



# Dermatosurgical rounds: double opposing rotational advancement (Ying-Yang) flap for reconstruction of primary defects following skin cancer excisions in the medial foot ankle and preauricular regions

Simona Kordeva<sup>1</sup>, Konstantin Georgiev Tchernev Jr<sup>1</sup>, Georgi Tchernev<sup>1,2</sup>

<sup>1</sup> Onkoderma Clinic of Dermatology, Venereology and Dermatologic Surgery, Sofia, Bulgaria

<sup>2</sup> Department of Dermatology and Venereology, Medical Institute of Ministry of Interior, Sofia, Bulgaria

**Corresponding author:** Simona Kordeva, Onkoderma Clinic of Dermatology, Venereology and Dermatologic Surgery, 26 General Skobelev, 1606 Sofia, Bulgaria; Email: simonakordeva97@gmail.com; Tel.: +359 884 959 176

**Received:** 10 August 2025 ♦ **Accepted:** 6 September 2025 ♦ **Published:** 19 March 2026

**Citation:** Kordeva S, Tchernev KG Jr, Tchernev G. Dermatosurgical rounds: double opposing rotational advancement (Ying-Yang) flap for reconstruction of primary defects following skin cancer excisions in the medial foot ankle and preauricular regions. *Folia Med (Plovdiv)* 2026;68(2):e168322. doi: 10.3897/folmed.68.e168322.

## Abstract

Surgical reconstructive techniques continue to evolve as dermatosurgeons combine clinical expertise, technical skill, and innovation. In some cases, such innovation can result in better outcomes in terms of tension management, vascular supply preservation, and esthetic appearance.

The double-opposing rotation advancement flap, also known as the Ying-Yang flap due to its yin-yang mode of action, is often applied in the scalp region, where it provides excellent results with minimal complications. However, data supporting its application in less conventional anatomical sites remains limited.

We present two independent cases involving primary defects resulting from skin tumor excisions, successfully reconstructed with the Ying-Yang flap in atypical locations: the medial foot ankle and preauricular regions. Tension-free closure was achieved in both cases, and follow-up at two months demonstrated great wound healing.

While surgical excision remains the gold standard for treating skin cancer, these cases highlight the double-opposing rotation advancement flap as a versatile and effective reconstructive option beyond its standard indications.

## Keywords

atypical site, double-opposing rotation flap, foot ankle, reconstructive surgery, skin cancer, preauricular region, Ying-Yang flap

## Introduction

A tissue movement procedure, known as a flap, is a surgical technique used in reconstructive surgery when simpler primary closure methods are insufficient.<sup>[1]</sup> Using a flap al-

lows for 1) redistribution of tension vectors, generated by the defect, 2) improved aesthetic outcomes through better matching of skin color, texture, and thickness at the recipient site, while also 3) preserving similar blood supply and utilizing the tissue laxity of the surrounding area.<sup>[2]</sup>

Different classifications exist; however, the most clinically practical may be the one based on the flap's primary movement - categorizing flaps by basic tissue motion into transposition, advancement, rotation, and interpolation types.<sup>[1]</sup>

Rotation flaps are often preferred when primary wound defect closure is not feasible or desirable due to esthetic considerations or the risk of tissue distortion.<sup>[2]</sup> They are particularly useful when tension needs to be redirected around a free margin.<sup>[2]</sup>

Each flap has specific indications based on its anatomical location<sup>[2]</sup>, but flaps that are not traditionally used for certain areas can, in some cases, be successfully applied to less conventional sites.<sup>[3]</sup>

We present two independently and successfully treated patients, both utilizing the Ying-Yang flap technique for defect closure in atypical sites—the right medial foot ankle and the left preauricular regions. These cases highlight the adaptability and effectiveness of the Ying-Yang flap across varied anatomical regions. Importantly, they underscore the necessity for a personalized, patient-specific approach in reconstructive surgery. To achieve the best functional and aesthetic results, dermatologists must frequently rely on both technical expertise and thoughtful innovation.

## Case reports

### Case 1

A 48-year-old female came to the Dermatology Department with a primary complaint of a tumorous lesion located on the right foot ankle, which had been present for approximately 40 years. Notably, the lesion had shown rapid growth over the past two years. Her medical history was significant for asthma and Hashimoto's thyroiditis, for which she was receiving ongoing systemic therapy with an inhaler containing 100 mcg of beclomethasone dipropionate and 6 mcg of formoterol fumarate dehydrate taken once daily and 75 mcg of levothyroxine sodium received following a prescribed dosing schedule.

