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# Latissimus dorsi flap versus pedicled transverse rectus abdominis myocutaneous breast reconstruction: outcomes



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## ARTICLE INFO

## Article history:

Received 3 January 2015

Received in revised form  
25 March 2015

Accepted 2 April 2015

Available online 8 April 2015

## Keywords:

Autologous breast reconstruction

Latissimus dorsi flap

Pedicled TRAM flap

Cost utilization

Length of stay

Postoperative complications

## ABSTRACT

**Background:** Pedicled breast reconstruction is a mainstay treatment for plastic surgeons. Although indications vary for each breast reconstruction technique, there exist some overlapping characteristics that may determine a successful outcome. We aimed to determine the impact flap selection has on postoperative outcomes and resource utilization.

**Materials and methods:** Nationwide Inpatient Sample database (2010–2011) was reviewed for cases of latissimus dorsi (LD; International Classification of Diseases, Ninth Revision, Clinical Modification, 85.71) and pedicled transverse rectus abdominis myocutaneous (pTRAM; 85.72) breast reconstruction. Males were excluded. Demographic, socioeconomic, clinical factors, postoperative complications, length of stay (LOS), and total charges (TC) were assessed. Chi-squared and multivariate analyses were performed to identify independent risk factors of resource utilization and postoperative complications.

**Results:** A total of 29,074 cases were identified; 17,670 (61%) LD and 11,405 (39%) pTRAM. 74% percent were Caucasian, 94% insured, and 66% were treated in teaching hospitals. There were 24 mortalities (15 LD, 9 pTRAM). LD patients were more likely to be obese (odds ratio [OR] = 1.3), suffer from flap loss (OR = 1.4), wound infection (OR = 1.6), wound dehiscence (OR = 2.2), and hematoma (OR = 1.3),  $P < 0.05$ . Patients undergoing pTRAM were more likely to undergo surgical revision (OR = 6.9), suffer from systemic infection (OR = 1.8), pneumonia (OR = 5.0), or pulmonary embolism (OR = 29.2),  $P < 0.05$ . Risk-adjusted multivariate analysis demonstrated LD was an independent risk factor for postoperative complication (OR = 1.4) and increased TC (OR = 1.3),  $P < 0.001$ . Conversely, undergoing pTRAM was an independent risk factor for increased LOS (OR = 6.3),  $P < 0.001$ .

**Conclusions:** Analysis of a national database found LD breast reconstruction to have higher TC and increased risk for surgical site complications. Patients undergoing pTRAM had increased risk for pulmonary complications and LOS. Procedure selection may be refined as additional characteristics are discovered using outcomes-based research.

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<http://dx.doi.org/10.1016/j.jss.2015.04.011>

## 1. Introduction

Autologous breast reconstruction offers patients the option of having their own tissue, avoiding the need for prosthesis placement and associated complications [1]. Although autologous reconstruction includes the drawback of an additional donor site and donor-site morbidity, it still carries the advantage of increased patient satisfaction while eliminating prosthesis complications [1,2]. Latissimus dorsi (LD) flap has been used as both a pedicled and free flap in many types of reconstructive surgery and its ideal location adjacent to the chest wall allows for reliable reconstruction postmastectomy with minimal functional deficit [3,4]. Because reconstruction using the LD pedicled flap has been limited by inadequate tissue volume, its use has been combined with implant placement and modified with the development of the extended latissimus flap [5,6]. Pedicled transverse rectus abdominis myocutaneous (pTRAM) flap, initially popularized by Hartrampf [7], has also gained interest by many plastic surgeons for reconstruction of the breast. In fact, the use of the pTRAM for autologous breast reconstruction has been favored over the free transverse rectus abdominis myocutaneous (fTRAM) flap by most surgeons [8]. Although it has the disadvantage of causing potential fat necrosis and/or abdominal wall hernia, this reconstructive method has been successful in creating aesthetic breast mounds [8,9].

Although these reconstructive techniques differ in terms of their indications, there is considerable overlap in the types of defect they can help reconstruct. Furthermore, there are differences in the complications and costs that each flap can incur. Therefore, our goal in this study was to determine the impact flap selection, using either the LD flap or pTRAM, had on postoperative outcomes and resource utilization.

