

# Use of Onlay and Laparoscopically-Placed Preperitoneal Mesh for Fascial Reinforcement in a Patient with a Recurrent Abdominal Bulge after TRAM Flap Breast Reconstruction: A Case Report

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<b>Background</b>	Abdominal asymmetry from fascial laxity is a common occurrence after harvesting the rectus abdominis muscle for use in pedicled and free flap breast reconstruction. Many techniques have been described to prevent or eliminate these abdominal bulges, but recurrences are still seen.
<b>Summary</b>	We present a unique option for eliminating an abdominal bulge after transverse rectus abdominis myocutaneous (TRAM) flap breast reconstruction. Our technique involves two separate layers of mesh, one placed in an onlay fashion over the anterior rectus sheath, after fascial imbrication, and the second mesh placed laparoscopically in the preperitoneal space. The patient we present previously developed a recurrent abdominal bulge after a TRAM. Our repair has prevented a recurrence at 10 months postoperatively.
<b>Conclusion</b>	Abdominal asymmetry from fascial laxity after TRAM flap breast reconstruction causes aesthetic concerns for patients and often causes abdominal wall discomfort. Traditional repair involves fascial imbrication and reinforcement with an onlay mesh. Despite this repair some patients develop a recurrence in the bulge. Our technique of eliminating this bulge and reinforcing the repair with two layers of the mesh, one onlay and the second placed laparoscopically in the preperitoneal space, is novel and has proven successful against recurrence in our patient.
<b>Keywords</b>	Transverse rectus abdominis myocutaneous flap, abdominal bulge, abdominal asymmetry, onlay mesh, preperitoneal mesh

**DISCLOSURE:**

The authors have no conflicts of interest or financial disclosures.

**MEETING PRESENTATION:**

N/A

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## Case Description

Removal of a portion of the rectus abdominis muscle in pedicled and free transverse rectus abdominis myocutaneous (TRAM) flaps results in alteration of the abdominal wall functional mechanics, which often results in the development of laxity and an associated bulge. Abdominal bulge rates have been reported to be as high as 20 percent in patients who have undergone breast reconstruction utilizing the rectus muscle.<sup>1</sup>

A large number of publications exist that address various efforts to minimize abdominal wall morbidity after abdominally-based autologous breast reconstruction. Inclusion of mesh over primary repair or imbrication of the fascia has been shown to decrease bulge and hernia rates.<sup>2-4</sup> Use of synthetic, instead of biologic mesh, also decreases the risk of a patient developing an abdominal bulge.<sup>2</sup> Muscle-sparing TRAM or deep inferior epigastric perforator free flap breast reconstruction has been shown to significantly reduce the risk of developing a post-operative bulge compared to the pedicled or free TRAM techniques; however, these techniques result in longer operative times and higher rates of fat necrosis and partial or total flap loss.<sup>1</sup> Additionally, despite preservation of the rectus muscle at the donor site, studies have shown that denervation of the rectus muscle during dissection can also result in the development of a post-operative bulge.<sup>5</sup>

After a bulge develops, management and recurrence prevention is difficult because no definitive fascial defect exists. In our practice, patient dissatisfaction with the unsightly appearance of the abdominal contour abnormality, in addition to pain and functional core weakness are the strongest motivators for reoperation. Various techniques have been described for elimination of abdominal bulges. Primary suture plication with or without mesh reinforcement is the simplest documented technique for repair, however, recurrence rates between 20.9 and 69 percent have been reported.<sup>6,7</sup> Specialized techniques, such as the internal oblique repair described by Kroll et al., could further lower the recurrence rate but are more technically challenging and require incisions through fascia, which could result in the development of a true hernia. Lee et al. described the placement of mesh laparoscopically in nine patients to repair bulges associated with abdominal wall laxity after DIEP and TRAM flap breast reconstruction. In this repair technique, they placed one piece of intraperitoneal mesh laparoscopically to reinforce the abdominal wall.<sup>8</sup>

Souto et al described the placement of two layers of synthetic mesh in separate fascial planes to correct abdominal wall defects secondary to pedicled TRAM breast reconstruction.<sup>9</sup> The deepest mesh was placed in the preperitoneal space and the second mesh was placed between the external and internal oblique muscles. The reinforcement of multiple layers of the abdominal wall with mesh seems to add additional protection against recurrence, however, this technique was described in patients with hernias and not bulges with intact fascia.

