We report a case of cardiac tamponade resulting in a death following minimally invasive direct coronary artery bypass. Despite absence of clinical symptoms at the time of hospital discharge, cardiac tamponade physiology may have been evident on close evaluation of Doppler studies of the left internal mammary artery. Performance of a predischarge transthoracic echocardiogram may have been confirmatory and lifesaving.

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**Key words:** cardiac surgery; MIDCAB; pericardial tamponade

**Abbreviations:** LAD = left anterior descending; LIMA = left internal mammary artery; MIDCAB = minimally invasive direct coronary artery bypass

Minimally invasive direct coronary artery bypass (MIDCAB) is a rapidly evolving technique for performing revascularization of the left anterior descending coronary artery (LAD) with the left internal mammary artery (LIMA). As with any new operative modality with a learning curve, complications are inevitable and should be thoroughly addressed, reviewed, and analyzed.

**CASE REPORT**

A 47-year-old man presented with exertional angina despite medical treatment. The patient had a history of a previous anterior wall myocardial infarction. Thallium perfusion study was consistent with ischemia to the anterior and lateral left ventricular myocardium. Angiography showed a chronic proximal occlusion of the LAD, with good collateral flow to a large distal LAD. The remainder of the coronary circulation showed no significant disease. The patient’s medical history was positive for chronic bronchitis and a smoking history of 20 pack-years. The patient was offered the option of MIDCAB for coronary revascularization per an Institutional Review Board-approved protocol.

The patient underwent MIDCAB with a LIMA to the LAD. The procedure was performed through a 4-inch left anterior thoracotomy. The LIMA was dissected to the level of the second intercostal space proximally and sixth intercostal space distally. The pericardium was opened through a small transverse incision and the LAD was isolated. Despite chronic occlusion, the LAD bled vigorously following the arteriotomy. To reduce the amount of flow, Silastic vessel loops were placed above and below the arteriotomy. The LIMA-LAD anastomosis was completed and patency was documented by passage of a coronary dilator proximally and distally, followed by determination of flow volume through the LIMA using an ultrasonic flow probe. Following removal of the Silastic tapes, bleeding occurred from the epicardial sites of their entrance and exit requiring suture closure. The patient was discharged from the hospital on postoperative day 4. Prior to discharge, as per protocol, he underwent Doppler analysis of the LIMA, which documented predominantly diastolic flow. Postoperative chest radiograph showed no cardiomegaly. The patient was recovering well until postoperative day 14 when he became dyspneic, unusually fatigued, and died sitting in a chair while resting. Autopsy revealed a patent and intact LIMA-LAD anastomosis. The pericardial sac contained 400 mL of nonclotted bloody fluid under pressure. The left lung was adhered over the pericardiotomy used for access to the heart during the MIDCAB. Histologic examination of the ventricular myocardium showed no evidence of myocardial infarction.

**DISCUSSION**

MIDCAB is a rapidly growing technique for performing coronary revascularization. We describe a death from cardiac tamponade confirmed at autopsy following MIDCAB and suggest that this could have possibly been recognized prior to hospital discharge.
Transthoracic Doppler analysis of the LIMA following MIDCAB has been reported as a method to document patency of the LIMA-LAD anastomosis. The normal flow velocity pattern in a LIMA anastomosed to the LAD shows an increase in the diastolic component of the flow velocity profile.
consistent with predominantly diastolic filling of the LAD. An analysis of our patient’s LIMA Doppler flow pattern (Fig 1) shows a prominent diastolic flow velocity consistent with a patent LIMA-LAD anastomosis, which was confirmed postmortem. An unusual abrupt near-absence of flow between the systolic and diastolic component of LIMA flow seen only during inspiration is also noteworthy and may be a marker of tamponade. In addition, though not recognized initially, careful postmortem analysis also reveals evidence of significant respiratory variation in LIMA Doppler flow velocity (Fig 2) consistent with pulsus paradoxus and early pericardial tamponade. These findings on LIMA-Doppler examination strongly suggest that early tamponade physiology was present prior to hospital discharge and could probably have been recognized by a simple screening echocardiographic examination.

Until further experience with MIDCAB has been accumulated, we suggest that the limited pericardiotomy utilized in this procedure may predispose to pericardial fluid accumulation. This complication may be detected easily by limited echocardiography and appropriate treatment instituted prior to hospital discharge.

**REFERENCES**
