

C A S E R E P O R T

Early venous congestion after DIEP flap breast reconstruction: case report of a successful management

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Abstract. *Background and aim:* More than 250 000 women estimated to be diagnosed with breast cancer in the USA every year, even during Covid emergency (1, 2, 3). Mastectomy is primary treatment for more than a third of those with early-stage disease. Most of the patients undergoing mastectomy receive breast reconstruction. A number of surgical techniques have been described to reconstruct the breast. With autologous tissue breast reconstruction, the plastic surgeon uses patient's own tissues, taken from a different part of the body where there is an excess of fat and skin. Deep inferior epigastric perforator (DIEP) flap is the autologous breast reconstruction technique of choice in our department due to long lasting results, low donor site morbidity and positive patient reported outcomes have been described. *Case Report:* We present the case of a 42-year-old woman who underwent neoadjuvant chemotherapy followed by left breast simple mastectomy, axillary lymph-nodes dissection and later adjuvant radiation therapy (RT). After conclusion of RT a DIEP flap breast reconstruction was performed. Nine-hours after the operation, signs of acute venous congestion were noted. The venous congestion was treated by a combined surgical and medical approach based on pedicle discharge and ICU resuscitation protocol. After take back surgery, the patient was tightly monitored in the intensive care unit where intravenous heparin infusion and leech therapy were performed for 3 days. Flap congestion resolved completely, and the patient was discharged. *Conclusions:* Venous congestion is very difficult to treat due to its potential multifactorial nature. The most important step is to recognize this kind of emergency because irreversible microvascular damages will develop in 6–8 hours. Because of multiple causes of venous congestion a timely multidisciplinary approach is mandatory, to maximize flap salvage and success rates. (www.actabiomedica.it)

Key words: DIEP flap complication, venous congestion, flap resuscitation

Introduction

Implant-based reconstructive procedures remain the most common option for breast restoration but in selected patients free flap reconstruction becomes mandatory. Deep inferior epigastric perforator (DIEP) flap can be performed in patients who have been previously irradiated and consequently have a high risk of prosthesis-related complications (4). Long lasting

results, low donor site morbidity and positive patient reported outcomes have been described (5, 6, 7). On the other hand, (8, 9, 10) DIEP flap reconstruction requires high-level microsurgical skills because of potential complications. Fat necrosis and partial flap loss occur in up to 17% of patients (11), and total flap failure in 1%–5% with need for surgical revision and possible aesthetic compromise (12,13). Venous congestion is the most common perfusion-related

complication (14). When venous congestion occurs, prompt management can be advocated. Salvage rates drop from 83.7%, within the first 24 hours, to 38.6% after (15). For this reason, surgeons not only should be able recognize early signs of venous congestion, but they should also be aware of all different causes which requires different flap salvage strategies in order to maximize success rates. In this report, we present the management of a patient who underwent a DIEP flap breast reconstruction complicated by sudden constitutional venous congestion during the first postoperative day. This case underlines the importance of combining different medical and surgical approaches, with the aim to improve the flap survival rates when perfusion is compromised.

Case report

A 42 years-old woman with a history of breast cancer (CDI G2) underwent neoadjuvant chemotherapy followed by left breast simple mastectomy, axillary lymph-nodes dissection and later adjuvant radiation therapy (RT). Nine months after conclusion of RT a DIEP flap breast reconstruction was indicated. (Figure 1)

The patient past medical history revealed three caesarean sections, while her BMI was 24,9.

During pre-operative work out an angio-CT scan of the abdomen was performed and adequate perforators were identified. The surgical operation was carried out without complications: a single-perforator flap was

raised and transferred to the left mammary region preserving rib cartilage. The deep epigastric inferior artery was anastomosed to the internal mammary artery and a single venous anastomosis was performed between one of the venae comitans and the internal mammary vein at the level of the second intercostal space. Finally, the flap was revascularized and inset. Three-hours later, the flap appeared viable: it was warm, pinkish and strong doppler signal was present. Nine-hours after the operation, signs of acute venous congestion were noted, so the patient promptly returned to the operating room where the flap was explored. (Figure 2)

Sutures were removed then the flap was raised, and a blood collection were washed-up. Afterwards, the pedicle was explored showing the artery pulsating and patent while veins appeared congested without evident sign of thrombosis. So, first the accessory vena comitans was unclipped, cannulated, washed with heparinized solution and left unclipped for 45 minutes in order to discharge the flap and to promote regular venous drainage recovery. Then the accessory vein was reclipped. After one-hour of intraoperative monitoring, both anastomosed vessels appeared patent. During surgery our resuscitation protocol included 8 mg steroid IV infusion and 2500 UI heparin infusion. Finally, the flap was inset back with four Penrose drains and stitched up with few simple sutures in order to avoid skin tension. At the end of the procedure the skin appeared mildly pinkish but still compromised in its microcirculation, despite adequate flap outflow being restored. Afterward, the patient was tightly monitored



Figure 1. Post mastectomy and radiotherapy.



