

Case Series

Recurrent vulvar carcinoma - reconstruction options with review of literature

Sakthi Usha Devi Jeevarajan¹, Karnan Srinivas^{2*}, Prasanna Srinivasa Rao Harikrishnan²,
T. D. Balamurugan², M. J. Prabu²

¹Department of Surgical Oncology, Kalaingar Centenary Super Specialty Hospital, Guindy, Chennai, Tamil Nadu, India

²Department of Surgical Oncology, Government Arignar Anna Memorial Cancer Hospital, Regional Care Centre, Kanchipuram, Chengalpattu Medical College, Tamil Nadu, India

Received: 23 July 2024

Revised: 03 December 2024

Accepted: 27 December 2024

*Correspondence:

Dr. Karnan Srinivas,

E-mail: karnan.srinivas@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Vulvar cancer is a rare gynecological malignancy that can be aggressive and have a high rate of recurrence. The surgical management of recurrent vulvar cancer often involves wide local excision and the use of various reconstructive techniques to restore formal function. The keystone flap is a type of local tissue flap that has gained popularity in recent years due to its versatility and low complication rates. Our patients are elderly female who had previously undergone modified radical vulvectomy with bilateral inguinal femoral lymph nodal dissection for vulvar cancer. They presented symptoms and signs of recurrence and underwent wide local excision along with a keystone flap reconstruction. The postoperative course was uneventful, and the patient had no complications. Lotus petal suprafascial flap is a simple alternative procedure that can be done during the same surgery as the radical vulvectomy, improving the aesthetic results and reducing both the rate of complications and hospital stay. Soft tissue reconstruction in patients undergoing resection of recurrent vulvar malignancies is associated with a low rate of postoperative complications, decreased pain, and improved functional status.

Keywords: Recurrent vulvar cancer, Vulvar reconstruction, Keystone flap, Lotus petal flap complications

INTRODUCTION

Among all gynecologic cancers, carcinoma vulva ranks as the fourth commonest cancer that amounts to 5% of all female genital tract malignancies.¹ An increase in human papilloma virus (HPV) infections and higher life expectancy leads to the overall incidence of vulvar cancer has risen over the past two decade.² The mainstay of treatment for vulvar cancer is wide surgical resection and reconstruction.

Recurrences of vulvar squamous cell carcinoma (VSCC) occur in 12–38% of patients after initial

treatment, depending on tumor stage at initial diagnosis; 40–80% of all recurrences occur within 2 years of initial treatment.^{3,4} Outcome for patients who had recurrences within 2 years after initial surgery is worse compared to patients who had recurrences >2 years after initial treatment.⁵

Currently, wide local excision with adequate margin along with reconstruction is the treatment of choice for local recurrences. The incidence of isolated local recurrences is 20–23%.⁶ In average 25% of patients with recurrent VSCC, the groin is the site of recurrence. In individuals with positive lymph nodes, the risk of groin recurrence is

notably high, ranging from 29% to 40%. Distant recurrences are detected in approximately 8% of patients experiencing recurrent disease, with the majority occurring within the initial 2 years after treatment (84%). Isolated local recurrence of VSCC holds a more favorable prognosis, boasting reported 5-year survival rates of up to 60%.⁸ Conversely, both groin recurrences and distant recurrences are associated with an extremely poor prognosis.⁹ In this context, we present a cases of recurrent vulvar cancer that was managed through wide local excision with keystone flap cover and lotus petal flap cover.

CASE SERIES

Case 1

An 80-year-old female, was diagnosed as a case of vulvar carcinoma and had undergone modified radical vulvectomy with bilateral inguino femoral lymph node dissection in May 2022. Postoperative histopathological analysis showed infiltrative well differentiated squamous cell carcinoma with a pathological staging of pT1N0. After a disease free period of 7 months she had presented to our clinic with a non-healing ulcer at the surgical scar site with serous discharge for one month.

