

# Uneventful Pregnancy and Delivery after TRAM Flap Reconstruction following Bilateral Mastectomies

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**B**reast cancer is the most common malignancy in women, with more than 200,000 cases annually in the United States [1]. Mastectomy is the treatment of choice in selected cases of breast cancer. The TRAM flap (transverse rectus abdominis myocutaneous) [2] is currently the preferred method of breast reconstruction in many institutions for patients seeking autologous tissue reconstruction [3]. It is believed that this type of reconstruction creates a more natural breast mound compared to other methods [3]. The TRAM flap is commonly performed as a pedicled flap based on the superior epigastric vascular system. The superior epigastric vascular system invested in the rectus abdominis muscle is used as a pedicle for the flap. The skin and fat tissue from the lower part of the abdominal wall is raised on the RAM and is transferred to the mastectomy site through a subcutaneous tunnel. The flap is then fashioned to resemble the amputated breast. Removal of the RAM and the rectus sheath significantly impairs the integrity of the abdominal wall, creating an "iatrogenic ventral hernia." The fascial layer

is repaired by primary closure or by synthetic mesh. Elevation of bilateral TRAM flaps leaves a more extensive fascial defect. Pregnancy and delivery are a challenge for the abdominal wall function and integrity. There is a lack of data regarding the safety of pedicle TRAM flap reconstruction in women of childbearing age.

The best timing for pregnancy after such operations is not defined, and the mode of delivery, natural versus cesarean section, is still under debate. We present two cases of bilateral breast reconstruction by pedicled TRAM flaps and successful uneventful pregnancy, and delivery by vaginal labor (the first patient) and by elective cesarean section (the second patient).

## PATIENT DESCRIPTIONS

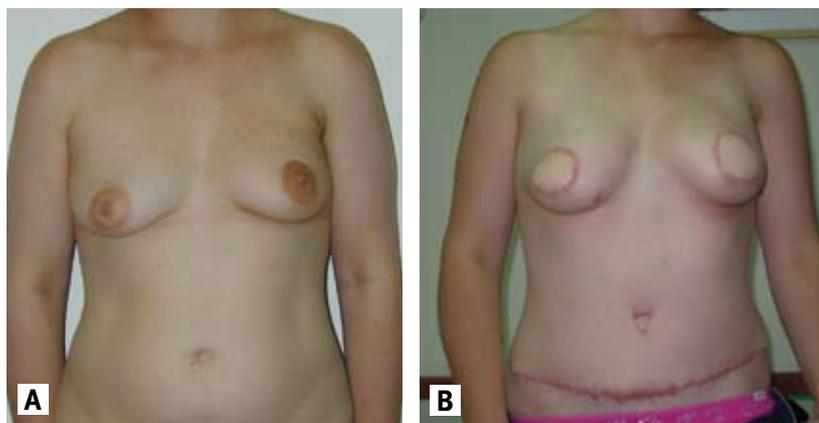
### PATIENT 1

A 34 year old woman presented initially in March 2006 with a palpable mass in her left breast. Preoperative evalua-

tion revealed a 2 cm mass in the breast tail with enlarged axillary lymph nodes. Ultrasound-guided core biopsy showed invasive ductal carcinoma. The patient underwent a lumpectomy and axillary lymph node dissection; the pathology findings diagnosed a high-grade invasive ductal carcinoma with a papillary pattern and prominent lymphatic invasion. Metastatic tumor was found in 6 of 14 examined regional lymph nodes. Postoperatively, she received adjuvant chemotherapy and radiotherapy. Genetic tests revealed the patient to be a BRCA1 mutation carrier.

In March 2007, after genetic counseling, the patient underwent bilateral mastectomy and immediate reconstruction by bilateral ipsilateral pedicled TRAM flaps. The fascial defect was reconstructed by a polypropylene mesh. The postoperative course was uneventful. The patient was advised to avoid pregnancy during the first postoperative year. Fifteen months

**Patient 1.** Reconstruction before [A] and after [B]



TRAM = transverse rectus abdominis myocutaneous  
RAM = rectus abdominis muscle

after the operation the patient became pregnant. She was carefully followed throughout the pregnancy. Except for one hospitalization due to preterm contractions, the pregnancy was uneventful. The abdominal wall gradually expanded relevant to the pregnancy stage without any signs of herniation or mesh disruption. In March 2009, at 36 weeks of gestation, she had a spontaneous vaginal delivery and a healthy 2470 g baby was born. Postpartum follow-up was without complication. Fifteen months postpartum the abdominal wall showed no sign of attenuation or hernia.

#### PATIENT 2

A 32 year old nulliparous woman presented initially in December 2005 with a palpable mass in her left breast. After preoperative evaluation she underwent a left lumpectomy and sentinel lymph node biopsy. A 2.5 cm small cell (oat cell) carcinoma was completely removed. The sentinel lymph node had no metastatic involvement. Postoperatively she received adjuvant chemotherapy and radiotherapy. In March 2008 a routine mammography revealed calcifications in her right breast. Ultrasound-guided core biopsy confirmed the diagnosis of high-grade ductal carcinoma in situ with comedo-type necrosis and foci of invasive ductal carcinoma. Genetic tests for BRCA1 mutation were found positive.

