

MRSA Aortic Valve Endocarditis Treated by Pericardium-lined Dacron Patch and Vancomycin-Containing Fibrin Glue

Shinji Miyamoto, MD, PhD,¹ Tetsuo Hadama, MD, PhD,¹ Hideyuki Tanaka, MD,¹
Hirofumi Anai, MD, PhD,¹ Hidenori Sako, MD, PhD,² Tomoyuki Wada, MD, PhD,¹
Eriko Iwata, MD,¹ and Hirotsugu Hamamoto, MD¹

A 40-year-old man was admitted with a diagnosis of MRSA aortic valve endocarditis. He was treated conservatively with clindamycin and vancomycin for three days, but embolism occurred into the brain and the right lower limb, and urgent aortic valve replacement was performed. Resecting an aortic annular abscess resulted in a huge defect of the root. The defect was reconstructed with a combined patch: a Dacron graft lined with pericardium using vancomycin-containing fibrin glue. Although complete healing of the infected leg wound was slow, no prosthetic valve endocarditis has been detected in the 11 months since operation. (Ann Thorac Cardiovasc Surg 2004; 10: 252–4)

Key words: MRSA, endocarditis, annular abscess, vancomycin

Introduction

Acute endocarditis, especially that caused by organisms which have acquired tolerance to antibiotics, remains a serious condition.¹⁾ Prosthetic valve replacement is usually performed despite the high frequency of fatal post-operative prosthetic valve endocarditis. We successfully treated a patient with MRSA aortic valve endocarditis with an annular abscess using a combined patch, lining a section of a Dacron graft with pericardium using vancomycin-containing fibrin glue.

Case Report

A 40-year-old gynecological doctor with his own clinic was admitted to another hospital with persistent high fever. He had been taking non-steroid anti-inflammatory drugs and antibiotics. He had suffered from atopic dermatitis since childhood and had been admitted to our

hospital for treatment of it, and MRSA was isolated from a skin swab. On hospital day three cardiac murmur became audible and he was transferred to our institution with a diagnosis of acute endocarditis. Blood culture had already proved MRSA infection. Echocardiography revealed a verruca attached to the aortic valve and mild aortic regurgitation. The verruca did not seem to be fragile, so we decided to treat him conservatively with antibiotics clindamycin 1,200 mg/day and vancomycin 4 g/day, which had been confirmed to be effective against this species. On day three of admission at our institute he felt stiffness in his right lower leg with weakness of pulse on the right dorsalis pedis artery, and urgent operation was performed. An oblique incision was carried out for aortotomy, which was extended downward to the sinus of Valsalva of the noncoronary cusp. Verrucas were found attached behind both the right cusp and the noncoronary cusp and a subannular abscess was found under the noncoronary cusp extending to the annulus of the anterior leaflet of the mitral valve. The abscess had a very thin adventitia and nearly ruptured. MRSA was detected even from the slime outside of the ascending aorta. We removed the as much of the contaminated and necrotic tissues as possible resulting in a huge defect down to the mitral valve annulus and close to the central fibrous body (Fig. 1). After thorough profuse irrigation of the operat-

From Departments of ¹Cardiovascular Surgery and ²Emergency Medicine, Faculty of Medicine, Oita University, Oita, Japan

Received January 13, 2004; accepted for publication February 26, 2004.

Address reprint requests to Shinji Miyamoto, MD, PhD: Department of Cardiovascular Surgery, Faculty of Medicine, Oita University, Hasama-machi, Oita 879-5593, Japan.

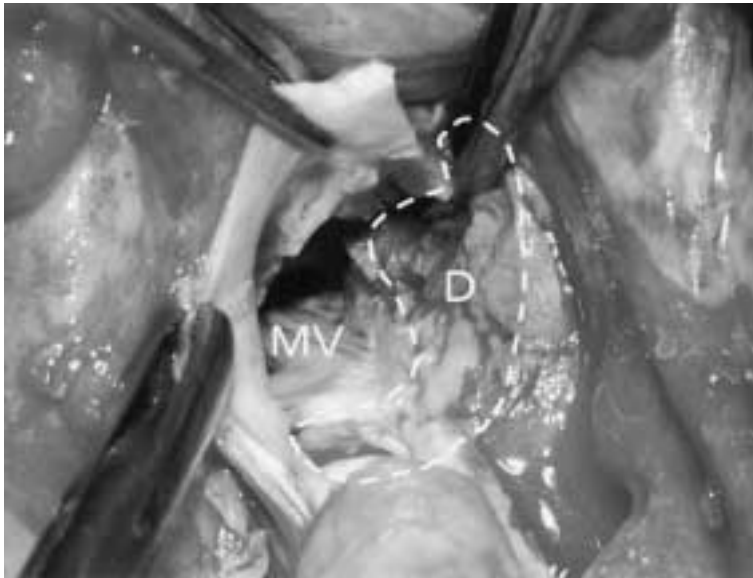


Fig. 1. Intraoperative photograph showing a huge defect of the aortic root.
MV, mitral valve; D, defect.

ing field with saline and changing all the equipment and sponges we had used until then, we created a combined patch, lining a section of a Dacron graft (Gelseal, Vascutek, Renfrewshire, UK) with pericardium using vancomycin-containing fibrin glue (VFG): 0.5g of vancomycin/3 ml of fibrin glue (Beriplast, Aventis Pharma, King of Prussia, USA). We also made a strip of pericardium, folding a rectangular piece of pericardium in half with the fold parallel to the short side and sandwiching VFG between the top and bottom parts. The combined patch was cut to the appropriate size and shape and sewn to the edge of the defect with 4-0 Prolene horizontal mattress sutures, and a subsequent continuous suture reinforced it by buttressing the sutures over the pericardial strip (Fig. 2). A 21 HP mechanical valve (St. Jude Medical, Inc., St. Paul, MN) that had been incubated in a vancomycin solution was implanted with 2-0 Ticron horizontal mattress sutures with the pledgets on the patch and with 2-0 Ticron single intermittent sutures. The aortotomy was closed with a continuous 4-0 Prolene suture using the combined patch, as in Nick's procedure.

