

The Modified Crescenteric Anterior Intercostal Perforator Flap

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Summary: Lower pole breast cancers are challenging to manage because conventional wide local excision may produce a “bird’s beak” deformity. In an era of oncological surgery, techniques that balance oncological results with cosmetic outcomes such as local flaps have extended the role of breast-conserving surgery. Local flaps are particularly useful for partial breast reconstruction due to the relative simplicity of the surgical procedure and reduced morbidity. Intercostal artery perforator flaps have a shorter duration of surgery than free flaps and do not require microsurgical anastomoses. Anterior intercostal artery perforator (AICAP) flaps provide excellent cosmesis, yet traditional crescenteric harvest yields limited volume for reconstruction. We describe a modification to an established reconstructive technique for lower pole breast defects. The technique is based on 3 extensions of tissue, providing a larger volume of tissue replacement compared with traditional AICAP flaps. The technique is particularly suitable for small- and medium-sized non-ptotic breasts, with lower pole tumors. The modified crescenteric AICAP technique can be used to increase the available tissue when performing lower pole reconstructions. (*Plast Reconstr Surg Glob Open* 2020;8:e2785; doi: [10.1097/GOX.0000000000002785](https://doi.org/10.1097/GOX.0000000000002785); Published online 26 May 2020.)

INTRODUCTION

The surgical treatment of breast cancer has changed significantly over the last 3 decades; breast-conserving surgery has become the preferred surgical treatment for locoregional control of early-stage breast cancer.¹ In view of this, an increasing number of women may require immediate or delayed partial breast reconstruction² to obtain a good cosmetic outcome.

A variety of techniques exist for partial breast reconstruction³; the choice of surgical technique is influenced by the size, location, and nature of the lesion. Reconstructive options comprise volume replacement or displacement techniques.⁴ Lower pole breast cancers present particular challenges to obtaining satisfactory cosmesis because resection can result in a concavity in the inferior aspect of the breast or a “bird’s beak appearance”.¹

A number of flaps have been described in breast reconstruction, and these include latissimus dorsi, deep inferior epigastric perforator, transverse myocutaneous gracilis, transverse upper gracilis, and intercostal artery perforator (ICAP) flaps.⁴⁻⁶ Local flaps are useful due to the simplicity of the surgical procedure in addition to skin color and texture matching.⁷ The use of ICAP flaps, limited by the size of the defect, remains low.⁸

We describe a technique for the reconstruction of lower pole breast defects based on a modified crescenteric AICAP advancement flap. This technique allows for reconstruction of larger defects of the lower pole than with conventional AICAP techniques, as it facilitates recruitment of extra tissue and is appropriate for use in small- and medium-sized breasts.

TECHNIQUE

Suitability

This technique can be used for the reconstruction of inferior pole tumors (Fig. 1) in small- to medium-sized, minimally ptotic breasts.

Flap Dimensions

Operative steps are shown in the Supplemental Digital Content 1 (see figure, Supplemental Digital Content 1,

Disclosure: The authors have no financial interest to declare in relation to the content of this article.

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

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Received for publication August 9, 2019; accepted February 25, 2020.

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DOI: [10.1097/GOX.0000000000002785](https://doi.org/10.1097/GOX.0000000000002785)

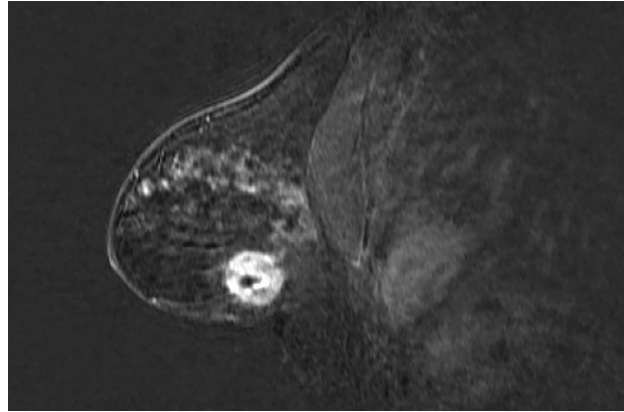


Fig. 1. Details of the patient's magnetic resonance imaging findings preoperatively.

which details a series of illustrations demonstrating the anatomy and operative steps. A, an anterolateral view of the flap. B, an anterior view of the flap. C, an anterior view of the flap with the 3 extensions secure in place. D, an anterior view of the flap after the new inframammary fold has been sutured (In 1b-1d: A, medial extension; B, lateral extension; C, inferior extension). E, a sagittal view of the flap following repair; <http://links.lww.com/PRSGO/B369>).

The inframammary fold (IMF) is identified and marked. The anterior intercostal artery perforator (AICAP) just inferior to the IMF in the line of the breast meridian is identified using Doppler ultrasonography. The flap is marked with the patient in an upright (sitting/standing) position, with the pedicle forming the center of the 3 limbs of the flap (Fig. 2). A crescent is marked in the same manner as with a traditional crescenteric AICAP

flap; the superior border is delineated by the IMF; the height of the crescent at the apex should measure one sixth of the width of the IMF. An additional inferior extension is then marked, the length of which is two sixths the width of the IMF (Fig. 2). This inferior extension is the key difference between the traditional and modified crescenteric technique.