Routine laboratory tests revealed mild abnormalities, including dyslipidemia and mild systemic inflammation.

Dermatological examination showed a well-defined, prominent, tumor-like formation in the right medial foot ankle area, under the medial malleolus, measuring approximately 3×4 cm (**Fig. 1**). The lesion was suspected for a keloid, differential diagnoses included Pincus fibroadenoma, keratoacanthoma.

The patient was scheduled for surgical excision under local anesthesia. Reconstruction of the primary wound defect was planned using a double-opposing rotation advancement flap, chosen for its ability to redistribute tension vectors across multiple vectors. A skin graft was considered unsuitable as it did not provide intrinsic tension redistribution, whereas a standard advancement flap would concentrate the tension in a single direction. Additionally, the Ying-Yang flap offers improved vascular supply, reduced risk of necrosis, and better color and thickness compared to grafts.



**Figure 1.** Case 1: intraoperative view; a well-defined, prominent, tumor-like formation in the right medial foot ankle area, under the medial malleolus, measuring approximately 3×4 cm.

The lesion was preoperatively marked, and the further flap technique was designed (**Fig. 2a**). An elliptical excision of the lesion was performed under local anesthesia with 1% lidocaine. The primary wound defect was reconstructed with the double rotation advancement (Ying-Yang) flap technique (**Fig. 2b**). The histopathological examination showed an extensive, well-demarcated fibro-histiocytic lesion, represented by orthohyperkeratosis, irregular acanthosis with hypermelanosis, proliferation of fusiform fibroblasts and fine collagen fibers, confluent in variously sized lesions amidst a myxoid, well-vascularized stroma, prominent throughout the entire dermal segment to the border with the hypodermis. Lateral resection lines were infiltrated, while the distal resection margin was clear. The histopathological findings were consistent with histiocytoma. Due to the large size and tendency for hypodermal invasion, immunohistochemical examination with CD34 was recommended to exclude dermatofibrosarcoma protuberans.

For postoperative swelling of the right foot and ankle, the patient was given 0.4 ml of nadroparin calcium subcutaneously for 5 days and heparin sodium gel 1000 topically 1-3 times per day for 10 days. Wound healing was excellent during the two-month postoperative period, and swelling was reduced (**Fig. 3a, b**). Several months later, complete ankle mobility and normal gait were restored.



**Figure 2.** Intraoperative view; (a) Preoperative marking of the lesion and designing the double-opposing rotation advancement (Ying-Yang) flap; (b) The two opposing flaps are undermined followed by careful hemostasis.



**Figure 3.** Case 1: (a) postoperative view; (b) a view at 2 months follow-up.

## Case 2

A 68-year-old male presented to the Dermatology Department with a two-month history of a growing and intermittently bleeding lesion on the left cheek.

His medical history was significant for aggravated chronic heart failure, dilated cardiomyopathy, grade 3 arterial hypertension, left ventricular dysfunction, paroxysmal atrial fibrillation, type 2 diabetes mellitus, and a prior cholecystectomy. The patient was receiving the following systemic medications: febuxostat 120 mg, half a tablet a day; furosemide 40 mg once daily; metoprolol succinate 50 mg twice daily; sacubitril/valsartan 97 mg/103 mg twice daily; amiodarone hydrochloride 200 mg once daily; dapagliflozin 10 mg once daily; metformin hydrochloride 1000 mg twice daily; and glimepiride 2 mg, half a tablet twice daily.

Dermatological examination revealed a dome-shaped, tumorous formation, measuring approximately 1 cm in diameter, in the left preauricular region, with a central crust and mild bleeding upon contact. The lesion was clinically suspected for keratoacanthoma.

The routine laboratory results showed hyperglycemia and mild renal function abnormality.

We did an elliptical excision of the lesion under local anesthesia with 1% lidocaine. The primary wound defect was reconstructed with the double-opposing rotation advancement (Ying-Yang) flap technique (Fig. 4a, b). The secondary wound defect was closed using single interrupted sutures (Fig. 5).

The histopathological examination revealed the diagnosis of basosquamous carcinoma, stage 1 T1N0M0R1. Two months postoperatively, the scar showed marked improvement, and the patient reported satisfaction with the aesthetic outcome.