Figure 2. DIEP flap with early venous congestion.



Figure 4. 6 months follow-up.



Figure 3. Leech therapy.

in the intensive care unit where intravenous heparin infusion and leech therapy for 3 days. (Figure 3)

During post-operative period it was performed daily IV steroid therapy (dexamethasone 4 mg) and Heparin (25000 UI/50 mL). On post-operative day 3, skin color had improved and only few purple spots were still present, so the patient was transferred to a non-intensive department where she was switched to twice-a-day low-molecular weight heparin injections. On day 5, the flap was secured with additional simple sutures. Flap congestion resolved completely, and the patient was discharged on day 8. No other complication was reported. Figure 4 depicts the patient 6 months after surgery.

Discussion

Venous congestion is very difficult to treat due to its potential multifactorial nature, so a better

understanding of the pathophysiology of this process allow to successfully manage this event. The most important step is to recognize the flap venous insufficiency. Clinically the flap present early capillary refill (< 1.5 seconds), purplish hue, increased consistency due to congestion and brisk dark bleeding during flap scaring (16). This is an emergency because irreversible microvascular lesions will develop in 6–8 hours. In our case of early venous congestion involving the entire flap, the first concerns is about a large vessel thrombosis. When a mechanical cause is suspected, surgical exploration of the pedicle in the operation room is mandatory. For this reason, tight flap monitoring and an emergency operating room available cannot be underestimated. Since the microanastomosis was patent, our intraoperative strategy was focused on flap decongestion through a temporary accessory vein unclipping and washed with heparinized solution. The use of SIEV as an alternative approach to improve venous drainage is often reported in the literature. Some studies (11,16) describe the use of SIEV venocutaneous catheterization with excellent success rates associated, other surgeons instead, prefer performing a second venous anastomosis to supercharge the flap. In our case we could not perform a superdrainage because no SIEV was found. Another mechanical threat to flap survival is postoperative oedema. Partial suture release and semi-seated patient position may be helpful to minimize pedicle compression and optimize vascularization (17). However, if the cause is unclear, as in our case, medical treatments can be crucial. The rational of these therapies consist of venous discharge techniques to reduce congestion until neovascularization can settle. Though leeches therapies have a low level evidence, the only validated medical treatment for managing acute venous congestion of pedicled or free flaps is hirudotherapy (approved by the FDA as medical device in 2004) A limitation of this treatment is the flap volume. In fact, the success rate falls to around 30% for high-volume flaps such as TRAM or DIEP. (18) Leeches bite decrease venous congestion thanks to the multiples active enzymes such as hyaluronidase, collagenase, vasodilating molecule, coagulation inhibitors and inflammatory suppressor present present in their saliva (19). To reduce risk of infection related to the hirudotherapy (commonly caused by *Aeromonas Hydrophilia* (20))

the patient had antibiotic coverage with ciprofloxacin. Hemoglobin was monitored daily because the risk of iatrogenic anaemia. In our opinion the use of the leeches allowed to save the microcirculation and consequently specifically the skin integrity. Some authors demonstrated that ischemia and reperfusion lead to an infiltration of leukocytes in flap. This process can block circulation in microvascular structures. Askar et al. demonstrated that methylprednisolone decreased the number of rolling, sticking, and transmigrating leukocytes, reducing ischemia and reperfusion damage. (21, 22, 23) Furthermore, steroid therapy decreases oedema and venous congestion. (24, 25, 26)

In conclusion, DIEP flap venous congestion is multifactorial. Being able to recognize and treat the aetiology is critical. We present a case of constitutional early venous congestion in a DIEP flap breast reconstruction successfully managed by combined surgical and medical approach.

Total flap salvage could not be achieved by surgery only in this case.

Further studies are necessary in order to draw up guidelines for this condition.

Conflict of Interest: Author declares that none have commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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