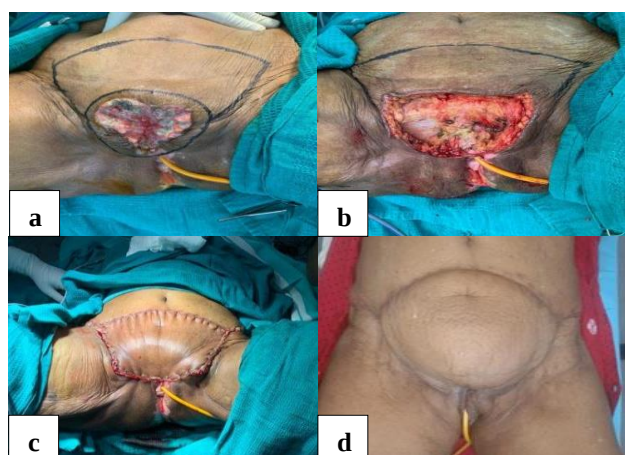


Figure 1: Case 1 (a) pre op picture, (b) wide local excision, (c) post flap cover, and (d) post suture removal.

On examination it was an ulceroproliferative growth of size 8×7 cm, seen arising from the site of surgical scar around the periurethral region extending into the labia (Figure 1a). As an office procedure wedge biopsy was done and she was diagnosed with recurrent vulvar carcinoma on March 2023. She was further evaluated with magnetic resonance imaging (MRI) abdomen and pelvis which shows a hyperintense Soft tissue thickening in the postoperative site with a maximum thickness of 10 mm and no significant lymphadenopathy. Chest X-ray was taken and showed no signs of distant metastasis. Patient was then taken up for wide local excision with the gross clinical margin of 1.5 cm (Figure 1b) and immediate and

reconstruction with keystone flap cover. Post op (Figure 1c) same patient after complete healing (Figure 1d).

Case 2

A 64-year-old female, diagnosed as a case of recurrent valvular carcinoma had undergone modified radical vulvectomy with bilateral inguino femoral lymph node dissection in January 2023. Postoperative histopathological analysis showed infiltrative well differentiated squamous cell carcinoma with a pathological staging of pT2N1b. after a disease free interval of 8 months this patient again presented with ulceroproliferative lesion in left side labia (Figure 2a). Biopsy show recurrence and non-metastatic disease. hence planned for wide local excision (Figure 2b) with keystone flap cover. Patient planned for adjuvant concurrent chemo radiation. Post op (Figure 2c) after complete healing and suture removal (Figure 2d).

The advantage in the design of this flap is that it apparently allows the rules of length and breadth ratio to be overruled by the optimum use of the biophysical properties of the skin.

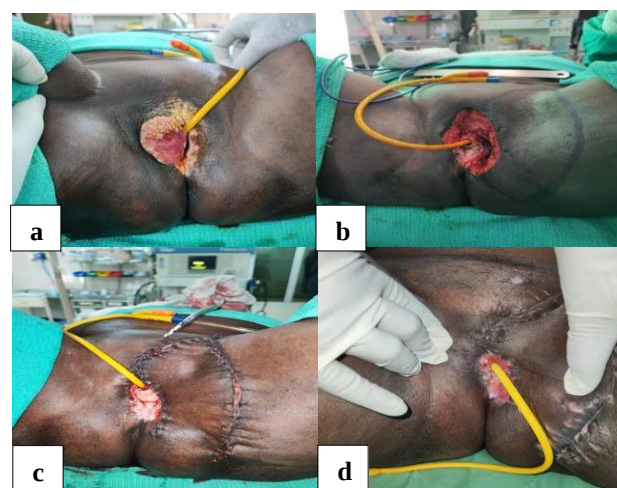


Figure 2: Case 2 (a) pre op picture, (b) wide local excision, (c) post flap cover, and (d) post suture removal.