## Discussion

The management of skin cancer is increasingly recognized as a multistep process, beginning with complete tumor resection, often followed by the selection of an appropriate reconstructive technique.<sup>[4]</sup> This decision is largely determined by the size and location of the tumor, with the goal of preserving tissue function while achieving an esthetically pleasing outcome, especially in cosmetically and functionally sensitive areas.<sup>[4]</sup>

Flaps can be versatile in nature, meaning that a flap not typically used for a certain anatomical location can still be effectively applied to less common sites, often providing the same results.<sup>[5]</sup> Apart from the size and location of the tumor, other factors often determine the choice of reconstructive technique, such as the presence of exposed structures, patient-specific characteristics, and comorbidities.<sup>[5]</sup> A case of a patient with giant basal cell carcinoma on the back was presented by colleagues, where the resulting primary defect was extensive and managed using a reconstructive technique not typically employed in that region.<sup>[5]</sup> This demonstrates that well-established surgical methods



**Figure 4.** Case 2: intraoperative view: Ying-Yang flap – elevation of the opposing flaps (a) and their subsequent adaptation (b).



**Figure 5.** Case 2: intraoperative view: the secondary wound defect is closed using single interrupted sutures.

can sometimes be successfully adapted to unconventional locations.<sup>[5]</sup> Moreover, opting for less invasive procedures may reduce postoperative complications and shorten recovery time.<sup>[5]</sup>

A classic approach of tissue rearrangement is the rotation flap, which involves mobilizing adjacent tissue to redirect tension vectors and recruit tissue from areas of laxity—particularly useful for closing defects not suitable for primary closure.<sup>[6]</sup>

Tension-related issues require a more precise flap design that can adequately redistribute tension across multiple vectors, thereby minimizing potential wound complications and optimizing healing outcomes.<sup>[7]</sup> An interesting variant addressing such concerns is the double opposing rotation-advancement flap—the Ying-Yang flap—which can provide tension-free closure and adequate defect coverage.<sup>[7]</sup>

The bilateral rotation advancement (Ying-Yang) flap is a commonly used technique for managing scalp defects requiring proper tissue coverage.<sup>[8]</sup> This flap is carefully designed and sufficiently large to close the primary defect while preserving the surrounding skin without distortion.<sup>[8]</sup> The initial step involves outlining two opposing rotational flaps, in a Yin-Yang manner, each approximately twice the length of the primary wound diameter.<sup>[9]</sup> The curvilinear incision begins at the supero- or inferolateral margin of the defect, with the rotational arc optimized by

designing the flap at a slightly greater height.<sup>[10]</sup> The procedure continues with flap elevation, careful dissection, and undermining down to the hypodermis to preserve vascular supply.<sup>[9]</sup> The pedicles consist of subcutaneous tissue, ensuring adequate perfusion.<sup>[9]</sup> Tension-free adaptation is achieved, with the tension vectors more evenly distributed along the suture line.<sup>[8-10]</sup> Finally, the secondary wound defect is closed using different suture techniques.<sup>[8,9]</sup>

Rotation flaps are highly versatile in nature, providing excellent defect coverage and effective redistribution of tension vectors, while also being relatively time-efficient procedures, typically completed in under an hour.<sup>[10]</sup> Skin grafts or free tissue transfer cannot be employed in the same manner as rotational flaps, as they often fail to match the surrounding skin's color, texture, and thickness as effectively.<sup>[10]</sup> This can lead to suboptimal esthetic outcomes and potential patient dissatisfaction with the final result.<sup>[10]</sup> The majority of the patients (74.7%) can be discharged either immediately or a within a few hours postoperatively.<sup>[10]</sup> Reported postoperative complication rates are low (9.4%), with approximately 3.6% of cases requiring additional surgical interventions due to wound healing issues and/or necrosis.<sup>[10]</sup>

The Ying-Yang reconstructive technique is primarily reserved for scalp reconstruction.<sup>[9,10]</sup> However, when properly performed, it can serve as a highly effective option for tension-related defect closures in less conventional anatomical sites.<sup>[11]</sup> For example, a patient underwent surgery for an open, chronic wound on the right elbow.<sup>[11]</sup> Following surgical exploration and debridement of devitalized tissue, a tension-free closure was successfully achieved using two opposing rotational (Ying-Yang) fasciocutaneous flaps.<sup>[11]</sup> Tension was tested by elbow flexion, which revealed no tension on the incision site.<sup>[11]</sup> A complete closure and healing of the wound was achieved<sup>[11]</sup>, making this technique an excellent choice for reconstruction in such areas. These cases often involve prolonged healing, with full cosmetic recovery taking up to a year.<sup>[11]</sup> In comparison, our first case presented a similar challenge. The patient initially expressed concern due to the extended healing process, with persistent erythema and swelling noted at the site. She was monitored monthly, and by the second-month follow-up—after complete suture removal—the defect had begun to integrate well with the surrounding skin.

