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CASE REPORT

Breast reconstruction with a free DIEP (TRAM) flap complicated by cardiac tamponade and arrest: a case report

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KEYWORDS

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Summary Breast reconstruction with free-tissue transfer is now well established and provides excellent aesthetic results. There has been an increasing swing in the literature in the use of internal mammary vessels as the preferred recipient vessels for this procedure. We present a case of a hitherto undocumented life-threatening complication related to the use of these vessels.

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Deep inferior epigastric perforator (DIEP) flap reconstruction following mastectomy has gained popularity in recent years due to a relatively low donor-site morbidity coupled with a flap-survival rate comparable to the more traditional non-muscle-sparing flaps. A recent review of 175 consecutive DIEP flaps showed a complete flap-failure rate of under 1% and a partial failure rate of 6%.¹ Other potentially life-threatening complications include pneumothorax and massive haemothorax, although descriptions of these are scant in the surgical literature. Indeed, a study looking specifically for these complications found none in a series of 25 cases.²

We present a case of intra-operative cardiac arrest secondary to cardiac tamponade which occurred during anastomosis of a DIEP free flap to the left internal mammary vessels. A thorough review of the Medline and Pubmed databases yielded no other reported case.

Case report

A 38-year-old woman with a 3-cm left breast carcinoma was scheduled for left mastectomy with sentinel lymph node biopsy. Immediate breast reconstruction with a DIEP flap was planned.

Previous medical history included a meningioma, smoking, retinitis pigmentosa and osteoarthritis. There was no family history of breast cancer and no known drug allergies. Preoperative clinic review included weight at

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75 kg and FEV1/FVC of 2.85/3.43. She was graded ASA 2 for anaesthetic purposes.

At surgery, the mastectomy proceeded uneventfully, and sentinel lymph node biopsy was negative. Following completion of the mastectomy, a thoracic window was created by excision of the left fourth costal cartilage. The initial window was lateral to the vessels, and after gentle retraction under the sternum with Doyen rib dissectors, the branches of the left internal thoracic artery and vein were identified and dissected free. No difficulties were noted, and bleeding was not more than the usual. Forward flow in the artery was satisfactory. Following this, harvesting of the DIEP flap was undertaken. Microvascular anastomoses were then performed, beginning with the venous system. Immediately following completion of the venous anastomosis, without warning and with no recent drug administration, the blood pressure fell from 105 mmHg systolic to around 40 mmHg, and the pulse rate increased from 80 bpm to 140 bpm. The pulseless electrical activity was confirmed by loss of any reading from the pulse oximeter and a profound drop in end tidal carbon dioxide. Resuscitation was commenced, including external cardiac massage and administration of 2 mg adrenaline (epinephrine) and approximately 2 l IV fluids including 2 units of packed red cells (PRCs).

The partially attached flap was secured by the operating surgeon with one hand, whilst chest compressions were performed with the other hand.

Circulation was restored after 5–6 min, with a pulse rate of 130 bpm and a systolic blood pressure of around 85 mmHg. Over the next hour, she required a further 6 l fluids and noradrenaline at 0.10–0.15 $\mu\text{g kg}^{-1} \text{min}^{-1}$. All non-cardiac causes for the arrest were quickly eliminated; therefore, a transoesophageal echocardiogram was performed. This showed a large pericardial effusion with marked collapse of both right atrium and right ventricle consistent with tamponade (Figures 1 and 2). Intra-operative echocardiography has been well described as an appropriate investigation following arrest where the cause is not obvious³ and was critical in this case, tamponade not being high on the differential diagnosis.

During this time, as the patient remained relatively stable, a decision was made in concurrence with the anaesthetists to complete rather than abandon the surgery. The arterial anastomosis was completed under loupe magnification, and the breast and abdomen were closed simultaneously.

The patient was transferred to the intensive care unit (ICU), where a cardiologist inserted a pigtail catheter via a subxiphoid approach. In addition, 300 ml of blood was aspirated acutely. As there was no further drainage, the pigtail catheter was removed after 3 days, and the patient was discharged to the ward 6 days after the surgery. Flap observations remained normal throughout this period. On day 11, the patient was discharged from hospital. A 1-month follow-up showed an excellent reconstructive result and minimal donor-site morbidity (Figure 3).

Discussion

The internal mammary vessels are becoming increasingly favoured as the recipient vessels for microvascular autologous breast reconstruction.⁴ This case introduces cardiac tamponade as a potentially fatal complication when using the internal mammary vessels as recipients for free-tissue transfer for breast reconstruction. Cardiac tamponade is most commonly described as a condition occurring after cardiac bypass surgery from leaking or aneurysmic coronary vein grafts. Other reported cases related to surgery include ventricular pacing lead implantation⁵, transhiatal resection of the oesophagus⁶, Kirschner wire placement in the sternoclavicular joint⁷ and pulmonary lobectomy⁸.

We postulate that blunt trauma to the pericardium from retraction under the costochondral junction during the dissection of the vessels led to a slow pericardial bleed. A blunt-trauma mechanism is favoured as this would not have resulted in a pericardial tear which would have allowed bleeding to escape out of the pericardial space, thus decompressing itself or into the operative field and alerting the operating team. The time elapse from the end of the internal mammary vessel dissection to the time of



Figure 1 Transgastric short-axis view of the left ventricle and pericardial effusion.



Figure 2 Mid-oesophageal four-chamber view centred on right atrium and right ventricle.



Figure 3 Follow-up photograph from file – 1 month postoperatively.

arrest was approximately 2 h as the DIEP flap was raised in the interim.

Due to the lessons learnt from this case, we no longer place any retractors under the rib or sternum. Should we need to extend the exposure medially, the costal cartilage is excised piecemeal with bone nibblers.

We introduce the potential for tamponade and cardiac arrest as a complication of using the internal mammary vessels for free-tissue transfer in the setting of breast reconstruction. Due to the proximity of the pericardium, retraction under the sternum should be avoided. The onset of symptoms from the time of injury may be delayed as in this case and the use of transoesophageal echocardiogram is invaluable in providing the diagnosis.

Conflicts of interest

Nil.

All authors have contributed to this paper and agree in its readiness for submission. This article has not been submitted elsewhere simultaneously.

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