

## Any Two-Lobed Flap Is Not A Bilobed Flap: a revisited study for the bilobed flap technique

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### ABSTRACT

*Eighty-two patients aged 1–91 years, who were operated on between 1989 and 2013, were included in this study. Bilobed flaps were used to repair 84 defects in 82 patients. Three flaps were elevated in a fasciocutaneous fashion, and 10 flaps were axial based on well-known vessels. Three flaps consisted of platysma, while the others were random based on unknown vessels. No donor site morbidity was reported, and a single partial necrosis in nasal alar reconstruction was observed. As a late complication, mild trapdoor deformities were found in two patients with upper cheek reconstruction. In three cases, venous stases were observed in the distal part of the flaps during the early postoperative period. Bilobed flaps were frequently used in nose and infraorbital region.*

*A flap may consist of many shapes and lobes. The reasons for having more than one lobe are as follows: 1) the defect having features that cannot be closed with only one lobe and 2) one lobe is enough to close the defect, but to transfer the lobe to the defect might be associated with a visible morbidity and to facilitate the closure we may need a second lobe. Flaps used for the second situation are termed as bilobed flaps, while the ones used for the first situation are termed as two-lobed flaps.*

*Key words: Flap, lobe, bilobed flap, flaps with more than one lobe*

### INTRODUCTION

The two main types of bilobed flaps are as follows: (1) a simple bilobed flap including skin and subcutaneous tissue, which is used mainly to close small skin defects and (2) a bilobed designed flap that may not always be a simple skin flap; however, it includes some tissues other than skin and subcutaneous tissue, e.g., muscle and fascia.

The first type of simple skin flaps can be termed as “bilobed flap” regardless of their size. The second type of bilobed designed flaps are named together with the tissues they are made of, such as bilobed fasciocutaneous flap or bilobed musculocutaneous flap (1,2). Flaps including more than skin and subcutaneous tissues shall be termed bilobed designed composite flaps.

In addition to these there are flaps composed of two lobes, but these cannot be called bilobed flaps because the primary closure of the defect and the flap donor site are not feasible.

### MATERIALS AND METHODS

Eighty-two patients aged 1–91 years, who were operated on between 1989 and 2013, were included in this study. Both general and local anesthetics were used. The main criteria for determining anesthetic were the age and general conditions of the patient and the type of defect (Table 1).

The bilobed flap was used to repair 84 defects in 82 patients. Three flaps were elevated in a fasciocutaneous fashion, and 10 flaps were axial based on well-known vessels. Three flaps consisted of platysma, while others were random based on unknown vessels. Planning was done in accordance with recipient site requirements and patient-related factors.

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TABLE 1: Characteristics of the 84 flaps in 82 patients.

