Minimally invasive Port-Access repair of a left ventricular pseudoaneurysm

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Despite being relatively rare, ventricular pseudoaneurysms might result from a number of different causes and present in numerous locations. Recent advances in minimally invasive cardiac surgery techniques include the use of minithoracotomy exposures and peripheral cannulation, providing closed-chest cardiac arrest (Port-Access; Heartport, Inc, Redwood City, Calif). We report a case in which minimally invasive Port-Access technology was used to perform a repair of a chronic left ventricular pseudoaneurysm caused by previous penetrating trauma.

Clinical Summary

A 41-year-old man was referred to our institution for elective repair of a suspected left ventricular pseudoaneurysm. He had undergone an emergency left anterior thoracotomy at another hospital 23 years earlier after a stab wound to the chest. At that time, a 1-cm laceration in the anterolateral left ventricle was repaired with interrupted 2-0 silk sutures. His immediate postoperative course and 3-month follow-up were unremarkable.

More than 2 decades later, the patient was found to have a 5-cm round opacity at the left heart border on routine chest radiography. On physical examination, an apical grade 3/6 systolic murmur was heard. His vital signs and electrocardiographic results were within normal limits.

The patient underwent cardiac magnetic resonance imaging to further define these abnormal findings, which demonstrated a 7 × 5–cm left ventricular pseudoaneurysm with a narrow neck and mild expansion during systole. Computed tomography suggested a calcified ventricular wall aneurysm with minimal left pleural thickening (Figure 1). Both transthoracic echocardiography and angiography revealed preserved ventricular function and a left ventricular pseudoaneurysm, with systolic filling through a narrow neck.

Given the potential risk of pseudoaneurysm rupture over time and the patient's wishes for a cosmetically appealing incision without a sternotomy, a minimally invasive resection of the left ventricular pseudoaneurysm on cardiopulmonary bypass (CPB) was planned. With the patient supine, a 6-cm left anterior thoracotomy was made through the previous incision scar at the fourth intercostal space. On administration of heparin, the femoral vessels were cannulated with a 21F Heartport arterial cannula and a 24F Heartport venous cannula. CPB was initiated, and the patient was cooled to 32°C. The Heartport EndoClamp catheter was positioned in the ascending aorta with transesophageal echocardiographic guidance. The heart was briefly fibrillated, and the balloon was then inflated to occlude the aorta. At this point, cardioplegic solution was then administered through the proximal port of the EndoClamp catheter in the usual fashion. The pseudoaneurysm was in close proximity to a diagonal branch of the left anterior descending coronary artery but was carefully dissected free from surrounding tissue. Once isolated, the blood-filled aneurysm was opened to reveal a small thrombus and an approximately 2-cm orifice communicating with the left ventricular cavity. The aneurysm was resected, and the orifice was closed with a series of 2-0 Ethibond mattress sutures (Ethicon, Inc, Somerville, NJ). Several minor lung leaks, resulting from our dissection of the pseudoaneurysm, were repaired with running polypropylene sutures. After the patient was weaned off CPB and decannulated, the minithoracotomy was closed. The patient was discharged home on postoperative day 5 after an uncomplicated hospital stay. The patient made a complete recovery, with no evidence of pseudoaneurysm recurrence at 3 years' follow-up (Figure 2).

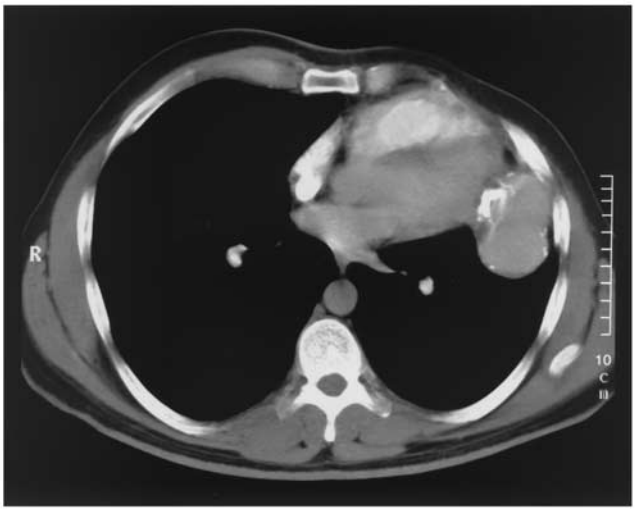

Figure 1. Preoperative computed tomographic scan of the chest showing a pseudoaneurysm at the anterolateral portion of the left ventricle. Note the calcification in the pseudoaneurysm causing increased attenuation.

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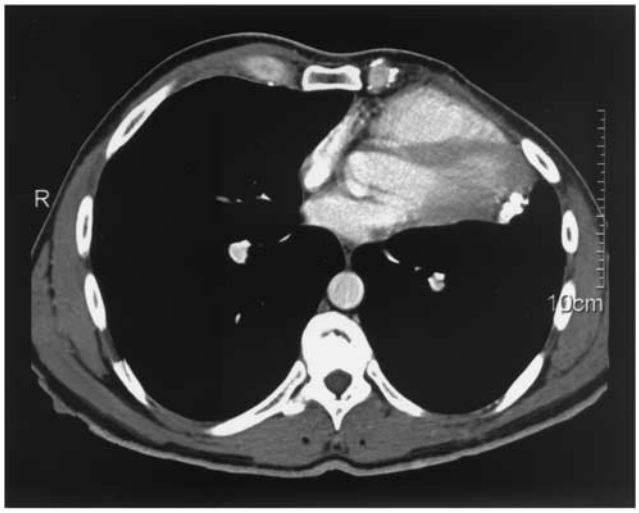

Figure 2. Three-year follow-up computed tomographic scan of the chest showing no left ventricular pseudoaneurysm recurrence.

Comment

Although rare, ventricular pseudoaneurysms can develop after blunt or penetrating chest trauma and might be asymptomatic and incidentally diagnosed.[1] Once suspected, various imaging studies, including 2-dimensional echocardiography, computed tomography, and ventricular angiography, might help determine the pseudoaneurysm's specific characteristics.[2] In this case all imaging studies suggested an approximately 5-cm chronic pseudoaneurysm in the anterolateral left ventricle. Despite a potential risk of rupture, some reports suggest that chronic ventricular pseudoaneurysms might remain stable over time with nonoperative management.[3,4] Although this patient was asymptomatic, elective repair of the pseudoaneurysm was indicated because of its large size and the otherwise good health of the patient.

A repeat left anterior thoracotomy approach was used to access the pseudoaneurysm because it coincided with the old incision scar and the anterolateral location of the pseudoaneurysm. Magnetic resonance imaging and computed tomographic imaging provided accurate information regarding the best intercostal space to access the pseudoaneurysm. Port-Access instruments were used for CPB cannulation and endoaortic occlusion to minimize incision size and mediastinal dissection. Therefore initiation of CPB was safely possible in this redo operation without isolation of the aorta for crossclamping and before dissection of the pseudoaneurysm off of the surrounding structures. Port-Access techniques allowed a less invasive and more efficient repair of this large left ventricular pseudoaneurysm by limiting mediastinal dissection before CPB.

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