

Versatile Use of Rhomboid Flaps for Closure of Skin Defects

Cilt Defektlerinin Onarılmasında Romboïd Fleplerin Çok Yönlü Kullanımı

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Abstract

Objective: The aim of this study is to present our clinical experience with rhomboid flaps.

Materials and Methods: Twenty-four patients who were operated on between January 2006 and October 2010 were included in the study. All defects were reconstructed using rhomboid flaps.

Results: Twenty-four patients were operated on for various reasons, and 26 rhomboid flaps were performed. Eleven of the 24 cases were male, and the median age of participants was 47.5 years. Eight cases were operated on under general anesthesia, and 13 were locally anesthetized; the remaining cases were operated on under regional anesthesia. In 17 cases, the defect was due to a benign or malignant tumor excision, and five cases were operated on due to burn contracture. There were no occurrences of partial or total flap necrosis or hematoma in our series.

Conclusion: Our series indicates that rhomboid flaps can be safely used to reconstruct small to moderately sized skin defects.

Key Words: Dufourmental flap, Limberg flap, Rhomboid flap

Özet

Amaç: Çalışmanın amacı rhomboid fleplerle elde ettiğimiz deneyimlerin sunulmasıdır.

Gereç ve Yöntem: Ocak 2006 ve Ekim 2010 arasında opere edilen 24 hasta çalışmaya dahil edildi. Tüm defektler rhomboid fleple rekonstrükte edilmişti.

Bulgular: Çeşitli nedenlerle opera edilen hastalarda 26 romboïd flep uygulandı. 24 hastanın 11'i erkekti. Medyan yaş 47.5 idi. 8 hastada genel, 13 hastada lokal anestezi kullanılırken diğer hastalara bölgesel anestezi verilmişti. 17 hastada benign ya da malign tumor eksizyonu nedeniyle rekonstrüksiyon yapıldı. 5 olgu yanık kontraktürüne bağlı opera edilmişti. Seride kısmi ya da tam flep nekrozu ve hematom görülmedi.

Sonuç: Serimizden elde edilen sonuçlar, orta veya küçük boy cilt defektlerin rekonstrüksiyonunda romboïd fleplerin güvenle kullanılabilirliğini göstermektedir.

Anahtar Kelimeler: Dufourmental flebi, Limberg flebi, Romboïd flep

Introduction

The concept of the "reconstructive ladder" suggests that primary closure of a defect is the first choice in reconstruction [1] (Figure 1). However, a considerable number of cases are not eligible for primary closure. In these circumstances, local flaps become the second option. Although defect size is a limiting factor, texture, pliability and color match of a local flap favor its use [2]. Of local flaps, a rhomboid flap is a prominent flap that can be used to reconstruct defects in any part on the body.

Alexander Alexandrovich Limberg was an outstanding surgeon who greatly contributed to the modern practice of plastic surgery. He defined the rhomboid flap and presented his studies in English in 1963 [3]. A rhomboid flap has equal edges with opposing angles of 120° and 60° (Figure 2A). Any defect that can be projected in a rhomboidal shape can be reconstructed with a Limberg flap. Four individual flap

choices are theoretically possible for any defect. However, the surgeon must choose the most suitable one. Skin laxity in the donor area determines the preferred flap (Figure 2A).

In 1962, Claude Dufourmental [4] modified the rhomboid flap. In his design, the distal border of the flap is placed on the line that bisects the angle between the short diagonal of the rhomboid defect and its adjacent side; the acute angle of the flap is still 60°. This modification widens the pedicle width and increases the safety of the flap (Figure 3). Webster [5] described another modification that combined a 30° transposition flap with an M-plasty to repair rhomboidal defects.

Rhomboid flaps can be used anywhere, without any limitations that are due to defect etiology, age or other patient factors. Tumor resection is the primary etiologic factor for this flap, and its use for skin cancers is most often in the head and neck regions. In addition, there have been efforts to use this flap in hand reconstruction, breast reconstruction and pilonidal sinus resection and reconstruction.

