

DOUBLE RANDOM V-Y ADVANCEMENT FLAPS FOR RECONSTRUCTION OF A PARTIAL EYEBROW DEFECTS

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The eyebrow region is very important for facial movements, symmetry and overall face aesthetic appearance of the face. Partial eyebrow defects after tumor excision can be repaired using several surgical techniques which are often complicated and clinically inapplicable.

The aim of the study is to establish a simplified surgical method for the treatment of partial eyebrow defects using the rest of the eyebrow by the double random V-Y flaps.

During the period from January 2009 to January 2016, a total of 12 patients (3 males, 9 females) with partial eyebrow defects were treated with eyebrow flap reconstruction. Patients' age ranged from 48 to 82 years. These defects were caused by tumor excision.

Defects were up to half the eyebrow width, localized in the middle three quarters of the eyebrow. The minimum area of the defect was 0.8 cm and the maximum area was 2.5 cm. The patients were treated with double random V-Y advancement flaps. All the patients were followed postoperatively for at least a year. Clinical effects of eyebrow reconstruction were evaluated using a designed scoring system.

All the 24 flaps survived without significant complications and all reconstructed eyebrows were continuous, symmetrical and with good integrity. After an average of 3.28 years of follow-up, the patients did not have infection, tumor recurrence, nor scarring.

Based on our experience with 12 patients who underwent eyebrow reconstruction, we may recommend double V-Y advancement flaps as a model for the treatment of patients with partial eyebrow defects. *Acta Medica Medianae* 2017;56(3):101-106.

Key words: eyebrow, flaps, reconstruction

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Introduction

Eyebrows are not strictly an extension of facial tissue, they are more specialized accessories of the hair-bearing scalp located in the upper part of the face, with the function to block the flow of sweat from the forehead to eyelids (1).

Despite the two-dimensional nature of the proceedings, eyebrow reconstruction is not always a simple matter. Eyebrow position and continuity play an important role in the overall facial harmony. As a consequence, in cases of oncological

defects the main target of reconstructive surgery is to restore the eyebrow continuity.

Skin defects in hair-bearing regions present a reconstructive challenge for plastic surgeons, since the replacement tissue must have the same characteristics as the recipient area, including similar color, thickness and hair-bearing capacity (2).

The hairs of the eyebrow have particular and unique characteristics: they are short in length, small in diameter and are slow growing. Because of that, finding a replacement tissue with all three characteristics is very challenging. Most common causes of eyebrow loss are burns, traumas and surgical excision.

Tumor lesions are very rare and represent about 6% of all tumors affecting the periorbital region. Because of the relative rarity of these tumors in the superciliary arch, very little material has been published on this topic. Most reconstructive techniques when eyebrows are concerned are reported as case reports (3).

A variety of methods used for eyebrow reconstruction have been widely reported (4-7). Matsuo et al. (2014) (8) described three main

eyebrow reconstruction methods, namely scalp grafting, free skin graft, and skin flap transplantation.

For relatively small eyebrow defects, a repair with local transfer flaps using the residual eyebrow can usually produce good results (9, 10). In the case of larger defects, a large free scalp flap or hair follicle transplantation can be used. For total eyebrow defects, it is often suitable to choose the superficial temporal fascia island flap approach (11). However, hair follicle transplantation is applicable in all types of eyebrow defects and can be used universally.

In partial defects, the eyebrows can be used in the form of random V-Y subcutaneous flaps. In the 1980s and 1990s, authors have published their first experiences on the use of flaps with a subcutaneous pedicle and the upper and lower eyelid regions (12-14). The advantages of using V-Y flaps have been widely described for the reconstruction of small to medium defects of the face following the resection of skin tumors.

One of the advantages of these flaps is that they are technically feasible, and their principal shortcoming is limited mobility due to the flap advancement relying on the elasticity of tissues that are not peculiarly mobile in this area of the forehead. Due to limited mobility of these flaps, the reconstruction of defects up to half of the eyebrows is facilitated by the use of double V-Y advancement flaps, doubling thus the mobility of the two flaps.

Our study includes a series of partial eyebrow defects caused by tumor excision, which were reconstructed using double V-Y advancement flaps.

Materials and methods

Patients

In the period between January 2009 and January 2016, 12 patients (3 men, 9 women) with eyebrow defects were treated with eyebrow flap reconstruction. Age of the patients ranged from 48 to 82 years.

