

# TRAM (Transverse Rectus Abdominis Myocutaneous) Flap

## Contents - PAGE 2

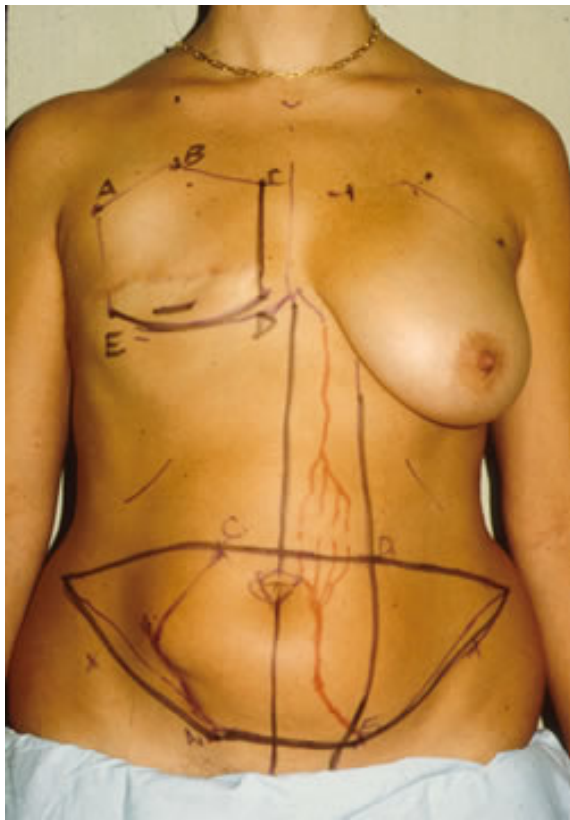
- [Pedicled TRAM flap](#)
  - [How is the procedure performed?](#)
    - [General overview](#)
    - [More detailed surgical technique](#)
  - [Important variations](#)
  - [Flap transfer to chest](#)
  - [Abdominal Closure](#)
- [Free TRAM flap](#)
  - [How is the procedure performed?](#)
  - [DIEP \(Deep Inferior Epigastric Perforator\) flap](#)
  - [Advantages of a free flap](#)
  - [Disadvantages of a free flap](#)
  - [Free TRAM versus DIEP flap](#)
- [Patient Examples of TRAM Flap Reconstructions](#)

## Pedicled TRAM Flap

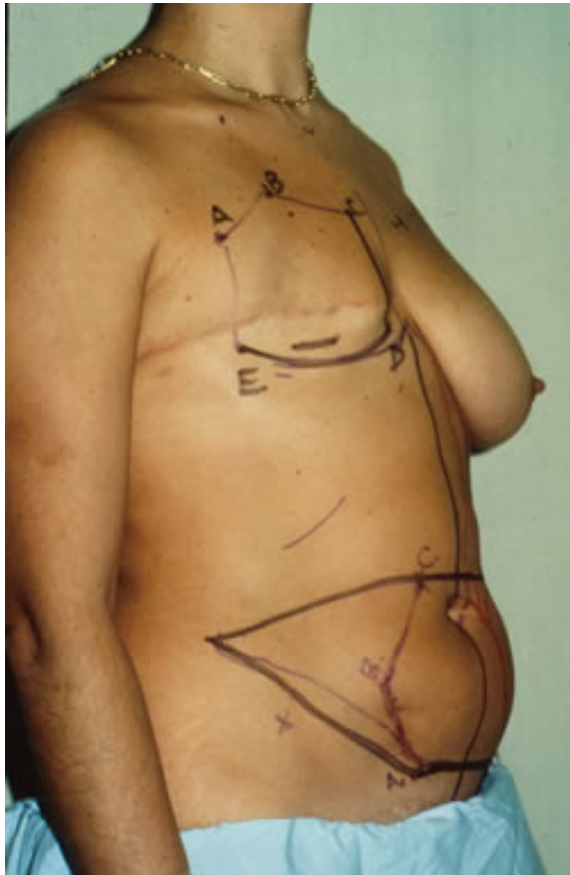
### How is the procedure performed?

