Deep Inferior Epigastric Artery (DIEP) flap monitoring in ICU and ward settings”

Harel Schwartzberg[1], Charles Patterson [2], Rhadbeh Torabi [2], Matthew Bartow [2], Robert Allen [2], Hugo St. Hilaire [2]

[1]LSUHSC School of Medicine, [2]LSUHSC Department of Plastic and Reconstructive Surgery.

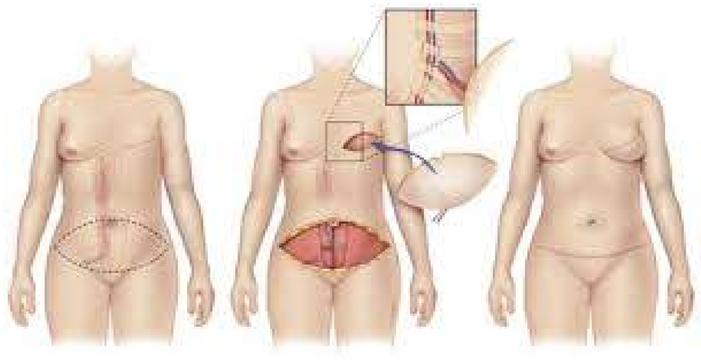
Introduction and Methods

Free flap reconstruction (FFR) is the process of microvascular tissue transfer from one section of the body to another. This surgical procedure is a popular method for the reconstruction of complex surgical defects and traumatic injuries with a success rate ranging between 91-99%. One of the more recent advancements in FFR comes in the form of the deep inferior epigastric artery (DIEP) flap. The DIEP flap is specific type of FFR surgery first described in 1994 by LSU’s very own Dr. Robert Allen. This surgery utilizes fasciocutaneous pedicles in the lower abdominal region supplied by the deep inferior epigastric artery to reconstruct surgical defects in the breasts commonly left by mastectomy surgery.

One of the drawbacks to the DIEP flap surgery as well as other surgeries which involve microvascular free tissue transfer is the labor-intensive task of postoperative monitoring of flap viability. Typically the first 24 hours after a free flap reconstruction surgery is when the transferred flap is at its highest risk for undergoing complications. The most common of these complications is clotting of flap’s venous outflow resulting in congestion and ischemia of the flap. In these situations prompt surgical exploration is the mainstay of management with the chances of flap salvage being directly correlated to the time that had passed since a complication was identified. Because of this FFR patients undergo hourly physical examinations by nursing staff to assess for flap complications during the first 24 hours after surgery. This makes the care of these patients extremely labor intensive and is the reason why most FFR patients are monitored in the ICU immediately after surgery. This ICU placement is a well-described driver of the cost of FFR surgery with ICU beds being up to three times more costly than a regular ward bed on a per night basis. ICU admission has also been proven to increase the chances of infection and have negative effects on a patient’s mental health. It is for these reasons and the low rates of flap complications in published literature that we sought to determine if postoperative flap monitoring in a non-ICU setting had any effect on the rates of flap complications and flap loss.

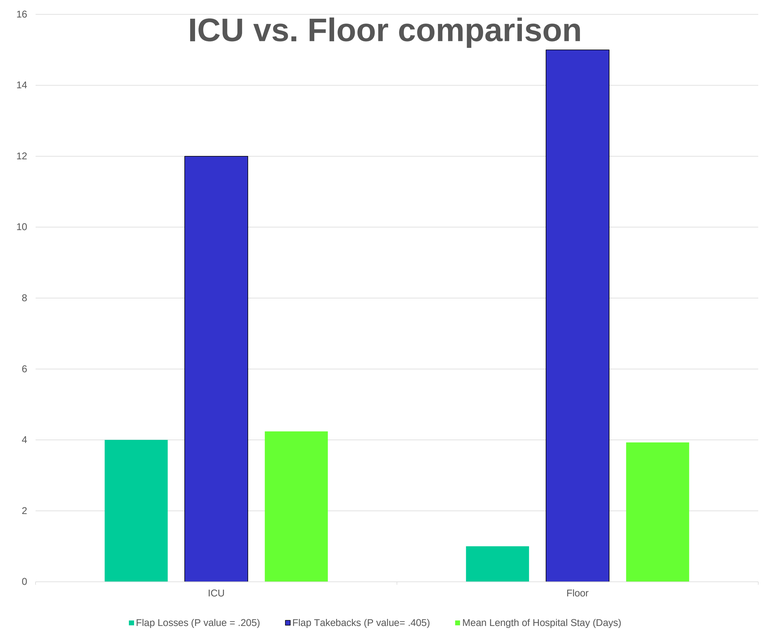
This study is a retrospective review of all free flap breast reconstructions performed by multiple surgeons at a single institution from April 2013 to February 2018. The primary variable assessed was patient postoperative disposition. Group 1 included patients who received flap monitoring in an ICU setting. Group 2 was made up of patients who received their flap monitoring in an inpatient ward setting. The primary outcomes measured included number of takebacks for vascular insufficiency and free flap failure. Secondary outcomes measured included length of hospital stay, and number of 30-day readmissions. Fisher’s exact test and Welch’s t-test were used to analyze differences between the two groups.

Figure 1: The DIEP Flap



Results

DIEP flap breast reconstruction was performed in using 229 total free flaps. Group 1 included 119 flaps followed by flap monitoring in an ICU setting. Group 2 included 110 flaps followed by flap monitoring in a hospital ward setting. There was no significant difference in total flap loss between the two groups, (group 1, 4 flaps [2.6%] vs. 1 flap [1.2%], p = 0.205). There was also no significant difference in takeback rate between the two groups (group 1, 12 flaps [10%]vs 15 flaps [14%] p= .405). There was significant difference in the average length of stay associated with non-ICU flap monitoring (4.24 days vs 3.93 days, p =.02).



Discussion

Our results indicate that ICU disposition is not necessary for high quality postoperative care of DIEP flap patients and may not be necessary for other FFR surgery patients. In FFR patients ICU admission has been shown to increase chances of infection as well increased utilization of mechanical ventilation and sedation when compared to patients managed on wards. The increased risk for these complications in patients placed in the ICU is likely the reasoning for the increased average length of hospital stay that was observed in our DIEP flap patients who were placed in the ICU postoperatively.

Moving forward with this data should involve implementation of similar study designs to other types of FFR surgeries. Non-ICU flap monitoring should first be studied in patients receiving less risky flap procedures such as those involving the upper and lower extremities before graduating to study more risky flaps such as those involving the head and neck. Additional research should address other areas postoperative flap management to reduce the cost and labor-intensive nature of FFR patient management. One example of this could be a study to determine the effect of lengthened flap check intervals on flap complication and failure rate.

Our study did have some limitations. One of which was the lack of a comparison of flap salvage rates between the two groups. Our study was not able to determine this because of the voerally low number of total flap complications in both the experimental and control group. Another shortcoming of this study involves the single center nature of our study population. Our study population is completely derived from a single center tertiary care facility in New Orleans which decreases the external validity of our results.

Conclusions

The results of our study show that non-ICU disposition of DIEP flap breast reconstruction does not increase the risk for flap failure or compromise. They also show that non-ICU setting disposition following FFR decreases factors which contribute heavily to the overall cost of free-flap breast reconstruction such as length of hospital stay. These findings indicate floor management of postoperative DIEP flap patients as a cost-effective alternative to ICU placement. These study methods need to be replicated for other FFR surgeries in the future with the end goal of making FFR a more cost-effective means of reconstructive surgery.

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