

Abdominal Closure after TRAM Flap Breast Reconstruction with Transversus Abdominis Muscle Release and Mesh

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Summary: Breast reconstruction with a pedicled transverse rectus abdominis muscle (TRAM) flap can result in significant abdominal wall donor-site morbidity. Although the pedicled TRAM flap donor area reinforced with mesh results in decreased rates of postoperative abdominal bulging and hernias, the best technique to accomplish that is yet to be elucidated. We present our novel technique of posterior components separation with transversus abdominis muscle release and retromuscular mesh reinforcement for donor-area closure during pedicled TRAM flap breast reconstruction. (*Plast Reconstr Surg Glob Open* 2016;4:e1014; doi: 10.1097/GOX.0000000000001014; Published online 21 September 2016.)

In the setting of breast reconstruction, pedicled transverse rectus abdominis muscle (TRAM) flap is known to be associated with abdominal bulging and ventral hernias in up to 63% and 18% of patients, respectively.¹ To overcome this high donor-area morbidity, one option is to perform deep inferior epigastric perforator flaps, for which reported rates of abdominal bulging and ventral hernias are 7% to 9%.¹ Another option involves the addition of mesh during abdominal wall closure, for which rates of abdominal bulging and ventral hernias are 2% to 6% and 1% to 2%, respectively.²⁻⁴ Cost utility of mesh reinforcement has been well established.⁵ Traditionally, meshes are placed as a subcutaneous onlay or as an inlay.¹ However, both techniques have limitations and are associated with frequent wound morbidity.⁶⁻⁹ Alternatively, in the setting of abdominal wall reconstruction for ventral hernias, retromuscular sublay repairs are shown to have superior morbidity profiles and lower hernia recurrence rates.^{6,7,10-13} A recently described posterior components separation (PCS) with transversus abdominis muscle release (TAR) has been gaining popularity among the surgical community worldwide for the treatment of

complex ventral hernias.¹⁴⁻¹⁸ Advantages of this method include the creation of a well-vascularized retromuscular plane for sublay mesh placement and significant myofascial medialization.¹⁴

The purpose of this article is to describe the application of the concepts of PCS/TAR with retromuscular synthetic mesh reinforcement during abdominal closure after pedicled TRAM flap transposition.

PATIENTS AND METHODS

We performed a retrospective review of consecutive patients who underwent PCS/TAR technique with retromuscular synthetic mesh reinforcement during abdominal closure after pedicled TRAM flap transposition. Main outcome measures included demographics, perioperative characteristics, complications, and hernia formation.

Surgical Technique

Once the pedicled TRAM flap is raised, the midportion of the abdominal wall is left with posterior rectus sheath and transversalis fascia. In the upper half of the abdomen, the transversus abdominis muscle extends medially to the linea semilunaris and is covered by the posterior lamina of the internal oblique aponeurosis and the posterior rectus sheath (Fig. 1). Posterior rectus fascia is incised medially to the linea semilunaris, and the underlying transversus abdominis muscle is divided to reveal the transversalis fascia. The space is then developed deep to the divided transversus abdominis muscle into the lateral retroperitoneum and also from

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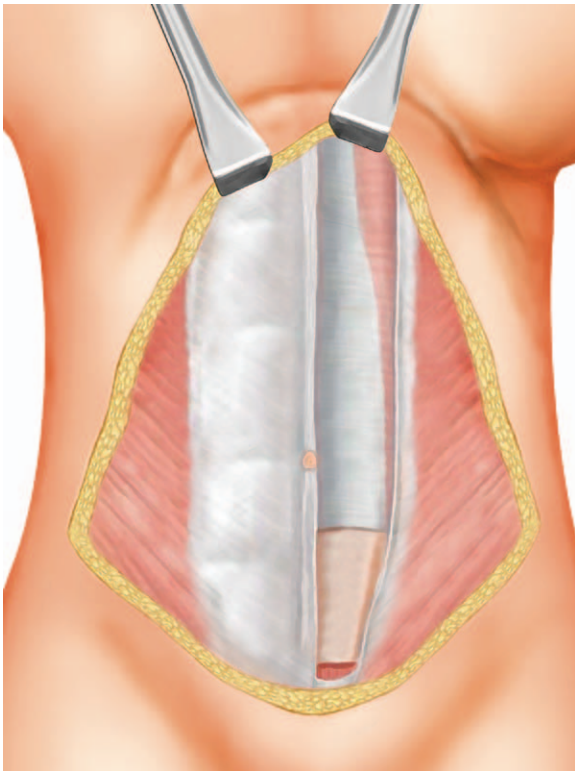