Case 3

A 74-year-old female, diagnosed as a case of vular carcinoma had undergone modified radical vulvectomy with bilateral inguino femoral lymph node dissection in January 2023. Postoperative histopathological analysis showed infiltrative moderately differentiated squamous cell carcinoma with a pathological staging of pT2N0. after a disease free interval of 6 months this patient again presented with ulceroproliferative lesion in right side labia (Figure 3a). Biopsy showed reoccurrence also have leukoplakia in the vulvar skin and non-metastatic disease. This patient planned for lotus petal flapcover (Figures 3b-

d) and subsequent radiation based on the depth of invasion and margin status.

Keystone flap design

The elevation and defect closure technique was followed. The skin incision was made and deepened towards the fascia by blunt dissection. This technique preserves superficial vessels, nerves and lymphatics. The first step of closure involves a V-Y plasty and this creates tissue laxity at the center of the flap perpendicular to the Y closure and it also narrows the economy defect. The flap is then sutured on to the original defect and the donor area was closed by 2-0 ethilon sutures with vertical mattress sutures. It is the design of this flap that apparently allows the rules of length and breadth ratio to be overruled, by optimum use of biophysical properties of skin. Postoperative period was uneventful and histopathological analysis showed infiltrating squamous cell carcinoma with depth of invasion 0.5 cm and margin clearance was 2 cm all around. The patient was discharged on Post op day 6 and is on follow up regular at our OPD once in three months. Our patient required hospitalization for 6 days. The Foleys catheter remained in place for two weeks.

Lotus petal flap design

The reconstruction plan was developed after receiving confirmation of negative resection margins. The defect, extent of the resection, and quality of the adjacent tissue were carefully evaluated. Any tissue that was considered to have compromised blood supply was resected. The defect was measured using a surgical ruler and the flap was designed accordingly.

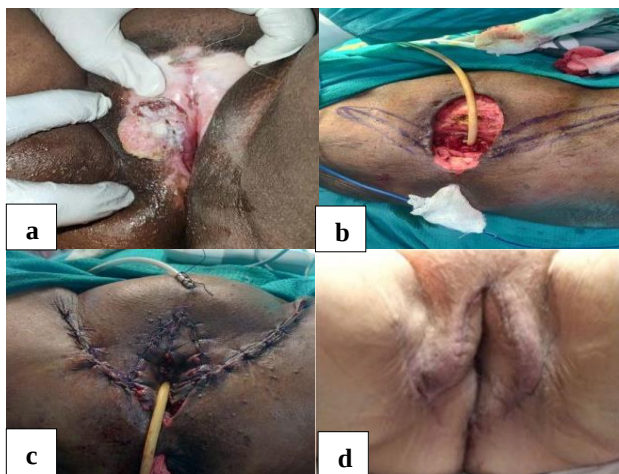


Figure 3: Case 3 (a) pre op picture, (b) wide local excision, (c) post flap cover, and (d) post suture removal.

The flap was custom-tailored on the gluteal fold in a lotus petal shape. An incision was made along the anterior margin of the flap. The incision was extended to the fascial layer, and retrograde dissection was performed to obtain a lengthy pedicle for flap transfer. The dissection stopped as

soon as flap rotation was sufficient without tension. All flaps were elevated from lateral to medial in a suprafascial plane. The flap was temporarily sutured in place, and the lower extremity was rotated internally to allow a tension-free donor site closure. The flap was sutured in two layers. Sub-skin was closed with single stitches of absorbable (vicryl-0) suture. Skin was closed with monofilament, non-absorbable polyamide (2-0) suture. We performed a tension-free closure of the donor site. Suction drains were placed under the flap.

DISCUSSION

In recurrent vulvar cancer, vulvar reconstruction is a challenging task and requires a multidisciplinary approach. The use of keystone flap reconstruction provides reliable soft tissue coverage, reduces pain, and improves functional status. The goals of reconstruction include providing quality skin cover, restoring the vaginal introitus and vault, maintaining the central position of the urethral meatus. The choice of flap depends on the extent and location of the defect. Finally, skin cover facilitates healing and a smooth postop period to adjuvant radiotherapy if needed.

