

# Stabilization of Microsurgical Anastomosis Using Fat-piece Graft With Autologous Fibrin Glue in Autologous Breast Reconstruction

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**Summary:** Flap loss is a severe complication of autologous breast reconstruction. Most flap losses are caused by thrombosis of the anastomosed artery or vein. To prevent vascular disorders, we placed a fat-piece graft around the vessel anastomosis and stabilized the graft and the vessel with autologous fibrin glue. From February 2020 to September 2023, 163 patients underwent autologous breast reconstruction, including 179 breasts, using a deep inferior epigastric perforator flap and autologous fibrin glue to stabilize the internal mammary artery and vein at the Toyama University Hospital. Information on complications was collected retrospectively. No flap losses were observed during the study period; however, 1 hematoma and 1 infection occurred. Stabilization of the pedicle geometry may reduce the risk of kinking, and filling the dead space around the anastomosis reduced vessel spasms. Moreover, autologous fibrin glue may decrease complications such as hematoma, infection, and wound healing disturbance. The factors that may lower the risk of complications include flap design, assessment using multidetector computed tomography, selection of perforator and recipient vessels, vascular anastomosis method, postoperative management, and so on. In addition to these factors, this technique, stabilization of vessels using a fat-piece graft and fibrin glue, may lead to fewer complications during autologous breast reconstruction. (*Plast Reconstr Surg Glob Open* 2025; 13:e6552; doi: [10.1097/GOX.00000000000006552](https://doi.org/10.1097/GOX.00000000000006552); Published online 12 February 2025.)

## INTRODUCTION

Flap loss occurs in approximately 1% of autologous breast reconstructions.<sup>1</sup> The main cause of flap loss is vessel thrombosis. We have been stabilizing the vessels with fat pieces and fibrin glue to prevent vessel kinks or vasospasms, and retrospectively analyzed the complications related to this technique.

## METHODS

This research is approved by the ethics committee of the University of Toyama (Study No. R2021100).

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A few weeks before breast reconstruction, autologous blood was collected, usually 200–400 mL. The blood was centrifuged to isolate red cell concentrate and plasma. Plasma was separated into 5–10 mL of cryoprecipitate and cryoprecipitate-depleted plasma manually. Three to 5 mL of cryoprecipitate and thrombin were used during the operation as autologous fibrin glue, and red cell concentrate and plasma were returned to the patient after the surgery.

During autologous breast reconstruction, the intercostal muscles and costal cartilage were resected for recipient preparation. After flap pedicle resection, end-to-end anastomosis with the internal mammary artery and vein (IMA/V) was performed. A piece of fat was cut from the lubricant adipofascial system (LAFS) in zone IV.<sup>2</sup> The fat-piece graft was laid under or between the vessel anastomosis as a cushion. After arranging the vessel geometry, the anastomosis and the fat piece were stabilized with the autologous fibrin glue. (**See Video [online]**, which shows the placement of the fat piece and spraying of autologous fibrin glue to arrange the

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

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**Table 1. Patient Characteristics**

Patients	163
Breasts	179
Age (y)	53.8
BMI (kg/m <sup>2</sup> )	23.1
Reconstructed breast	
Unilateral	147
Bilateral	16
Flap pedicle	
Unipedicle	163
Bipedicle	16
Timing of reconstruction	
Immediate 1 stage	51
Immediate 2 stage	30
Secondary 1 stage	48
Secondary 2 stage	37
Others	13

**Table 2. Complications**

Complication	Cases	Rate (%)
Total flap loss	0	—
Reoperation	2	1.12
Arterial thrombosis	0	—
Venous thrombosis	0	—
Hematoma (recipient)	1	0.56
Infection (recipient)	1	0.56

vessel geometry. The IMA/V are easily kinked after anastomosis. Placing fat pieces under the vessel anastomosis and spraying autologous fibrin glue improves and stabilizes vessel geometry and fills the dead space.)

## RESULTS

From February 2020 to September 2023, a total of 235 patients underwent breast reconstructions with deep inferior epigastric perforator flaps, including 257 breasts. The IMA/V was used as the recipient in 177 patients and 193 breasts. Fourteen patients and 14 breasts were excluded from the analysis because of anemia or difficulty in blood collection. In the end, 163 patients and 179 breasts were included in this study. Patient background data are shown in Table 1. We investigated the complications related to the procedure, including total flap loss, reoperation, venous thrombosis, arterial thrombosis, hematoma, and infection (Table 2). There were no flap losses during the study period; however, 1 hematoma and 1 infection occurred.

