The final pathologic description of the right lung nodule was pulmonary meningotheliallike tumor. The clinicopathologic characteristic of this benign tumor remain unclear, but it is usually very tiny (1-3 mm) and discovered incidentally after lung resection for other lesions. Presentation as a solitary nodule 5 mm in size, as in our patient, is not common.

In conclusion, the successful treatment in this patient suggests that nonintubated thoracoscopic operation may be feasible and safe in the treatment of selected patients with bilateral small peripheral pulmonary lesions and good preoperative cardiopulmonary function.

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Acute ascending aortic dissection during transaortic balloon-expandable aortic valve implantation

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Transcatheter aortic valve replacement (TAVR) has shown good early and midterm results in high-risk or inoperable patients with severe symptomatic aortic valve stenosis.¹ TAVR is generally accomplished with either antegrade transapical or retrograde transfemoral access. If these approaches are not technically possible, transaortic TAVR (Tao-TAVR) is feasible and effective. Tao-TAVR can be performed through either a ministernotomy or a minithoracotomy.^{2,3} The advantages of Tao-TAVR are mainly related to (1) the short distance between the delivery system and the aortic annulus that enables a precise valve deployment and (2) the possibility to schedule for TAVR patients who have contraindications for the transapical and/or transfemoral approach. Nowadays there is a wide experience with both transapical and transfemoral TAVR, and consequently their related complications are known, predictable, and manageable.⁴ On the other hand, Tao-TAVR is a relatively new technique that is performed without specifically designed devices, and its possible complications are still not widely known and described. We describe a case of acute ascending aortic dissection during Tao-TAVR that required emergency conversion to open surgery.

CLINICAL SUMMARY

A 79-year-old woman with severe symptomatic aortic valve stenosis was admitted to our department for surgical treatment. She had a history of pulmonary edema and was in New York Heart Association functional class III. Associated comorbidities were rheumatoid arthritis, osteoporosis, and a history of spontaneous cerebral hemorrhage. The aortic valve area was 0.4 cm²/m², and the mean and peak transaortic gradients were 23 mm Hg and 38 mm Hg, respectively. Preoperative echocardiography showed a severe diffuse left ventricular hypokinesia. The left ventricular ejection fraction was 26% and the end-diastolic volume index was 165 mL/m². Dobutamine stress echocardiography showed an improvement in left ventricular ejection fraction that reached 35% as well as an increase of peak gradient that reached 65 mm Hg. Coronary artery angiography showed diffuse coronary artery disease with a 60% stenosis of the circumflex coronary artery and an 85% stenosis of a small posterolateral branch of the right coronary artery. Both vessels were judged as not amenable for either surgical or percutaneous revascularization. The nature of left ventricular dysfunction was related to the diffuse coronary artery disease and to the longstanding aortic valve disease. Logistic EuroSCOREs I and II were 20% and 12%, respectively. The Society of Thoracic Surgeons risk of mortality was 18%.

Owing to the high surgical risk, the patient was scheduled for TAVR with the Sapien XT bioprosthesis (Edwards Lifesciences, Irvine, Calif). The aortic valve annulus, measured with transesophageal echocardiography and with cardiac computed tomographic scan, was 24 mm and consequently a 26-mm prosthesis was chosen. The diameter of the

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FIGURE 1. Intraoperative echocardiogram showing the intimal flap in the ascending aorta that appeared soon after sheath removal and purse-string tightening.

ascending aorta, which appeared free from severe calcifications, was 35 mm. Preoperative peripheral angiography and computed tomographic scan showed severe tortuosity, calcification, and stenosis of the iliofemoral axis (minimum diameter, 0.5 cm at the origin of both common femoral arteries) as well as small and tortuous subclavian/axillary arteries. Thus, transfemoral and transsubclavian approaches were contraindicated. Absolute contraindications for transapical TAVR are represented by the presence of apical aneurysms with or without mural thrombi or a previous Dor procedure. However, severe left ventricular dysfunction is a relative contraindication for the transapical approach because this can significantly worsen heart contractility. In fact, it has been demonstrated that a new hypokinesia or akinesia after the transapical procedure is visible in up to 37% of patients 1 year after the operation.⁵ Thus, our TAVR team considered that Tao-TAVR was the best option for this patient.