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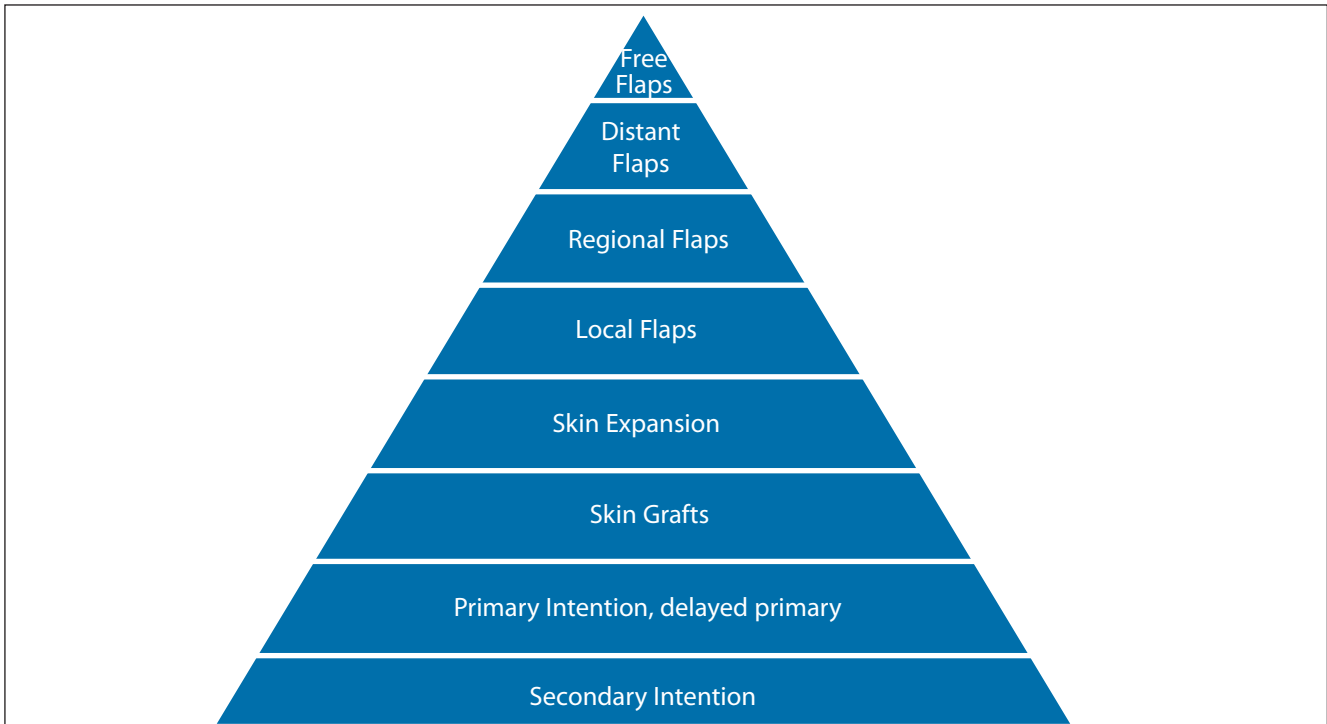


Figure 1. Reconstructive ladder, procedures ranging from simplest to complex.

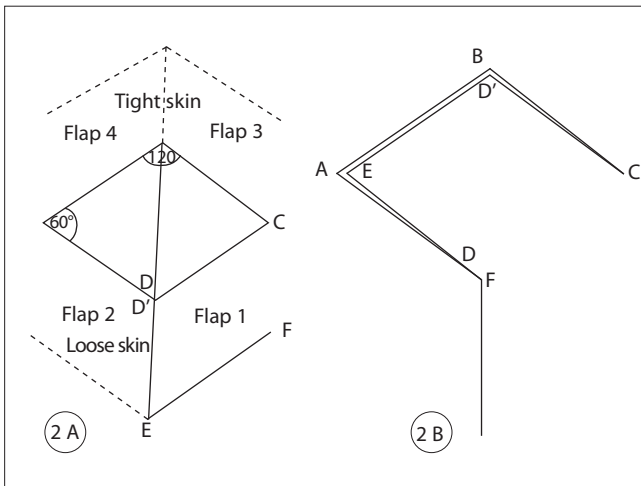


Figure 2. A) Limberg flap design. For any defect there are 4 possible flaps. B) Point A corresponds to E, B corresponds to D'; D corresponds to F.

We have been using Limberg flaps in our daily plastic surgery practice for the reconstruction of any defect. In this paper, we review operations that we have performed during the past 4 years.