After counseling the patient decided to have both breasts amputated and an immediate reconstruction. Bilateral simple mastectomy with right sentinel lymph node biopsy was performed. The pathology results were identical to the preoperative biopsy result. The tumor was completely removed. No malignancy was identified either in the right sentinel lymph node or the left breast sample. An immediate reconstruction by bilateral ipsilateral pedicled TRAM flaps was undertaken. The postoperative period was uneventful. The patient received the same recommendation to avoid pregnancy during the first postoperative year. However, 3 months thereafter she informed the medical team that she was pregnant. The decision was made to continue the pregnancy. The course of the pregnancy was uneventful.

The patient requested elective cesarean section, which was performed in March 2009. The incision was made 3 cm under the transverse abdominal scar. A healthy 2720 g baby was born. Postpartum follow-up was without complication. The patient had no evidence of disease or abdominal wall complications 15 months later.

#### COMMENT

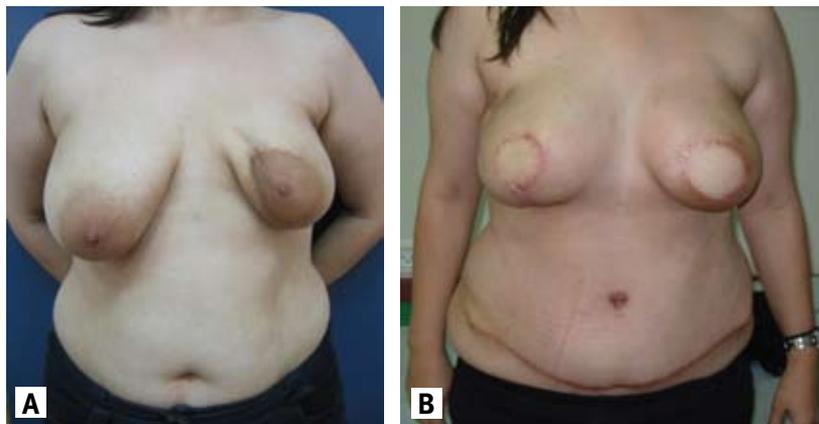
The abdominal wall is a structure comprised of several layers. Only the fascial and muscular components of this struc-

ture are functionally significant. The abdominal wall has several functions which can be divided into two categories: passive and active. The fascial system is responsible for the passive function by the equal distribution of pressure on the abdominal wall and the avoidance of herniation. The active function is produced by the abdominal wall muscles, which can provide torso posturing when they contract separately or intraabdominal pressure when they contract simultaneously. The elevated pressure participates in several tasks such as expiration, defecation, coughing, and fetus progression during delivery.

The TRAM procedure affects both the fascial and the muscular components of the abdominal wall. Bilateral harvesting impairs abdominal wall integrity even more. The fascial defect is generally repaired by a permanent mesh. Meticulous mesh repair is obligatory for the avoidance of herniation in the mesh circumference. The stiff mesh allows the abdominal wall to distend only in its lateral parts instead of the whole abdominal wall. Therefore, the risk of failure of the abdominal wall in the flanks should not be underestimated. The muscular defect caused by the bilateral rectus abdominis harvesting is most probably compensated by the other abdominal muscles.

Pregnancy and delivery are extreme challenges to the abdominal wall function and integrity, as mentioned above. Presumably, impairment of the abdominal wall components might be harmful to these activities. This might be the rationale for the recommendation not to use this breast reconstruction modality in women of childbearing age or at least to postpone the pregnancy for at least 12 months after the TRAM flap surgery [4]. This was advised by Parodi et al. [4] based on only one case of abdominal wall hernia after conceiving 4 months postoperatively. Our second case demonstrates no abdominal wall complication, even though the patient became pregnant only 2 months after the surgery. As far as we know, this is the shortest interval ever reported.

**Patient 2.** Reconstruction before [A] and after [B]



A search of the literature revealed only a few cases of successful pregnancies after pedicled TRAM procedure. Chen et al. [5] reported six patients who carried seven pregnancies to successful deliveries without any abdominal wall complications. Four of these six women underwent bilateral TRAM procedure; the others were unilateral. Also reported was the successful vaginal delivery of twins after the TRAM procedure.

We believe that our two successive cases, in addition to the other cases in the literature, demonstrate the feasibility of normal pregnancy and delivery in women who have undergone bilateral TRAM flaps. Our second case, the patient who became pregnant almost immediately after the reconstructive operation and had a normal pregnancy, confirms this conclusion.

We presume that the ability of the abdominal wall to overcome the impact of this operation can be explained by two mechanisms. a) The passive func-

tion: during pregnancy, the portion of the abdominal wall that was not repaired by mesh has the ability to further distend beyond the extent that would have happened under normal circumstances. b) The active function: during the active phase of delivery the role of the abdominal wall muscles in the delivery procedure appears secondary to the function of the uterus. Furthermore, the ability to elevate the intraabdominal pressure is preserved, at least partially, by the function of the abdominal oblique muscles.

The two presented cases of uneventful pregnancy and delivery after bilateral pedicled TRAM flap reconstruction provide additional information to the current reports. The literature on pregnancy after the TRAM procedure is limited. These two cases support our policy to consider even bilateral pedicled TRAM flap reconstruction in women of childbearing age. Uneventful pregnancy and delivery is possible in a

short lag time after TRAM flap procedure.

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