We present a novel technique to repair abdominal wall bulges that develop after abdominally-based breast reconstruction. Our technique involves two layers of mesh, one placed in an onlay fashion after imbrication of the fascial laxity and the other placed laparoscopically in the preperitoneal space as a sublay. This unique technique provides a strong, multiple-layered repair while at the same time minimizing procedure morbidity without disruption of the intact fascia. The repair was performed in a patient who had undergone a pedicled TRAM and developed a recurrent bulge after prior attempted repair.

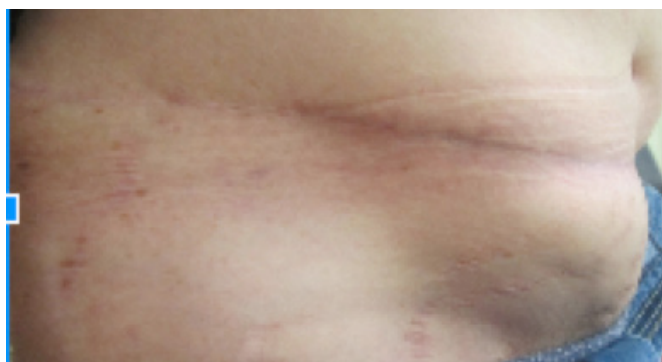
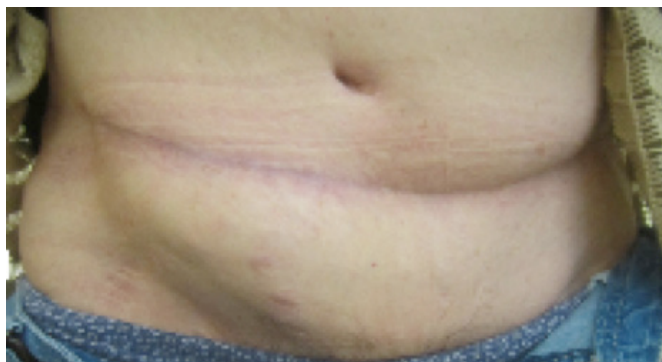
Our patient is a 70-year-old female who was diagnosed with invasive ductal carcinoma of the left breast. She subsequently had a left mastectomy with sentinel lymph node biopsy and adjuvant chemoradiation therapy. She was interested in pursuing breast reconstruction and due to her radiation therapy it was recommended that she consider autologous reconstruction from the abdomen. She was in agreement and opted for left breast reconstruction with a right pedicled transverse rectus abdominis myocutaneous (TRAM) flap. During this operation, she had primary fascial closure of the anterior rectus sheath. Strattice mesh (Acelity, San Antonio, TX) was used to reinforce the fascial closure.

Two months post-operatively, the patient developed cellulitis of the abdomen, which required hospital admission and a course of intravenous antibiotics. At her six month follow-up visit she identified a bulge in her right lower quadrant when standing upright (Figure 1). This bulge would disappear when supine. There was no palpable fascial defect on examination. In subsequent follow-up visits the bulge was noted to be enlarging and becoming increasingly more painful to the patient.



**Figure 1.** Bulge identified in right lower quadrant when standing upright (8/13/2015)

Nine months following her left breast TRAM flap reconstruction, she returned to the operating room for repair of her abdominal wall bulge. She underwent plication of the anterior rectus sheath to reduce the laxity that was promoting the bulge. The plication was reinforced with a 10 cm x 10 cm sheet of Strattice (Acelity, San Antonio, TX). In the initial postoperatively period she did well and was happy with her results; however, four months after the repair, the patient returned to clinic with a recurrence and pain over the repair site causing a functional limitation (Figure 2 and Figure 3).



