

## A Tracheostomy Case of Aortic Valve Regurgitation Successfully Treated by a Lower Mini-sternotomy Technique

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**The performance of cardiac surgical procedures via median sternotomy in a patient with a tracheostomy can result in difficult problems, such as mediastinitis, stoma necrosis or inadequate operative exposure. We present a case of successful treatment for aortic valve regurgitation in a patient with a tracheostomy using a T-shaped sternotomy instead of a usual median sternotomy. This approach permitted adequate surgical exposure for cardiopulmonary bypass and aortic valve replacement. After surgery, the patient had a good clinical course without any complications and he was discharged on the 65th postoperative day. We consider this procedure to be applicable in consideration of the favorable results obtained. (Ann Thorac Cardiovasc Surg 2004; 10: 379–81)**

**Key words:** cardiac surgery, tracheostomy, mini-sternotomy

### Introduction

A tracheostomy carries a high risk of sternal infection and lethal mediastinitis in cardiac surgery with a usual median full-sternotomy because of possible communication between the tracheostomy and the operative field. We performed aortic valve replacement (AVR) using a mini-sternotomy with upper full-transverse division (T-shaped sternotomy) for aortic valve regurgitation in a patient with infective endocarditis with bacterial meningitis. This procedure was able to provide traditional exposure with which the cardiac surgeon is familiar and allow the surgeon to directly visualize the field of operation. There was no infection in the mediastinum and the postoperative course was uneventful.

### Case Report

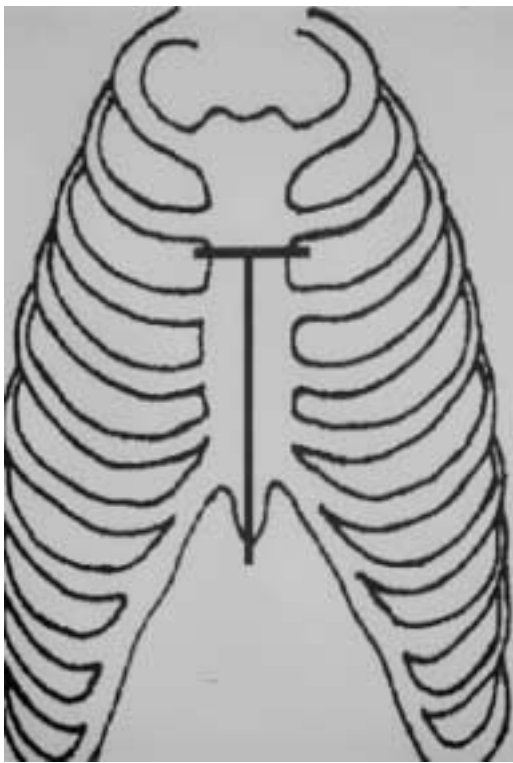
A 62-year-old man complaining of fever and disturbance

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of consciousness was admitted to our hospital and diagnosed as bacterial meningitis on December 13, 2002. After hospitalization, he developed pneumonia and sepsis, and received artificial ventilation with endotracheal intubation because of respiratory insufficiency and poor oxygenation. At this time, antibiotics were already being used and spinal fluid culture and blood culture became negative. However, streptococcus pneumoniae was noted in septum and respiratory failure did not improve although effective antibiotics were administered. On December 28 a tracheostomy was performed. Following that, large pulse-pressure and a heart murmur were indicated. Echocardiography showed aortic valve regurgitation due to a cusp perforation with infective endocarditis. Heart failure worsened and urgent surgery was performed on January 9, 2003.

Under general anesthesia, a skin incision was made at the midline of the chest from sternal angle to processus xiphoideus. We selected a T-shaped sternotomy (Fig. 1): The sternum was divided from the bottom, including the processus xiphoideus up the midline and ending at the second intercostal space, and then divided full-transversely at the second intercostal space. The cardiopulmonary bypass was established with a return cannula into the ascending aorta and withdrawal cannulae from the right



**Fig. 1.** Schema of T-shaped sternotomy. A lower midline skin incision was made distant from the tracheostomy. The sternum was divided vertically in the midline from the processus xiphoideus to the second intercostal space and full-transversely at that point.



**Fig. 2.** Exposure of the aortic valve. With standard aortic and bicaval cannulation techniques, AVR was performed in a usual manner.

atrium appendage and right atrium free wall to the superior vena cava and inferior vena cava. The heart was cooled by core cooling to 34°C. The aorta was clamped and the ascending aorta was opened. Blood cardioplegia was infused direct to the coronary ostia and heart arrest was obtained. Next we inserted a retrograde cardioplegic catheter into the coronary vein by opening the right atrium. Retrograde cardioplegia was infused every 15 minutes afterwards. The aortic valve was detected (Fig. 2) and the right coronary cusp and non-coronary cusp were perfo-

rated and aortic valve regurgitation was considered to be the cause of it. There was no vegetation on the valve. All leaflets were resected and U-stay divided sutures were placed around the annulus. A 21 mm St. Jude Medical pyrolite carbon valve was put in place by tying the divided sutures. After closing the aortic incision, the aortic clamp was released and the heart recovered its sinus rhythm naturally. Weaning from the cardiopulmonary bypass was easy. Exposure for aortic and atrial cannulation was adequate using this approach and we encoun-

tered no problems with cannulation or with these surgical procedures. The total operation time was 348 minutes, which included a total cardiopulmonary bypass time of 157 minutes and ischemic time of 106 minutes. The bacterial culture of the resected valve was negative.

The patient was weaned from artificial ventilation on postoperative day (POD) 3 and discharged from the intensive care unit on POD 6. Antibiotics were used until POD 57 (8 weeks) and in blood cultures taken no bacterium was detected. Postoperatively, the wound showed no evidence of infection and the tracheostomy wound healed completely. He was discharged from the hospital on POD 65.

### Comment

Median sternotomy is selected as a usual manner for cardiac surgery. However, if an infective wound is near the traditional incision line, mini-sternotomy is better than median sternotomy to avoid mediastinitis and wound infection. Various kinds of procedures for approaching the heart through partial sternotomy have been reported.<sup>1-4)</sup> In the present case, a tracheostomy was close to the traditional incision line and imposed a considerable risk for infection. We selected a T-shaped sternotomy, which provided an adequate view of the aortic valve, and cannula-

tion of the aorta and right atrium presented no difficulty. The incision was distant from the area of the tracheostomy. The patient recovered favorably after surgery and his postoperative course was uneventful without mediastinitis and any other complications. In this tracheostomy case, we considered a T-shaped sternotomy was a useful method and brought satisfactory results. Its advantages include ease of cannulation for cardiopulmonary bypass and placement of the incision at a site distant from a tracheostomy.

### References

1. Doty DB, DiRusso GB, Doty JR. Full-spectrum cardiac surgery through a minimal incision: mini-sternotomy (lower half) technique. *Ann Thorac Surg* 1998; **65**: 573-7.
2. Cosgrove III DM, Sabik JF. Minimally invasive approach for aortic valve operations. *Ann Thorac Surg* 1996; **62**: 596-7.
3. Gundry SR, Shattuck OH, Razzouk AJ, et al. Facile minimally invasive cardiac surgery via ministernotomy. *Ann Thorac Surg* 1998; **65**: 1100-4.
4. Bonacchi M, Prifti E, Giunti G, et al. Does ministernotomy improve postoperative outcome in aortic valve operation?: a prospective randomized study. *Ann Thorac Surg* 2002; **73**: 460-6.