Materials and Methods

Patients with skin defects that were closed with rhomboid flaps between January 2006 and October 2010 were included

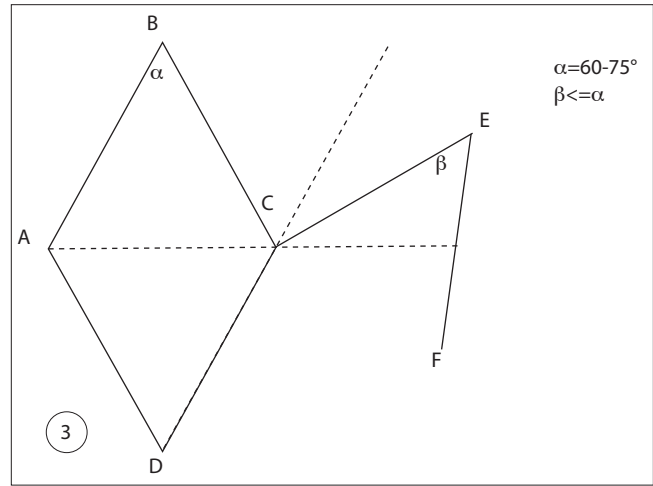


Figure 3. Dufourmental flap design. Note alpha angle ranges between 60-75°.

in this study. There were no limitations in regards to etiology, location, size, age, sex or any other patient factors.

Operative Technique

Regardless of the defect's size, location or etiology, the defect was prepared as follows. A diagonal line bisecting the 120° angle was elongated outside the defect on neighboring tissue with the same length as the diagonal. Next, on the

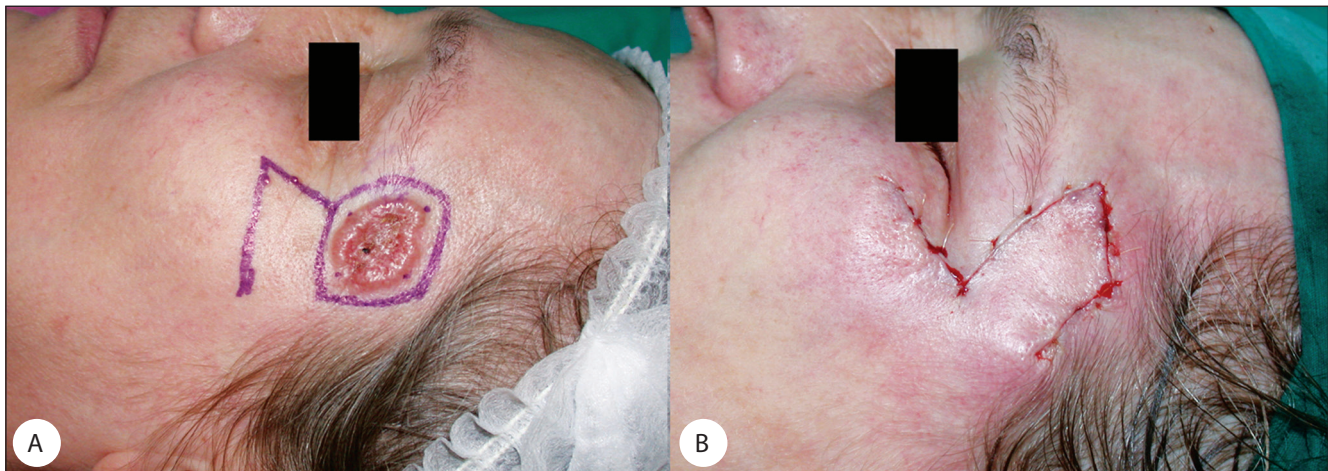


Figure 4. A) BCC on left temple. Rhomboid flap designed. B) BCC excised and flap transposed from cheek.

basis of skin laxity around the defect, we chose a donor area that could be closed primarily without tension and would result in a scar parallel to skin tension lines. Then, a line parallel to the defect side was drawn that was as long as the length of the defect (Figure 2A).

After planning, the flap was elevated and transposed over the defect. The points D', E and F of the flap corresponded to the points B, A and D of the defect, respectively (Figure 2B). After hemostasis was achieved, a penrose drain was placed under the flap and the donor area. According to the defect's location and size, the subcutaneous tissues and skin were sutured using appropriately sized suture thread.

Results

There were 24 patients who underwent surgical procedures for various reasons, for a total of 26 elevated rhomboid flaps. Eleven of the 24 cases were male and the median patient age was 47.5 years (Table 1).

Eight cases were operated on under general anesthesia while 13 were locally anesthetized. The other operations were performed under regional anesthesia. In 17 cases, the defect was due to a benign or malignant tumor excision, and five cases were operated on due to burn contractures. Seventeen cases were performed in the head and neck regions, but the flap can also be used in the torso, lower extremity and upper extremity.