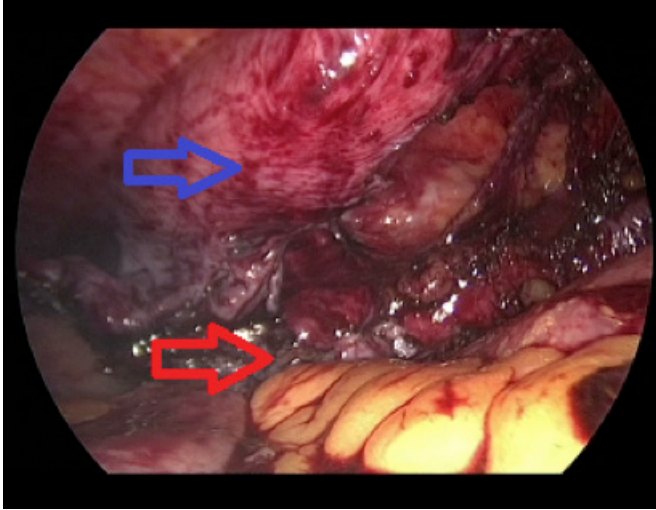
**Figure 2&3.** Recurrence and pain over the repair site causing a functional limitation (4/14/2016)

On exam the patient was found to have a large abdominal wall bulge, which was significantly tender. We discussed various options for repair including repeat imbrication with mesh onlay, component separation with mesh placement, or a combined laparoscopic and open technique utilizing two layers of mesh. She opted for the combined approach and met with our general surgeon who would perform the laparoscopic portion of the procedure. Our indication for returning to the operating room for repeat repair was the symptomatic nature (pain and tenderness) of the bulge and the patient's aesthetic concern over the asymmetry caused by the bulge. Twelve months after the previous repair (eight months after the recurrence) we performed a repeat plication of the internal oblique muscle with onlay prolene mesh reinforcement. In addition, our general surgery colleagues placed a preperitoneal mesh laparoscopically, as described below.

Following informed consent, the patient's bulge was marked in the preoperative area with her standing in the upright position. Once intubated and on the operating room table anesthesia performed a Valsalva maneuver, which accentuated the bulge and was used to confirm our preoperative markings. An incision was made through the previous low transverse TRAM donor site scar down to the level of the fascia. The subcutaneous tissue was dissected free from the underlying abdominal wall fascia to give adequate exposure of the fascial laxity. The sutures from the previous repair were identified and appeared to have torn through the weakened fascia at the previous imbrication site. Strong fascial edges were then clearly identified adjacent to the laxity and plicated with multiple 0 Prolene sutures in a figure-of-eight fashion until the laxity was eliminated. A 6 x 6 inch piece of Prolene mesh (Ethicon, Somerville, NJ) was then brought onto the field and cut to cover the area of plication with at least 6 cm of overlap in all directions. The mesh was then securely fixated to the fascia as on onlay with 0-Prolene.

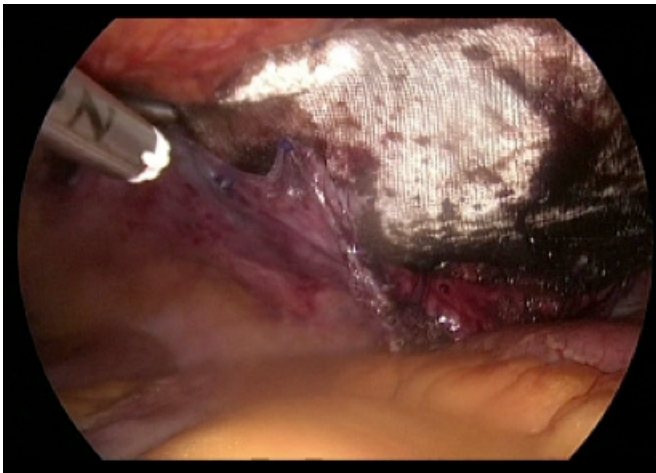
At this juncture of the surgery, our general surgery colleagues entered the abdomen laparoscopically with the placement of a 5mm subcostal trochar on the left. Pneumoperitoneum was created to 15mmHg. Two additional trochars, one 12mm and one 5mm, were placed on the patient's left side. The area of plication was identified in the patient's right lower quadrant. The peritoneum surrounding the plication was then incised and a flap was created (Figure 4).