Reconstructive strategies for addressing large defects involve addressing specific requirements such as dead space filling, coverage of the pubic bone, and lining the periurethral area. Commonly employed options include skin grafts, local skin flaps, and myocutaneous flaps.⁹ The choice of reconstruction method and flap selection is contingent upon the size and location of the vulvar defect (Figure 4). When viewed from the lithotomy perspective, the vulva can be anatomically divided into three subunits: the upper third subunit comprising the mons pubis extending into the labia, the middle third representing the labia proper, and the lower third encompassing the vaginal orifice and perineum.

The methods of reconstruction ranged from primary closure to skin grafting to the use of pedicled flaps.

In flap reconstruction of vulva, there were no major acute complications such as flap necrosis, wound dehiscence, and urethral metal stenosis. Minor complications included cellulitis requiring higher antibiotic treatment, superficial tip necrosis of the flap, long term hyper trophic and/or unaesthetic scarring of the donor site could be managed with conservative management.

The keystone design perforator islanded flap (KDPIF) was first published in 2003. After excision, the defect is considered as an ellipse for flap planning. The ellipse should lie with its axis parallel to the line of cutaneous nerves, veins and/or known cutaneous perforators. The flap is designed within dermatomal patterns, and straddles these longitudinal running structures, which are incorporated in the flap and preserved during soft tissue dissection.

The procedure involves selecting the side of the tissue defect with greater laxity for the KDPIF. If a single flap is deemed insufficient, a secondary flap is prepared on the opposite side of the ellipse. Incisions are then made at 90-degree angles at either end of the defect, meeting the curvilinear line of the marked flap. The width of the flap is matched to the defect's width, and a keystone shape is created, with the curvature mobilized to cover the defect. The flap's length is determined by the elliptical excision's length. The procedure emphasizes the vascular safety of KDPIF, supported by experience.

Lotus petal flap

The flaps are designed to be based on the dense network of perforating vessels near the midline of the perineum.¹³ The flaps are based around the vaginal orifice and so can be easily transposed to cover vulvo-vaginal defects while the donor sites are closed primarily. The design of the flaps resembles the petals of the lotus flower (Figure 3b). In clinical practice, the shape of the flaps is appropriately tailored to the reconstructive requirements of the local

defects and do not necessarily conform to the shape of a "petal". After selection of the appropriate flap and ensuring that the flap is of adequate length and size. The perforators entering the base of the flap are carefully preserved. The flap is then raised including the fascia.

Once a perforator of the internal pudendal artery is identified, it is safe to island the flap on the perforator to allow better mobility of the flap and avoid dog-ears at the pivot point. As the perforators of the two external pudendal arteries are usually divided during radical vulvectomy with bilateral inguinal lymph node dissection, we prefer to use the lowermost petal flaps designed along the gluteal folds, relying on perforators of the internal pudendal artery.

The vascularity of the flap is not affected by the extensive surgery necessitated in radical vulvectomy and bilateral inguinal dissection, which has been the standard treatment of invasive squamous cell carcinoma of the vulva. Furthermore the donor site scars are excellent, being sited along the gluteal folds.

