

# Autoderm in Direct-to-implant Prepectoral Breast Reconstruction Decreases Perioperative Complication Rates and Improves Reconstructive Outcomes

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**Background:** Wise pattern skin incision in breast reconstruction following mastectomy facilitates removal of skin excess in patients with large and ptotic breasts. The trifurcation of the inverted-T incision poses increased risk of infection and reconstructive failure in implant reconstruction. Autoderm has been described in subpectoral implant-based reconstruction. In this case series, it is described in prepectoral implant-based reconstruction.

**Methods:** A retrospective review of breast cancer patients who underwent either unilateral or bilateral skin-reducing mastectomy via immediate prepectoral implant-based breast reconstruction in conjunction with an inferiorly based autoderm flap for implant coverage between February 2022 to April 2024 was performed and compared with previously published Wise pattern outcomes.

**Results:** Ten patients (15 breasts) underwent immediate prepectoral implant-based breast reconstruction with an inferiorly-based autoderm flap. Implant sizes ranged from 300 to 800 mL. Autoderm was able to cover the implant under the inverted-T incision in 13 breasts, whereas 1 breast required extension of the dermal flap using acellular dermal matrix. No major complications were observed in this study. One patient developed delayed wound healing in 1 breast that was managed nonoperatively. The test of 2 proportions was used to compare complications to published rates. Rate of delay wound healing showed no significant difference ( $P = 0.38$ ), whereas the overall complication rate was lower ( $P < 0.05$ ).

**Conclusions:** The inferiorly based autoderm flap in immediate prepectoral implant-based breast reconstruction is a safe and effective option in managing patients with large and ptotic breasts that reduces the rate of infection and reconstructive failure. (*Plast Reconstr Surg Glob Open* 2025;13:e6722; doi: [10.1097/GOX.00000000000006722](https://doi.org/10.1097/GOX.00000000000006722); Published online 6 May 2025.)

## INTRODUCTION

Immediate implant-based breast reconstruction in large and ptotic breasts is challenging, as it requires the management of both horizontal and vertical skin excess to allow for desirable implant position. Mastectomy skin necrosis is one of the most concerning complications

following mastectomy, ranging from 5% to 30%.<sup>1–7</sup> Techniques have been introduced to mitigate such complications, including the creation of an “internal bra” that provides structural support for the implant, relieving tension on the skin envelope and protecting the vulnerable T-junction. Several previously reported methods to create the “internal bra” include acellular dermal matrix (ADM), synthetic mesh, autoderm grafts, and autoderm flaps.<sup>8–19</sup> The excess skin can be managed with various kinds of skin incisions and excisions,<sup>20–27</sup> whereas the pocket customization is required to maintain breast implant position due to the fascial supporting system being sometimes destroyed in the process of mastectomy. ADM provides the benefits of pocket customization, shortened operative time, and cosmetic improvements.<sup>28</sup> Its use, however, leads to higher rates of seroma and infections, and extremely high cost.<sup>29</sup> Ideally, the bioprosthetic material should be processed easily, free from potentially

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DOI: [10.1097/GOX.00000000000006722](https://doi.org/10.1097/GOX.00000000000006722)

Disclosure statements are at the end of this article, following the correspondence information.

antigenic material, reliably and rapidly repopulated by host cells, able to promote early revascularization, resistant to infection, and inexpensive.<sup>8</sup> These characteristics favor using an inferiorly based, vascularized flap from de-epithelialization of the horizontal component of a Wise pattern skin incision.

Autoderm has been described as both a graft and a flap.<sup>8,10–15,17–19,30</sup> In the autoderm flap, it has been reported as a combined procedure with subpectoral implant insertion.<sup>10–15,17–19,30</sup> In the current era, the paradigm has shifted heavily to prepectoral implantation due to multiple advantages previously reported in the literature.<sup>31</sup> Theoretically speaking, the autoderm flap with prepectoral implant placement would provide internal support of the prosthesis using well-vascularized tissue while reducing the risk of mastectomy skin flap necrosis and preventing implant exposure. Additionally, there is no additional direct cost that would otherwise be involved when using allografts. There is a paucity of literature regarding this technique.<sup>32</sup> The Bayam et al proposed using de-epithelialized tissue between the vertical incision to add a vascularized layer between the implant and the incision to lower the wound complications. However, pocket customization is difficult in this technique, especially the inferolateral pocket control. This study was conducted to report our experience with using autoderm flaps for immediate prepectoral direct-to-implant (DTI) breast reconstruction to provide both tissue layers under all incisions to decrease wound complications and pocket customization for the implant.