Fig. 1. After a left-pedicled TRAM flap is transposed to the chest, the surgically created defect consists in the upper-most segment of the transversus abdominis muscle, and also the left posterior rectus sheath and transversalis fascia.

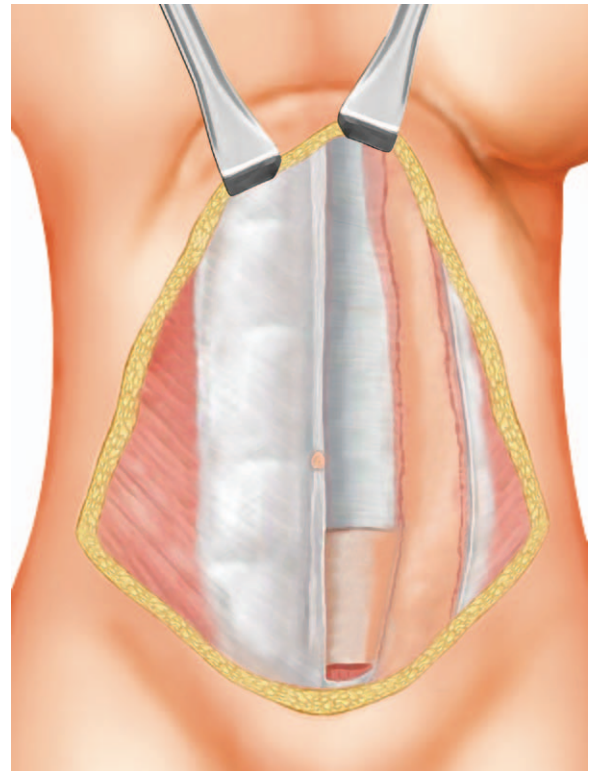


Fig. 2. After the left transversus abdominis muscle is incised and dissected off, a large surface of transversalis fascia is exposed.

the xyphoid process to Cooper's ligament (Fig. 2). On the contralateral side, the medial border of the rectus sheath is incised and the retrorectus plane is developed medially to the linea semilunaris (Fig. 3), leaving the posterior rectus sheath in continuity with the one on the flap-harvest side. After the retromuscular space has been established, a 30 × 15 cm polypropylene mesh (Prolene, Ethicon; Somerville, N.J.) is placed over both posterior rectus sheaths and the transversalis fascia. An aperture is made in the mesh for the umbilicus. This mesh is then fixated to the xyphoid process superiorly, to Cooper's ligament inferiorly, to the lateral muscles on the flap-harvest side, and to the rectus muscle on the contralateral side; therefore, reinforcement of the entire abdominal wall is achieved (Fig. 4). Muscle closure is performed with reduced tension because of the medial advancement of the muscular block afforded by PCS/TAR technique (Fig. 5).

RESULTS

Six consecutive patients underwent breast reconstructions with pedicled TRAM flaps and abdominal donor-area reconstruction with PCS/TAR technique. The average age was 42 years old (range, 32–49) and the mean body mass index was 24 kg/m² (range, 22–28). Four patients had their reconstructions performed at the same time as the mastectomies. Four patients had simultaneous contralateral breast procedures (2