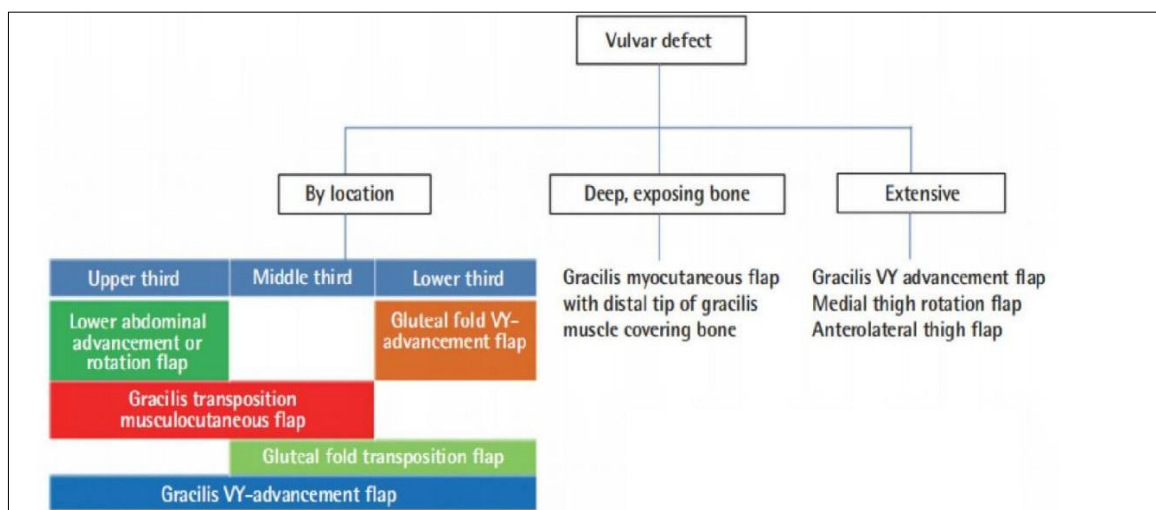


Figure 4: Vulvar cancer reconstruction options.

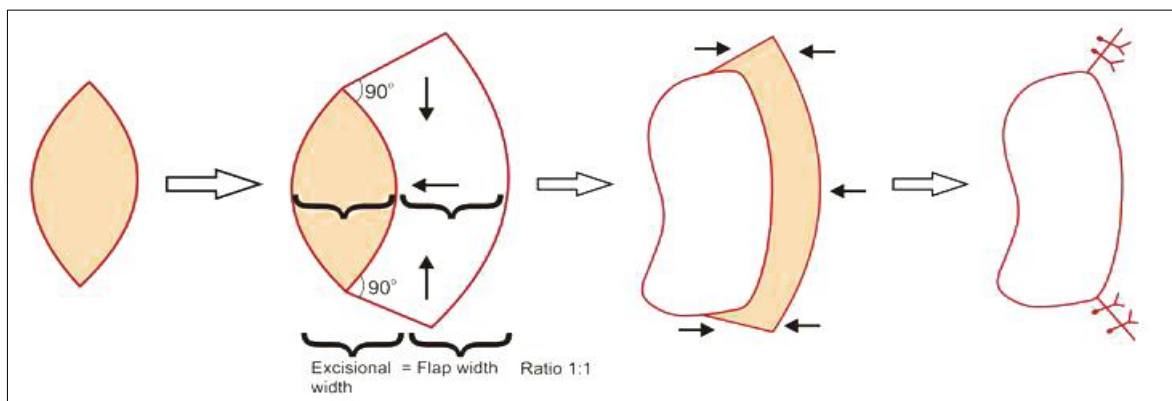


Figure 5: Design of key stone flap cover.

Table 1: Advantages and disadvantages of each flap design used in vulvar reconstruction.

Flap type	Advantage	Disadvantage
Medial VY-advancement flaps	Utilizing a subcutaneous pedicle based on the femoral circumflex artery, offer enhanced coverage as they can be fully mobilized	They are susceptible to pin-cushioning and the development of hypertrophic curvilinear scars.
Large anterolateral thigh rotation flaps	Effective for addressing extensive defects, meeting the requirements of dead space filling, pubic bone coverage, and lining the periurethral area.	Lateral thigh donor site can be managed using a skin graft.
VRAM flap	Useful in case radical vulvectomy with pubic ostectomy for sarcoma.	Its bulkiness is a limitation, and there is a risk of abdominal hernia formation due to the flap's pivot and the deficiency of the posterior rectus sheath.
Gluteal fold flap transposition or VY-advancement	From an aesthetic viewpoint because of well-concealed donor scar. ^{11,12}	Its coverage is limited to the lower and middle thirds of the vulva.
Gracilis myocutaneous transposition flap	It heals with a short linear thigh scar and minimal complications in severely obese and less demanding, and devoid of donor site morbidity	
Keystone design perforator islanded flap	Based on central perforators and use of “V-Y” closures to gain local tissue for advancement into the defect. Handheld Doppler can be used to identify large central perforators for preservation.	Technically less demanding, and devoid of donor site morbidity
Suprafascial lotus petal flap	Resection and bilateral reconstruction are carried out efficiently and both intra- and postoperative bleeding, as opposed to musculocutaneous flaps, are reduced.	

