

The Narrative of an Aberrant Pericardiocentesis Catheter in the Heart: A Case Report on the Surgical Management of an Iatrogenic Left Ventricle Perforation

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Abstract

Pericardiocentesis catheter placement is a procedure for treating pericardial effusion and has a low complication rate. Inadvertent intraventricular perforation of a pericardiocentesis catheter is an uncommon complication of the procedure. Generally, an intraventricular perforation is tolerable, but the failure to achieve hemostasis in the ventricular wall amounts to catastrophic effects, such as continuous bleeding and cardiac tamponade. Here we describe a case in which a pigtail catheter (8F) accidentally penetrated the left ventricle while attempting to drain the pericardial effusion. The patient was brought to the surgical theater, where the cardiac surgeon performed an off-pump left anterolateral thoracotomy and successfully extracted the drain. Pledged sutures (Prolene 3-0) were placed under tension, and the knots were secured, thereby achieving excellent hemostasis of the entry point of perforation. During the postoperative course, neither the Chest X-ray (CXR) nor an echocardiogram demonstrated hemothorax or pericardial tamponade. Five days later, the patient was discharged from our hospital.

Keywords

Iatrogenic, cardiac, perforation, pericardiocentesis, chest drains, catheter-related procedure, surgical management

Case Report

A 67-year-old man was admitted to the medical department due to acute cardiac decompensation. Echocardiography revealed global pericardial effusion, with the widest plane of effusion at 3 cm. Following the findings, the decision for pericardiocentesis by the subcostal approach was undertaken by the general physician. Unfortunately, there was no prior referral made to the cardiologist. The procedure was performed by a junior staff member in training under the supervision of the general physician. An ultrasonographic guided pigtail catheter (8F) was inserted through a subcostal puncture approach between the 7th and 8th ribs in the anterior axillary line. Immediately after insertion, blood was flowing in a pulsatile fashion, and thereupon the catheter was clamped and left in situ. A contrast-enhanced computed tomography scan of the thorax was done and showed an aberrantly positioned catheter traversing below the 7th rib, which was located within the left ventricle (Fig. 1).

Based on considerations involving the hemodynamic status and extent of cardiac perforation, the surgeon embarked upon an off-pump suture-only repair of the perforation without volume substitution via left anterolateral thoracotomy. Transoesophageal echocardiography showed a catheter placed within the left ventricle without other structural damages. A large pericardial window (80x50mm) was created. The puncture site (2x2mm) was identified on the left ventricle wall adjacent to the second diagonal artery. Upon examination, the catheter had penetrated the myocardium, and blood was oozing with each contraction. The drain was extracted (Fig. 2). The puncture site was repaired with Prolene 3-0 pledgetted suture and Hemosealant (Co-Seal), thereby achieving excellent haemostasis at the entry point of perforation.

Postoperatively, neither the CXR nor an echocardiogram demonstrated haemothorax or pericardial tamponade. Five days later, the patient was discharged from the hospital.

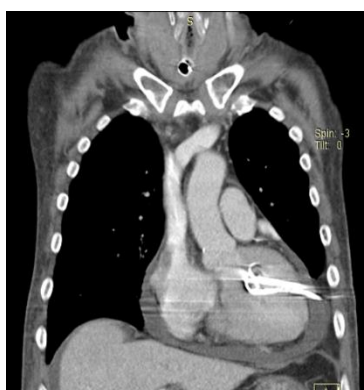


Figure 1: A contrast-enhanced CT scan in coronal view: foreign body penetrating the left ventricle.



Figure 2: Extracted pigtail catheter.

Discussion

This report delineates the available strategies to manage iatrogenic intracardiac perforations acquired by misplaced catheters. Sound knowledge of anatomic landmarks is advocated to avoid untoward complications. The use of image guidance such as computed tomography and echocardiography could serve as better surgical aids². Achieving hemostasis would always be the most fundamental objective in ensuring the success of the surgery. Several other methods used to treat cardiac perforation caused by catheter-related procedures include removal of clots only,^{3,4} suture repair, glue application^{4,5} and combination of suture and glue^{6,7} with or without cardiopulmonary bypass (CPB).

In routine surgical procedures, the chest is opened prior to the evacuation of the blood clots. If no further bleeding from the heart is observed after evacuation of blood clots from the pericardial cavity, the chest

may be closed after a thorough inspection. Thorough inspection of the heart is necessary to ensure the site of perforation is appropriately sealed and if additional suture reinforcements are required. CPB could be instituted in the event of active bleeding and if the approach to the perforation site is challenging.

Primarily, suture repair is used. However, if the perforation site is very friable or near the coronary arteries, sutureless repair may be considered. The patient should be arranged for the operation theatre immediately⁸. Close follow-up is warranted among patients treated with sutureless repair since pseudoaneurysm⁹ possibly occurred later from the previous perforation site.

Conclusion

In patients for whom pericardiocentesis is indicated, ultrasound-guided pericardiocentesis should be considered due to its excellent safety profile and high effectiveness. There are three approaches to performing ultrasound-guided pericardiocentesis: subcostal, left parasternal, and apical. The selection of the most suitable approach should be guided by imaging.

Other approaches are generally considered safer than the subcostal approach, as the latter carries an increased risk of injuring the neurovascular bundle. It is essential that the procedure be performed by credentialed and experienced individuals, in a setting where maximum diagnostic and physiologic information can be obtained, and where alternative surgical therapy is readily available. In the event of inadvertent intracardiac perforations, surgical management is necessary. Closure devices can be utilized for septal defects, if applicable.

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