Flap no	Nature of the pathology	Location of the pathology	Selected anesthesia	Age and gender	Type of the flap	Comment on end result
1	Congenital nevus	Cheek	General	5-F	Bilobed skin flap	Good
2	Hemangioma	Cheek	General	3-F	Bilobed skin flap	Good
3	Congenital nevus	Mandibular margin	General	19-F	Bilobed skin flap	Good
4	BCC	Cheek	Local	84-M	Bilobed skin flap	Excellent
5	Neuropathic ulcer (charcot foot)	Sole	General	55-M	Bilobed skin flap	Excellent but the ulcer recurred 3 months after the operation
6	BCC	Nose	Local	65-F	Bilobed skin flap	Good
7	Giant BCC	Cheek	Local	75-F	Bilobed skin flap	Excellent
8	SCC	Infraorbital	General	75-M	Bilobed skin flap + median forehead flap	Scleral show, abnormal hairs on infraorbital region
9	BCC	Nose	Local	37-M	Bilobed skin flap	Excellent
10	BCC	Nose	Local	43-M	Bilobed skin flap	Excellent
11	BCC	Infraorbital	General	52-F	Bilobed skin flap	Good
12	Lentigo malignant melanoma	Infraorbital	General	63-F	Bilobed skin flap	Good
13	BCC	Cheek	Local	38-F	Bilobed skin flap	Good
14	BCC	Infraorbital	General	72-f	Bilobed skin flap	Excellent
15	BCC	Infraorbital	General	59-M	Bilobed skin flap	Good
16	Gunshot wound	Neck	General	14-F	Musculocutaneous bilobed flap (platysma)	Good
17	Linear BCC	Lower Cheek	General	52-F	Large bilobed flap	Good
18	Benign skin tumor	Epigastric	Local	27-f	Bilobed skin flap	Scar formation like a tattoo
19	Lymphangioma	Scalp	General	34-M	Axial bilobed flap	Excellent
20	BCC	Frontal	Local	35-M	Axial bilobed flap	Excellent
21	Congenital nevus	Cruris	General	17-M	Bilobed skin flap	Good
22	BCC	Infraorbital	Local	42-F	Bilobed skin flap	Mild trapdoor deformity
23	BCC	Scalp	Local	62-M	Bilobed skin flap	Excellent
24	BCC	Forehead	Local	46-F	Bilobed skin flap	Good
25	BCC	Cheek	General	69-F	Bilobed skin flap	Good
26	BCC	Cheek	General	69-M	Bilobed skin flap	Excellent
27	Lymphangioma	Forehead	General	6-M	Axial bilobed flap	Good
28	BCC	Infraorbital	General	62-F	Bilobed skin flap	Excellent
29	SCC	Nose	General	63-F	Bilobed skin flap	Excellent
30	Dermatofibrosarcoma	Cruris	General	9-F	Axial bilobed	Good
31	BCC	Nasolabial	General	54-F	Bilobed skin flap	Excellent
32	SCC	Forehead	Local	55-M	Bilobed skin flap	Recurrence
33	SCC	Lower cheek	General		Bilobed skin flap	Excellent
34-35	Herpetic ulcer	Cruris and thigh	General	77-M	Bilobed skin flap	Good
36	Congenital nevus	Cheek	General	3-F	Musculocutaneous (Platysma)	Scar formation on the suture line
37	Congenital nevus	Mental	General	19-F	Large bilobed skin flap	Donor site was closed with skin graft
38	Giant ulcus rodent	Cheek	General		Maxillectomy and composit bilobed flap	Reccurrence
39	Congenital Nevus	Forearm	General	27-M	Fasciocutaneous bilobed flap	The flap could not be moved. Defect was closed with a skin graft.
40	BCC	Back	Local	58-F	Bilobed skin flap	Good

TABLE 1: Continue.

