

Plicated Patch Repair for Acquired Gerbode Defect Involving the Tricuspid Valve

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Gerbode's defect, a left ventricular-to-right atrial communication, with involvement of the tricuspid valve acquired after bacterial endocarditis can be challenging to repair. We report a modified technique for a shunt closure and reconstruction of the tricuspid valve using a plicated bovine pericardial patch. Combining

such a repair with a left ventricular patch resulted in a complete defect closure and competent tricuspid valve without regurgitation.

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Gerbode's defect is a rare type of left ventricular to right atrial shunt [1]. The defect is usually congenital but can be acquired after bacterial endocarditis [2–6]. The acquired defect differs from the congenital, as the communication is between the left ventricle and the right atrium above the septal leaflet of the tricuspid valve. Acquired Gerbode defects with large septal destructions and vegetations involving the tricuspid valve can be challenging and might require complex patch repair. We report a modified technique for shunt closure and reconstruction of the tricuspid valve using a plicated bovine pericardial patch.

Technique

A 35-year-old man presented with a 3-week history of fever, chills, and malaise. Although there was no organism growth in blood cultures, echocardiography detected vegetations with a maximum 16 × 26 mm in diameter at the base of the tricuspid septal leaflet, and a small left ventricular to right atrial shunt (Gerbode defect) beginning just below the right-to-noncoronary sinus of a bicuspid aortic valve. There were few vegetations on the aortic valve cusps, and there was a mild aortic and moderate tricuspid valve regurgitation. After 10 days of treatment with antibiotics (ceftriaxone) administered intravenously, progressive enlargement of the Gerbode defect developed in the patient that hemodynamically deteriorated and therefore was scheduled for surgery.

After cardiopulmonary bypass was installed, and the heart was arrested by means of cardioplegia, the right atrium and aorta were opened. There was an approximate 15 mm in diameter defect at the base of the tricuspid septal leaflet with multiple vegetations at the rim of the defect extending to the tricuspid valve annulus and destructing part of the septal leaflet (Fig 1). The defect communicated

with the left ventricle just below the right-to-noncoronary sinus. There were mild, but destroying vegetations at the aortic valve cusps. First, the aortic valve was excised, all vegetations were removed, and the destructed part of the tricuspid septal leaflet was excised, resulting in a 10 × 10 mm defect (Fig 1, dashed red line). Due to the large dimensions of the acquired Gerbode defect, we decided to perform a two-sided patch closure. A large bovine pericardial patch was sewn in from the left ventricular side through the aortotomy for primary defect closure. We then closed the defect with an additional bovine pericardial patch from the right atrial side, which in part repaired the destructed tricuspid valve annulus (Fig 2). The upper part of the patch was then plicated and used to reconstruct the septal leaflet of the tricuspid valve (Figs 2 and 3). This technique resulted in a smooth annulus-leaflet transition and a competent tricuspid valve, as assessed with a saline test. We did not reinforce the leaflet reconstruction with an annuloplasty, because there was no annulus dilatation, and we aimed to implant as little fabric material as possible in this infective situation. The aortic valve was replaced with a 22-mm mechanical prosthesis (ATS Open Pivot AP360 heart valve; ATS Medical Inc, Minneapolis, MN). After weaning from cardiopulmonary bypass, transesophageal echocardiography showed a complete closure of the acquired Gerbode defect and a competent tricuspid valve without regurgitation or stenosis. Due to complete heart block, we implanted an epicardial pacemaker to avoid later transvenous pacemaker lead implantation. The perioperative course was uneventful, and the patient was discharged to another hospital for long-term antibiotic treatment after 1 week. The polymerase chain reaction (PCR) analysis of the aortic valve tissue revealed that the organism responsible for this destructive endocarditis was *hemophilus aphrophilus*.

Comment

Gerbode's defect was originally described as a congenital atrioventricular shunt originating from the interventric-

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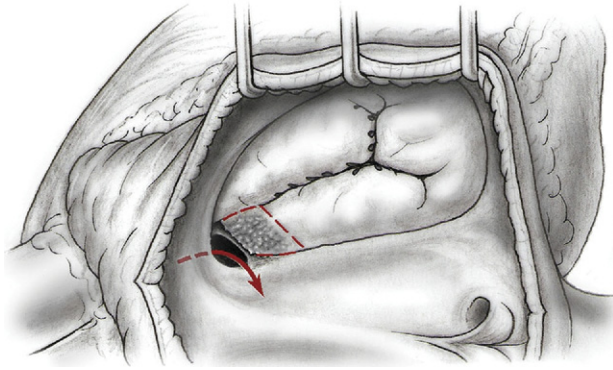


Fig 1. Opened right atrium with left ventricular-to-right atrial communication (red arrow). There were multiple vegetations at the rim of the defect extending into the tricuspid valve annulus and destructing part of the septal leaflet. All vegetations were removed and the destructed part of the septal leaflet excised (dashed red line).