The largest flap was 12x14 cm and was used to correct a defect over the stump of a patient with Buerger disease who underwent amputation below the knee. The only complication reported in our study, which was a suture separation, occurred in this patient. There were no events of partial or total flap necrosis or hematomas.

Cases

Case 8

A 57-year-old female patient was operated on because of a BCC on her left temple region. The donor area was on her cheek (Figure 4A and B).

Case 14

An 83-year-old female patient was operated on because of a malignant melanoma on her left cheek. The donor area was on her cheek (Figure 5A, B, C and D).

Case 16

An eight-year-old female patient was operated on because of a congenital nevus over her medial canthal region. The donor area was the glabella (Figure 6A, B, and C).

Case 17

A 43-year-old male patient was operated on because of a BCC over his left temple. The defect was closed with double opposing rhomboid flaps (Figure 7A, B and C).

Case 19

A 72-year-old female patient was operated on because of a malignant melanoma on her cheek. The donor area was on her cheek (Figure 8A, B, C and D).

Case 21

A 53-year-old male patient was operated on because of an SCC on his distal thigh. The defect was closed with a laterally based rhomboid flap from the thigh (Figure 9A and B).

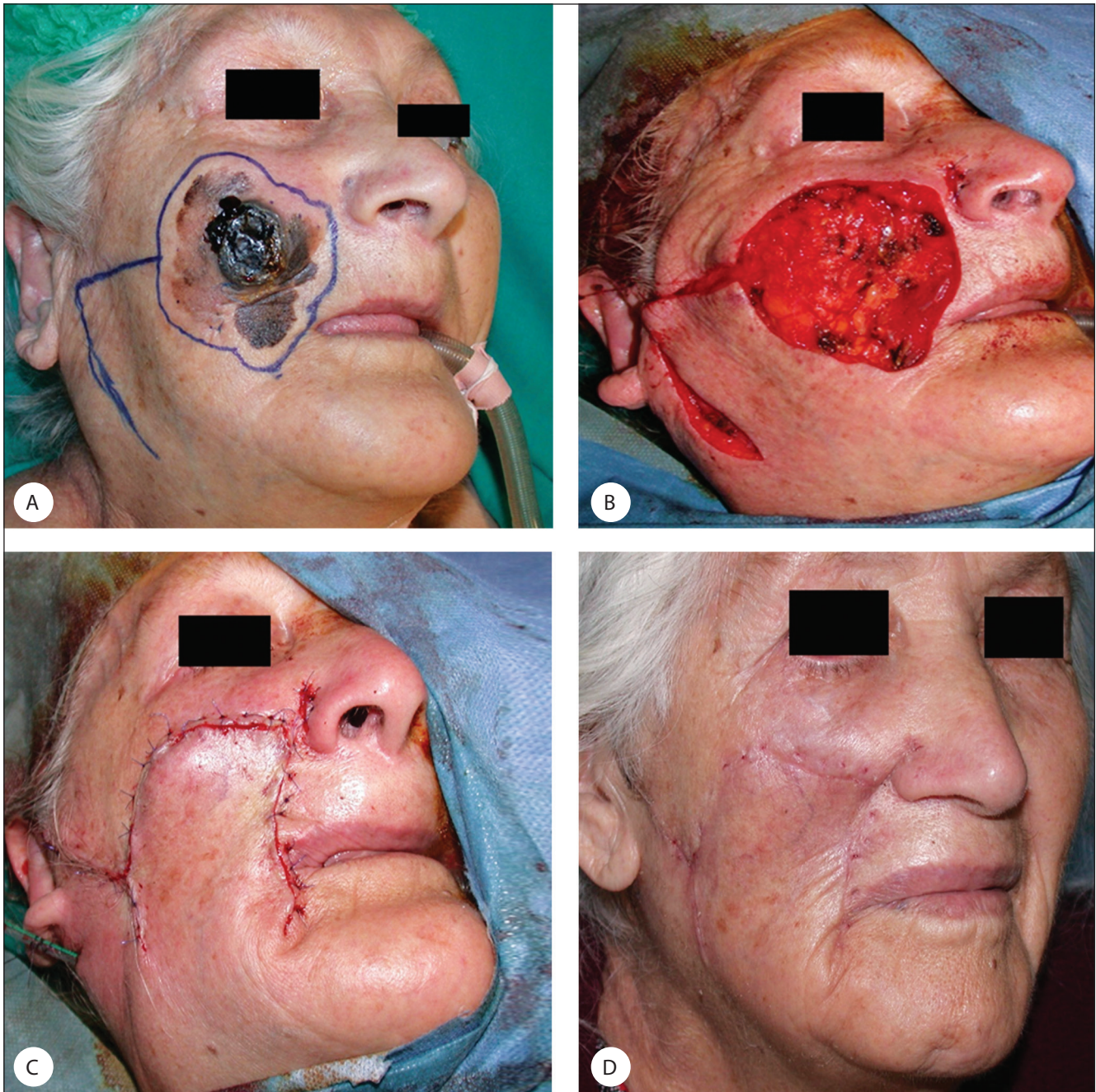


Figure 5. A) Malignant melanoma of the right cheek. Flap designed. B) Tumor excised and flap elevated. C) Flap transposed and sutured. D) Six months after the operation.

Discussion

The “reconstructive ladder” emphasizes using the simplest procedure to manage skin defects (Figure 1). Most of the time, direct closure of a defect is easily achieved. However, as a defect increases in size, it is harder to close primarily. In such

situations, clinical experience suggests a slightly different perspective. Technical ease, aesthetic concerns, continuity of function and follow-up duration direct surgeons toward the use local flaps, thereby bypassing grafts and tissue expansion steps as suggested by the “reconstructive ladder.” Local flaps are distinguished from other techniques by their short opera-