## PATIENTS AND METHODS

This study received institutional review board approval and followed the guidelines set by the Declaration of Helsinki (protocol number 2020-011). The data collection retrospectively assessed the senior authors' clinical records (K.C. and J.C.S.) of patients with breast cancer who underwent either unilateral or bilateral skin-reducing mastectomy with immediate prepectoral implant-based breast reconstruction in conjunction with inferiorly based autoderm flaps for implant coverage between February 2022 to April 2024.

### Patient Selection

Inclusion criteria included patients with ptotic (Regnault classification grade 2 or 3) breasts<sup>33</sup> who had a sufficiently long distance of lower pole skin, accepted a smaller reconstructive breast than their native breast, and accepted nipple–areolar complex excision. Additional criteria included nipple-to-inframammary fold (IMF) distance of 10 cm or more. Adjuvant radiotherapy was not a criteria of inclusion. Patients who chose partial mastectomy were excluded. There were no exclusion criteria regarding tumor location, smoking status, or body mass index (BMI); however, patients were informed of the increased risk of wound complications during preoperative counseling.

The main outcomes included wound complications, mastectomy skin necrosis, infection, and implant exposure

## Takeaways

**Question:** Is the application of an inferiorly based autoderm flap safe in immediate prepectoral implant-based breast reconstruction in terms of wound complications and reconstructive failure?

**Findings:** We present the technique and optimal results of the senior surgeon to perform inferiorly based autoderm flaps in immediate prepectoral implant-based breast reconstruction.

**Meaning:** The inferiorly based autoderm flap in immediate prepectoral implant-based breast reconstruction is safe and effective in managing patients with large and ptotic breasts.

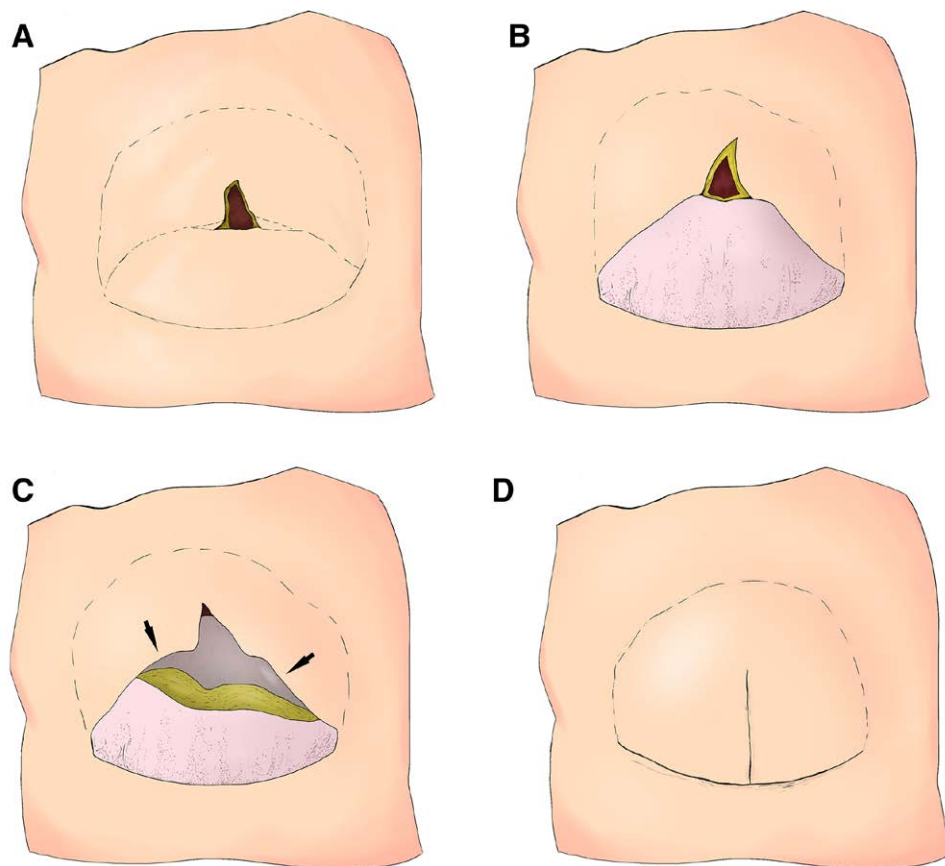
during the perioperative period, and these were compared with previously published Wise pattern outcomes. The test of 2 proportions was used to compare complications to published rates of the systemic review.<sup>34</sup> Specific complications and overall complications were compared. The secondary outcomes involved patient satisfaction of the outcomes of the surgery (very satisfied = 5, somewhat satisfied = 4, undecided = 3, somewhat dissatisfied = 2, and very dissatisfied = 1).