Flap no	Nature of the pathology	Location of the pathology	Selected anesthesia	Age and gender	Type of the flap	Comment on end result
41	BCC	Back	Local	37-F	Bilobed skin flap	Good
42	BCC	Back	Local	68-M	Bilobed skin flap	Good
43	BCC	Back	General	63-F	Bilobed skin flap	Poor
44	BCC	Forehead	General	43-F	Bilobed skin flap	Excellent
45	Callus	Sole	General	62-M	Bilobed skin flap	Good
46	BCC	Cheek	General	17-F	Bilobed skin flap	Good
47	BCC	Upper lip	General	62-M	Large bilobed skin flap	Insufficiency of oral sphincteric function
48	BCC	Upper lip	Local	53-M	Bilobed skin flap	Good
49	Traumatic tissue defect	Thigh	General	32-M	Bilobed skin flap	Good
50	Benign skin tumor	Thigh	General	35-M	Bilobed skin flap	Good
51	BCC	Nose	General	71-M	Bilobed skin flap	Good
52	Melanoma (metastatic)	Cheek	General	45-M	Bilobed skin flap	No follow up
53	Melanoma	Sole	General	75-M	Bilobed skin flap	Good
54-55	Constrictive ring	Thumb	General	1-F	Bilobed skin flap	Good
56	BCC	Nose	Local	56-F	Bilobed skin flap	Excellent
57	BCC	Nose	Local	47-F	Bilobed skin flap	Excellent
58	BCC	Nose	Local	42-M	Bilobed skin flap	Excellent
59	BCC	Nose	Local	46-F	Bilobed skin flap	Excellent
60	BCC	Nose	Local	36-M	Bilobed skin flap	Excellent
61	BCC	Nose	Local	52-M	Bilobed skin flap	Excellent
62	BCC	Nose	Local	50-F	Bilobed skin flap	Excellent
63	BCC	Nose	General	63-F	Bilobed skin flap	Excellent
64	BCC	Infraorbital	General	51-M	Bilobed skin flap	Mild trapdoordeformity
65	BCC	Lower eye lid	Local	35-M	Bilobed skin flap	Good
66	BCC	Lower eye lid	Local	37-M	Bilobed skin flap	Excellent
67	BCC	Lower eye lid	General	55-M	Bilobed skin flap	Good
68	BCC	Nose	Local	50-F	Bilobed skin flap	Excellent
69	BCC	Medial chantal	Local	42-M	Bilobed skin flap	Excellent
70	BCC	Nose	Local	49-M	Bilobed skin flap	Good
71	BCC	Cheek	General	75-F	Bilobed skin flap	Good
72	BCC	Forehead	Local	76-F	Bilobed skin flap	Excellent
73	BCC	Nasolabial sulcus	General	60-F	Bilobed skin flap	Excellent
74	BCC	Upper lip	General	61-F	Bilobed skin flap	Excellent
75	BCC	Sacral region	General	63-M	Bilobed skin flap	Excellent
76	Pyogenic granuloma	Index finger	Local	30-F	Bilobed skin flap	Dog ear
77	BCC	Forehead	General	74-M	Axial bilobed flap	Good
78	SCC	Temporal	Local	72-F	Bilobed skin flap	Good
79	BCC	Cheek	Local	50-F	Bilobed skin flap	Good
80	BCC	Nose	Local	63-F	Bilobed skin flap	Trapdoor deformity on the second flap
81	SCC	Cheek	Local	91-F	Bilobed skin flap	Dog-ear deformity and epiphora
82	BCC	Cheek	Local	65-M	Bilobed skin flap	Good
83	Pyogenic granuloma	Posterior leg	General	11-M	Bilobed fasciocutaneous flap	Good
84	SCC	Posterior leg	Local	72-M	Bilobed fasciocutaneous flap	



FIGURE 1: Main disadvantage of the bilobed flap is a visible scar.

The flap consisted of two flaps with one base. The primary flap was of the size of the defect or slightly smaller than the defect, and the secondary flap was half the width of the primary flap. The dissection level for the flap was related to the depth of the defect (Figures 1, 2, 3, 4, 5). Perioperative antibiotics were used in traumatic and diabetic wounds. In simple bilobed flaps a Penrose drain was inserted for 1-2 days postoperatively. In composite bilobed flaps, a suction drain was inserted.

## RESULTS

No donor site morbidity was reported, and a single partial necrosis in nasal alar reconstruction existed. As a late complication, mild trapdoor deformities were found in two patients with upper cheek reconstruction. In three cases, venous stases were found in the distal part of the flaps during the early postoperative period. Bilobed flaps were frequently used in nose and infraorbital region.

In one case, we planned to close a moderately sized forearm defect with a bilobed flap based on the fasciocutaneous perforators of the radial artery, but we were not able to move the flap to the defect. It was returned to the recipient site, and the defect was closed with a full thickness skin graft.

The bilobed flap was used to repair 84 defects in 82 patients. Most

of these patients had malignant skin tumors, while others had post-traumatic problems (2 cases), benign skin tumors (12 cases), constrictive ring syndrome (2 operations in a case), diabetic wound (1 case), vascular lesions (4 cases), and herpetic ulcer (2 operations in a case). The defect size ranged from 1,5 x 2 cm to 7 x 12 cm. Table 1 shows baseline characteristics of these patients.

## DISCUSSION

A bilobed flap consists of two flaps: the first flap is transposed to the original defect and the second flap is transposed to the first flap donor site. Usually these two lobes have a right angle between them, and the width of the second flap is half of that of the first. The angle between the two may change.

Bilobed flaps are used in all parts of the body. The term bilobed" implies a technique, originally stated by Horch et al (2), in which a flap allows primary closure of the defect and that of the flap donor site. At times it may not be possible to close the primary or secondary flap donor site defect by skin advancement, and in such situations V-Y like advancement can facilitate donor site closure. In cases where the difference in size between the two flaps is large, V-Y closure might be necessary. Thus, the term shall not be used only for the shape.