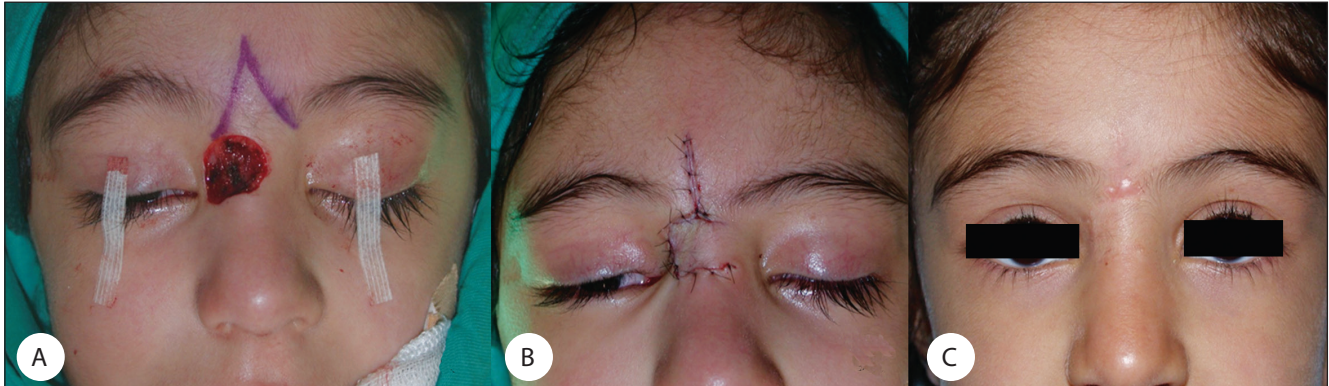


Figure 6. A) Medial canthal defect after nevus excision. Flap designed from the glabella. B) Flap transposed and sutured. C) Six months after the operation.



Figure 7. A) BCC on the left temple. Double flap designed. B) Flaps transposed and sutured. C) Eighteen months after operation.

tion time, early functionality and fewer out-patient clinic visits. Skin texture and color are also reasons that local flaps are favored.

Transposition flaps planned using rhomboid flap principles have been widely used in clinical practice by plastic surgeons. They are easy to learn and simple to perform. They can be used at any site on the body surface. Modifications by Dufourmentel and Webster have also increased their popularity by increasing the safety and angular ranges of these flaps.

Aesthetics are especially important, even after ablative cancer surgery. Defect closure by primary intention and grafts may offer satisfactory outcomes for some locations. However, a well-planned rhomboid flap with scars parallel to tension lines provides the best results. Naturally, the skin texture and color adjacent to the defect best matches the surrounding skin.

Skin grafts may appear to be the simplest way to reconstruct a defect. However, they are limited by the need to immobilize the graft for at least five days, the need for restrictions in diet, the necessity of greater care with personal

hygiene, the prevention of everyday physical activities, and delays in patient functionality. The duration of such issues is much shorter for patients with local flaps.

Skin grafts need more dressing changes than do any other procedure. After five days of tie-over dressings, dressing changes every two days for about ten days is a standard protocol. In contrast, local flaps do not require many dressing changes.

The safety of rhomboid flaps has attracted surgeons to its use for several different purposes. Rhomboid flaps have been used to reconstruct defects after pilonidal sinus resection [6], antecubital burn contractures [7] and breast reconstruction [8].