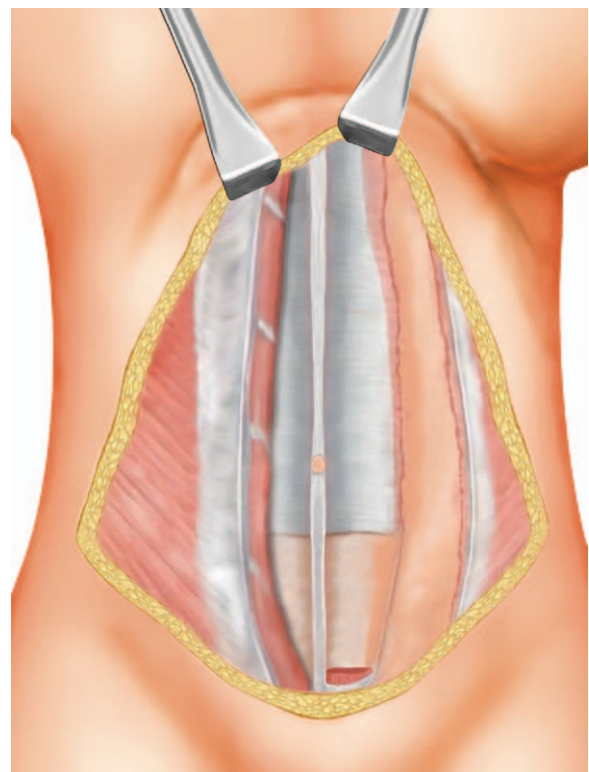


Fig. 3. On the right side, a retrorectus plane is developed, exposing the right posterior rectus sheath and transversalis fascia.

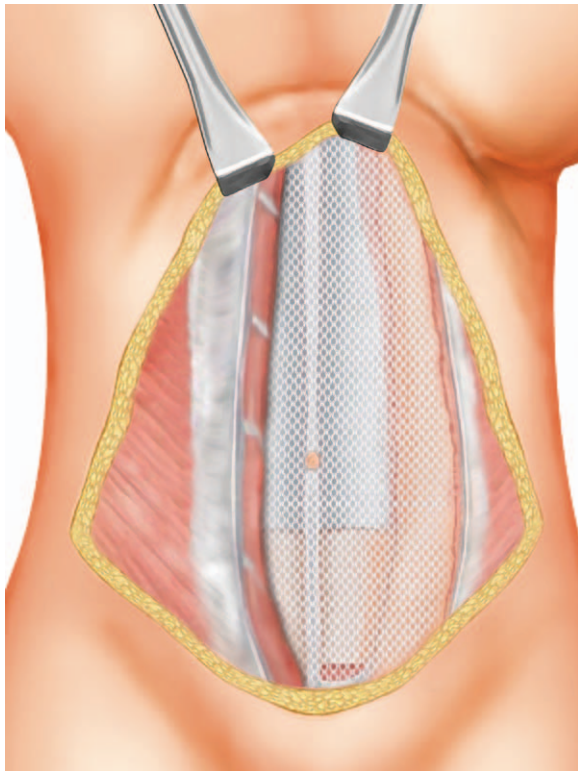


Fig. 4. A sublay synthetic mesh is placed over the posterior rectus sheaths and transversalis fascia. It is fixed to the xyphoid process superiorly, to the left Cooper's ligament inferiorly, and to the abdominal wall musculature peripherally. Note that an aperture is made in the mesh for the umbilicus.