FIGURE 2: In elderly patients skin laxity gives more flap mobility.



FIGURE 3: An upper lip basocellular carcinoma resection and reconstruction with superiorly based nasolabial bilobed flap.

Bilobed flaps have been proved useful for the reconstruction of small facial and nasal defects (3). Using bilobed flaps from expanded skin and designing large bilobed flaps were also reported, and the results were fairly acceptable (4, 5).

The bulkiness of the flap is the problem usually seen in the infraorbital and medial canthal regions. This is partly because of the architecture of the lower lid and infraorbital cheek. This is why it is difficult to solve the problem just by making the flap thinner. Fortunately, the bulky appearance of the flap may become better as the time passes (6).

Scalp tightness is a significant factor that can make transposition of the flap difficult. Usually the scalp loses its elasticity in a bald man; therefore, the elasticity of the bilobed flap in the scalp should be checked before using it for closure. Change of hair direction is a problem with scalp flaps. Change of facial hair direction and/or location can also occur in male patients. This is especially true when a bilobed flap is planned from the lower cheek to the middle cheek or infraorbital region (6).

We attempted to close a forearm defect in only one case in which the fascial structure prevented transposition of the bilobed flap. After this case, no further attempts were made to raise a bilobed flap from forearm. The reason for this may be attributed to the texture of the forearm skin and the lack of fatty tissue between the fascia and the skin. As stated earlier, when the bilobed flap was elevated in the lower

extremity, the fascia was included but it was not sutured. In this way we were able to move the skin and subcutaneous tissues freely from the fascia although they were still in contact. On the forearm, this was not possible as there are very little subcutaneous tissues and fat between the fascia and the skin.

A bilobed flap can be used in many ways. It has been used for very small defects in fingers following excision of mucous cysts in six digits in six patients (7). In contrast to such small bilobed flaps, a very large bilobed flap including latissimus dorsi muscle has also been reported to close a decubitus ulcer (8). In five cases of children, bilobed flaps have been used to close meningomyelocele defects (9). In a series of 21 patients, the bilobed island flap has been used for nasal ala reconstruction on patients aged 25--83 years. In two cases, the undersurface of the bilobed island flap has been grafted to provide nasal lining. It was an island flap with a subcutaneous pedicle (10).

It has been reported that 12 nonhealing neuropathic foot patients were treated with bilobed flaps. The primary pathologies were diabetes mellitus, meningomyelocele, and cerebral palsy; the follow-up period was at least 1 year (11). In our series, some sole ulcer cases were closed using bilobed flaps; one of the cases with Charcot deformity recurred 3 months later. Diabetic ulcers can result from ischemia, neuropathy, and infection or combinations of these pathologies. We believe that closure of the wound alone is not a solution for this problem. A careful clinical



FIGURE 4: A benign tumor in the posterior leg and its reconstruction with bilobed fasciocutaneous flap including sural neurovascular pedicle.

evaluation of the sensorial and mechanical problems in diabetic patients should be performed before any reconstructive procedure is undertaken. These are usually the patients who require more complex treatments such as corrective orthopedic surgery and rehabilitation than merely skin flap procedures. It is clear that a sole ulcer can be closed with any flap, but the underlying cause, e.g. neuropathy cannot be eliminated.

Radial skin deficiency in a congenitally angulated thumb has been corrected using a bilobed flap combined with wedge osteotomy and K-wire stabilization (12). The use of a bilobed flap in the hand seems more frequently indicated on the extensor surface (13, 14). Bilobed flaps were used in our series for the reconstruction of the constricted ring syndrome in one patient and pyogenic granuloma in another patient.

A bilobed fasciocutaneous flap was used successfully for reconstruction of the posterior neck after necrotizing fasciitis (1). A bilobed flap based on the fasciocutaneous perforator of the ulnar artery has been used to repair small- to-medium size donor defects following elevation of radial forearm flaps. Using such a flap has minimized the donor site morbidity (15). In two cases, large upper arm defects have been closed with bilobed fasciocutaneous flaps; it was not necessary to use skin grafts to close the donor sites (16). The upper arm as compared

to the forearm and especially flex or surface has much more fatty subcutaneous tissues and can easily allow transferring of the bilobed flap.

