

CASE REPORT

ADVANCED

CLINICAL CASE

AngioVac Removal of an Isolated Infected Pulmonary Valve Papillary Fibroelastoma



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ABSTRACT

The AngioVac (Angiodynamics) system is indicated for the removal of right-sided venous soft thrombi and emboli. This is the first report that demonstrates the AngioVac system can be extended to the extraction of right-sided cardiac tumors, in the current case, a pulmonary valve papillary fibroelastoma infected with *Streptococcus salivarius* and *Rothia* species. **(Level of Difficulty: Advanced.)** (J Am Coll Cardiol Case Rep 2020;2:2213-6) © 2020 Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

A 64-year-old white male presented to the hospital after a ground-level fall shortly after an episode of dizziness and lightheadedness in the setting of hypoglycemia. Initial physical examination findings revealed a hemodynamically stable, alert, and oriented male with 3+ bilateral lower extremity pitting edema, small superficial forehead abrasion, a stage 2 sacral decubitus ulcer, and a ruptured skin blister on the left medial calcaneus. Notable laboratory values showed leukocytosis with a white blood cell count of 14.7×10^3 cells/ μ l; a

neutrophil count of 12.2×10^3 cells/ μ l; and a serum creatinine concentration of 1.33 mg/dl. Despite optimal medical therapy from the time of admission, he continued to show signs and symptoms of evolving sepsis that later led to septic shock and exacerbation of congestive heart failure requiring admission to the intensive care unit. The cause of his sepsis was bacteremia with methicillin-sensitive *Staphylococcus aureus* (MSSA) infection, likely due to skin infection. His hospital course was then complicated by development of acute tubular necrosis requiring dialysis. Because of persistently positive blood cultures, the patient was evaluated for infective endocarditis by using echocardiography.

LEARNING OBJECTIVES

- To evaluate a novel indication for use of the AngioVac system for extraction of right-sided cardiac tumors in patients who are poor candidates for surgery.
- To discuss the differential of a pulmonic valve mass including endocarditis and papillary fibroelastoma.

MEDICAL HISTORY

The patient's medical history included heart failure with preserved ejection fraction, symptomatic bradycardia status-post pacemaker placement, hypertension, hyperlipidemia, and controlled type 2 diabetes mellitus. Furthermore, it was reported that he had

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the JACC: Case Reports [author instructions page](#).

Manuscript received September 10, 2020; revised manuscript received September 29, 2020, accepted October 6, 2020.