### Operative Techniques

Wise pattern skin incision was marked preoperatively in the upright position with the 3 key landmarks: the midline, breast meridian, and IMF. Regarding the marking of the vertical limbs, the planning of the amount of the skin excision was slightly lesser than the usual breast reduction/mastopexy technique; the breast was advanced medially and laterally to connect the breast meridian to accommodate for intraoperative modification.

Collaborative planning with the breast surgeons was essential during the mastectomy portion of the procedure, particularly performing via a limited incision to preserve more native tissue to be managed in the reconstructive portion. The incision would be made only between the vertical limbs to perform mastectomy (Fig. 1A). The plastic surgery team was not involved in this part, as oncologic concern should be determined by the breast surgeons. No tumescent solution was administered into the mastectomy plane.

Following the mastectomy and hemostasis, pocket control was accomplished using a 2-step process. The first step was by suturing the mastectomy flap to the chest wall to reestablish the appropriate breast boundaries, especially the lateral boundary (at the anterior axillary line) and the IMF (at the preoperative marking location). To control the lateral boundary of the breast, a suture was placed in the sulcus where the chest wall meets the mastectomy flap, and advanced upwards to the desired location along the chest wall. This allowed the lateral boarder of the breast to be advanced without puckering the mastectomy flap skin. A Jackson-Pratt drain (15 Fr) was placed within each pocket after this step. The second step was de-epithelialization of the inferiorly based, horizontal component of the mastectomy flap to create the autoderm flap (Fig. 1B). To avoid



**Fig. 1.** Illustration of the operative technique. A, Following mastectomy (nipple and skin between the vertical incisions were removed) via vertical incision, de-epithelialization of the inferiorly based mastectomy flap between the horizontal incision (pink area) to create the autoderm flap (B). Insertion of prepectoral implant sized into the prepectoral pocket with adjustable degree of tissue release at the junction (arrow) between the vertical and horizontal limbs was performed as needed (C) to facilitate the autoderm and T-junction inset for final breast shape (D).

dermal inclusion cysts, deeper de-epithelialization on the flap was required, with care not to perform full thickness removal through the flap to maintain the subdermal plexus.

The superior part of the autoderm flap required debriding to retain only vascularized tissue, as determined by pinpoint bleeding through the de-epithelialized skin (laser angiography can also be used). Implant sizes were then inserted to select the appropriately sized implant. Implant selection was performed by cross-referencing base width of the adjusted pocket, overall volume of the breast specimen, and patient-stated size desire. The autoderm was then sutured inferiorly to the pectoralis major and laterally to the serratus muscle/fascia for inferior and lateral pocket control, respectively. Full-thickness incision of the de-epithelialized flap was performed at the upper border of the de-epithelialized flap to facilitate advancement of the upper mastectomy flaps over the autoderm flap, creating a “pants over vest,” closure at the T-junction (Fig. 1C). Excess skin between the vertical limbs was adjusted and removed as appropriate to avoid high skin tension closure. Temporary closure was performed with a skin stapler (Fig. 1D). Before changing to a permanent implant, chlorhexidine solution and hypochlorous acid