ular membranous septum with regurgitation into the right atrium through a defect or cleft in the tricuspid valve leaflet [1]. Less common is the acquired form of a Gerbode defect, which is often associated with bacterial endocarditis [2-6]. Infection of the aortic valve, most often with *Staphylococcus aureus*, extends below the aortic annulus onto the upper part of the interventricular septum. Infective tissue destruction leads to a perforation of the septum creating a communication between the left ventricle and the right atrium. Although small shunts may be well tolerated with few symptoms, and at surgery these can often be closed by simple direct suture of the

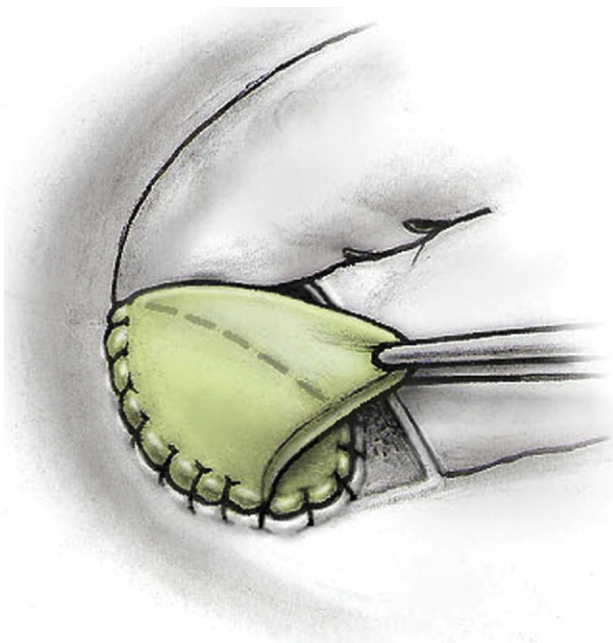


Fig 2. After left-ventricular patch closure through the aortotomy, the defect was closed from the right atrial side with a bovine pericardial patch reconstructing part of the tricuspid valve annulus. The upper part of the patch was then plicated to reconstruct the septal leaflet.

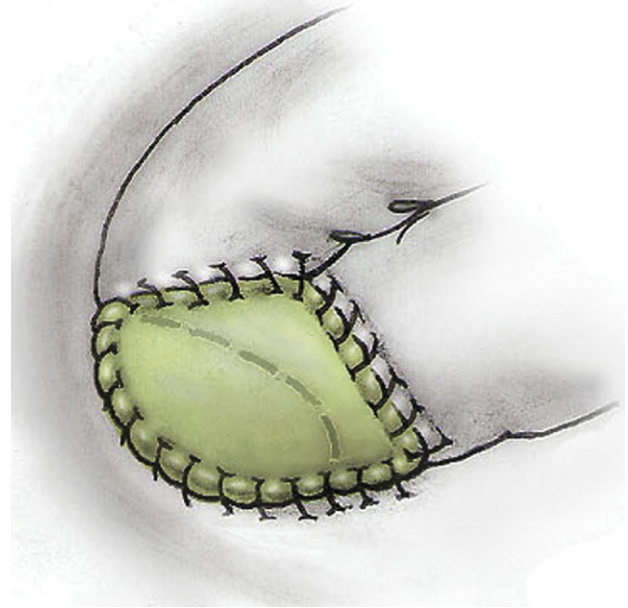


Fig 3. Final results after defect closure and reconstruction of the septal leaflet of the tricuspid valve.

defect [5], a large Gerbode defect can be much more challenging. Patients with large defects may have severe clinical signs due to pulmonary congestion and heart failure, which might require urgent surgery. Surgical closure of a large Gerbode defect can be difficult, especially if infective destruction involves the tricuspid valve annulus and leaflets. Then, the repair requires not only a patch closure but a reconstruction or replacement of the tricuspid valve. Tatewaki and colleagues [7] describe a pericardial patch closure with sutures from the ventricular side of the tricuspid valve through the leaflets, followed by a DeVega annuloplasty [7]. Others report a Dacron (C. R. Bard, Haverhill, MA) or Gore-Tex (W. L. Gore & Assoc, Flagstaff, AZ) patch closure with septal leaflet reimplantation onto the patch [3, 5], an annuloplasty ring implantation, or tricuspid valve replacement [3-6]. We present a modified, rather simple technique with a plicated bovine pericardial patch combining a defect closure and reconstruction of the tricuspid valve annulus and septal leaflet (Figs 1-3). This technique allowed us to perform a complex right-sided defect repair with one patch that might be advantageous in an infective situation. In addition, this technique led to a smooth annulus leaflet transition. Such a technique might allow an extensive reconstruction of the tricuspid valve, if necessary. Combining such repair with a left ventricular patch for primary defect closure resulted in a complete repair of the acquired Gerbode defect, and a competent tricuspid valve without regurgitation. Further long-term studies including echocardiographic examinations will be necessary to assess the durability of the described technique for complex acquired Gerbode defects.

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