- Rod J. Rohrich: Superiorly based nasolabial flap, *Plast. Reconstr. Surg.*, 108: 1727, 2001.
- 35- Klingensmith M.R., Millman B. and Foster W.P.: Analysis of methods for nasal tip reconstruction. *Head & Neck*, 16: 347, 1994.