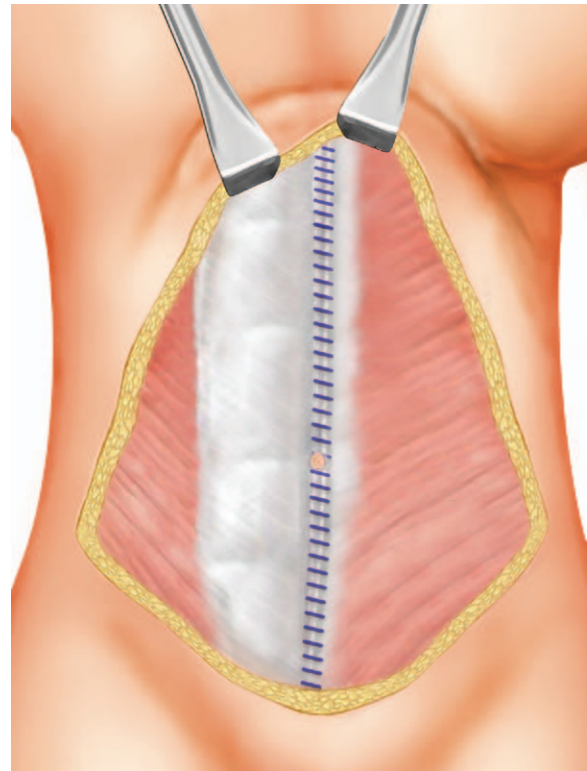


Fig. 5. The right rectus muscle and the 3 lateral muscles on the left side are closed together over the synthetic mesh.

mastopexies and 2 augmentations). The average operative time was 264 minutes (range, 240–300), and mean blood loss was 140 ml (range, 100–200). There were no intraoperative complications. Postoperatively, 1 patient developed pneumonia and had a hospital stay of 10 days while completing treatment with antibiotics. All other patients had uneventful hospital stays averaging 3.7 days (range, 3–4 d). There was no increased pain or drain amount. There were no mesh infections. Abdominal wounds healed without complications in 5 patients. One patient with previous history of smoking developed skin-edge necrosis in the center of the abdominal wound and in the superomedial edge of the reconstructed breast. Her mesh was not exposed and her wounds healed after 8 weeks of outpatient wound care. After a follow-up ranging between 6 and 14 months, patient satisfaction is high in all cases, and bulgings or hernias have not developed. A representative result is shown in Fig. 6.

DISCUSSION

Pedicated TRAM flaps are performed for autologous breast reconstruction and are associated with good aesthetic outcomes.^{19,20} However, reported rates of abdominal bulging and ventral hernia are high when mesh is not included in the donor-area closure.¹ To overcome this situation, one option is to perform deep inferior

epigastric perforator flaps, with low associated abdominal bulging and hernia rates.¹ Another option is to add a mesh to the abdominal wall closure, which is also associated with low rates of abdominal bulging and hernia.^{2–4} In this scenario, meshes are placed as an onlay or as an inlay.¹ In patients undergoing ventral hernia repair, inlay meshes are associated with high recurrence rates because of disruption of mesh-to-muscle interface.^{6–8} Onlay meshes have greater overlap than inlay, but they are associated with higher postoperative wound complications, including mesh exposure.^{6,7,9,21} On the other hand, synthetic retromuscular meshes have lower recurrence rates, given the superiority of intramuscular mesh location, and a stronger profile compared with biologic meshes.^{6,7,13,22–24}

In this article, we describe a preliminary series on the addition of PCS/TAR concept to abdominal closure in patients undergoing breast reconstruction with pedicled TRAM flaps. To perform this technique in the setting of free TRAM flaps, the segment of rectus muscle not included in the flap requires separation from its posterior sheath to reach the transversalis muscle plane. Although sample size and follow-up are limited, we have found that this technique has several advantages over traditional techniques. First, it provides a well-vascularized plane for mesh positioning with a wide overlap without the need of further wound devascularization. Second, mesh can be placed as a sublay, which is associated with lower rates of ventral hernias. Third, mesh is provided with full retromuscular coverage, lowering risks of infection, and expo-



Fig. 6. Two-month postoperative aspect of a 42-year-old woman who underwent right nipple-preserving mastectomy and immediate reconstruction with pedicled TRAM flap. Posterior components separation with transversus abdominis release and retromuscular mesh reinforcement was performed for abdominal donor-area reconstruction.

sure in case of wound disruption. Fourth, muscle closure is achieved with lower tension because the 3 lateral muscles on the flap-harvest side advance over transversalis fascia into a more medial position. The development of this technique during closure of a pedicled TRAM flap donor area results in myofascial continuity of the abdominal wall musculature, and reinforcement with a properly overlapped synthetic mesh placed behind the muscles, without performing extra subcutaneous undermining.

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