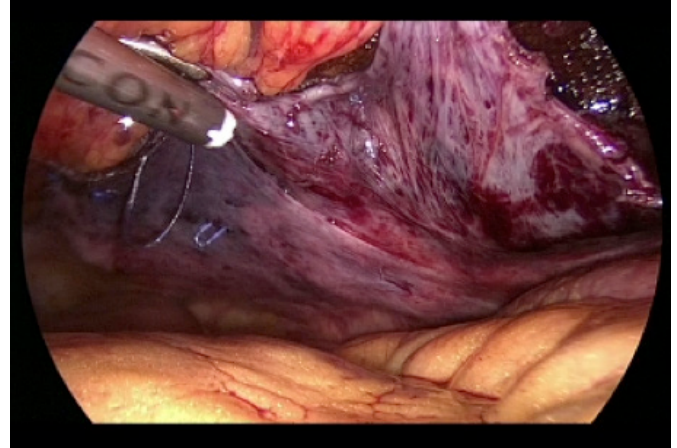


**Figure 4.** The blue arrow marks the imbricated fascia, the red arrow marks the flap of peritoneum.

A 10 x 15 cm Proceed mesh (Ethicon, Somerville, NJ) was passed through the 12mm trochar and unfolded in the abdomen. The mesh was then tacked to the fascia and the flap of peritoneum was tacked over the mesh (Figure 5 and Figure 6). The trochars were removed and pneumoperitoneum released. The fascia at the 12mm trochar site was closed using 2-0 Vicryl suture.



**Figure 5.** Mesh in preperitoneal space, beginning coverage by flap of peritoneum



**Figure 6.** Mesh covered by peritoneum.

The patient was seen at two month intervals postoperatively. Her last follow-up visit was ten months after surgery and she remains free of a recurrence (Figure 7 and Figure 8) and has no persistent pain. She is pleased with the symmetry of her abdominal contour.



**Figure 7&8.** Ten months postoperative (5/18/2017)

## Discussion

Our technique is novel in that it combines both onlay and sublay mesh to reinforce a repeated imbrication site that had previously failed, without dividing any fascial planes. First, we used synthetic mesh to reinforce our primary repair of the fascial laxity. Next, we added a second layer of mesh support in the preperitoneal space that was placed laparoscopically. The laparoscopic approach to placing the second layer of mesh avoided violating any healthy intact layers of fascia, which would risk the development of a true hernia.

Initial plication of the fascia, prior to laparoscopic placement of mesh, allowed for correction of the bulge before insufflation of the peritoneal cavity could result in accentuation of the bulge. Placement of the preperitoneal mesh prior to plication of the fascial laxity would only exacerbate the bulge and not the plication. We feel that the dual layers of mesh (to support imbrication of the fascia) are key to correction of the defect. Simply placing mesh laparoscopically in the preperitoneal space under the bulge, as described by Lee et al, lacks the imbrication of the fascial laxity and therefore only seems to add support to the weakened fascia without eliminating the laxity-induced bulge. A benefit to the order of our procedure is that insufflation after imbrication allowed for contralateral comparison of the abdomen for symmetry. Increased intra-abdominal pressure during insufflation would accentuate any fascial laxity. We were able to confirm that our imbrication eliminated adequate excess fascia based on the achieved symmetry. Another benefit of laparoscopy is direct visualization of our plication from the under surface of the fascia, which allowed us to confirm full-thickness plication of the fascia without violation of the peritoneum. After placement of the mesh in the preperitoneal space, the mesh was covered by replacement of the peritoneum, which will minimize adhesion formation that is risked by entering the peritoneal cavity.

This technique requires additional operating room time and the assistance of a surgeon skilled in laparoscopic placement of mesh. This limits the utility of the technique in every patient who undergoes pedicled or free TRAM breast reconstruction. However, the technique may be employed in any patient who develops a post-operative bulge for correction of the defect while decreasing the recurrence risk and minimizing patient and surgeon frustration.

## Conclusion

We present a unique multi-layered reinforcement of fascial imbrication to eliminate a recurrent bulge that resulted after a pedicled TRAM breast reconstruction. Both pieces of mesh were placed without dividing any layers of fascia. This technique requires assistance from a surgeon skilled in laparoscopy but, as in our patient, provides key reinforcement to prevent a return of the bulge in a patient who had already developed a recurrence.

## Lessons Learned

Abdominal asymmetry from fascial laxity is a common occurrence after harvesting the rectus abdominis muscle for use in pedicled and free flap breast reconstruction. Many studies have presented techniques to avoid or eliminate a post-operative abdominal bulge. We found the addition of a second layer of mesh, placed laparoscopically in the preperitoneal space, reinforced the fascia adequately to prevent against a recurrence of the bulge in a patient who had failed a previous bulge repair.

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