Intrapericardial colonic herniation

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Subxiphoid pericardial window is a well-established technique to drain and prevent the recurrence of pericardial effusion. We report an uncommon complication of intrapericardial herniation of colon through a subxiphoid pericardial window.

Clinical Summary
A 77-year-old woman with dyspnea was diagnosed with massive pericardial effusion. A subxiphoid pericardial window drained 600 mL of mildly blood-stained pericardial fluid. A pericardial window into the peritoneal cavity was performed by excising a 3-cm piece of intervening diaphragm. The initial postoperative course was uneventful. Pathologic examination showed an exudative fluid without evidence of infection or malignancy.

One month postoperatively, she complained of abdominal cramps. There was no nausea or vomiting, and she was still passing flatus and having bowel movements. However, a chest X-ray and chest computed tomography (CT) (Figure 1) showed that a significant portion of the transverse colon had herniated into the anterior pericardial cavity up to the level of the aortic arch.

Emergency laparatomy by extending the previous vertical subxiphoid incision revealed that the original 3-cm pericardial window had enlarged to $5 \times 7 \text{ cm}^2$ in size (Figure 2, A) and a 40-cm segment of the transverse colon (Figure 2, B) had herniated into the pericardial cavity. Adhesion between the colon and the edge of pericardial window was easily separated and the completely viable colon was easily reduced. The diaphragmatic defect was repaired with a 2-mm-thick Gore-Tex (W. L. Gore & Associates, Inc, Flagstaff, Ariz) patch with interrupted mattress 0 silk and running 0 prolene. She had an uneventful recovery.

Discussion
Only 4 cases of iatrogenic intrapericardial herniation following subxiphoid pericardial window for drainage of pericardial effusion have previously been reported.1-4 The organs involved included either individual or a combination5 of stomach,4 small bowel,3 and colon. Secondary complications in the form of bowel infarction6 and cardiac tamponade4 were reported. The key to diagnosis is high index of suspicion coupled with the appropriate investigations like chest X-ray, CT scan, or contrast gastrointestinal study. Prompt surgical reduction is mandatory to prevent secondary complications.

It should be noted that the subsequent size of the pericardial window is larger than the size of the disc of diaphragm removed. In our patient, the original 3-cm defect enlarged to $5 \times 7 \text{ cm}$. Ames and colleagues reported that a 5-cm pericardial window enlarged to $6 \times 8 \text{ cm}$. Murari and associates found a $12 \times 10 \text{ cm}$ defect on reexploration.4 This most likely is due to the fact that the diaphragm is a piece of muscle and muscular contraction causes the defect to enlarge after its creation. As a result, a small (less than 3 cm) pericardial window should be made to reduce the risk of this complication.

Creation of any defect in the diaphragm in contact with the pericardial cavity can potentially lead to intrapericardial herniation. Intrapericardial herniation of the jejunum with subsequent jejunal necrosis and cardiac tamponade had occurred after a diagnostic pericardial window in a trauma patient.5 Gastric herniation has been reported through a diaphragmatic defect created to allow the gastroepiploic artery to transverse in coronary artery bypass surgery. Other causes of intrapericardial herniation include traumatic rupture of diaphragm and congenital defect.

References
Figure 1. Chest CT. A, Lateral scout view showing bowel gas in front of the heart. B, Colon in the anterior pericardial cavity.

Figure 2. Operative photos. A, Pericardial window through which the right ventricle is easily seen. B, The completely viable reduced transverse colon.