LV function, rather than to technical difficulties during repair.^{2,3} We believe that achieving a tension-free connection of the left atrium to the LV is crucial for successful repair. Such tension-free connection is best achieved by application of a bovine pericardial patch sutured to the mitral annulus. The patch can be placed either via the posterior LV incision, as previously described by one of us,⁴ or via the mitral valve orifice.⁵ Endocavitary placement of the pericardial patch seals the entry point into the pseudoaneurysm, stabilizes the AV connection, and relieves the tension from the posterior LV wall, preventing postoperative bleeding owing to LV wall rupture. Furthermore, preservation of the chordal apparatus is crucial for LV function. Preservation of all chords combined with papillary muscle resuspension with the PTFE chords and myocardial revascularization resulted in significant improvement of LV function in our patient.

Acute postinfarction AV dehiscence is a challenging problem. Prompt surgical management, however, can achieve a successful outcome.

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Video-assisted thoracoscopic bullectomy for an infectious giant bulla with the concomitant use of the perioperative intracavity fluid suction

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Bullectomy by video-assisted thoracoscopic surgery (VATS) is an effective treatment for giant bullae.¹ However, once an infection comorbidly develops in a bulla, a bullectomy is not easy to perform. We completed a VATS bullectomy with excellent vision by perioperatively inserting a balloon catheter into the bullae and aspirating the fluid contents therein.

CLINICAL SUMMARY

A 69-year-old man who had received follow-up for bilateral giant bullae had a temperature of 39.0°C to 40.0°C, and a small amount of fluid was detected in the giant bulla on the right (Figure 1, A). He was admitted to our hospital because of infectious giant bulla on the right side.

An antibacterial agent was administered, but an increase in the content fluid of the right giant bulla was detected in a chest x-ray film (Figure 1, B). Furthermore, inasmuch as the temperature of 38.0°C to 39.0°C continued, it was determined that medical treatment was not effective. We performed VATS.

The operation was performed in the lateral decubitus position with the patient under general anesthesia. We used a double-lumen endobronchial tube with protection of the contralateral lung from infectious fluid. First, a trocar (Thoracoport, Norwalk, Conn) was inserted at the midaxillary line in the sixth intercostal space. Observations with a thoracoscope showed the anterior side of the thoracic cavity to be occupied by a thickened white bulla wall, a large portion of which had adhered to the chest wall. The adhesion was dissected from the chest wall to the fourth rib, and a trocar was inserted at the midaxillary line in the fourth intercostal space. About 5 mm of the bulla wall was resected using a radio knife inserted through the trocar. A 12F balloon catheter (Biocath Foley Catheter; C. R. Bard Inc, Murray Hill, NJ) was immediately inserted into the bulla through this orifice, and the balloon was inflated to aspirate the content fluid of the bulla. After 750 mL of fluid was aspirated, the bulla shrank significantly, providing better vision. The bulla was easily dissected from the chest wall without the fluid

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FIGURE 1. A, Chest x-ray film at the time of hospitalization. B, Chest x-ray film before surgery.

contents flowing into the thoracic cavity. Thereafter, the catheter was not removed, and the bulla was resected with an endoscopic stapler while the bulla was raised (Figure 2). The operation lasted 3 hours 14 minutes, and the amount of perioperative bleeding was 100 mL. The postoperative course was excellent, with a decrease in fever, and the patient was discharged on day 11 after the operation.

DISCUSSION

For an infectious giant bulla, the administration of an antibiotic often becomes the initial choice of treatment. The reasons are that postoperative thoracic empyema or postoperative pneumonia may occur with surgery, and treatment with an antibiotic can reduce a bulla size.² It is also believed that the bulla size decreases because it is not connected to the bronchus.³

On the basis of this theory, Nomori and associates⁴ reported that an excellent result can be obtained by simply

opening an infectious giant bulla without resection by VATS. However, there is also a report in which an infectious giant bulla that was not connected to the bronchus has been observed to reconnect during the follow-up.² Therefore, the risk of a future occurrence of pneumothorax or thoracic empyema cannot be ruled out with an opening of an infectious bulla. We therefore believe a bullectomy is desirable as a surgical remedy for infectious bullae.