#### General Overview

The basic steps in the pedicled TRAM flap procedure require the dissection and elevation of skin, fat and a portion of muscle from the lower abdomen. See [Figures 8](#) and [9](#) for a detailed look at the preoperative markings for a TRAM flap. A tunnel is then created subcutaneously along the chest wall. This connects the abdominal region with the mastectomy site. The flap, which is still attached to its blood supply, is pulled through the tunnel and up into the mastectomy site. Once through, the flap is appropriately trimmed and shaped into a breast. After this is completed, the flap is sutured into place.



**Figure 8** - This photograph shows a patient who has been marked preoperatively for a TRAM flap procedure.



**Figure 9** - This photograph shows the same patient who has been marked preoperatively for a TRAM flap procedure (this time from the side).

## More Detailed Surgical Technique

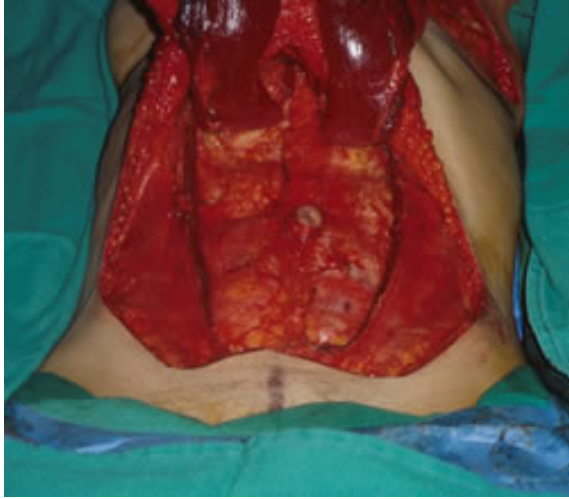
The flap is outlined with a marking pen on the lower abdomen (see [Figures 10](#) and [11](#)). It is important that the flap be drawn symmetrically so that the final abdominal scar will also be symmetrical. The superior aspect of the flap is incised first. The abdominal skin and fat is then elevated in a suprafascial plane to the level of the rib cage. The inferior border of the flap is then incised. Dissection is then carried out on the side opposite to the pedicle, again in a suprafascial plane. The pedicle can either be on the same side as the reconstructed breast (i.e. ipsilateral) or on the opposite side (i.e. contralateral). This dissection is completed at the midline. Attention is then turned to the pedicle side. Dissection begins laterally, again in the suprafascial plane. Dissection continues until the perforators running between the rectus muscle and the overlying skin are encountered. There are generally two rows of perforators, one lateral and one medial. While it is possible to take both rows of perforators with the flap, most surgeons will take one or other. The fascia overlying the rectus muscle is then incised on both the medial and lateral sides of the perforator row. The rectus muscle is then dissected free from the deep fascia and is divided inferiorly. During this division, the deep inferior epigastric vessels are ligated. Most surgeons will try to preserve a strip of the rectus muscle so that about 2/3 of the circumference of the muscle is taken with the flap. The rectus muscle and the fascia surrounding the perforators is then elevated with the flap. This elevation continues up to the costal margin (see [Figure 12](#)). See [Figures 13](#) and [14](#) for photographs of single and a double pedicled TRAM flaps, intraoperatively. Once dissection is complete, a tunnel is fashioned between the abdomen and breast area to facilitate passage of the flap up to the chest.



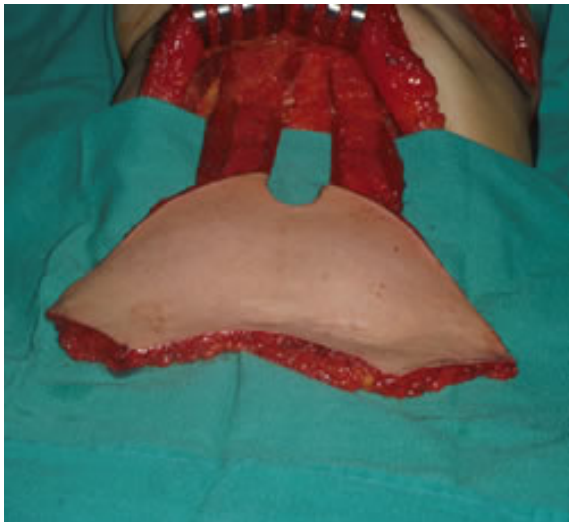
**Figure 10** - The patient shown here has had a right mastectomy.



