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# Tachycardia in breast reconstructive microsurgery: Affirmation of the IMA tachycardia syndrome

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## KEYWORDS

Breast reconstruction;  
Tachycardia;  
TRAM;  
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IMA

**Summary** *Introduction:* The internal mammary vessels are frequently chosen as recipient vessels for breast free flap reconstruction. We have noticed that when using the internal mammary recipients that these patients have a propensity for tachycardia that was not previously observed. Our aim was to investigate the factors related to perioperative tachycardia in the microsurgical breast reconstruction population and to address whether use of the internal mammary system is a causative factor in tachycardia.

*Methods:* A retrospective chart review was conducted to identify patients who underwent abdominal-based microvascular breast reconstruction at the Washington University School of Medicine between 2002 and 2012 to identify the presence of tachycardia. After application of exclusion criteria, 76 microvascular abdominal-based free flap reconstructions were identified. The internal mammary (IM) TRAM group (n = 24) and the thoracodorsal (TD) TRAM group (n = 52) were compared. A binomial logistic regression was performed with the presence of tachycardia as the dependent variable.

*Results:* There was a higher incidence of tachycardia in the IM TRAM group when compared to the TD TRAM group (p = 0.004). The variables predictive of tachycardia in our logistic regression model were IMA recipient (p = 0.04), need for transfusion (p = 0.03), and presence of fever (p = 0.01).

*Conclusion:* Our study reaffirms that there are several factors that are predictive of tachycardia in the setting of microvascular breast reconstruction. The IMA syndrome should

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be a recognized cause of tachycardia as using these recipient vessels are shown to be predictive of postoperative tachycardia as shown in our study.

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## Introduction

Breast reconstruction utilizing abdominal based free flaps is a standard technique that employs native tissue to provide a natural, esthetic reconstruction. The challenges of perioperative management in microvascular breast reconstruction involve judicious fluid management and hemodynamic monitoring.<sup>1</sup>

The internal mammary artery (IMA) and vein(s) are frequently chosen as recipient vessels for breast free flap reconstruction for several reasons. Some studies have suggested that this technique may decrease issues such as postoperative shoulder pain and have potentially improved esthetic outcomes.<sup>2,3</sup> Additionally, it has been suggested that the incidence of fat necrosis with the thoracodorsal recipient vessels may be higher as compared to that of the internal mammary system.<sup>4</sup> When compared head to head, this technique was found to have similar operative times, length of stay, and return to work as the traditionally used thoracodorsal recipient vessels.<sup>5</sup> The rising use of the internal mammary vessels in the modern era of breast reconstruction has mirrored the increased utilization of sentinel lymph node biopsy since the thoracodorsal vessels are less routinely exposed.<sup>6</sup> Additional benefits of internal mammary harvest include ease of dissection, particularly in irradiated fields. In patients that require completion axillary lymphadenectomy, there is an increased risk that the thoracodorsal vessels may be injured. The central position of the internal mammary system increased the ease of flap inset with minimal risk of pedicle kinking issues. The use of thoracodorsal recipient vessels may preclude the use of latissimus dorsi flap as a lifeboat in the circumstances of a flap loss. Although it has been shown that the internal mammary artery has a higher flow than the thoracodorsal system, the amount of actual blood flow to the flap is similar regardless of which recipient vessels are used.<sup>7</sup> The benefits of internal mammary recipients include more superficial location for free flap inset. Additionally, the use of the internal mammary vessels may allow for better medial fullness with less lateral migration of the flap with less possibility of stretching the flap vessels. The IM vessels are able to accommodate flaps with shorter pedicle lengths due to their central location.<sup>8</sup> The disadvantages of internal mammary harvest include the risk of pneumothorax and a vertically moving surgical field due to respiratory mechanics. There is a risk of taking the internal mammary vessels as they may be needed as a conduit for coronary revascularization in the future.<sup>9,10</sup>

Through our clinical experiences, we have noticed that when using the internal mammary vessels as a recipient that these patients may have a propensity for tachycardia which we have not observed while using traditional

recipients, such as the thoracodorsal system. Other groups have also reported an increased incidence of tachycardia in the IMA recipient vessel population.<sup>1</sup> The goal of this study was to look into the factors related to perioperative tachycardia in the microsurgical breast reconstruction population and to specifically address whether use of the internal mammary system is a causative factor in tachycardia.

## Methods

### Patient selection

A retrospective chart review was conducted to identify patients who underwent breast reconstruction with an abdominal-based microvascular breast reconstruction at the Washington University School of Medicine between 2002 and 2012 to identify the presence of tachycardia. For the purposes of this study, tachycardia was defined as a persistent heart rate greater than 100 beats per minute for greater than 12 hours after the completion of the anesthetic. The heart rate measurements were taken from vital signs that were measured on our surgical floor. In all patients that were noted to have tachycardia, this occurred within the first 24 hours after surgery. Our study was approved by our institution review board and conforms to the World Medical Association Declaration of Helsinki.

273 microvascular abdominal-based free flaps were identified. Exclusion criteria included previous radiation therapy, neoadjuvant chemotherapy, pre-operative beta blocker usage, bilateral reconstruction utilizing simultaneous microvascular TRAM flaps and pedicle TRAM flaps, flap failure, or identifiable causes of tachycardia (documented hemorrhage, infection, preexisting conditions). After applying these exclusion criteria, 76 microvascular abdominal-based free flap reconstructions were identified. The microvascular TRAM group was further subdivided into two groups based on the recipient vessels utilized, the internal mammary (IM) microvascular TRAM group (n = 24) and the thoracodorsal (TD) microvascular TRAM group (n = 52). The microvascular TRAM group was once again subdivided into two groups based on laterality, the bilateral (BL) microvascular TRAM group (n = 20) and the unilateral (UL) microvascular TRAM group (n = 56).

### Statistical analysis

Demographic and intra-operative comparisons between the IM and LD groups were performed using Student's unpaired t-tests for continuous data and Fisher's exact test for categorical data. *P*-values <0.05 were considered significant.

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