Patch Reconstruction of the Aorto-Mitral Curtain without Posterior Extension: Alternative to the Commando Procedure for Double Valve Replacement

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Glossary of Abbreviations:

- AMC: aorto-mitral curtain
- AV: aortic valve
- AVR: aortic valve replacement
- MR: mitral valve regurgitation
- MV: mitral valve
- MVR: mitral valve replacement

Central Picture Legend

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.
Introduction

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. 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. 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 prostheses. 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 male presented to our institution with symptomatic hemolytic anemia. In his twenties, 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 interestingly, implantation of a mechanical MV prosthesis within the pre-existing bioprosthetic MV sewing ring (Supplemental Figure 1). Multimodality imaging at the time of presentation revealed severe MR due to multiple paravalvular leaks, moderate aortic insufficiency and two large calcified aortic root pseudoaneurysms.

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

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 prostheses up-sizing during double valve replacement. In double valve re-operations where the AMC appears fragile after explanting the previous aortic and mitral prostheses, and 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 require less reconstruction compared to the Commando approach. The goal is to avoid dehiscence and para-valvular leak at the AMC if it is weakened after 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 in appropriately selected cases of incomplete AMC destruction without need for annular enlargement.

IRB approval is waived for single case reports at our institution. Documented informed consent was provided for publication of this work.

References


**Figure Legends**

**Figure 1:** Intraoperative view of thin and fragile aorto-mitral curtain, requiring reconstruction or replacement.

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

**Video Legend:** 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.

**Supplemental Figure 1:** 3D CT reconstruction demonstrating mechanical aortic valve, mechanical mitral valve inside a bioprosthetic strut with leaflets removed and calcified aortic root pseudoaneurysms.
calcified root pseudo-aneurysms

mechanical aortic prosthesis

mechanical mitral prosthesis

bioprosthetic mitral sewing ring & posts
Supplemental Material

**Supplemental Figure 1:** 3D CT reconstruction demonstrating mechanical aortic valve, mechanical mitral valve inside a bioprosthetic strut with leaflets removed and calcified aortic root pseudoaneurysms.