Of all the patients, there were seven cases with eyebrow defects on the left side and five cases with defects situated on the right side. All these defects were made by tumor excision. The defects were up to half the width of the eyebrows, localized in the middle two quarters of the eyebrows. The minimum area of the defect was 0.8 cm and the maximum surface defect was 2.5 cm. The patients were treated with using double random V-Y advancement flaps. Surgical procedures were performed under local anesthesia.

All the patients were followed postoperatively for at least a year. The effectiveness of the applied procedure was evaluated in relation to the following three aspects: (1) the shape of reconstructed eyebrows; (2) maintaining of the symmetry with the other eyebrow; and (3) the

residual scar. Each aspect was assigned a score, ranging from 1 to 5.

The overall result of all three aspects was graded as "excellent (12-15 points)," "good (7-11 points)," and "poor (0-6 points)."

Surgical procedure

Tumors were excised with a radical oncological intent. As for the oncological parameters, the lesions were excised along the marked lines with a sharp knife 15, in parallel to the eyebrows, ensuring that the root of the hair follicles was preserved.

V-Y advancement flaps were designed according to the length and width of the defect area. The base of the V-Y flaps was represented by the lateral and medial margins of the residual defect, and the width of the flaps was slightly less than that of the defect area.

Flaps were dissected out in a subcutaneous plane. V-Y flaps were advanced forward medially and laterally to cover the eyebrow defect, without being folded up or serried. The incision was closed with 3-0 and 6-0 sutures (Figure 1).

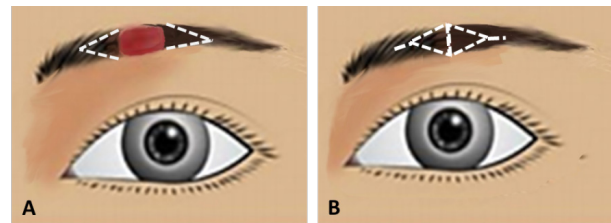


Figure 1. : Illustration of the surgical technique. A: The defect is outlined and a triangular flap, including the entire hairy portion of the remaining eyebrow, is incised. B: Flaps are advanced toward the defect and sutured.

Flaps are then stitched with special attention on the correct positioning of the hair-bearing area which must be symmetrical with the contralateral eyebrow.

Results

Pathological examinations were performed on 12 tumors excised and the tumors were diagnosed as: pigmented intradermal nevus (2 cases), basal cell carcinoma (8 cases), basal and squamous cell carcinoma (2 cases). Oncological radical intent was achieved in all cases. In all 12 patients, the minimum surface defect was 0.8 cm, and the maximum surface defect was 2.5 cm. The average of 3.28 years of patient follow-up showed neither local recurrences, nor locoregional lymphadenopathy. None of the patients had any complications during the follow-up (Table 1).

All 24 flaps survived without significant complications, and the shape of the reconstructed eyebrow was continuous and symmetrical (Figure 2 and 3).

According to the rating scale, there were 8 excellent and 4 good outcomes (Table 2).

Table 1.: Series of patients treated with double V-Y advancement flaps for the reconstruction of a partial eyebrow defect

Number	Sex	Age	Diagnosis	Defect size(cm)	Complications
1	F	56	basal cell carcinoma	1.2	None
2	F	65	basal cell carcinoma	2.5	None
3	M	78	basal cell carcinoma	2.2	None
4	F	82	pigmented intradermal nevus	0.8	None
5	F	48	basal cell carcinoma	1.8	None
6	F	63	basal cell carcinoma	1.5	None
7	M	71	basal squamous cell carcinoma	2.1	None
8	F	54	basal cell carcinoma	1.2	None
9	F	62	pigmented intradermal nevus	0.9	None
10	M	67	basal squamous cell carcinoma	1.4	None
11	F	58	basal cell carcinoma	1.7	None
12	F	52	basal cell carcinoma	1.5	None



Figure 2. :A: Basal cell carcinoma of the left eyebrow. B: Skin defect after surgical excision. C: Double V-Y flaps advanced on a random subcutaneous pedicle and sutured. D: Double V-Y flaps reconstruction at 2 months follow-up.

