A successful staged approach for treatment of concomitant mitral insufficiency and mycotic aneurysm

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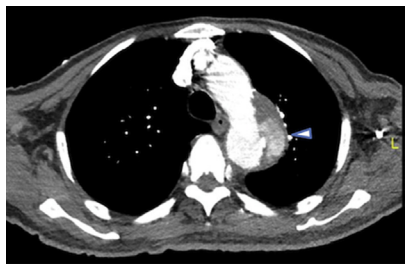

Staged repair of mycotic aneurysm (*arrow*) and mitral endocarditis.

CENTRAL MESSAGE

We report a case of staged endovascular and open approach to treat concomitant mitral endocarditis and aortic mycotic aneurysm.

See Commentary on page 9.

Video clip is available online.

A 78-year-old gentleman with diabetes and hypertension presented with a febrile illness and 10 days of shoulder pain. Electrocardiogram on admission revealed right heart strain, and computed tomography angiogram demonstrated a 5.0- × 4.2- × 1.8-cm pseudoaneurysm of the aorta distal to the left subclavian artery (Figure 1, *A*). Echocardiogram revealed mitral vegetations and severe regurgitation with a preserved left ventricular ejection fraction of 50%. Blood cultures revealed *Streptococcus gallolyticus* subspecies. Magnetic resonance imaging of the brain and spine revealed punctate hemorrhage along the corona radiata in the brain and osteomyelitis of L4–L5, establishing the diagnosis of septic emboli from endocarditis and associated aortic mycotic aneurysm.

Broad-spectrum antibiotics were initiated and subsequently narrowed to ceftriaxone and gentamicin per blood culture sensitivities. Following 6 weeks of antibiotics and repeat negative blood cultures, the patient agreed to surgery to address the mycotic aneurysm. We felt he would not survive a combined mitral valve repair (MVR) and open surgical debridement with extra-anatomic bypass, so we staged the repair starting with stabilization of the aneurysmal defect with a thoracic endovascular aneurysm repair (TEVAR).

Intraprocedural aortogram revealed a 3-cm seal zone between the affected aorta and the left subclavian artery (Figure 1, *B*). A 32- × 109-mm Zenith Alpha thoracic endovascular graft (Cook Medical, Bloomington, Ind) was positioned and deployed with partial coverage of the left subclavian artery. Completion angiogram revealed exclusion of the pseudoaneurysm and preserved flow in the left subclavian artery (Figure 1, *C*). The patient tolerated the procedure well and was discharged on postoperative day 4 with lifelong suppressive oral antibiotics.

The patient was advised to undergo MVR after he recovered from the TEVAR but deferred surgery given his lack of symptoms and desire to avoid a large operation. Six months following discharge, the patient developed worsening shortness of breath related to mitral insufficiency. Echocardiogram demonstrated severe (4+) mitral regurgitation with associated flail A3/P3 segments, ruptured A2/P2 chordae, 40-mm^2 regurgitant orifice, and regurgitant fraction of 62% (78 mL). The patient now agreed to surgery, given his worsening symptoms. Intraoperatively, it was determined that the mitral valve was repairable via triangular plication of P3, commisuroplasty between A3 and P3, and annuloplasty with a 28-mm Physio II Edwards semirigid complete ring (Edward Lifesciences Corporation, Irvine, Calif). His clinical course