The versatility of a bilobed flap can be enhanced when it is planned in axial pattern. Several different types of axial pattern bilobed flaps were reported. One was for the reconstruction of forehead defects (17). Two cases with burn contractures of the axilla have been treated with an axial bilobed flap based on the transverse and descending branches of the circumflex scapular artery. By using such a combination, the authors enhanced the versatility of the scapular and parascapular flaps in a bilobed flap design (18). A bilobed island flap with an extended subcutaneous pedicle including the part of transverse portion of the elevator muscle of the nasal ala has been described for nasal reconstruction in 21 patients following the excision of malignancy (10). Maruyama presented his experience of two cases in which a fasciocutaneous bilobed flap was used in reconstruction of lower leg defects (19). Today it is nearly impossible to publish an article having two examples of the flap located anywhere in the body. We would not have even imagined having another paper covering at least two cases with similar properties in this series (Figure 4).

Furthermore, flaps comprising two lobes have been reported, but they cannot be called bilobed flaps. An example of such a flap was noted



FIGURE 5: A skin-grafted surgical margin tumor positive case with SCC. Following a wide resection, bilobed flap reconstruction helped with minimal scleral show.

by Yao et al. They elevated a skin flap based on the first and second dorsal metacarpal arteries to cover a thumb defect. They used both lobes of the flap to reconstruct the defect, and both donor areas were covered with skin grafts (20). This type of flap should be called a two-lobed flap instead of a bilobed flap. The term “bilobed flap” means a transposition flap in which there is mobilization of two flaps with a common base. The first lobe is slightly smaller than the defect and the second lobe is usually one-half the width of the first lobe. This design allows the defect from the second flap to be closed primarily, and the defect from the primary flap is closed with the second flap. Therefore, any two-lobed flaps that do not give us a chance to close the donor defects in this way cannot be called bilobed flaps.

Another type of composite two-lobed flap using an island musculocutaneous flap with a pectoralis major muscle has been described in nine patients (including some oncologic and traumatic defects), which was termed myocutaneous flap (21). There was also a case report of a 34-year-old female with a recurrent synovial sarcoma of the heel region, which was treated by a bilobed monobloc transfer of parascapular and latissimus dorsi muscle flap. It is better to refer to this type of flap as a two-lobed flap (22). In a case report, a one-stage repair of a large perineal defect using a bilobed design of gluteus maximus and tensor fascia lata musculocutaneous flap has been presented (23).

There are also studies in which a two-lobed free flap has been elevated and called a bilobed flap. In one of these studies, 11 patients were evaluated retrospectively. A two-lobed radial forearm free flap was used for reconstruction of the tongue. In this situation, no matter whether the donor area was closed by skin grafting, it cannot be called a bilobed flap. In the bilobed flap situation, the defect should be closed with the first flap. The bilobed flap is a flap that provides one of its lobes for the closure of the defect. When two lobes are used for the closure of the defect (in the above-mentioned report it was a tongue defect), then it is not a bilobed flap (24).

A flap may consist of many shapes. Usually a flap has only one “lobe,” and we do not describe it as a monolobed flap. There are two-lobed and three-lobed flaps and these have been termed two-lobed (bilobed) or trilobed flaps. A flap may have more than one lobe for two reasons: (1) the defect has some features that cannot be closed with only one lobe and (2) one lobe is enough to close the defect, but to transfer one lobe to the defect might be associated with a visible morbidity and to facilitate the closure we may need a second lobe. Flaps used for the second situation are termed as bilobed flaps, while the ones used for the first situation are termed as two-lobed flaps. However, both may include some composite forms (Table 1).