Table 2. :Score efficient surgical procedure

Number	the shape of the reconstructed eyebrow	retaining symmetry with the other eyebrow	residual scar	Total scores	
1	3	4	5	12	excellent
2	2	2	3	7	good
3	2	2	4	8	good
4	5	5	5	15	excellent
5	3	3	4	10	good
6	4	4	5	13	excellent
7	3	3	4	10	good
8	5	4	5	14	excellent
9	5	4	5	14	excellent
10	4	4	4	12	excellent
11	5	4	5	14	excellent
12	5	5	4	12	excellent

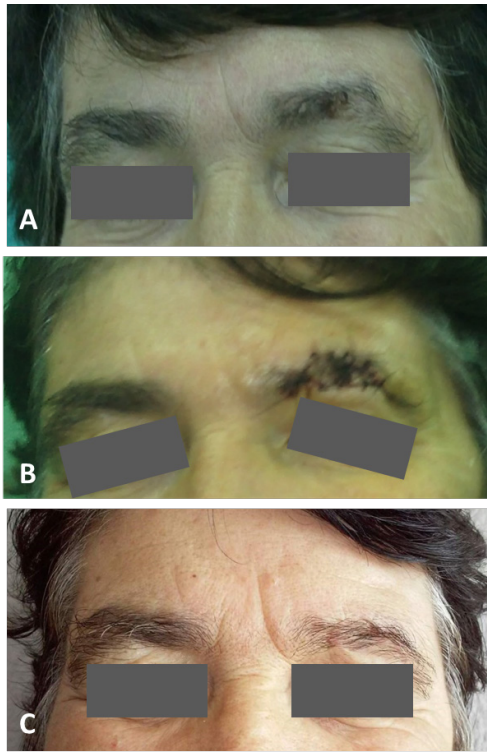


Figure 3. A: Basal cell carcinoma of the left eyebrow. B: Double V-Y flaps advanced on a random subcutaneous pedicle and sutured. C: Double V-Y flaps reconstruction at 5 years follow-up.

Discussion

Despite the aesthetic and functional character eyebrows have and eumorphism of the face, a review of scientific literature highlights the lack of effective surgical techniques.

Several techniques have been described in sporadic case reports, and these are much more concerned with the composite grafts and flaps harvested from the skin of the head, while others are extremely complex and are not warranted for use because they do not offer any additional therapeutic benefits.

The reconstructed eyebrow, despite of its being symmetrical and well oriented, will be shorter than the contralateral eyebrow. This is due to the fact that no additional hair-bearing areas are transferred. However, very often 30-50% reduction in the length of the forehead, particularly in elderly patients, does not lead to any apparent cosmetic defect (3).

A generally adopted principle is that in a unilateral eyebrow loss, the contralateral eyebrow is used as a model (15). Matsuo et al. (2014) (8) have identified three main options for the reconstruction of eyebrows: free hair transfer, free skin graft with hair transfer, and flap transfer. Omrani-fard et al. (2007) (16) considered the grafting another option after switching and density of hair is not sufficient and you need more than two phases to complete it. For partial eyebrows defects, the best option is the use of local flaps from

the rest of the ipsilateral eyebrow, with characteristics that are more similar to that with the recipient party. Rotation flaps, ailerons and bilobed transposition flap are contraindicated because they cannot precisely follow the eyebrow line. Other reconstructive techniques like tattoos should be considered as secondary options. Silapunt et al. (2004) (9) were not successful using V-Y flap to correct an eyebrow defect higher than 1.5 cm due to the impossibility of obtaining eyebrows of the same length postoperatively.

Accardo et al. (2015) (2) showed that when the defect was larger than 2.5 cm it was too difficult to cover the lack of subcutaneous pedicled V-Y advancement flap. In our study, random double V-Y advancement flaps were limited to half the width of the eyebrows with a maximum width of 2.5 cm, and it was not possible to close large defects with these flaps. This was the case because vascularization and subcutaneous pedicle cannot provide enough flexibility and mobility to cover the defect.

This aesthetic problem largely depends on the age, elasticity of the patient skin and total eyebrow length. In addition, postoperative asymmetry may be bypassed by using camouflage conservative procedure on the contralateral eyebrow. A typical subcutaneous pedicle V-Y flap with random vascularization does not provide sufficient flap mobility. However, dissection revealed the flap with an increased risk of partial or complete necrosis.

