

# Repair of Areolar Defect Following the Excision of Sebaceous Cyst by Applying Kite-Flap: A Case Report and Literature Review

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**Abstract:** We report a case of a 68-year-old female with a 6-year history of a left medial areolar sebaceous cyst, which progressed to 12.5×16.2×8 mm and resulted in a 2.0×1.5 cm defect after complete excision. A modified kite flap with an optimized length-to-width ratio (1:1.5) and Y-suturing technique was used for repair. The operation lasted 25 minutes with 1 mL blood loss. Postoperatively, the flap achieved primary healing without complications, and bilateral breast symmetry was preserved (<3 mm diameter difference). At 6-month follow-up, the patient reported 100% satisfaction. This modified technique addresses the core challenges of small areolar defect repair, offering high tissue compatibility, minimal invasiveness, and concealed scarring.

**Keywords:** kite flap, areolar flap reconstruction, case report

## Introduction

The nipple-areola complex (NAC) is the functional and aesthetic center of the breast and presents unique reconstructive challenges because of its thin dermis, distinctive pigmentation, limited tissue reserve, and high sensitivity to minor geometric changes.<sup>1,2</sup> Even small defects may result in visible asymmetry, contour deformity, or unsatisfactory scarring, particularly in patients with small areolae, in whom local tissue is relatively limited.<sup>3,4</sup>

Sebaceous or epidermoid cysts arising in the areolar region are uncommon. Although most are benign, accurate preoperative evaluation and pathological confirmation remain important because certain benign lesions and rare malignant tumors, such as sebaceous carcinoma, may present with similar clinical features.<sup>5,6</sup> For small benign areolar lesions, simple elliptical excision with direct closure is often the most straightforward and commonly accepted treatment when sufficient tissue laxity is present and distortion of the NAC is unlikely.<sup>7</sup> In selected small cysts, less invasive procedures such as puncture, evacuation, or capsule stripping may also be considered. However, these approaches may be less suitable when complete excision and definitive histopathological assessment are required, or when recurrence is a concern.<sup>8,9</sup>

When the areola is small or local tissue is limited, direct closure after complete excision may place excessive tension on the wound and increase the risk of nipple deviation, areolar flattening, border distortion, or conspicuous scarring. In such situations, local flap reconstruction may be a more suitable option.<sup>10</sup> The kite flap has been used in other anatomically sensitive regions because of its reliable vascularity, good tissue match, and relatively simple design.<sup>11</sup> However, its application in the areolar region has rarely been described. In this report, we describe the use of a modified kite flap for repair of a small periareolar defect after excision of a sebaceous cyst in a patient with a small areola, and discuss the rationale for selecting this technique in comparison with simpler alternatives.

## Case Presentation

### Clinical Presentation

A 68-year-old woman presented with a 6-year history of a subcutaneous mass located at the medial border of the left areola. After first noticing the lesion, she had previously undergone breast ultrasonography, which reportedly showed a subcutaneous nodule in the left areolar region, although the original report was unavailable. No further treatment was undertaken at that time. Over the preceding 6 months, the patient noted gradual enlargement of the lesion. Repeat breast ultrasonography demonstrated a complex cystic-solid mass measuring  $12.5 \times 16.2 \times 8$  mm in the subcutaneous layer medial to the left nipple. The lesion showed mixed echogenicity, clear borders, and a visible capsule, without significant internal Doppler flow.

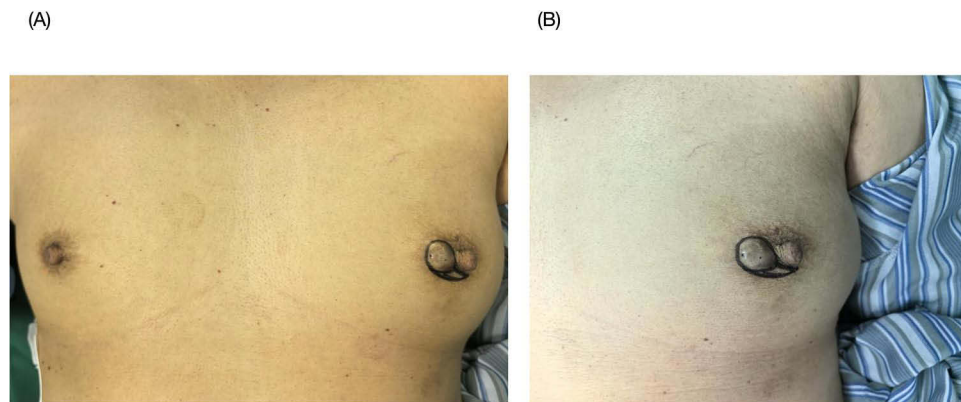
On physical examination, both breasts were symmetric, with no nipple retraction or discharge on compression (Figure 1A). A firm, well-circumscribed, mildly mobile mass measuring approximately  $2.0 \times 1.0$  cm was palpated at the medial aspect of the left areola. The diameter of the left areola was approximately 2.5 cm, indicating a relatively small areola (Figure 1B). No additional palpable masses were detected in either breast. No enlarged lymph nodes were palpable in the axillary or supraclavicular regions.