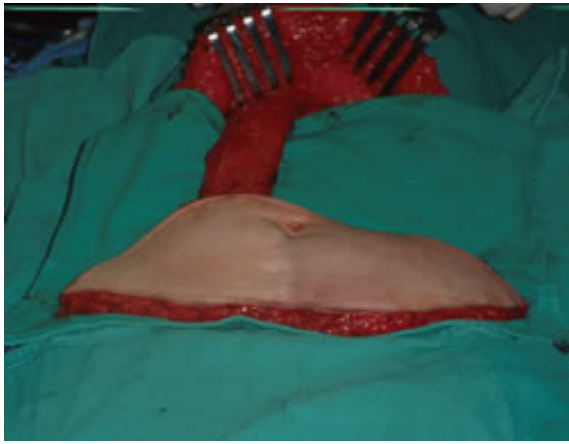
**Figure 11** - The same patient is shown here in the operating room. Note the preoperative markings describing the TRAM flap procedure.



**Figure 12** - This photograph shows a fully raised double pedicled TRAM flap. Note how the two rectus muscles remain attached to the flap.



**Figure 13** - This photograph shows a double pedicle TRAM flap attached to both of its rectus muscles.



**Figure 14** - This photograph shows a single pedicle TRAM flap attached to a single one of the rectus muscles.

## Important Variations

The above technique describes a single pedicled TRAM flap procedure. In some patients, for example those who need to have a larger breast reconstructed or those in whom the blood supply may be tenuous, a double pedicled TRAM flap may be considered. For a double pedicled TRAM, both rectus muscles are elevated in a similar fashion to that described above. Both rectus muscles and their superior epigastric vessels remain intact and attached to the TRAM flap (see [Figure 13](#)). But again, strips of each muscle are left behind in the donor site.

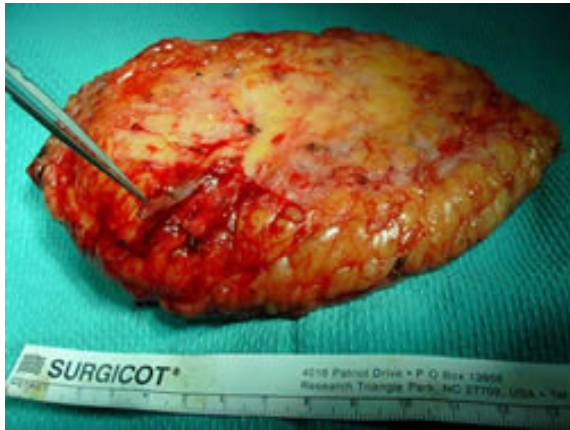
For a free TRAM, less rectus muscle needs to be elevated and included with the flap. In this case, the superior rectus muscle and the small tributary vessels from the superior epigastric artery are divided. The deep inferior epigastric vessels are then dissected and temporarily ligated, as they will be microsurgically "reattached" to vessels in the upper chest at the new breast site.

For a DIEP (Deep Inferior Epigastric Perforator) flap, the same abdominal incision and dissection is undertaken. But, no amount of rectus muscle or fascia is elevated and included with the flap. This time one or two of the musculocutaneous perforators from the epigastric vessel are dissected free and reattached at the new breast site.

See [Figures 15](#), [16](#) and [17](#) for photographs of a DIEP flap that has been raised and is ready for "reattachment" at the new breast site.



**Figure 15** - This photograph shows a DIEP flap that has been completely raised and is now ready to be detached from its original blood supply and transferred to the breast site.



**Figure 16** - This photograph shows a vessel that will be microscopically reattached to a recipient vessel at the breast site.



**Figure 17** - This photograph shows the resultant fascial defect that is created after a DIEP flap. Note the very small incision in the rectus fascia, as compared to a traditional TRAM flap.