The procedure was performed through an anterior mini-thoracotomy in the second right intercostal space, according to our previously described technique.² After opening of the pericardium, the ascending aorta was adequately exposed and 2 concentric purse-string sutures were made with a 3-0 braided stitch and Teflon pledget reinforcement. A 24F Ascendra 2 sheath (Edwards Lifesciences) was inserted in the ascending aorta without difficulties. A 26-mm Sapien XT bioprosthesis was deployed in the correct position and hemodynamic recovery after valve positioning was excellent. The Ascendra 2 sheath was removed under rapid ventricular pacing (mean systemic arterial pressure < 50 mm Hg during rapid pacing) and aortic purse-string sutures were tightened. Severe bleeding from the sheath insertion site was suddenly observed, and intraoperative transesophageal echocardiography showed acute Stanford type A aortic

FIGURE 2. Intraoperative view. A, The intimal tear causing the acute aortic dissection is on the anterior portion of the ascending aorta at the site of the sheath insertion. B, The Sapien XT bioprosthesis appears correctly positioned and the dissection does not involve the aortic root.

dissection (Figure 1). Emergency conversion to open surgery was performed.

Cardiopulmonary bypass was instituted with cannulation of the right distal common femoral artery under direct vision with the Seldinger technique using a 18F Fem-Flex II cannula (Edwards Lifesciences) and, after median sternotomy, with cannulation of the right atrium. The site of femoral artery cannulation was carefully inspected and appeared free from calcifications; the cannula was inserted smoothly and without difficulties. The aortic crossclamp was positioned proximal to the origin of the brachiocephalic artery. After cardioplegic arrest, the ascending aorta was opened and an intimal tear was found at the sheath insertion site (Figure 2, A). At surgical inspection, the dissection was found to involve the ascending aorta from the sinotubular junction until 2 cm below the aortic clamp. The aortic root was free from dissection and the Sapien XT bioprosthesis appeared well positioned with no visible paravalvular leaks (Figure 2, B). Therefore, the Sapien XT valve was

left in place, and isolated replacement of the ascending aorta was performed under moderate hypothermia with a 28-mm vascular prosthesis (Maquet Cardiovascular, Wayne, NJ) without the need for open distal anastomosis, circulatory arrest, and hemiarch replacement. Aortic cross-clamp and cardiopulmonary bypass times were 115 and 152 minutes, respectively. Soon after surgery, the patient had a good hemodynamic and neurologic recovery that allowed the transfer from the intensive care unit to the ward. The following hospital stay was complicated by respiratory insufficiency caused by *Candida albicans*-mediated pneumonia and by subsequent septic shock that caused the patient's death on the 32nd postoperative day.

COMMENT

Tao-TAVR with the Sapien XT bioprosthesis represents an alternative to more conventional transfemoral and transapical access if these are not feasible for severe peripheral artery disease and severe left ventricular dysfunction or aneurysm. Tao-TAVR is contraindicated in patients with severe calcifications of the ascending aorta or porcelain aorta and should be carefully evaluated in patients with previous heart operations owing to the risks of mediastinal re-entry and injury to proximal graft anastomosis. Tao-TAVR can be performed using either ministernotomy or minithoracotomy. The first has the advantage of good visualization of the ascending aorta and of the aortic root. The latter does not require sternotomy and thus should be considered less invasive. However, in case of complications,

ministernotomy allows a more rapid conversion to conventional surgery. There are no differences with regard to the sheath/aorta angle between ministernotomy and minithoracotomy. As for every TAVR approach, even Tao-TAVR has its specific access-related complications. Intraoperative acute dissection of the ascending aorta is a severe complication of Tao-TAVR. Its occurrence should be taken into careful consideration when performing Tao-TAVR, and a timely diagnosis and management by the TAVR team with emergency conversion to open surgery are mandatory to reduce its potentially dramatic effects. Aortic dissection during Tao-TAVR can derive from fragile and/or calcific aortic wall, problems during sheath insertion, and acute angle between the sheath and aorta for device delivery. The development of delivery systems specifically designed for the transaortic approach could reduce the risk of dissection.

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