Routine blood tests, coagulation studies, and tumor marker examinations were all within normal ranges. After preoperative assessment, the patient was considered suitable for surgical treatment. Written informed consent was obtained for surgery and for publication of the case details and accompanying clinical images.

### Surgical Procedure

The preoperative diagnosis was sebaceous cyst of the left areola and the intraoperative diagnosis was consistent with the preoperative diagnosis. The patient was placed in the supine position with bilateral upper limbs abducted, and after induction of total intravenous anesthesia, the surgical field was disinfected with iodophor and sterilely draped in a standard manner. A comma-shaped incision measuring  $4.0 \times 2.0$  cm was made along the medial margin of the left areola to encompass the sebaceous cyst, with an elliptical auxiliary incision carefully created adjacent to the cyst wall to avoid injury to the nipple. Layer-by-layer dissection was performed through the skin and subcutaneous tissue, and a cystic mass sized  $2.0 \times 1.5 \times 1.0$  cm was dissected from the subcutaneous layer on the medial border of the left areola. The mass presented with regular morphology, firm texture, intact capsule, well-defined margins, good mobility and no adhesion to the underlying tissues. The mass was completely resected and sent for intraoperative rapid frozen pathological examination, followed by meticulous hemostasis with bipolar electrocoagulation until no active bleeding was observed.

The residual skin tissue within the incision was dissected to the subcutaneous layer without transecting the flap, thus forming a triangular kite flap pedicled with subcutaneous tissue and designed with a length-to-width ratio of 1:1.5 (base length 2.2 cm, height 3.3 cm, pedicle width 1.0 cm). The flap was then advanced to the defect site after



**Figure 1** Preoperative clinical presentation. (A) Frontal preoperative view showing symmetric breasts without nipple retraction or discharge. (B) Close-up preoperative view showing the lesion located at the medial aspect of the left areola.

cyst resection and accurately approximated to the skin at the inferomedial margin of the nipple. Tension dispersion was achieved via three key suture sites with continuous intradermal sutures placed between the flap tip and the midpoint of the defect medial margin, intradermal sutures at the flap pedicle and the lateral incision margin, and interrupted sutures around the flap periphery for tight tissue approximation. The incision was finally closed in an ovoid shape, and the surgical procedure was completed uneventfully with an estimated blood loss of 1 mL. A multi-tailed thoracic bandage was applied for compressive dressing postoperatively, and the patient was transferred back to the ward in a stable condition.

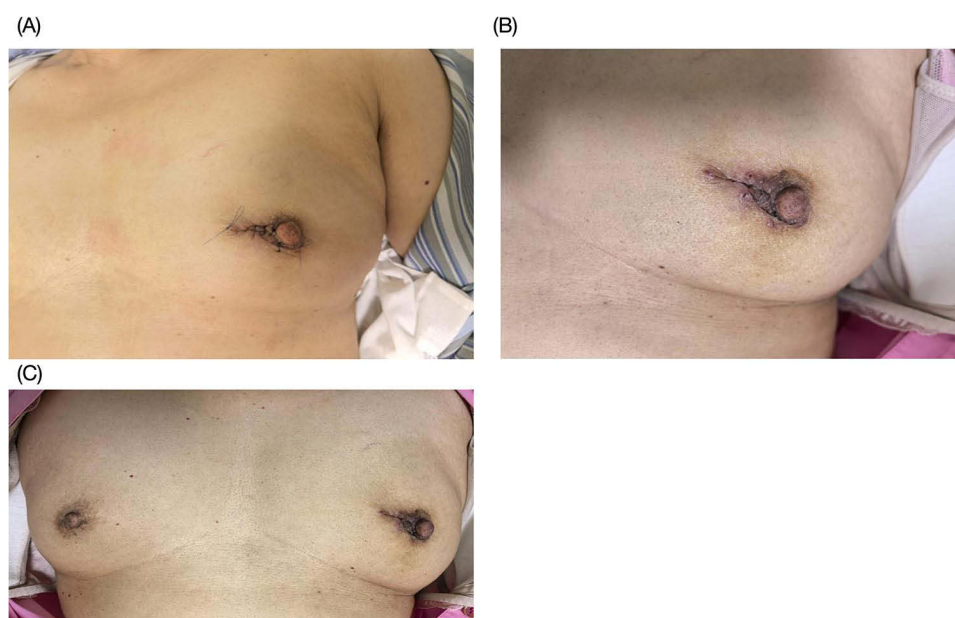
Intraoperative frozen pathological examination was conducted for the resected left breast mass, and the pathological result confirmed cutaneous epidermoid cyst with focal inflammatory cell (lymphocytes, plasma cells and neutrophils) infiltration in the partial cyst wall, which was consistent with the preoperative diagnosis.