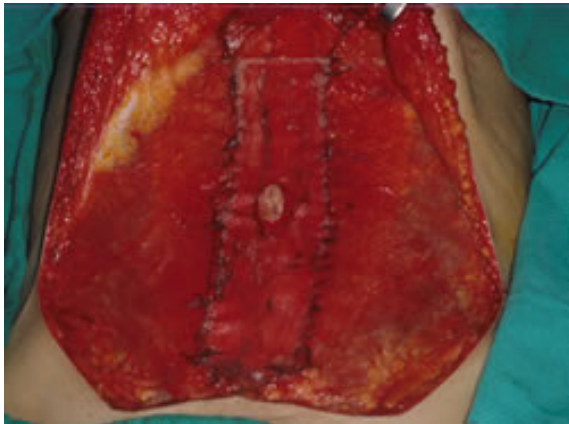
## Flap Transfer to the Chest

In the pedicled TRAM flap procedure, once the flap has been raised, a subcutaneous tunnel must be fashioned. This tunnel is made above the chest wall and below the skin. It is important that it be large enough to allow easy passage of the flap and prevent any undue pressure on the pedicle.

In cases of bilateral reconstructions, the ipsilateral muscle is used for each new breast to avoid crossing of the pedicles. In a free TRAM or a DIEP flap, the flap does not need to go through the tunnel, as the flap is completely detached from its blood supply. Therefore, it is simply detached from the abdominal area and then brought up to the new breast site.

## Abdominal Closure

Once the flap has been harvested and transferred to the new breast site, the abdomen is closed. Some surgeons close the resultant layers of the abdomen directly and some tend to also use a synthetic mesh to help with the closure (see [Figure 18](#)). Following the closure of the abdominal skin, the umbilicus is sutured in its new position. See [Figures 19](#) and [20](#) for early and later postoperative results.



**Figure 18** - This photograph shows the repair of the rectus sheath. Note that a synthetic mesh has been sutured in place for extra support.



**Figure 19** - This is the same patient immediately postoperatively (still on the OR table). (This is the same patient as was shown preoperatively in Figures 10 and 11)



**Figure 20** - This is the same patient a few months postoperatively (before a nipple and areola reconstruction).

## **Free TRAM Flap**

A "free" TRAM flap involves the detachment of the flap (i.e. tissue) from its original blood supply. It is then microsurgically reattached to a blood supply at the new breast location.

### **How is the procedure performed?**

#### **General Overview**

The basic steps in the free TRAM flap procedure are very similar to those of the pedicled TRAM. However, in the free TRAM, the superior rectus muscle and the small tributary vessels from the superior epigastric artery are divided. The deep inferior epigastric vessels are dissected and temporarily ligated, as they will be microsurgically "reattached" to vessels in the upper chest at the new breast site. The most common vessels used for the reattachment are the internal mammary or the thoracodorsal vessels.

#### **DIEP (Deep Inferior Epigastric Perforator) Flap**

For a DIEP flap, the same abdominal incision and dissection is undertaken. But, no amount of rectus muscle or fascia is elevated and included with the flap. This time, one or two of the musculocutaneous perforators from the epigastric vessel are dissected free and reattached at the new breast site.

See [Figures 15](#), [16](#) and [17](#) for photographs of a DIEP flap that has been raised and is ready for "reattachment" at the new breast site.

#### **Advantages of a Free Flap**

- more abdominal (rectus) muscle left intact
- quicker recovery of abdominal strength
- no "bulge" where the pedicled runs through the tunnel
- a better blood supply to the flap

- abdominal wall defect can be closed directly
- mesh is very rarely needed to close the abdominal wall
- it is a more reliable flap in smokers and patients with other risk factors

## **Disadvantages of a Free Flap**

- more complicated surgery
- longer operating time is necessary
- more surgical expertise and experience is required
- there is a possibility that the new vessel reattachment will become blocked
- likely requires a longer hospitalisation time

## **Free TRAM Versus DIEP Flap**

- the DIEP flap is more complicated to perform
- the blood supply to the DIEP flap is less reliable
- there is less of an abdominal defect with the DIEP flap
- there is the potential for a quicker recovery of abdominal strength with the DIEP flap

## **Patient Examples of TRAM Flap Reconstructions**

[Example 1](#)

[Example 2](#)

[Example 3](#)

[Example 4](#)