

ANZASM Case of the Month

March 2024 Edition

(case selected by the ANZASM Committee for your information)

Failure to re-explore post-cardiotomy bleeding

Cardiothoracic Surgery

Case summary

A 55-year-old man underwent an elective coronary artery bypass and aortic valve replacement. The procedure was successful; however, on return to ICU (intensive care unit) he exhibited large drain outputs of 650 ml in the first 45 minutes and 1,400 ml in 3 hours. At that stage, systolic blood pressure was 80–90 mm Hg and the patient was oliguric. The surgical unit reviewed the patient and ordered coagulation factors, blood and volume transfusion. A tentative plan was made to return the patient to theatre after an afternoon case had finished.

Over the next few hours, the drainage amount reduced to 10–110 ml per hour. With the extra fluid the patient's blood pressure improved and he was weaned from inotropic support. Urine output remained low despite furosemide infusion. Central venous pressure (CVP) was severely elevated at 21 mm Hg. A bedside echocardiogram (echo) revealed a thin film of pericardial fluid. The drainage cannister was replaced after the volume reached 2 L and the return to theatre was cancelled considering the decreased drainage.

The patient was extubated the next morning and discharged to the ward on postoperative day 2. In the ward the patient was noted to be hypoxic on room air, had labile blood pressure and was tachycardic. He had nausea and fatigue and was somnolent. On day 4, the drains and pacing wires were removed. Two hours later the patient became acutely unwell and arrested. Emergency opening of the sternum was performed in the ward. Tamponade with an old clot was present in the pericardium, but there was no active bleeding from either pacing wire or surgical sites. Poor haemodynamics persisted for 50 minutes until spontaneous cardiac activity resumed. There was an initial plan to return the patient to ECMO (extracorporeal membrane oxygenation) support but as haemodynamics were adequate on inotropic support he was taken to theatre for washout and chest closure.

Over the next 4 days the patient deteriorated inexorably in cardiac, renal and hepatic function. Severe upper and lower limb ischaemia developed, indicating the need for amputation should the patient survive. There was no return of consciousness, even though an early cerebral CT (computed tomography) scan was unremarkable. A family meeting was arranged and support was withdrawn.

Discussion

This relatively young man in a low-risk category who underwent an elective double bypass and aortic valve replacement, died on the 8th postoperative day as a result of multiorgan ischaemic failure. The treating surgical team failed to heed the early warnings and did not intervene for a readily reversible complication.

Post-cardiotomy excess drainage can occur from residual coagulopathy after bypass. However, volumes of 600 ml in the first hour and 1,400 ml in 3 hours are almost certainly due to a surgical cause such as mammary branch, aortotomy or cannulation site bleeding, which left unchecked can lead to rapid exsanguination after the herald bleed. Even if the bleeding site is arrested by coagulation factors and accumulation of a local clot, the quantity of residual blood in the pericardium is likely to lead to tamponade as the hygroscopic clot attracts more fluid into the pericardium. If tamponade is avoided, the patient remains at increased risk of infection in the medium term and constrictive pericarditis in the longer term.

The need for return to theatre was urgent enough to open an emergency second theatre if the cardiac theatre was occupied by an ongoing case. The reassurance felt by the team from the reduction in output—leading to cancellation of the return to theatre—was ill founded, as this reduction is often the sign of clot blockage to the drains. Bleeding can still be proceeding internally. The clinical features of labile blood pressure, oliguria and severely elevated CVP should raise suspicion of a significant pericardial collection. Reassurance by bedside echo (often performed by non-echo-qualified ICU staff) of no large pericardial collection was poorly founded, as even a transoesophageal echo performed by a skilled echocardiologist can miss postoperative tamponade. The patient remained languishing in the ward with clinical features of tachycardia, labile blood pressure, lethargy and somnolence suggestive of a low cardiac output state.

Clinical lessons

Large drainage (>300 ml/hour) is an indication for rapid return to theatre irrespective of the assumed cause. Large drainage for several hours followed by a major reduction is not cause for reassurance as it often means the drains are blocked by a clot. Negative echocardiography findings, especially bedside transthoracic echo performed by untrained individuals, can never override clinical findings. Patients with a history of large drainage postoperatively who display clinical features of low cardiac output must be treated with a high index of suspicion, and a high-quality echo obtained.

An unfortunate side effect of 'take back' for bleeding being a specialty KPI (key performance indicator) may be the reason for some resistance to returning patients to theatre when indicated. While it is important to ensure that the quality of surgery is sufficient to reduce the need for take back for surgical causes, it must not override the decision to do so when clinically indicated.