

# Effects of Vasopressor Administration on the Outcomes of Microsurgical Breast Reconstruction

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**Abstract:** The use of vasopressors during microsurgery is still debated. General anesthesia often induces hypotension, but microsurgeons are reluctant to use intraoperative vasopressors with the potential risks of vasoconstriction. A retrospective review was performed on 187 consecutive patients undergoing 258 deep inferior epigastric perforator flaps, free transverse rectus abdominis myocutaneous flap, and muscle-sparing free transverse rectus abdominis myocutaneous flap operations. A total of 102 patients (140 flaps) received intraoperative ephedrine and/or phenylephrine and 85 patients (118 flaps) did not. The administration of vasopressors did not affect the rates of reoperation, complete flap loss, partial flap loss, or fat necrosis. Patients receiving vasopressors had no differences in operative time, number of perforators, or number of rows of perforators harvested. There was no statistically significant association between dosage, timing, and complications. Although we do not recommend routine vasopressor use during microsurgery, administration does not seem to increase complications in microsurgical breast reconstruction.

**Key Words:** microsurgery, vasopressors, flap loss, breast reconstruction

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The field of reconstructive microsurgery has undergone rapid advancement since the first descriptions of microsurgical techniques used for free tissue transfer in the 1970s. Breast reconstruction has evolved as well, from the transverse rectus abdominal myocutaneous (TRAM) flaps described by Hartrampf to the free abdominal flaps described by Holmstrom.<sup>1,2</sup> Currently, perforator flaps such as the deep inferior epigastric perforator (DIEP) and superior gluteal artery perforator (SGAP) flaps are the latest innovations in the microsurgical reconstruction of the breast.<sup>3,4</sup>

Despite decades of experience, the use of vasopressors during microsurgery is still greatly debated. General anesthesia induces hypotension in patients during surgery, especially during induction. Anesthesiologists commonly treat hypotension by decreasing the amount of anesthetic, increasing the volume of intravenous fluids, and administering systemic vasopressors. However, microsurgeons are often reluctant to use vasopressors during free flaps due to the theoretical risk of vasoconstriction and potential ischemia and necrosis.

Some animal studies seem to support this practice. Decreased flap arterial flow has been described with the systemic and topical administration of the vasopressor phenylephrine.<sup>5–7</sup> These studies also showed that vasopressors are not universally deleterious as epinephrine, and dobutamine actually increase flap perfusion.<sup>5,6</sup> However, other animal studies show no decrease in perfusion with phenylephrine.<sup>8</sup> These contradictory results make vasopressor usage even more confusing for microsurgeons.

There are little human clinical data to confirm the observations in these animal studies; therefore, we examined the effects of systemic, intraoperative vasopressor administration on the outcomes of microvascular reconstruction in patients undergoing free flap breast reconstruction.

## METHODS

### Patient Selection

This study was approved by the institutional review board. We identified all patients undergoing free flap microsurgical breast reconstruction over a 33-month period from June 2005 to March 2008 from the operating room case log at Beth Israel Deaconess Medical Center. A total of 187 consecutive patients undergoing 258 DIEP flaps, free TRAM flaps, and muscle-sparing free TRAM (MS-2) flaps were included. Patients undergoing superficial inferior epigastric artery flap operations were excluded from analysis due to significant differences in dissection time compared with the other flaps. The remaining patients were divided into 2 groups based on whether or not they received ephedrine and/or phenylephrine during surgery. This provided us with 102 patients (140 flaps) who received vasopressors during surgery and 85 patients (118 flaps) who did not.

### Data Collection

A retrospective chart review was performed from online medical records and inpatient hospital records to collect information concerning patient demographics, procedure details, and surgical outcomes. Specific data included patient comorbidities (diabetes mellitus, smoking status, and obesity defined by body mass index >30), dosing of ephedrine and phenylephrine, timing of vasopressor administration (during dissection time or not), laterality of procedure (unilateral vs. bilateral), number of perforator vessels harvested, orientation of perforator vessels (medial or lateral rows vs. medial and lateral rows), duration of surgery, reoperation within the first week, fat necrosis, and flap status (viable, partial loss, or complete loss). Partial flap loss was defined as tissue loss of 5 cm or greater in diameter. Fat necrosis was defined as palpable subcutaneous firmness greater than 2 cm in diameter evaluated at 3-months follow-up.

### Statistical Analysis

We assessed differences in patient characteristics using the  $\chi^2$  test, Fisher exact test, and the nonparametric Wilcoxon rank-sum tests. The  $\chi^2$  trend tests, Fisher exact test, and Two-sample *t* test were used to compare incidences of any complications, including complete flap loss, partial flap loss, fat necrosis, and reoperations. Differences in secondary outcomes (operative time, perforator vessel orientation, and number of perforator vessels harvested) were

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