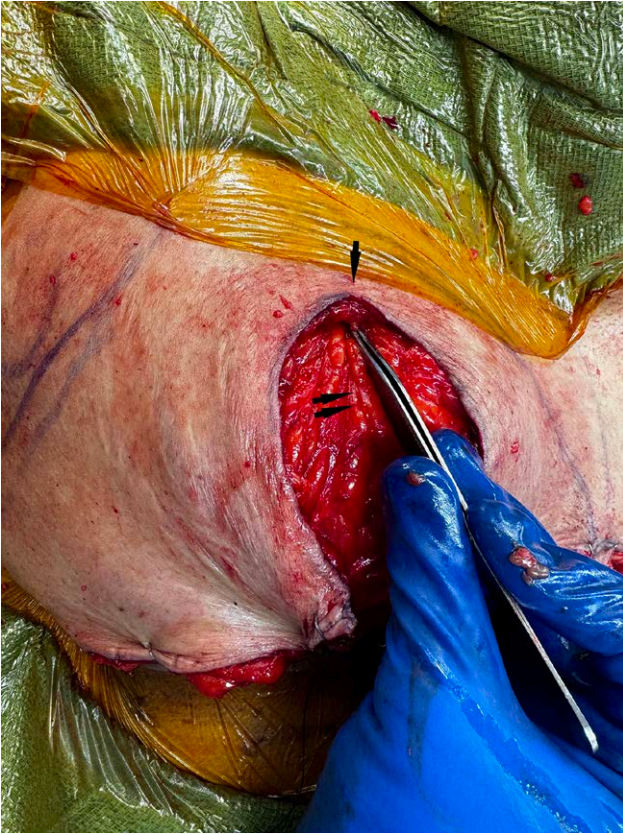
were used for pocket irrigation, followed by draping of the surgical field with antimicrobial film dressing (3M Ioban). The implant was inserted with a no-touch technique using a funnel device. Once the implant was placed within the pocket, the upper mastectomy flaps were advanced to the IMF to estimate where to secure the autoderm to the undersurface of the mastectomy skin flap. The upper edge of the autoderm was then sutured at that location. (Fig. 2). An allograft tissue matrix could be used as an extension to the autoderm in case its superior part could not provide full implant coverage under the vertical limb (Fig. 3). The remainder of the incision was closed in layers using interrupted 2-0 Vicryl and 3-0 Monocryl for deep layer closure, and then 4-0 barbed Monocryl suture for subcuticular closure.

Postoperatively, the patients stayed in the hospital overnight, and the Jackson-Pratt drains were removed in the office after 2 weeks on average.

## RESULTS

Ten patients (total 15 breasts) were included. Demographic data and operative details are shown in Table 1. Five patients underwent bilateral reconstruction.





**Fig. 2.** Upper part of the autoderm flap (double arrow) was sutured to the undersurface of the right mastectomy skin at the apex of the vertical limbs (arrow) of the right breast for full coverage of the implant under the inverted-T incisions.

In the unilateral reconstruction group, 3 patients underwent simultaneous contralateral mastopexy. Mean age and BMI of the patients were  $57.6 \pm 11.7$  years of age and  $32.5 \pm 5.5 \text{ kg/m}^2$ , respectively. Two patients were former smokers (quit 12 and 45 y ago). Follow-up period ranged from 2 months to 2 years.

Implant sizes ranged from 300 to 800 mL (implant selection as described earlier). The autoderm flap reached the apex of the vertical limbs in 14 breasts. In 1 case, the superior part of the autoderm flap required debriding to retain only vascularized tissue. In this particular case, additional tissue matrix (OviTex) was used as an extension

of the autoderm to achieve coverage beneath the vertical limb (Fig. 3). There was no difference in postoperative course between this patient and the other patients. There was no major complication requiring surgical intervention among all patients. There was no wound dehiscence, infection, or implant exposure. Delayed wound healing at the trifurcation of the inverted-T incision was observed in 1 case (one breast) and was managed with outpatient wound management for 3 weeks, after which it healed without further issues. The test of 2 proportions was used to compare the complication rates between our technique and previously published complications of DTI with Wise pattern skin incision.<sup>34</sup> Comparison of delayed wound healing showed no significant difference (6.7%, 95% confidence interval [CI]: -6.0% to 19.3% versus 2.7%, 95% CI: 1.2%-4.3%;  $P = 0.38$ ). However, the overall complications were lower in our technique (6.7%, 95% CI: -6.0% to 19.3% versus 30.3%, 95% CI: 25.9%-34.6%) with statistical significance ( $P < 0.05$ ). All patients were satisfied with the overall operative result and the aesthetic appearance of the reconstructed breast (mean score of 4.8 of 5).