A V-Y advancement flap can also be applied to defects of the posterior heel and ankle region, with generally favorable outcomes and minimal complications reported.<sup>[12]</sup> However, superficial tip necrosis of the flap should be considered when selecting the appropriate technique.<sup>[12]</sup> Another option for use in less conventional sites is the bilobed flap, a versatile local transposition flap that distributes tension over a wider surface area compared to a conventional rotational flap.<sup>[13]</sup> Nevertheless, due to its crescentic design, there is a risk of developing a pincushion deformity from subdermal tissue contraction.<sup>[13]</sup>

Case reports or articles describing the use of the Ying-Yang flap in the preauricular zone are scarce. Belmahi et

al.<sup>[14]</sup> reported a case involving a preauricular cutaneous defect managed following a Mustardé cheek rotation flap. In this article, nine patients underwent excision of basal cell carcinomas.<sup>[14]</sup> While the Mustardé flap was designed, the skin's undermining was limited to the lower border of the mandible, effectively creating a geometrical base for the design of an opposing temporoparietal rotation flap.<sup>[14]</sup> Although the Mustardé flap is an excellent reconstructive option, its limited undermining in certain areas may necessitate the use of a secondary flap.<sup>[14]</sup> In our second patient, a double opposing Ying-Yang flap was successfully utilized in the left preauricular area. Although this is not a typical site for application of this flap, it provided similar vascular supply, effective defect coverage, and efficient redistribution of tension vectors—once again highlighting the versatile nature of the flap.

Other reconstructive options can be effectively applied when managing soft-tissue defects.<sup>[15]</sup> Tissue expansion is considered a suitable alternative for managing large defects where local tissue is insufficient for flap formation.<sup>[15]</sup> When combined with other reconstructive techniques, this approach can provide adequate coverage while minimizing scar formation and donor-site morbidity.<sup>[15]</sup> Another effective technique, either alone or in combination with other methods, is the Z-plasty, which is particularly valuable for correcting scar deformities, such as those following burns.<sup>[16]</sup>

The formation of pathological scars following surgical interventions, injuries or burns remains a challenge for every reconstructive surgeon.<sup>[17]</sup> Reducing the scar size and its pigmentation, pain or pruritus can be difficult.<sup>[17]</sup> In such cases, hypertrophic scars and keloids may be effectively managed with high-intensity focused ultrasound thermotherapy.<sup>[17]</sup>

The small sample size of two cases clearly does not constitute a large-scale study, and the short follow-up period of two months is insufficient to assess long-term outcomes. However, despite these limitations, both patients reported highly satisfactory results. Moreover, postoperative complications were minimal or absent.

The concept of an “optimal flap” remains a topic of ongoing debate, as not every flap is universally suitable for all anatomical location - each case requires individualized consideration based on defect characteristics and patient factors.<sup>[7]</sup>

Larger-scale studies are needed to evaluate specific techniques more fully. However, even small case reports can provide valuable insights that aid in selecting the most appropriate reconstructive approach.

## Conclusions

While not a novel approach in the reconstruction of skin cancer defects, this technique remains a safe, reliable, efficient, and time-saving option—particularly in managing scalp defects<sup>[9,10]</sup>, though its application may extend

to other anatomical sites. We present two independent case reports demonstrating that a classical flap design can be successfully employed in less conventional anatomical sites, despite not being commonly used outside standard locations. Every dermatosurgeon should aim to approach each case with clinical expertise, following established indications and contraindications, yet remain open to modifying and adapting techniques when appropriate. With careful planning and anatomical consideration, innovation within safe boundaries can lead to excellent reconstructive outcomes.

## Ethical approval

Not applicable

## Conflict of interest

The authors have declared that no competing interests exist.

## Ethical statements

- The authors declared that no clinical trials were used in the present study.
- The authors declared that no experiments on humans or human tissues were performed for the present study.
- Written informed consent was obtained from the patients for the publication of this case report and any accompanying images.
- The authors declared that no experiments on animals were performed for the present study.
- The authors declared that no commercially available immortalised human and animal cell lines were used in the present study.