Intraoperatively

The crescenteric section is de-epithelialized. The inferior extension is formed from subcutaneous fat. The medial and lateral limbs of the crescent and inferior tongue are then raised, maintaining the pedicle (Fig. 2). All three limbs of the flap are then brought together and sutured to form a single body of tissue. This is delivered into the desired position for volume replacement and sutured in place with 2/0 Vicryl. The IMF is then recreated and fixed at the level of the pedicle, slightly lower than the previous IMF position, with interrupted 2/0 Vicryl (see figure, Supplemental Digital Content 1, <http://links.lww.com/PRSGO/B369>).

Postoperative Care

The operation is performed as a day case procedure unless contraindicated. A supportive sports bra should be worn for 2 weeks. Forty-eight hours of prophylactic co-amoxiclav is given (clindamycin if penicillin allergy).

RESULTS

Figure 3 demonstrates the cosmetic outcome of patient A, 2 months postoperatively, who underwent wide local excision of a lower pole lesion (Fig. 1) and reconstruction with the modified AICAP technique (Fig. 2); postoperative cosmetic outcome was excellent (Fig. 3). Figure 4 demonstrates the cosmetic outcome, 2 years postoperatively, of the same technique performed on Patient B. This technique has been used in 4 patients in our unit. There have been no instances of postoperative fat necrosis, wound breakdown, or wound infection. Patients have reported high rates of satisfaction with cosmetic outcome and have not noted asymmetry or problems with the new IMF.

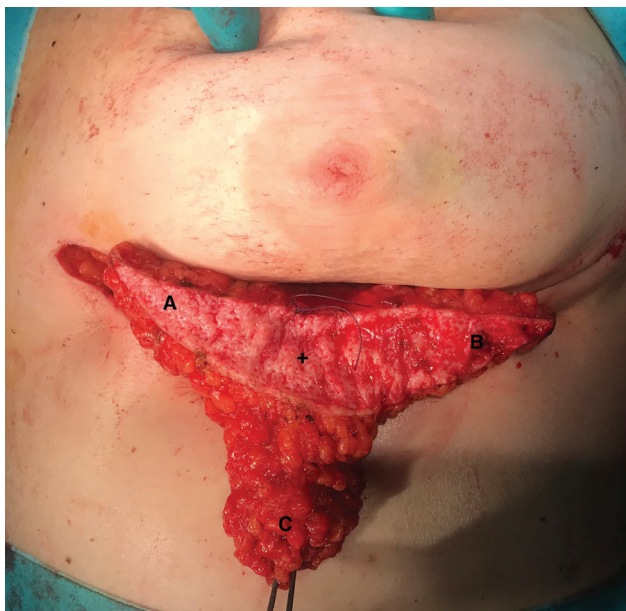


Fig. 2. Details of the flap intraoperatively. A, medial extension (de-epithelialized); B, lateral extension (de-epithelialized); C, inferior extension (subcutaneous tissue); +, pedicle.



Fig. 3. Details of an example patient in the early postoperative phase following reconstruction with a modified crescentic flap.



Fig. 4. Details of a patient 2 years following reconstruction with a modified crescentic flap.

DISCUSSION

ICAP flaps were originally described anatomically by Kerrigan and Daniel⁹ in 1979. ICAP flaps are useful in well-selected patients. The use of AICAPs in partial breast reconstruction, however, remains low.⁸ AICAP flaps offer a good aesthetic outcome with minimal morbidity.

To our knowledge, this is the first description of this method, modifying a crescentic AICAP flap to reconstruct defects following excision of lower pole breast tumors.

Anatomy

AICAP flaps are based on perforators originating from the rectus abdominis or oblique segment of the intercostal artery.^{8,10} Cadaveric studies¹¹ and radiological studies^{7,12} have demonstrated reliable and consistent location of perforator arteries.

Clinical Applications

AICAP flaps have been described in a VY or propeller fashion for the correction of small defects¹³; they are

especially useful in lower pole reconstructions for which other volume displacement or replacement techniques are challenging.^{7,8,13} AICAP flaps have been shown to produce excellent cosmetic outcomes in immediate breast reconstruction.⁷ The proposed technique allows larger defects to be reconstructed due to recruitment of larger volumes of tissue. Further quantitative research and external validation is needed to corroborate postoperative clinical outcomes.

Advantages

AICAP flaps provide benefits⁸ compared to myocutaneous flaps. There is no need to reposition the patient as is required in latissimus dorsi flaps. Moreover, the operative time is shorter when performing AICAP flaps compared with free flaps as microsurgical anastomoses are not required.⁸

It is not necessary to sacrifice the underlying muscle when harvesting AICAP flaps, leading to reduced morbidity compared with myocutaneous flaps.^{7,8} AICAP flaps can be defatted during surgery or subject to secondary liposuction to adapt the flap to match the recipient site. AICAP flaps can additionally be placed so as to locate the scar in the IMF, decreasing visibility.

Noguchi et al¹⁴ have described a downward mobilization technique in the excision of lower pole tumors to prevent “bird-beak” deformities. The modified AICAP technique, however, has the advantage of being a simple adaptation to a common technique, with which surgeons may be familiar.

CONCLUSIONS

We have described a novel “modified crescentic technique” method of partial breast reconstruction using AICAP flaps. Capitalizing on an inferior extension of tissue, this technique allows larger inferior pole defects to be reconstructed than with traditional AICAP advancement flaps. Experience from our center indicates that this procedure is safe and provides good clinical, cosmetic, and quality-of-life outcomes.

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PATIENT CONSENT STATEMENT

The patients provided written consent for the use of their image.

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