## REFERENCES

1. El-Khatib HA. Bilobed fasciocutaneous flap for reconstruction of the posterior neck after necrotizing fasciitis. *Plast Reconstr Surg* 2004; 114:885-889.
2. Horch RE, Doz P, Stark B. The contralateral bilobed trapezius myocutaneous flap for closure of large defects of the dorsal neck permitting primary donor site closure. *Head and Neck* 2000; 22:513-519.
3. Smith JD, Pribaz JJ. Flaps. In: Achauer BM, Eriksson E (ed). *Plastic Surgery Indications, Operations and Outcomes*. Mosby, St Louis, 261-290, 2000.
4. Yenidunya MO. The bi-lobed flap design on expanded skin of the face and neck region. *Plast Reconstr Surg* 1998;101:1741-1742.
5. Yenidunya MO, Demirseren ME, Uslu C. Large bilobed flap. *Eur J Plast Surg* 2004;27:131-134.
6. Yenidunya MO, Demirseren ME, Ceran C. Bilobed flap reconstruction in the infraorbital area. *Plast Reconstr Surg* 2007;119:145-150.
7. Young KA, Campbell AC. The bilobed flap in treatment of mucous cysts of the distal interphalangeal joint. *J Hand Surg* 1999;24(B):238-240.
8. Bleicher JN, Garred J. Bilobed latissimus dorsi flap for a decubitus ulcer. *Plast Reconstr Surg* 1984;73:459-461.
9. Lapid O, Rosenberg L, Cohen A. Meningomyelocele reconstruction with bilobed flaps. *Br J Plast Surg* 2001;54:570-572.
10. Golcman R, Speranzini MB, Golcman B. The bilobed island flap in nasal ala reconstruction. *Br Plast Surg* 1998;51:493-498.
11. Yetkin H, Kanatli U, Ozturk AM, et al. Bilobed flaps for nonhealing ulcer treatment. *Foot Ankle Int* 2003;24:685-689.
12. Mosquera JC, Fleming ANM (2000). The bilobed flap: a new application in the reconstruction of congenital thumb deviation. *J Hand Surg* 2000;25(B):262-265.
13. Marble K, Fudem G. First web space release with the dorsal hand rotation flap closing the donor site. *Annals Plast Surg* 1995;35:83-85.
14. Evans DM, Gateley DR, Lewis JS. The use of a bilobed flap in the correction of radial club hand. *J Hand Surg* 1995;20(B):333-337.
15. Hseih CH, Kuo YR, Yao SF, Liang CC, Jeng SF. Primary closure of radial forearm flap donor defects with a bilobed flap based on the fasciocutaneous perforator of the ulnar artery. *Plast Reconstr Surg* 2004;113:1355-1360.
16. Onishi K, Maruyama Y, Okada E. Bilobed fasciocutaneous flap for primary repair of a large upper arm defect with secondary closure of the donor site without skin graft. *Ann Plast Surg* 1997;39:205-209.
17. Yenidunya MO. Axial pattern bilobed flap for the reconstruction of the midline forehead defects. *Plast Reconstr Surg* 1999;103:737.
18. Karacalar A, Güner H. The axial bilobed flap for burn contractures of the axilla. *Burns* 2000;26:628-633.
19. Maruyama Y. Bilobed fasciocutaneous flap. *Br J Plast Surg*, 1985;38:515-517.
20. Yao JM, Song L, Xu JH. The second web bilobed island flap for thumb reconstruction. *Br J Plast Surg* 1996;49:103-106.
21. Haers PE, Gratz KW, Sailer HF. The bilobed myocutaneous pectoralis major flap in closure of combined intraoral and extraoral defects. *Int J Oral and Maxillofac Surg* 1994;23:214-218.
22. Brenner P, Berger A, Kunert P, et al. Bilobed monobloc transfer including parascapular and neurovascular latissimus dorsi muscle flap for functional lower leg repair following muscle group resection for synovial sarcoma. *Eur J Plast Surg* 1993;16:60-62.
23. Maruyama Y, Nakajima H, Kodaira S. Primary reconstruction of perineal defect with a bilobed myocutaneous flap: case report. *Br J Plast Surg* 1980;33:440-444.
24. Uweira T, Seikaly H, Rieger J, et al. Functional outcomes after hemiglossectomy and reconstruction with a bilobed radial forearm free flap. *J Otolaryngol* 2004;33:356-359.