The modification of rhomboid flaps that is used depends on the individual characteristics of the case and a surgeon's experience. Our series indicates that rhomboid flaps can be safely used to reconstruct small to moderately sized skin defects.

Conflict of interest statement: The authors declare that they have no conflict of interest to the publication of this article.



Figure 8. A) Malignant melanoma of the left cheek. Flap designed. B) Tumor excised and flap elevated. C) Flap transposed and sutured. D) Six months after operation.

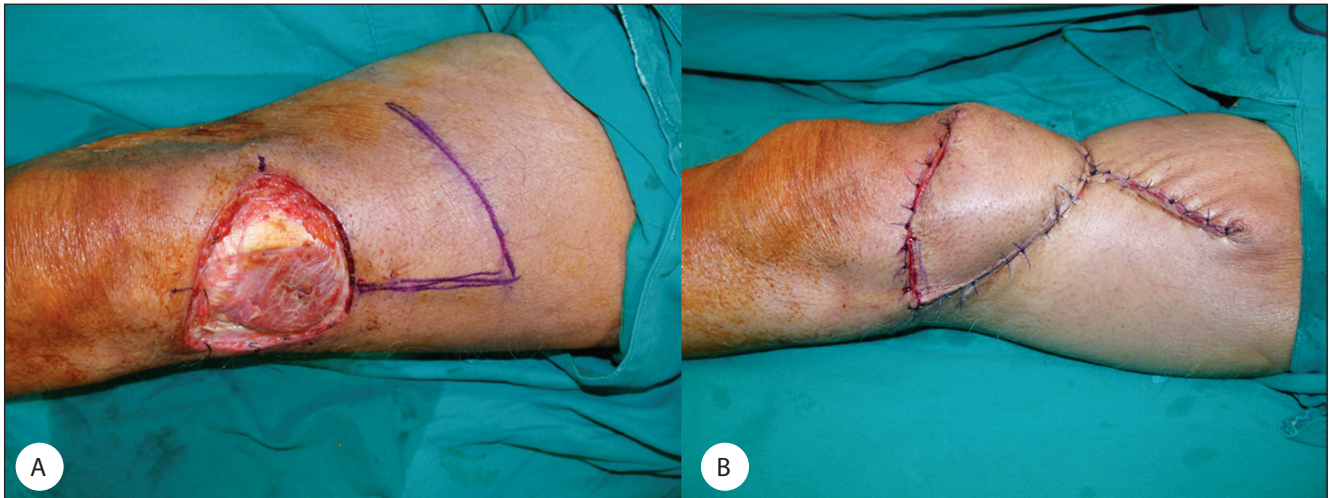


Figure 9. A) Defect on the distal thigh. B) Flap transposed and sutured.

Table 1. Summary of the cases

Case no	Age/Sex	Site	Flap size	Etiology	Anesthesia	Complication
1	13/M	Finger	2x1.5	Burn Contracture	GA	None
2	9/M	Axilla	10x14	Burn Contracture	GA	None
3	57/M	Nose	2x2	BCC	LA	None
4	16/F	Neck	12x10	Burn Contracture	GA	None
5	10/F	Hand	5x3	Burn Contracture	GA	None
6	50/M	Nose	2x1	BCC	LA	None
7	33/F	Cheek	5x8	Melanoma	LA	None
8	57/F	Temple	3x5	BCC	LA	None
9	42/F	Arm	8x9	Burn Contracture	RA	None
10	60/F	Cheek	5x3	BCC	LA	None
11	43/M	Cheek		BCC	LA	None
12	45/F	Bilateral Temporal	3x2,3x3	BCC	LA	None
13	63/M	Temporal	3x2	BCC	LA	None
14	83/F	Cheek	7x9	Melanoma	GA	None
15	74/M	Cheek	2x3	BCC	LA	None
16	8/F	Medial Cantus	3x2	Nevus	GA	None
17	43/M	Temple	3x2	BCC (Double opposing flaps)	LA	None
18	61/F	Cheek	6x5	Melanoma	GA	None
19	72/F	Cheek	7x5	Melanoma	LA	None
20	76/F	Nose	3x2	SCC	LA	None
21	53/M	Thigh	10x13	SCC	RA	None
22	67/M	Knee Stump	12x14	Buerger Disease	RA	Suture separation
23	28/M	Achilles	3x2	Fibroma	LA	None
24	45/F	Cheek	8x12	Gun Shot Injury	GA	None

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