## 2. Methods

We reviewed the Nationwide Inpatient Sample (NIS) database (2010–2011) for cases of latissimus dorsi (LD; International Classification of Diseases, Ninth Revision, Clinical Modification, 85.71) and pTRAM; 85.72 breast reconstruction. The NIS data set samples up to 1051 hospitals for approximately 8 million unweighted cases per annual release. Thus, weighted national estimates represent approximately 40 million cases. Males were excluded from the analysis. Demographic, socioeconomic, and clinical factors were assessed, along with postoperative complications, including reoperation, hemorrhage, hematoma, seroma, pulmonary embolus, wound infection, and flap loss. Clinical end points also included total charges (TC) and length of stay (LOS). Chi-squared and multivariate analyses were performed to identify independent risk factors of higher resource utilization and postoperative complications after reconstructive surgery. Cases were weighted to represent national estimates.  $P < 0.05$  was considered statistically significant.

## 3. Results

A total of 29,074 patients who underwent either pTRAM or LD breast reconstruction were identified during the study period. Of these cases, 17,670 (61%) were LD patients and 11,404 (39%) were pTRAM patients. Patient demographics and clinical data are summarized in Table 1. Seventy-four percent of the cohort was composed of Caucasian patients. Majority of patients in the cohort (94%) were insured. Seventy-one percent were insured by private insurance/health maintenance organization. Medicare and Medicaid patients comprised 21% of the cohort. Eighteen percent were in the first quartile for household income and 31% were in the fourth quartile for household income. Most of the cases (66%) in the study cohort were treated at a large, urban-teaching hospital setting with a predominant distribution in the southern United States.

There were 24 in-hospital mortalities (15 LD, 9 pTRAM). LD patients were more likely to be obese (odds ratio [OR] = 1.3), suffer from flap loss (OR = 1.4), wound infection (OR = 1.6), wound dehiscence (OR = 2.2), and hematoma (OR = 1.3),  $P < 0.05$ . Patients undergoing pTRAM were more likely to undergo surgical revision (OR = 6.9), suffer from systemic infection (OR = 1.8), pneumonia (OR = 5.0), or pulmonary embolism (OR = 29.2),  $P < 0.05$ . There was no difference in rates of postoperative hemorrhage.

We examined independent predictors of increased post-surgical complications via risk-adjusted analysis (Table 2). Race ( $P < 0.001$ ) and self-paying patients ( $P = 0.003$ ) were independent risk factors for higher postoperative complications. When compared to the fourth quartile of income, being in the first, second, or third quartile were all independent risk factors for increased postsurgical complications (OR, 1.41, [95% confidence interval, 1.18–1.67;  $P < 0.001$ ], OR, 1.44 [1.22–1.69;  $P < 0.001$ ], and OR, 1.68 [1.45–1.94;  $P < 0.001$ ], respectively). Obesity was also an independent risk factor for postsurgical complications (OR, 1.57 [1.32–1.88;  $P < 0.001$ ]). LD breast reconstruction was a risk factor for postsurgical complications when compared with pTRAM (OR, 1.39 [1.24–1.57;  $P < 0.001$ ]).

Risk-adjusted multivariate analysis of LOS (Fig. 1) demonstrated that pTRAM was an independent predictor for increased LOS (OR, 0.16 [0.15–0.17;  $P < 0.001$ ]). In this analysis, flap loss (OR, 3.30 [2.61–4.17;  $P < 0.001$ ]), hematoma (OR, 4.50 [3.61–5.62;  $P < 0.001$ ]), seroma (OR, 1.42 [1.13–1.78;  $P = 0.003$ ]), wound infection (OR, 16.86 [12.48–22.78;  $P < 0.001$ ]), and wound dehiscence (OR, 1.42 [1.09–1.85;  $P < 0.001$ ]) were all independent predictors for increased LOS.

On a risk-adjusted multivariate analysis for TCs (Fig. 2), independent predictors for increased TC included LD breast reconstruction (OR, 1.28 [1.21–1.34;  $P < 0.001$ ]) and hematoma (OR, 1.40 [1.13–1.73;  $P = 0.002$ ]).

## 4. Discussion

Main findings of the study demonstrated that the LD flap was associated with higher cost utilization and an increased risk for surgical site complications. In contrast, patients

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