The desire for nipple-preserving mastectomies (NPMs) has increased over the past decade as studies have proven that the procedure has comparable oncologic risk as a traditional mastectomy in both therapeutic and prophylactic cases. Partial or complete nipple necrosis is a well-known complication of this procedure with rates in the literature ranging between 1% and 9%. In high-risk patients, surgeons are performing a delay procedure before the mastectomy to help improve nipple vascularity and decrease necrosis rates. We present a technique of using a short-lasting bioresorbable hyaluronate–carboxymethylcellulose membrane (SepraFilm; Genzyme, Cambridge, Mass.) during the delay procedure as an interpositional sheet, which prevents adhesion of the anterior breast skin from the underlying gland to both block revascularization to improve nipple perfusion and prevent the need for redissection of the previously created plane during the final mastectomy.

**SURGICAL TECHNIQUE**

Our technique involves the placement of 2 sheets per side of 3" × 5" SepraFilm over the underlying breast gland as the anterior breast skin is retracted upward at the completion of the delay procedure. Placement is performed without difficulty using the described instructions provided by the manufacturer. The overlying breast skin is then gently placed back down, and the inframammary fold (IMF) incision is closed in a standard layered closure. No closed-suction drains are placed. The final mastectomy can then be performed usually after at least 10 days have passed.

**CASE REPORT**

Our patient was a 37-year-old healthy female, non-smoker, and BRCA positive who requested bilateral prophylactic nipple-sparing mastectomies. She had a body mass index of 28.3 kg/m², grade 2 to 3 ptosis, 36-D bra size, and a sternal notch to a nipple distance of 25 cm on each side. To first properly position her nipple–areolar complex (NAC), a standard superior medial vertical pattern breast reduction was performed. Four months later,
the patient underwent her first nipple delay procedure performed through a new IMF incision. The anterior skin of the breast was elevated off the gland to a level just above the NAC. A subareolar biopsy was taken at this time, and the final pathology was negative. No Seprafilm was placed at this time. Postoperatively, she subsequently developed a small 1 × 3-mm eschar on the right nipple and required aspiration of a 40-mL seroma from the same side. After the eschar healed, we decided to perform a second delay procedure. Upon reopening the IMF incisions on each side, a small seroma was noted bilaterally and evacuated. There was difficulty in reestablishing the same mastectomy plane created in the first delay. Once the previous devascularized area was separated off the underlying gland, an additional section of anterior breast skin superior to the NAC was elevated. At the completion of this, 2 sheets of Seprafilm were placed on the underlying gland of each side as described previously.

Four weeks passed before the final mastectomy. After the first IMF incision was reopened and a small seroma was evacuated, we found that the predissected anterior mastectomy flap had no adhesions to the underlying gland and was separated easily (Fig. 1). The underlying gland had a uniform shine over the top but no trace of the Seprafilm (Fig. 2). The contralateral breast had similar findings. The ability to maintain this predissected mastectomy plane facilitated a more rapid completion of the full NPM on each side. Immediate reconstruction with bilateral buried deep inferior epigastric perforator flaps was performed successfully without complications.

**DISCUSSION**

Partial or complete nipple necrosis is a well-known complication of NPM with rates in the literature ranging between 1% and 9%. To help combat this problem, especially in high-risk patients, surgeons are performing a delay procedure before the final mastectomy to help improve nipple vascularity and decrease necrosis rates.

In 2005, Palmieri et al were the first to describe a nipple delay technique with the use of laparoscopic scissors placed through a small stab incision to sever the blood supply traveling from the gland to the NAC. Jensen et al reported in 2011 of using an open delay technique, which included separating the skin of the anterior breast and NAC from the underlying gland in the same plane as the standard mastectomy through a larger incision than previously described. They performed a nipple delay on high-risk patients with an active smoking history, preexisting surgical scars, or a sternal notch to a nipple distance of 28 cm or greater. Since 2011, only a few studies have been published documenting the efficacy of nipple delay with each group having slight variations on the technique described by Jensen et al.

We perform the nipple delay procedure via an IMF incision, with devascularization of the anterior breast skin within the mastectomy plane just passed the NAC. One problem that was discovered after the delay was the difficulty in reestablishing the mastectomy plane during the completion mastectomy, especially if more than 3 weeks had passed. Martinez et al described in 2015 the use of silicone sheets being placed within this plane to prevent revascularization of the NAC from the underlying gland and facilitate a subsequent mastectomy although they did not comment on its efficacy of doing so. One potential downside of using silicone is an introduction of a foreign body that is permanent, which may increase the potential for infection. We present a technique of using a short-lasting bioresorbable hyaluronate–carboxymethylcellulose membrane (Seprafilm; Genzyme, Cambridge, Mass.) as an interpositional sheet, which prevents adhesion of the anterior breast skin from the underlying gland to both block revascu-
larization to improve nipple perfusion and prevent the need for redissection of the previous plane during the final mastectomy.

Seprafilm is most commonly used in abdominal and pelvic surgery to effectively reduce postoperative adhesions. In 2012, Yang et al. used a solution of sodium hyaluronate and carboxymethyl cellulose over the pectoralis after mastectomy and found that the solution increased the shoulder range of motion and pain postoperatively with no adverse reactions. Additionally, Blount in 2011 published a report on 2 cases of using Seprafilm during a delay procedure; one for a reverse sural flap and the other for a trapezius muscle flap. Although they did not include the amount of time of the delay, they concluded that Seprafilm served as a barrier to fibrotic healing, which may enhance the vascular delay and facilitate reoperation. We observed a similar lack of fibrotic healing from the overlying mastectomy skin flap and the underlying breast. In our case, both breasts were found to have small seromas, which proved beneficial to maintaining the plane of dissection. However, this does not undermine the effectiveness of the Seprafilm because it may have facilitated the seroma formation by preventing adhesions between the 2 surfaces, for up to 4 weeks in our case, without requiring a permanent implant (silicone sheet).

CONCLUSIONS

Nipple delay procedures are usually reserved for patients who are at high risk of nipple necrosis after a NPM. For these patients, the delay has been found to be effective in preventing necrosis. Our technique of placing Seprafilm between the breast gland and overlying breast skin after the delay to act as bioresorbable adhesion barrier has potential to both augment the vascular delay of the NAC and effectively maintain a predissected mastectomy plane to facilitate the final mastectomy.

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