Patch reconstruction of the aorto-mitral curtain without posterior extension: Alternative to the Commando procedure for double valve replacement

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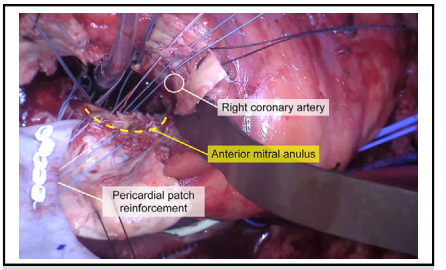


Aortic and mitral valve replacement with patch reinforcement of thin aorto-mitral curtain.

CENTRAL MESSAGE

A Commando procedure is often described for patients with damaged aorto-mitral curtain requiring double valve replacement. We describe a simplified technique for an adequately sized mitral annulus.

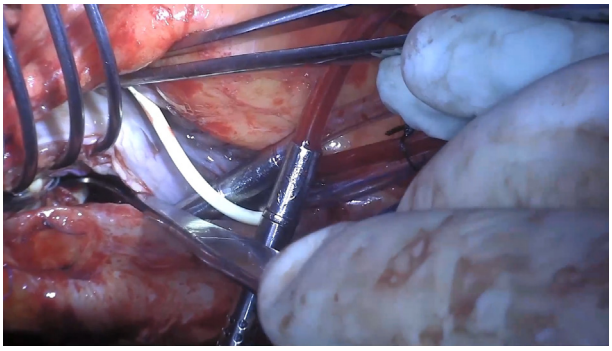
Video clip is available online.

Commando reconstruction of the intervalvular fibrosa or aorto-mitral curtain (AMC) is a technically demanding procedure and complex undertaking reserved for double-valve invasive endocarditis or severely calcified radiation heart disease.[1,2] According to the Commando technique, patch reconstruction of AMC is performed due to complete destruction of the AMC or in cases where significant annular upsizing is required to accommodate valve prostheses.[3-5] In situations where the AMC is only partially destroyed or thinned out without active infection, significant calcification, or need for annular enlargement, we have utilized a modified technique of patch reinforcement of the AMC without posterior extension through the roof of the left atrium to reinforce the AMC and anchor the new valve prosthesis. This simplified alternative to the Commando procedure in appropriately selected patients maintains the integrity and geometry of the fibrous skeleton of the heart and may limit operative time and complexity.

CASE SUMMARY

A 60-year-old man presented to our institution with symptomatic hemolytic anemia. In his 20s, he underwent biological aortic valve replacement (AVR) and mitral valve replacement (MVR). Fifteen years later, he underwent reoperation for infective endocarditis, involving mechanical AVR and implantation of a mechanical MV prosthesis within the preexisting bioprosthetic MV sewing ring (Figure E1). Multimodality imaging at the time of presentation revealed severe mitral regurgitation due to multiple paravalvular leaks, moderate aortic insufficiency, and 2 large calcified aortic root pseudoaneurysms.

He was brought to the operating room for reoperation (Video 1). A third-time redo sternotomy was performed and cardiopulmonary bypass initiated via central cannulation and cardiac arrest with antegrade and direct coronary sinus retrograde cold blood cardioplegia. The AV prosthesis was explanted first. Next, the mechanical MV prosthesis along with the surrounding bioprosthetic MV sewing ring were removed through transseptal incision. This left a large mitral annulus, appropriate for the patient's body size. The aortic root was dissected and the coronary buttons mobilized. After extensive debridement of the aortic root, including the large pseudoaneurysms, the AMC was found to be thinned out and unlikely to anchor a new valve



VIDEO 1. Video demonstrating an alternative technique to the Commando procedure for patients with a thin or partially destroyed aorto-mitral curtain without the need for mitral annular enlargement. Video available at: https://www.jtcvs.org/article/S2666-2507(23)00297-3/fulltext.

prosthesis (Figure 1). Sizing for the new prosthesis was adequate based on the patient's body surface area with no need for enlargement through the left atrial dome (ie, the Commando approach). To maintain the geometry and integrity of the fibrous skeleton, we used a 2-cm width rectangle-shaped bovine pericardial patch to reinforce the AMC. The anterior sutures (from trigone to trigone) for MVR were passed from the aortic side through the patch, then the anterior mitral annulus, and then pulled from the transseptal incision (Figure 2). The rest of the MV sutures were completed through the transseptal incision. All sutures then were passed through the MV prosthesis (31 mm) cuff and tied down through the transseptal incision. The aortic root was replaced by a 25-mm biocomposite graft using 3 running Prolene sutures. The upper end of the AMC enforcement pericardial patch was incorporated in the running suture of the new biocomposite graft. The coronary buttons were attached and an end-to-end aortic anastomosis was performed. The heart was reperfused and the patient was easily weaned from cardiopulmonary bypass with well-functioning valve prostheses on transesophageal echocardiography and preserved biventricular function.