## DISCUSSION

Immediate implant-based breast reconstruction in large ptotic breasts requires precise skin envelope management and reduction of skin excess to control the pocket and the implant. Building the new breast in this manner is one of the most challenging aspects of immediate DTI breast reconstruction. DTI reconstruction without skin envelope management leads to hollowness at the upper pole and the tail of breast, as well as a heavy, low neo-breast. To stabilize the implant in an elevated position on the chest requires management of the excess hanging skin envelope and significant structural support to maintain this position over time. To accomplish this task, vertical and horizontal skin excisions (Wise pattern) are usually required to reduce the excess skin and offer better shape and cosmesis.<sup>12</sup> The major disadvantage of this approach is the high risk for complications due to wound breakdown.<sup>34,35</sup>

In the current era, prepectoral implant-based reconstruction has eclipsed subpectoral breast reconstruction due to the advantages of lower rates of postoperative pain, capsular contracture, and animation deformity, as well as being technically simpler.<sup>31</sup> However, use of a Wise pattern incision with prepectoral DTI reconstruction poses



**Fig. 3.** Superior extension of inferiorly based autoderm flap with tissue matrix (OviTex). Autoderm flap before de-epithelialization (A), after de-epithelialization (B), and with tissue matrix extension for implant coverage (C).

**Table 1. Demographic Data and Operative Details**

No.	Age, y	BMI, kg/m <sup>2</sup>	Mastectomy Side	Side	Implant Size	Contralateral Symmetry Procedure	Combined ADM to Autoderm Flap	Complications	Follow-up Time (mo)
1	63	20.9	Bilateral	Right	300	n/a	No	No	8
				Left	300	n/a	No	No	
2	53	32.81	Bilateral	Right	470	n/a	No	No	14
				Left	470	n/a	No	No	
3	71	31	Unilateral	Right	405	Left mastopexy	No	No	3
4	63	31.95	Unilateral	Left	405	No	No	No	3
5	76	28.71	Bilateral	Right	450	n/a	No	No	3
				Left	450	n/a	No	Delayed wound healing at trifurcation for 3 wk	
6	47	31.55	Unilateral	Left	490	Right mastopexy	Yes (Ovitex)	No	2
7	64	42.44	Bilateral	Right	800	n/a	No	No	29
				Left	800	n/a	No	No	
8	52	34.91	Unilateral	Right	850	No	No	No	29
9	49	34.7	Unilateral	Right	470	Left mastopexy	No	No	16
10	38	35.94	Bilateral	Right	800	n/a	No	No	12
				Left	800	n/a	No	No	

n/a, not applicable.

multiple simultaneous risks of wound complications that can lead to implant exposure and reconstruction failure. Having a layer of well-vascularized tissue between the mastectomy skin flap and the implant not only possibly prevents implant exposure in the case of wound breakdown at the trifurcation but can also serve as an “internal bra” to relieve skin tension and control the implant pocket and implant position.

To achieve the goal of “internal bra,” ADM and autoderm grafts are both reasonable options. Although ADM provides the benefits of pocket customization, shortened operative time, and cosmetic improvements,<sup>28</sup> it leads to higher rates of seroma and infections, and extremely high cost.<sup>29</sup> Also, both ADM and autoderm grafts<sup>8</sup> are deficient in vascularization to prevent implant exposure in case of wound breakdown. The autoderm flap has long been in use and reported in subpectoral implant-based reconstruction for increased safety and effectiveness.<sup>10–15,17–19,30</sup> The autoderm graft has been safely used in prepectoral DTI,<sup>32</sup> but evidence of application of inferiorly based autoderm flaps in prepectoral DTI, specifically, is lacking.<sup>32</sup> Bayram proposed the use of a medially based autoderm flap between the vertical incision to add a vascularized layer under the incision.<sup>32</sup> This technique showed positive outcomes to the wound complications, but pocket control is difficult. In addition to becoming a vascularized layer, the autoderm flap can act as an internal bra and provides additional support and pocket re-establishment, in case the fascial system is jeopardized, for the implant within the mastectomy pocket, which allows for tension relief and structural stability at the incisions. Its vascularity may also enhance the healing of the mastectomy skin flap, especially in high risk populations, such as those with high BMI and large ptotic breasts, thus potentially reducing wound healing complications. In sum, with a certain design and appropriate patient selection, the inferiorly based autoderm flap can become a vascularized layer under all skin incisions from the Wise pattern design, which removes the excess skin and reshapes the breast envelope, and sufficiently serve as an “internal bra” to recreate an optimal

implant pocket. Both goals can be achieved without requiring combining with pectoralis major muscle elevation to create a subpectoral pocket for the implant. This avoids multiples disadvantages from subpectoral implantation, as previously reported in the literature.<sup>31</sup>