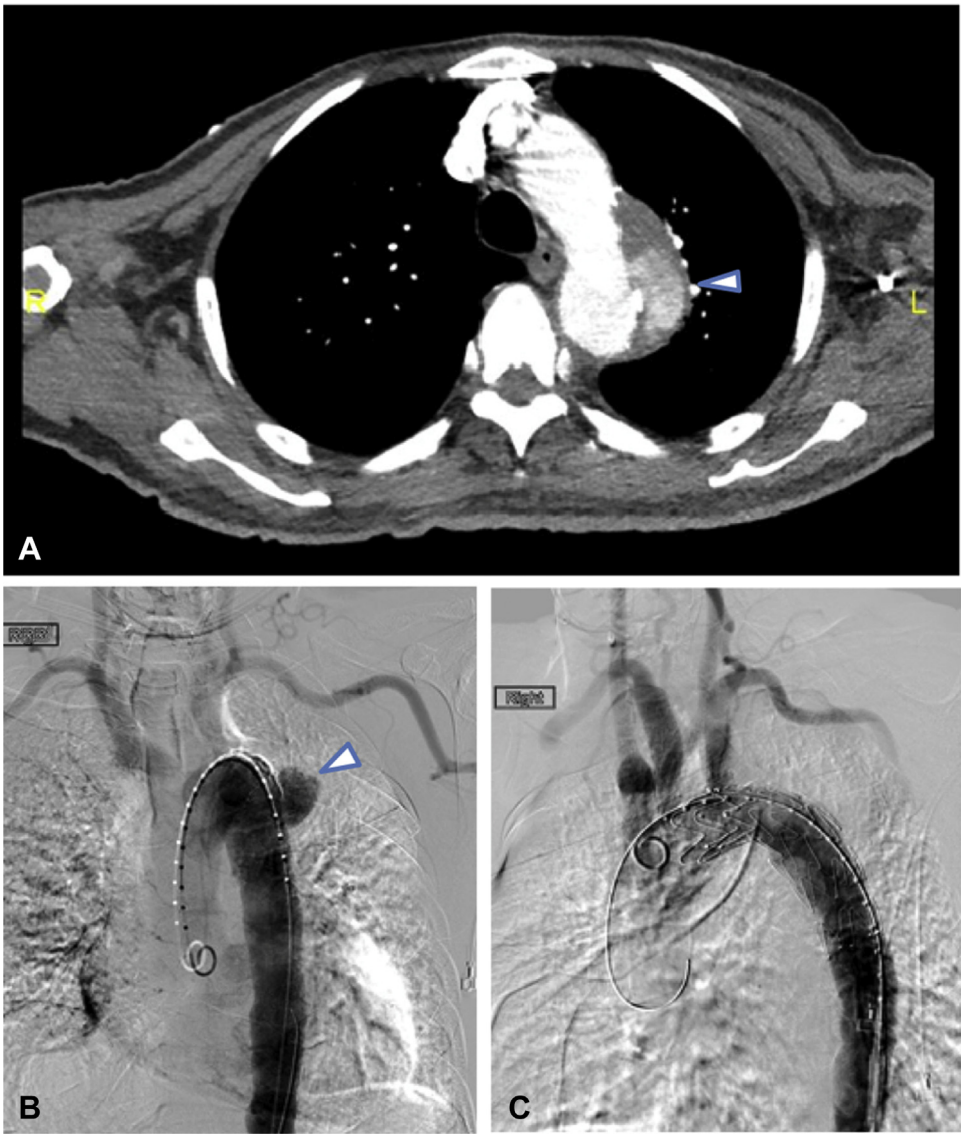

FIGURE 1. A, Computed tomography on admission shows contrast in a mycotic aneurysm defect (*arrow*). B, Location of defect with respect to left subclavian artery (*arrow*) before placement of stent graft. C, Completion angiogram demonstrates good left subclavian flow and exclusion of aortic defect

was uncomplicated, and he was discharged to a skilled nursing facility on postoperative day 6. At 24 months' follow-up, he has made a full recovery, maintains antibiotic compliance, and repeat blood cultures were negative; surveillance computed tomography angiogram shows no evidence of endoleak (Figure 2). The admission and follow-up imaging may be viewed in Video 1.

DISCUSSION

We chose to perform TEVAR before MVR because we felt stabilization of the aneurysm would mitigate risk of rupture in the eventual mitral intervention. There is agreement that all mycotic aneurysms rupture if left untreated; however, the risk of rupture at time of presentation ranges between 15% and 38%.[1] It is up to the surgeon's clinical judgment to determine when to employ endovascular techniques for mycotic aneurysms due to concerns for recurrent graft infection and is ostensibly determined by the patient's tolerance for open surgical intervention. Immediate mortality appears to be similar between endovascular and open surgical repair (5% vs 4.8%, respectively),[2] and with adequate antimicrobial treatment before intervention, patients treated endovascularly have a greater survival than those treated with conventional surgery for abdominal mycotic aneurysms (80% vs 70% at 24 months, respectively).[3]

Collaborating with our infectious disease service, we treated the patient with antibiotics for 6 weeks and obtained negative blood cultures before TEVAR to protect against recurrent graft infection. Receiving antibiotics for greater

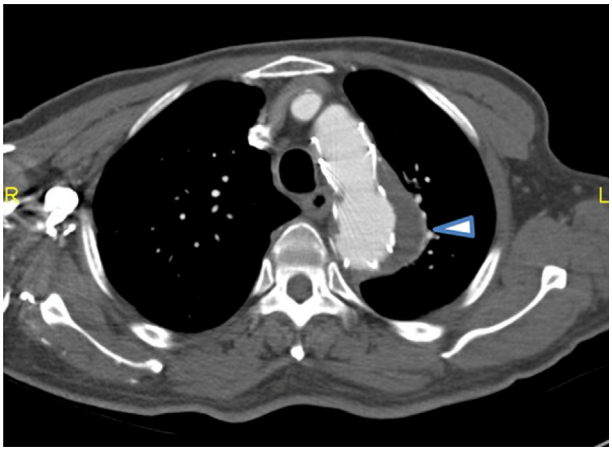

FIGURE 2. Follow-up computed tomography at 24 months with *arrow* pointing to residual aneurysm sack; there is no residual contrast filling the mycotic aneurysm.

than 1 week before intervention appears to be a protective factor.[2] A separate nationwide study in Sweden reported a 71% five-year survival rate with median antibiotic treatment of 15 weeks before TEVAR.[4] Anecdotal reports of soaking prosthetic grafts in rifampin before implantation reportedly help prevent secondary infection, but this practice remains controversial.[1]

If stigmata of infection such as leukocytosis or fever persist, F-fluorodeoxyglucose positron-emission tomography or radiolabeled white blood cell imaging may help localize ongoing infectious burden.[5] If infective endocarditis or recurrent graft infection persists despite long-term antibiotic therapy, mitral valve replacement and excision of the graft with extra-anatomic bypass would be the only remaining option for long-term survival.

VIDEO 1. Video depicting initial computed tomography images, echo, and their respective follow-up studies. Video available at: https://www.jtcvs.org/article/S2666-2507(19)30057-4/fulltext.

The authors acknowledge the limitations of the current findings. Existing guidance relies primarily on retrospective reviews, which carry bias toward positive outcomes. To this end, prospective studies to establish higher-level evidence for treatment guidance may not be feasible, given the relatively rare nature of the disease.

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