CONCLUSION

The keystone flap is a valuable tool in the armamentarium for vulvar reconstruction in patients with recurrent vulvar cancer. It provides excellent outcomes with minimal complications and should be considered in the surgical management. Alternatively, the lotus petal suprafascial flap is a simple procedure that can be done during the same surgery as the radical vulvectomy, improving the aesthetic results and reducing both the rate of complications and hospital stay of these patients.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Siegel R, Naishadham D, Jemal A. Cancer statistics, 2013. *CA Cancer J Clin.* 2013;63(1):11-30.
2. Schuurman MS, van den Einden LC, Massuger LF, Kiemeny LA, van der Aa MA, de Hullu JA. Trends in incidence and survival of Dutch women with vulvar squamous cell carcinoma. *Eur J Cancer.* 2013;49(18):3872-80.
3. Gadducci A, Tana R, Barsotti C, Guerrieri ME, Genazzani AR. Clinico-pathological and biological prognostic variables in squamous cell carcinoma of the vulva. *Crit Rev Oncol Hematol.* 2012;83(1):71-83.
4. Gadducci A, Cionini L, Romanini A, Fanucchi A, Genazzani AR. Old and new perspectives in the management of high-risk, locally advanced or recurrent, and metastatic vulvar cancer. *Crit Rev Oncol Hematol.* 2006;60(3):227-41.
5. Salom EM, Penalver M. Recurrent vulvar cancer. *Curr Treat Options Oncol.* 2002;3(2):143-53.
6. Maggino T, Landoni F, Sartori E, Zola P, Gadducci A, Alessi C, et al. Patterns of recurrence in patients with squamous cell carcinoma of the vulva. A multicenter CTF Study. *Cancer.* 2000;89(1):116-22.
7. Stehman FB, Bundy BN, Ball H, Clarke-Pearson DL. Sites of failure and times to failure in carcinoma of the vulva treated conservatively: a Gynecologic Oncology Group study. *Am J Obstet Gynecol.* 1996;174(4):1128-32.
8. Gonzalez Bosquet J, Magrina JF, Gaffey TA, Hernandez JL, Webb MJ, Cliby WA, et al. Long-term survival and disease recurrence in patients with primary squamous cell carcinoma of the vulva. *Gynecol Oncol.* 2005;97(3):828-33.
9. Hopkins MP, Reid GC, Morley GW. The surgical management of recurrent squamous cell carcinoma of the vulva. *Obstet Gynecol.* 1990;75(6):1001-5.
10. Fowler JM. Incorporating pelvic/vaginal reconstruction into radical pelvic surgery. *Gynecol Oncol.* 2009;115(1):154-63.
11. Wang TN, Whetzel T, Mathes SJ, Vasconez LO. A fasciocutaneous flap for vaginal and perineal

- reconstruction. *Plast Reconstr Surg.* 1987;80(1):95-103.
12. Hashimoto I, Nakanishi H, Nagae H, Harada H, Sedo H. The gluteal-fold flap for vulvar and buttock reconstruction: anatomic study and adjustment of flap volume. *Plast Reconstr Surg.* 2001;108(7):1998-2005.
 13. Yii NW, Niranjana NS. Lotus petal flaps in vulvo-vaginal reconstruction. *Br J Plast Surg.* 1996;49(8):547-54.

Cite this article as: Jeevarajan SUD, Srinivas K, Harikrishnan PSR, Balamurugan TD, Prabu MJ. Recurrent vulvar carcinoma - reconstruction options with review of literature. *Int J Res Med Sci* 2025;13:810-5.