Our study demonstrated favorable results, as only a small number of patients (7%) developed delayed wound healing at the trifurcation of the inverted-T incision, which was managed conservatively. Most importantly, none of the patients experienced skin flap necrosis, infection, or hematoma. Higher rate of delayed wound healing compared with previous studies (7% versus 2.8%) may result from a small sample size or the exclusively DTI technique.<sup>34</sup> However, the overall complication rate is still lower than previous studies.<sup>12,34,35</sup> These outcomes support the benefits of using an autoderm flap in immediate prepectoral DTI reconstruction. Because the autoderm acts as a barrier between the skin envelope and the implant, any wound dehiscence or flap necrosis, though not observed in our study, should not lead to implant exposure. In the case of insufficient autoderm flap height to fully cover the implant under the vertical incision, ADM can be used to extend the implant coverage, although this may not be deemed necessary. It should be noted that this option obliterates the benefit of lower cost in the autoderm flap. We performed this option in 1 case, and the perioperative course did not seem to be different from the other cases, as no infection or seroma developed within the timeframe of this study. However, larger studies with longer follow-up periods are required to compare the difference between the 2 techniques. Overall, we believe that taking the extra time to create an inferiorly based autoderm flap is very worthwhile. It should be noted that this study is limited by its small sample size. Generalizability will require studies with a larger population.

In terms of cosmetic results, nipple-sparing mastectomy has been proven to be superior to skin-sparing mastectomy.<sup>36</sup> Nipple preservation by either designing the autoderm flap with nipple or nipple grafting is possible and has been previously reported. However, we opted for nipple





**Fig. 4.** Example of end of the dog ear from the vertical limb positioned at the most projecting portion of the neo-breast to be neo-nipple.



**Fig. 5.** Preoperative picture (A) and postoperative results at 3 months (B) of prepectoral implant-based breast reconstruction with inferiorly-based autoderm flap (case 2).

removal, as grafting poses a higher risk of nipple necrosis (approximately 30%)<sup>13,37</sup> than a standard nipple-sparing mastectomy (less than 10%).<sup>4,38–46</sup> In addition, if carefully planned, the end of the dog ear from the vertical limb can be positioned at the most projecting portion of the

neo-breast, thus creating a very aesthetic, projecting neo-nipple (Fig. 4). Similarly, tumescent solution during mastectomy was not implemented in our surgical technique due to the controversy in its association with mastectomy skin flap necrosis, which can affect final outcomes.<sup>7,47,48</sup> In

unilateral reconstruction, symmetry is a key for achieving aesthetically pleasing results. Contralateral symmetrical procedures can be safely performed simultaneously or as a staged surgery. The counseling not only dictates the operative options, but also helps manage patients' expectations, leading to higher rates and levels of patient satisfaction.

Overall, the inferiorly based autoderm flap in immediate prepectoral DTI for implant-based breast reconstruction is a safe and effective approach in high BMI patients with large, ptotic breasts. It helps with implant protection and allows for skin excess management and structural stability to optimize overall breast shape and longevity (Fig. 5). In addition, careful management of the vertical limb will create the substrate for nipple reconstruction and tattooing. Close collaboration with breast surgeons to preserve the skin in the horizontal limbs during mastectomy is key to the success of this approach. Despite adding more operative time during the creation of the autoderm flap, this approach is otherwise simple and does not require additional cost.

The limitations of this study included retrospective design and small sample size. Generalizability will require studies with a larger population. Although there was no implant malposition or capsular contracture developed in this study, the follow-up period was less than 1 year in approximately 50%. Long-term studies are needed to affirm the positive outcomes, including long-term complications.

## CONCLUSIONS

The inferiorly based autoderm flap in immediate prepectoral DTI breast reconstruction is safe and effective in this pilot study. It provides the benefits of internal support to relieve skin tension and control the implant pocket, and acts as a barrier between the implant and the external environment in the case of delayed wound healing at the T-junction. We believe that this will reduce the overall complication profile and improve aesthetic outcomes in this type of breast reconstruction.

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## DISCLOSURE

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

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