## Use of AI

The authors declare that no AI was used to generate the article text or clinical images.

## Funding

No funding was received.

## Author contributions

All authors contributed equally to the creation of the manuscript.

## Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Acknowledgements

Not applicable.

## References

1. Peters JD, Rahman SM, Sheehan JM, et al. Flaps. In: Nouri, K, eds. *Mohs Micrographic Surgery*. Cham: Springer Nature Switzerland. 2025; pp. 535–570 Available from: [https://doi.org/10.1007/978-3-031-82552-1\\_30](https://doi.org/10.1007/978-3-031-82552-1_30)
2. Prohaska J, Sequeira Campos MB, Cook C. Rotation Flaps. [Updated 2023 Aug 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482371/>
3. Healy C, Tiernan E, Lamberty BG, et al. Rotation fasciocutaneous flap repair of lower limb defects. *Plast Reconstr Surg* 1995; 95(2):243–51. doi: 10.1097/00006534-199502000-00003
4. Suárez OHM, Ortega LJJ, Mendoza AJI, et al. Scalp spinal cell carcinoma managed with resection and Ying-Yang Flap. *Int J Med Sci Clin Res Stud* 2024; 4:807–9.
5. Torresetti M, Gioacchini M, Scalise A, et al. Versatility of the O-Z flap for back reconstruction after giant basal cell carcinoma resection: A case report and review of the literature. *Int J Surg Case Rep* 2019; 63:23–6. doi: 10.1016/j.ijscr.2019.08.034
6. LoPiccolo MC. Rotation flaps - principles and locations. *Dermatol Surg* 2015; 41, Suppl 10:S247–54. doi: 10.1097/DSS.0000000000000498
7. Ortega HMS, Landeros JJO, Argáez JIM, et al. Scalp spinal cell carcinoma managed with resection and Ying Yang flap. *Int J Med Sci Clin Res Stud* 2024; 4:807–9.
8. Steven Dayan. Scalp reconstruction [Internet]. *Plastic Surgery Key*; [cited 2025 Sep 29]. Available from: <https://plasticsurgerykey.com/scalp-reconstruction-5>
9. Tchernev G, Kordeva S. Dermatologic surgery rounds: double rotation (Yin-Yang) flap for reconstruction of a circular skin defect after BCC removal in the scalp region. *Dermatol Rep* 2025 [Epub Ahead of Print]. doi: 10.4081/dr.2025.10420
10. Seretis K, Bounas N, Lykoudis E. Reconstruction of scalp defects with rotational flaps: where is the limit? *Surgeries* 2025; 6(1):18. ; doi: 10.3390/surgeries6010018
11. Marku L, Climov M, Gelman J. Elbow wound closed with two opposing rotational flaps (Ying-Yang). *Best Wound Practice* [Internet]. Available from: <https://bestwoundpractice.com/two-opposing-rotational-flaps-ying-yang-for-elbow-wound-closure/>.
12. Maruyama Y, Iwahira Y, Ebihara H. V-Y advancement flaps in the reconstruction of skin defects of the posterior heel and ankle. *Plast Reconstr Surg* 1990; 85(5):759–64. doi: 10.1097/00006534-199005000-00017
13. Mole RJ, Hohman MH, Sebes N. Bilobed flaps. [Updated 2023 Aug 14]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470355/>.
14. Belmahi A, Oufkir A, Bron T, et al. Reconstruction of cheek skin defects by the ‘Yin-Yang’ rotation of the Mustardé flap and the temporo-parietal scalp. *J Plast Reconstr Aesthet Surg* 2009; 62(4):506–9. doi: 10.1016/j.bjps.2007.11.012
15. Anastasova V, Krasteva E, Kiskinov P, et al. Our experience using tissue expansion in reconstructive surgery. *Folia Med (Plovdiv)* 2025; 67(2):e137928. doi: 10.3897/folmed.67.e137928
16. Anastasova V, Kiskinov P, Georgiev A, et al. Z-plasty – basic surgical technique for post-burn patients. *Acta Medica Bulgarica* 2025; 52(1):21–8. doi: 10.2478/amb-2025-0004
17. Anastasova VN, Georgiev AA, Zanzov EI, et al. High-intensity focused ultrasound thermotherapy for scar treatment. *Ann Burns Fire Disasters* 2023; 36(1):63–7. PMID: 38680902; PMCID: PMC11044736.