Infection in the right lower leg required fasciotomy followed by frequent debridement. A DDD pacemaker was implanted due to persistent complete A-V block on the seventh POD. A cranial CT performed on the 17th POD because of slightly abnormal behavior from time to time revealed a brain abscess. Postoperative intravenous administration of vancomycin 2 g/day for four weeks and clindamycin 1,200 mg/day for two weeks was followed by p. o. of levofloxacin for three weeks. The patient was

moved to another hospital where the wound in the leg was closed, and discharged four months after the initial operation. At the present time, 11 months after the operation, he is seeing patients ordinarily at his hospital without neurological deficits or any evidence of relapse of infection.

Discussion

The principle of operations for acute infective endocarditis should be complete debridement of the infected tissue and painstaking irrigation of the field. However, the fear of residual microorganism must remain because we have no tool to detect it during surgery. Therefore, we look for additional artifices such as using a patch with a local antiseptic effect to prevent relapse of infection. Glutaraldehyde-treated autologous pericardium, bovine pericardium and shielded Dacron polyester sheet have been used for patch enlargement of aortotomy. Also, fresh autologous pericardium is sometimes used after reinforcement with Gore-Tex or Dacron sheet.¹⁾ Although Garcia-Bengochea et al.²⁾ reported glutaraldehyde-fixed bovine pericardium is superior to Teflon in terms of bacterial adherence, the best suited patch material for infective endocarditis patients is still controversial.³⁾ Nonautologous fibrin glue combined with antibiotics has shown continuous diffusion of the antibiotics for up to five to seven days and inhibition of *S. aureus* growth in vitro.⁴⁾ On the basis of this study, VFG was recommended for use around the aortic root in cases of acute aortic valve endocarditis.⁵⁾

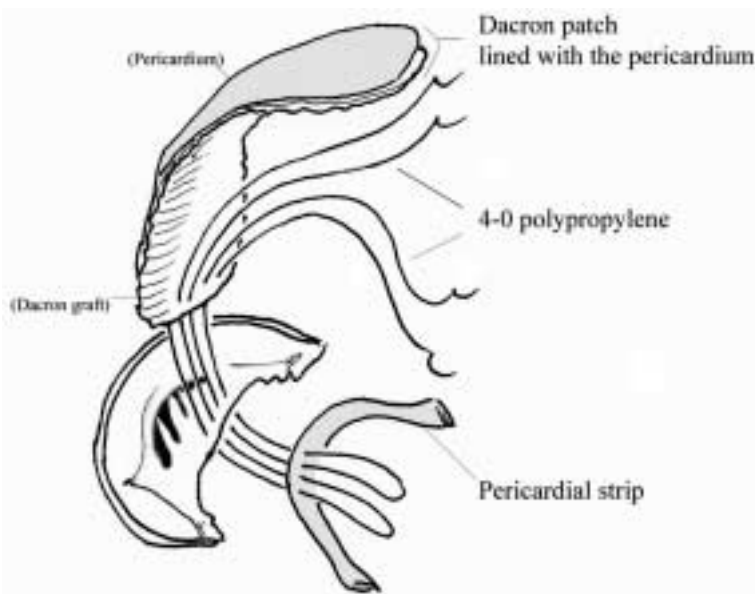


Fig. 2. Drawing of the operative procedure showing reconstruction of the defect with a combined patch.

We used the VFG to fold and secure a fresh autologous pericardial strip and to line a Dacron sheet with fresh autologous pericardium, expecting longer antibacterial effects on the prostheses. Once completely clotted it coalesced in to one sheet (strip) we could easily handle thereafter. Furthermore, there was no danger of emboli of glue clots because of the consistency of the fibrin polymer. Although a homograft is now thought to be the valve of choice for complex aortic valve endocarditis,⁶⁾ it is not easy to obtain a homograft yet because of lack of donors and imperfect distribution system in Japan. The method we used in this case is acceptable as an urgent countermeasure.

References

1. Siavosh Khonsari. Cardiac surgery: safeguards and pitfalls in operative technique, 2nd ed. Siavosh Khonsari ed.: Lippincott Williams & Wilkins, 1996, pp 71–5.
2. Garcia-Bengochea JB, Gonzalez-Juanatey JR, Rubio Alvarez J, et al. Experimental and clinical evaluation of formalin containing pericardial bioprosthesis for replacement of infected valves. *J Heart Valve Dis* 1995; **4**: 284–7.
3. Kunitomo R, Hara M, Utoh J, et al. Patch reconstruction of the mitral annulus for active infective endocarditis with annular abscess. *Ann Thorac Cardiovasc Surg* 2001; **7**: 52–5.
4. Kram HB, Bansal M, Timberlake O, Shoemaker WC. Antibacterial effects of fibrin glue-antibiotic mixtures. *J Surg Res* 1991; **50**: 175–8.
5. Niwaya K, Kitamura S. Aortic valve replacement for annular abscess. In: Koyanagi H, Kitamura S, Yasui H eds.: *Sinzoukekkangekashujutsusho*. Tokyo: Sentaniryogijutsukenkyusho, 2002: pp 135–8.
6. Niwaya K, Knott-Craig CJ, Santangelo K, Lane MM, Chandrasekaran K, Elkins RC. Advantage of autograft and homograft valve replacement for complex aortic valve endocarditis. *Ann Thorac Surg* 1999; **67**: 1603–8.