## Postoperative Outcome

On postoperative day 1, the incision was well approximated, with mild erythema along the suture line (Figure 2A). During the initial dressing change, no active bleeding, serous discharge, subcutaneous ecchymosis, marked edema, or severe pain was observed. The left nipple-areola complex maintained satisfactory contour without traction, displacement, or obvious deformity.

At postoperative day 7, mild residual erythema was still present but had improved, and the incision blended well with the areolar border (Figure 2B). The reconstructed left areola showed good symmetry relative to the contralateral side, with preservation of the overall breast contour (Figure 2C). No nipple malposition, flap necrosis, wound infection, or obvious deformity was noted.

At 1-month follow-up, the pigmentation match had improved further and the scar had become less apparent. No abnormal pigmentation, flap contracture, or obvious asymmetry was observed, and the patient reported high satisfaction with the reconstructive outcome. At 6-month follow-up, the reconstructed areola maintained satisfactory contour, symmetry, and scar concealment, with no evident contracture, deformity, or marked asymmetry (Figure 3).



**Figure 2** Early postoperative outcomes after reconstruction with the modified kite flap. (A) Postoperative day 1 showing a well-approximated incision with mild erythema. (B) Postoperative day 7 showing good wound healing and fading hyperemia. (C) Postoperative day 7 showing satisfactory symmetry of the reconstructed left areola and bilateral breasts.



**Figure 3** Six-month postoperative follow-up showing preserved areolar contour, satisfactory symmetry, and no obvious contracture, deformity, or marked asymmetry.

## Discussion

Reconstruction of defects involving the nipple-areola complex (NAC) is challenging because this region has distinctive anatomical and aesthetic characteristics, including thin skin, unique pigmentation, limited tissue reserve, and high sensitivity to minor geometric changes.<sup>1,2</sup> In patients with small areolae, even a relatively small defect may result in visible asymmetry, contour deformity, or conspicuous scarring after excision of a benign lesion. These considerations are particularly relevant in elderly patients, in whom reduced tissue elasticity may further limit the tolerance of local closure.

For small sebaceous or epidermoid cysts of the areolar region, simple elliptical excision including the punctum followed by direct closure is often the most straightforward and commonly accepted treatment when sufficient tissue laxity is present and distortion of the NAC is unlikely.<sup>12</sup> This option warrants particular consideration because, when feasible, it may preserve more natural NAC symmetry and avoid the need for flap design. In addition, for some small cystic lesions, less invasive procedures such as puncture, evacuation, or capsule stripping may also be considered when preservation of local tissue is prioritized. However, these approaches may be less suitable when complete excision and definitive histopathological assessment are required, or when recurrence is a concern.<sup>13</sup>

In the present case, the lesion was located at the medial border of a relatively small areola, and complete excision was expected to leave a defect measuring approximately 2.0×1.5 cm. Under these circumstances, direct closure was considered likely to place excessive tension on the wound and increase the risk of nipple deviation, areolar flattening, border distortion, or a conspicuous scar. For this reason, local flap reconstruction was selected. The purpose of the present report is not to suggest that a modified kite flap should replace simpler procedures in all benign areolar lesions, but rather to present it as a possible reconstructive option in selected patients when direct closure is judged likely to compromise the aesthetic outcome.<sup>14</sup>

