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Robot-assisted endoscopic excision of left atrial myxomas

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Recent advances in robotic instrumentation have facilitated endoscopic intracardiac procedures.^{1,2} We report our initial experience with endoscopic left atrial myxoma excision with the da Vinci Surgical System (Intuitive Surgical, Inc, Sunnyvale, Calif).

Clinical Summary

The clinical characteristics of 3 patients with left atrial masses operated on between September 2003 and May 2004 are presented in Table 1. No patient had preoperative embolic phenomena.

Surgical Technique

Under general anesthesia with left lung ventilation, the da Vinci endoscope was inserted through a 12-mm port in the fourth intercostal space 2 cm lateral to the midclavicular line. A 20-mm service port was created lateral to the endoscope in the same interspace. The 2 robotic instrument arms were inserted 1 interspace above and below the endoscope (Figure 1). No rib-spreading retractors were used.

The patients were then heparinized and cannulated as previously described for Port Access (Cardioventions, New Brunswick, NJ).³ The da Vinci endoscope and instrument arms were then inserted in their respective ports. Insufflation of CO₂ into the right pleural space was used to create working space. Pericardium was excised for possible atrial septal reconstruction. The venae cavae were encircled with linen tapes, and total cardiopulmonary bypass,

TABLE 1. Patient characteristics

Patient no.	Age	Sex	Clinical presentation	Tumor size (cm)	Attachment site
1	41	Male	Near syncope	3.5 × 5.0	Interatrial septum
2	47	Female	Arthralgias	2.5 × 1.5	Posterocaudal wall
3	53	Male	Near syncope	3.8 × 5.6	Interatrial septum

intraluminal balloon aortic occlusion, and antegrade cardioplegia were achieved. In the 2 patients with atrial tumors attached to the interatrial septum, exploration was through an oblique right atriotomy for wide exposure of the atrial septum. In both cases, the point of attachment of the tumor could be identified by the presence of abnormal vascularity at the superior pole of the fossa ovalis. Incision was made in the septum medial to the fossa ovalis, and when the left atrium was entered, the incision was extended 360° around the tumor attachment; 5- to 10-mm margins of normal septal tissue were maintained, with almost no direct instrument contact with the tumor. In the patient with tumor attachment to the posterior left atrial wall, exploration was through a left atriotomy anterior to the pulmonary veins. This tumor was attached to the posterior caudal wall overlying the coronary sinus. Excision was achieved by dissecting a plane through the atrial muscle at the point of attachment. All tumors were grasped by the tissue margins and deposited into an Endopouch Retriever (Ethicon Endo-Surgery, Cincinnati, Ohio) and extracted through the service port. Atrial septal defects created in 2 patients were repaired with autologous pericardial patches. Deairing was ensured with a vent across the mitral valve.

Results

All intrathoracic components of the operations were completed endoscopically by using robotic instrumentation. Mean cardiopulmonary bypass time was 103 ± 40 minutes, and mean aortic occlusion time was 64 ± 2 minutes. Postoperative transesophageal echocardiography demonstrated removal of all tumors and intact

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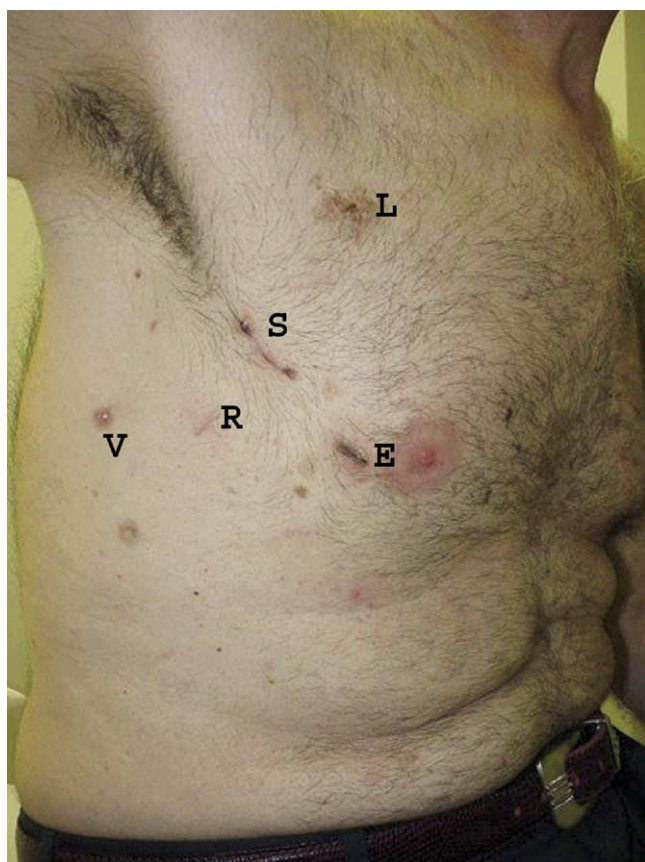


Figure 1. Patient 3, 5 weeks after endoscopic excision of left atrial myxoma, demonstrating port placement. *E*, Endoscope; *S*, service port; *L*, left arm; *R*, right arm; *V*, left atrial vent.

atrial septae. There were no postoperative complications. Patients were discharged on postoperative day 4, and all resumed normal activity 3 weeks after surgery. Pathology revealed polypoid myxomas in all 3 patients.

Comment

An endoscopic approach to atrial myxoma resection affords the patient the advantages previously described for endoscopic mitral

valve and atrial septal surgery, including rapid recovery and excellent cosmesis.^{2,3} An endoscopic approach to atrial myxomas is appropriate, however, only if the surgical tenets of myxoma excision can be achieved.⁴ These include exposure of the attachment point of the tumor, allowing excision of adequate tissue margins; removal of the tumor without fragmentation; reconstruction of atrial wall defects; and the ability to inspect the cardiac chambers for other tumors. We found that the endoscopic exposure of the atria was excellent, and the identification of the tumor attachment point was superior to that which we have achieved in patients previously approached through median sternotomy. This exposure allowed excision with satisfactory margins with a nearly no-touch technique not possible with a conventional biatrial approach. None of the patients manifested tumor embolization, but all had polypoid myxomas, which are less friable than the villous type. The use of the Endopouch bag allowed extraction of the tumors through the substantially smaller service port without fragmentation in the pleural space. Repair of the atrial wall excision defect was accomplished by using the principles learned from endoscopic atrial septal defect repair.² Chamber inspection was thoroughly accomplished with the da Vinci endoscope, although the sensitivity of transesophageal echocardiography may reduce the importance of this exercise.

Despite an earlier report of successful endoscopic myxoma excision with handheld thorascopic instruments,⁴ most surgeons continue to use a median sternotomy approach. This initial experience involving 3 patients suggests that endoscopic excision of atrial myxomas with the da Vinci robotic system is feasible and deserves further clinical evaluation.

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