Lack of mobility is a limiting factor in random V-Y flaps. Leto Barone et al. (3) tried to solve the problem using the perforator V-Y flaps. The same authors stressed the importance of V-Y flaps and eyebrow reconstruction. In particular, the author described a "free style-like V-Y flap" as in advancement V-Y flap for the shortcomings of those between 30 and 50% of the length of eyebrows that provides brilliant cosmetic results. V-Y perforator flap were described on the pedicle including perforators from supratrochlear, ophthalmic or superficial temporal artery depending on the location to be repaired. This perforator flap is more mobile than random V-Y flap, but technically more complex and demanding.

The lack of mobility of otherwise technically feasible random V-Y flap can be overcome by using a random double V-Y flap which doubles the flap mobility.

In our surgical practice we routinely perform double V-Y flaps for the reconstruction of partial eyebrow defects.

For patients with defects less than half of the entire length of the eyebrow, it is suitable to use double random V-Y advancement flaps for eyebrow reconstruction. This flaps has the following advantages: first, it has the similar texture, color, and thickness as the recipient area; in the case of V-Y flaps of the eyebrow here described, it allows for easy and correct orientation of the hairbearing areas. These characteristics can help us to achieve an optimal esthetic appearance.

Moreover, the scar is invisible as the donor site incision can be hidden in the eyebrow hair. The scars resulting from a V-Y flap do not involve hairbearing zones and are parallel to the minimum tension lines of the forehead and the eyelid, resulting in nonvisible scars with scar maturation. Second, the reconstructed eyebrow does not need to be trimmed.

Furthermore, this procedure is practical and convenient, as the operation is simple and can be completed under local anesthesia without secondary revision. However, the disadvantage is that the reconstructed eyebrow may be narrower than the healthy side; this can be corrected with a tattoo to the defect area. In order to minimize the damage to the eyebrows when cutting the skin flap, attention should be paid to protect the eyebrows.

In addition, we recommend the selection of a random double V-Y advancement flaps to cover the deficiency when the diameter of the deficiency is less than half an eyebrow, because it can compensate for the additional "loss" after trimming the hair follicles in the "dog ear" on both sides of the

defect, although it may be somewhat complex compared to direct closure.

In addition, changes in the shape of the eyebrows through the V-Y advancement flaps are more obvious than with direct closure, especially when the deficiencies are found in the top of the eyebrow or the central eyebrow region.

Conclusion

Reconstruction of the eyebrow defects is not a simple procedure and represents a major challenge for the plastic surgeon.

From our experience with 12 patients who underwent reconstruction of the eyebrow defects in our hospital, we recommend the use of double V-Y advancement flaps to reconstruct the defect when its size is less than half of the whole eyebrow, especially when the defects are situated at the top of the eyebrow and in the central eyebrow region.