## DISCUSSION

Total flap loss occurs in 1% of breast reconstructions and is mainly caused by vessel thrombosis near the anastomosis.<sup>1</sup> Most vessel thromboses occur within 48 hours after surgery and are caused by twisting or kinking of the pedicle, vasospasms, mismatch caliber differences, or technical problems. We experienced tender movements against anastomosis, and stable geometry relieves vascular stress. Protection of the vascular anastomosis section by fat graft and fibrin glue may prevent vessels from folding or experiencing secondary vasospasm.

## Takeaways

**Question:** Total flap loss may occur during breast reconstruction. We present a technique using a fat-piece graft and autologous fibrin glue that may lessen complications after breast reconstruction.

**Findings:** Breast reconstruction using this technique stabilizes the microsurgical anastomosis and may reduce complications related to flap necrosis.

**Meaning:** Stabilization of the microsurgical anastomosis using a fat-piece graft and autologous fibrin glue is useful and may reduce complications after autologous breast reconstruction.

The use of an underlying fat-piece graft improves the geometry and vessel flow. For autologous breast reconstruction, the IMA/V is the first choice of recipient vessels due to its consistent anatomy, easy access, and arterial flow.<sup>3</sup> However, the surgical space for anastomosis with the IMA/V is narrow, and the IMA/V and donor vessel are often skewed. Crooked vessel geometry over a short distance may result in twisting or kinking. Autologous fibrin glue stabilizes the vessel and the fat piece, while adjusting the shape of the breast and postoperative ambulation.

To address the narrow access for microsurgical anastomosis, the intercostal muscle and costal cartilage are often resected, creating dead space near the anastomosis. Fresh blood is said to cause vasospasms at the anastomotic site.<sup>4</sup> Filling the dead space with a fat-piece graft and autologous fibrin glue may lessen the possibility of vasospasms. However, we have no data to support these ideas; therefore, we are trying to reveal the cause of vasospasm.

We use a fat piece from the LAFS due to its mobility and ability to spread and occupy the dead space around the anastomosis. Several articles report the placement of fat pieces around the anastomosis. Bar-Meir et al<sup>5</sup> used several fat pieces for breast reconstruction; others have used a single piece of fat to arrange the vessel geometry during head and neck reconstruction.<sup>6,7</sup> Subcutaneous adipofascial tissue may be classified into 2 systems: LAFS and protective adipofascial system. The LAFS makes the skin mobile against the musculoskeletal system and lubricates musculoskeletal motion, whereas the protective adipofascial system is solid to protect from external forces.<sup>2</sup> Fat pieces from the LAFS are easy to use to fill dead space and arrange vessel geometry in a short time.

Autologous fibrin glue may decrease complications. Fibrin glue has been used to treat minor blood leakage and for stabilization. It is made from human plasma, and autologous fibrin glue is made from the patient's own blood, causing a lower infection risk. At the clinic, shortening the duration of drain placement has been reported by Tokumoto et al.<sup>8</sup> Moreover, autologous fibrin glue positively impacts wound infection and healing with growth factors and pro-inflammatory cytokines.<sup>9</sup>

The rate of hematoma following autologous breast reconstruction is said to be between 3% and 6%.<sup>10</sup> The incidence of hematoma was low in our experience, suggesting that the proposed method may lower the risk of

hematoma. We use other techniques to prevent hematoma, such as elevating a patient's blood pressure to stimulate and control bleeding.

Our report has limitations to assure that this method is the most effective for reducing complications because the sample size is still small, and a randomized controlled trial was not conducted. At this point, we can only say that our method may be effective. Thus, we must continue collecting cases and conduct a randomized study.

The factors that may lower the risk of complications include flap design, assessment using multi-detector computed tomography, selection of a perforator and recipient vessels, vascular anastomosis method, postoperative management, and so on. In addition to these factors, this technique of stabilizing the vessels in an ideal position using fat pieces and autologous fibrin glue may lead to fewer complications during autologous breast reconstruction.

## CONCLUSIONS

During autologous breast reconstruction, fat-piece graft and autologous fibrin glue stabilize the pedicle geometry and fill the dead space, which may prevent vascular disorders. This technique is easy to perform in a short time and may prevent complications after breast reconstruction.

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## DISCLOSURE

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

## ETHICAL APPROVAL

*This research is approved by the Ethics Committee of the University of Toyama (Study No. R2021100).*

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