Reports in which preoperative percutaneous intracavity suction was performed on giant bullae with no infection, followed by bullectomy on another day, are occasionally seen.⁵ However, there are few reported cases in which intracavity suction therapy is performed for infectious giant bullae. We speculate that the reason thereof is the avoidance of empyema or pneumothorax after preoperative catheter insertion in a case without adhesion to the chest wall.⁴ In the present case, the perioperative finding showed adhesion of the bulla wall to the chest wall. This concurs with the report by Nomori and associates,⁴ stating that infectious giant bullae adhere to the chest wall. Therefore, the insertion of a catheter immediately after minimal dissection from the chest wall of adhesion prevents intracavity fluid from flowing into the thoracic cavity. Moreover, the insertion of a balloon catheter enables raising of the bulla after suction to ensure excellent vision, which facilitates resection.

It is believed that a VATS bullectomy, less invasive than thoracotomy, using a balloon catheter can thus be an effective surgical procedure for cystic lesions in the thoracic cavity as well as for infectious giant bullae. However, in a complicated case such as chronic inflammation or malignancy, VATS should be converted to thoracotomy.

FIGURE 2. The bulla was resected with a balloon catheter inserted into the bulla while the bulla was raised.

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Incomplete transmural ablation caused by bipolar radiofrequency ablation devices

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Since the recent development of radiofrequency ablation devices, surgical ablation of atrial fibrillation has become more common.¹⁻⁴ We have recently adopted the Atricure bipolar radiofrequency clamp (Atricure, Inc, Cincinnati, Ohio) for surgical ablation. According to some reports, a bipolar radiofrequency system ensures transmural ablation compared with the unipolar system.^{1,2} However, even when using a bipolar device an incomplete ablation can occur as a result of the thickness of the atrium wall or folding on itself²⁻⁴ and thus can trigger a recurrence of atrial fibrillation. Because the pathologic sections of ablation lesions were occasionally obtained from an autopsy patient, we report a case of an incomplete ablation of the left atrium.

CLINICAL SUMMARY

An 81-year-old man with aortic regurgitation and atrial fibrillation electively underwent aortic valve replacement and the left atrial maze procedure by using the Atricure clamp through a median sternotomy. The ablation was performed circumferentially on the orifice of the right and left pulmonary veins and the neck of the left atrial appendage by using the Atricure bipolar radiofrequency clamp during cardiac arrest. Each ablation was done twice to ensure transmural ablation. The generator of the radiofrequency device showed low and stabilized tissue conductance each time. After completing the ablation, the left atrial appendage was ligated. Cryoablation was also applied on the right atrium between the coronary sinus and isthmus of the inferior vena cava, and the aortic valve was then replaced with the 23-mm Med-

tronic Mosaic bioprosthesis (Medtronic, Inc, Minneapolis, Minn). The atrial fibrillation was converted into normal sinus rhythm after resuming the heartbeat. Early after surgical intervention, the patient once had a paroxysmal atrial fibrillation that was easily converted into normal sinus rhythm with medication. Except for this episode, the postoperative course had been uneventful until the third postoperative day. However, the patient had a mesenteric ischemia abruptly and died on the fifth postoperative day. A pathologic autopsy revealed massive intestinal necrosis. Because cardiogenic thromboembolisms were suspected, lesions of the radiofrequency ablation were also dissected to rule out the left atrial thrombus related to surgical ablation. The lesions were easily detected because of discoloration of the intima. On microscopic examination, the lesion of the neck of the atrial appendage showed transmural scar tissue, suggesting that the transmural ablation was complete (Figure 1). However, another section of the posterior wall of the left atrium showed an incomplete transmural ablation. Microscopic findings showed that the intima was thickened, probably by the ablation, but the normal myocardium of the left atrium partially remained among necrotic tissue on the thick atrial wall (Figure 2). No thrombus was found in the heart. The mesenteric arteries also revealed no thromboembolism. The pathologic diagnosis was nonobstructive mesenteric ischemia.

DISCUSSION

The clinical effectiveness of bipolar ablation devices has been reported.¹⁻⁴ Bipolar devices have 2 jaws equipped with electrodes. By clamping the atrial tissue between the jaws, radiofrequency energy is delivered effectively to the tissue, and more precise transmural ablation is obtained than with unipolar types of devices. Because the conductance of the tissue clamped between the jaws of the device relates to the transmural ablation, the bipolar devices measure the tissue conductance between the jaws. A low and stabilized conductance is used as an indicator of transmural ablation.¹

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