A key issue in such cases is whether immediate reconstruction is appropriate when benign pathology has not been definitively established preoperatively or, in the setting of malignancy, when clear margins have not yet been confirmed. Immediate reconstruction should be approached cautiously when malignancy cannot reasonably be excluded preoperatively or intraoperatively.<sup>15</sup> In this patient, although the lesion was clinically and radiologically suggestive of a benign cyst, intraoperative frozen-section examination was performed before completion of reconstruction to reduce the risk of reconstructing over an unexpected malignant lesion. Frozen section supported a benign cystic process, and final histopathology confirmed a cutaneous epidermoid cyst with focal inflammatory cell infiltration. Therefore, immediate single-stage reconstruction was considered appropriate in this case. If suspicious malignant features had been present, or if frozen-section assessment had been unavailable or inconclusive, a staged reconstructive strategy would have been more prudent.<sup>16</sup>

A two-step reconstruction was also considered conceptually. However, because the lesion was small, appeared clinically resectable, and could be assessed intraoperatively by frozen section, single-stage treatment was preferred to avoid a second procedure, reduce patient burden, and preserve local tissue architecture. Nevertheless, staged reconstruction remains a reasonable option in cases with diagnostic uncertainty, concerns about margin status, larger defects, or higher oncologic risk.<sup>17</sup>

From a technical perspective, the modified kite flap appeared well suited to this selected defect. The flap was designed from adjacent periareolar tissue, which provided a close match in color, thickness, and texture and allowed the final scar to be placed along the areolar border for improved concealment.<sup>18,19</sup> In addition, the flap design and Y-suture arrangement helped redistribute tension across the closure rather than concentrating it at a single point, which may reduce the risk of distortion in a small NAC.<sup>20,21</sup> In our patient, the flap survived completely, the wound healed primarily, and early postoperative symmetry was satisfactory. The short operative time and minimal blood loss also suggest that this approach may be well tolerated in elderly patients when carefully selected.

The kite flap has been reported previously in other anatomically and aesthetically sensitive regions, such as the eyelid and face, where it has shown reliable vascularity and favorable contour restoration.<sup>22,23</sup> Although the anatomical characteristics of the areola differ from those of the face or eyelid, these prior experiences support the feasibility of adapting the same reconstructive principle to selected periareolar defects. In the present case, several practical technical points appeared important: placing the incision along the pigmented areolar border to improve scar concealment,<sup>24</sup> maintaining an adequate pedicle width to preserve blood supply,<sup>19</sup> performing dissection in the subcutaneous plane to avoid unnecessary injury to the vascular pedicle, and using postoperative compressive dressing to support flap stability.<sup>25</sup>

At the same time, the conclusions drawn from this case should remain cautious. First, this is a single-case report, and the findings cannot establish the superiority of the modified kite flap over simpler methods such as direct closure. Second, although follow-up has now been extended to 6 months, this duration is still relatively limited for fully assessing long-term aesthetic stability, scar maturation, pigment changes, contracture, or delayed asymmetry. Longer-term follow-up and additional cases would be needed before stronger conclusions can be made. Third, this technique may be most applicable to selected small to moderate periareolar defects in which direct closure is likely to cause distortion, and its value in larger defects remains uncertain. Finally, flap perfusion was not assessed using objective imaging modalities, so the mechanistic basis for flap reliability in this setting remains to be further studied.<sup>19</sup>

Overall, this case suggests that a modified kite flap may be a useful option for selected small periareolar defects after complete excision of a benign lesion, particularly when local tissue is limited and direct closure is expected to compromise NAC shape or symmetry. However, broader clinical experience and longer follow-up are needed to better define its indications, limitations, and long-term outcomes.

## Conclusion

The modified kite flap may be a useful reconstructive option for selected small periareolar defects after complete excision of a benign lesion when direct closure is likely to compromise nipple-areola complex shape, symmetry, or scar concealment. In the present case, the technique provided satisfactory early healing and aesthetic outcome. However, because this is a single-case report with limited follow-up, no definitive conclusions can be drawn regarding long-term superiority over simpler approaches. Careful preoperative evaluation, pathological confirmation, and longer follow-up remain essential.

## Ethics Statement

Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical images. Institutional approval was not required for publication of this single case report according to the policy of Longhua Hospital, Shanghai University of Traditional Chinese Medicine.

## Acknowledgments

We thank the patient for her consent to publish this case and the medical staff of Longhua Hospital Shanghai University of Traditional Chinese Medicine involved in the surgical procedure and follow-up.

## Funding

This work was supported by the Major Difficult and Complicated Diseases Collaborative Project of Traditional Chinese and Western Medicine by the National Administration of Traditional Chinese Medicine: Plasma Cell Mastitis (ZDYN-2024-A-019).

## Disclosure

The authors report no conflicts of interest in this work.

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