References

1. Sadr J, Jarudi I, Sinha P. The role of eyebrows in face recognition. *Perception* 2003;32(3):285-93. [[CrossRef](#)] [[PubMed](#)]
2. Accardo G, Aveta A, Ambrosino E, Aceto B, Di Martino A, Schonauer F. A surgical algorithm for partial or total eyebrow flap reconstruction. *J Surg Oncol* 2015;112(6):603-9. [[CrossRef](#)] [[PubMed](#)]
3. Leto Barone AA, Rossi M, Giunta G, Carmisciano M, Di Rosa L, Toia F, et al. Freestyle-like V-Y flaps of the eyebrow: a new outlook and indication of an historical technique. *Sci World J* 2013; 2013:182518. [[PubMed](#)]
4. Brent B. Reconstruction of ear, eyebrow, and sideburn in the burned patient. *Plast Reconstr Surg* 1975;55(3):312-7. [[CrossRef](#)] [[PubMed](#)]
5. Pensler JM, Dillon B, Parry SW. Reconstruction of the eyebrow in the pediatric burn patient. *Plast Reconstr Surg* 1985;76(3):434-40. [[CrossRef](#)] [[PubMed](#)]
6. Sloan DF, Huang TT, Larson DL, Lewis SR. Reconstruction of eyelids and eyebrows in burned patients. *Plast Reconstr Surg* 1975;58(3):340-6. [[CrossRef](#)] [[PubMed](#)]
7. Juri J. Eyebrow reconstruction. *Plast Reconstr Surg* 2001;107(5):1225-8. [[CrossRef](#)] [[PubMed](#)]
8. Matsuo S, Hashimoto I, Seike T, Abe Y, Ishida S, Nakanishi H. Extended hair-bearing lateral orbital flap for simultaneous reconstruction of eyebrow and eyelid. *Plast Reconstr Surg Glob Open* 2014;2(2):e111. [[CrossRef](#)] [[PubMed](#)]
9. Silapunt S, Goldberg LH, Peterson SR, Gardner ES. Eyebrow reconstruction: options for reconstruction of cutaneous defects of the eyebrow. *Dermatol Surg* 2004;30(4Pt1):530-5. [[CrossRef](#)] [[PubMed](#)]
10. Cedars MG. Reconstruction of the localized eyebrow defect. *Plast Reconstr Surg* 1997;100(3):685-9. [[CrossRef](#)] [[PubMed](#)]
11. Tenna S, Brunetti B, Aveta A, Poccia I, Persichetti P. Scalp reconstruction with superficial temporal artery island flap: clinical experience on 30 consecutive cases. *J Plast Reconstr Aesthet Surg* 2013;66(5):660-6. [[CrossRef](#)] [[PubMed](#)]
12. Moschella F, Cordova A, Castelli E, Leonardi V. L'impiego dei lembi a peduncolo sottocutaneo in chirurgia oncologica delle palpebre. *Atti del 38° Congresso Nazionale della Società Italiana di Chirurgia Plastica*. Bologna, Monduzzi 1989; p. 1073.
13. Moschella F, Cordova A. Upper eyelid reconstruction with mucosa-lined bipedicle myocutaneous flaps. *Br J Plast Surg* 1995; 48(5):294-9. [[CrossRef](#)] [[PubMed](#)]
14. Moschella F, Cordova A, Di Gregorio C. Lower eyelid reconstruction by multiple subcutaneous pedicle flaps: a new method. *Br J Plast Surg* 1992;45(1):55-8. [[CrossRef](#)] [[PubMed](#)]
15. Gunter JP, Antrobus SD. Aesthetic analysis of the eyebrows. *Plast Reconstr Surg* 1997;99(7):1808-16. [[CrossRef](#)] [[PubMed](#)]
16. Omranifard M, Koushki AM. Comparison of four surgical methods for eyebrow reconstruction. *Indian J Plast Surg* 2007;40(2):147-52. [[CrossRef](#)]

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doi:10.5633/amm.2017.0316**REKONSTRUKCIJA PARCIJALNIH DEFEKATA OBRVA
DUPLIM RANDOM V-Y KLIZAJUĆIM REŽNJEVIMA***Irena Janković^{1,2}, Predrag Kovačević^{1,2}, Goran Stevanović^{1,2},
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Obrve su vrlo važne za pokrete lica, simetriju i ukupan estetski izgled lica. Parcijalni defekti obrva nakon ekscizije tumora mogu se rekonstruisati pomoću nekoliko hirurških tehnika, koje su često komplikovane i klinički teško izvodljive.

Cilj istraživanja bio je ustanoviti pojednostavljenu hiruršku metodu rekonstrukcije parcijalnog defekta obrva pomoću ostatka tkiva obrve dvostrukim random V-Y režnjevima.

U periodu od januara 2009. godine do januara 2016. godine operisano je 12 bolesnika (tri muškarca, 9 žena) sa parcijalnim defektom obrva, koji su rekonstruisani režnjevima. Starost bolesnika bila je od 48 do 82 godine. Defekti su nastali ekscizijom tumora.

Defekti su bili do polovine širine obrve, lokalizovani u srednje tri četvrtine obrva. Minimalna veličina defekta bila je 0,8 cm, a maksimalna 2,5 cm. Bolesnici su operisani korišćenjem duplih random V-Y klizajućih režnjeva. Postoperativno praćenje bilo je minimalno godinu dana. Klinički efekti rekonstrukcije obrva procenjivani su pomoću formiranog sistema bodovanja.

Sva 24 režnja su bila bez značajnih komplikacija i sve rekonstruisane obrve su bile u kontinuitetu, simetrične i sa dobrim integritetom. Nakon prosečno 3,28 godina praćenja, bolesnici nisu imali infekcije, recidiv tumora, a ožiljak je bio dobar.

Na osnovu našeg iskustva sa 12 bolesnika kojima su obrve rekonstruisane, preporučujemo korišćenje duplih V-Y klizajućih režnjeva kao model za rekonstrukciju parcijalnih defekata obrva. *Acta Medica Medianae* 2017;56(3):101-106.

Ključne reči: obrve, režnjevi, rekonstrukcija

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