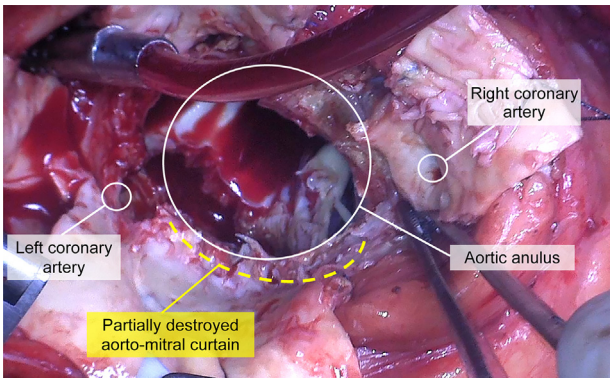


FIGURE 1. Intraoperative view of a thin and fragile aorto-mitral curtain requiring reconstruction or replacement.

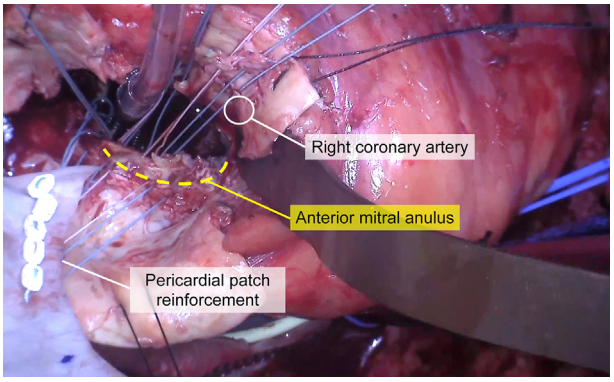


FIGURE 2. Placement of pledgeted mitral valve annular stitches through a bovine pericardial patch, then through the thin aorto-mitral curtain. These will be passed through to the transseptal incision and placed through a new prosthesis sewing cuff. The top portion of the patch will be used to anchor the aortic valve prosthesis.

DISCUSSION

We present a modified technique of patch reinforcement of the AMC as an alternative to the Commando procedure in double valve replacement with a thinned out and fragile AMC. The Commando approach includes posterior extension from the aortic root through the left atrial dome,[1-3] which is indicated when the AMC is destroyed by endocarditis or severe calcification. Another consideration for a Commando approach is prosthesis upsizing during double valve replacement. In double valve reoperations where the AMC appears fragile after explanting the previous aortic and mitral prostheses, and there are no existing indications for Commando approach, a patch reinforcement of the AMC can be performed from the aortic root side and incorporated during implantation of both prostheses. This alternative technique preserves the cardiac geometry and requires less reconstruction compared with the Commando approach. The goal is to avoid dehiscence and paravalvular leak at the AMC if it is weakened after a previous operation. By maintaining the cardiac fibrous skeleton and simplifying AMC reconstruction, we believe that this technique may be a useful alternative to the Commando procedure in appropriately selected cases of incomplete AMC destruction without the need for annular enlargement.

Conflict of Interest Statement

Dr Elgharably has a financial relationship with Edwards Lifesciences and Dr Witten has a financial relationship with LifeNet Health. All other authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

References

1. David TE. The surgical treatment of patients with prosthetic valve endocarditis. *Semin Thorac Cardiovasc Surg*. 1995;7:47-53.
2. Lytle BW. Surgical treatment of prosthetic valve endocarditis. *Semin Thorac Cardiovasc Surg*. 1995;7:13-9.
3. Pettersson GB, Hussain ST, Ramankutty RM, Lytle BW, Blackstone EH. Reconstruction of fibrous skeleton: technique, pitfalls and results. *Multimed Man Cardiothorac Surg*. 2014;2014:mmu004. https://doi.org/10.1093/mmcts/mmu004
4. Navia JL, Elgharably H, Hakim AH, Witten JC, Haupt MJ, Germano E, et al. Long-term outcomes of surgery for invasive valvular endocarditis involving the aortomitral fibrosa. *Ann Thorac Surg*. 2019;108:1314-23. https://doi.org/10.1016/j.athoracsur.2019.04.119
5. Perri JL, Johnston DR. Commando procedure in a radiated chest. *JTCVS Tech*. 2022;15:54-7. https://doi.org/10.1016/j.xjtc.2022.07.006

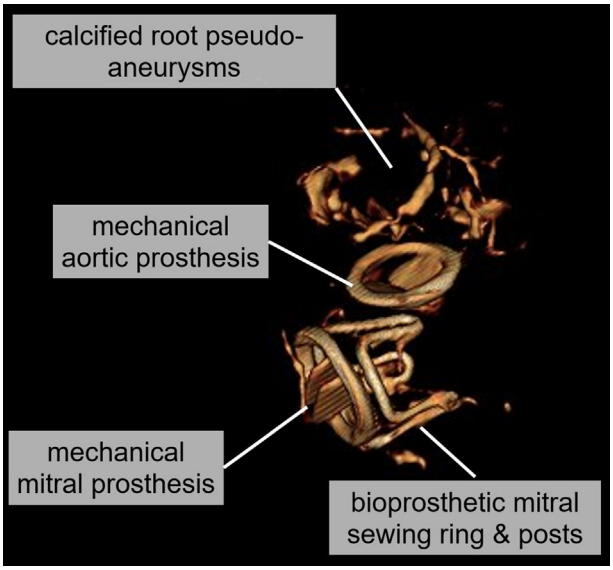


FIGURE E1. Three-dimensional computed tomography reconstruction demonstrating a mechanical aortic valve, mechanical mitral valve inside a bioprosthetic strut with leaflets removed, and calcified aortic root pseudoaneurysms.