**ABBREVIATIONS
AND ACRONYMS**

MSSA = methicillin-sensitive *Staphylococcus aureus*

PFE = pulmonic fibroelastoma

TEE = transesophageal echocardiogram

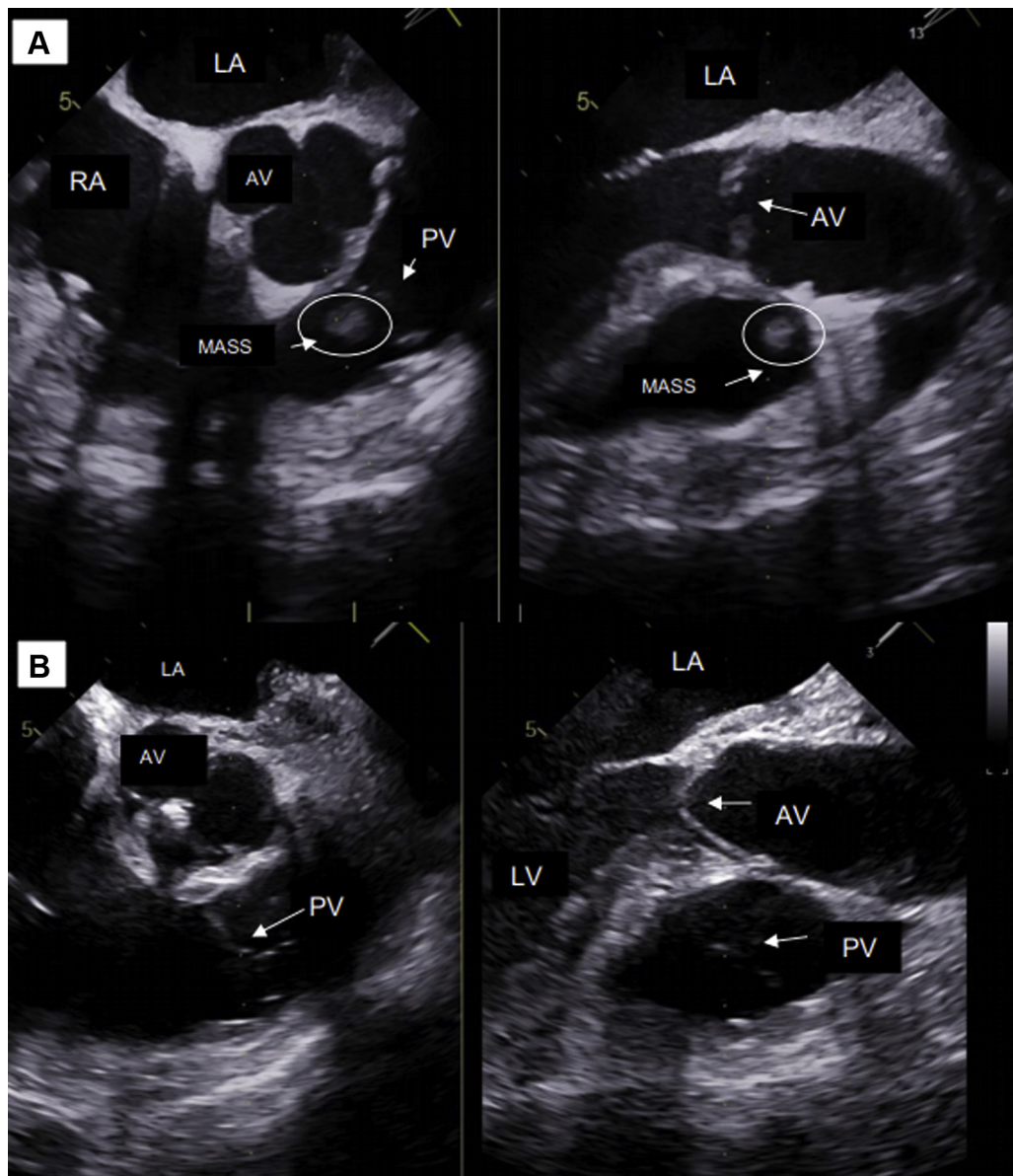
undergone a dental procedure approximately 2 months prior to hospital admission.

INVESTIGATIONS

Initial imaging, which included computed tomography of the chest, showed large

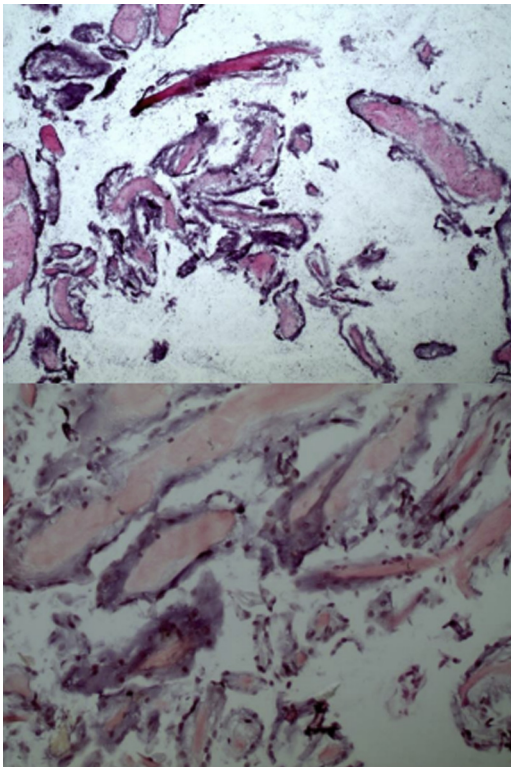
bilateral pleural effusions and pulmonary vascular congestion, consistent with heart failure. Blood cultures obtained on admission revealed MSSA bacteremia. Repeated blood cultures again yielded MSSA. The bilateral pleural effusions were addressed by multiple thoracentesis that revealed transudative effusions without evidence of bacteria. Moreover,

FIGURE 1 TEE Images Pre- and Post-AngioVac



(A) TEE images at 45° midesophageal with an accompanied biplanar view demonstrating mass of the PV. **(B)** TEE images s/p AngioVac procedure demonstrating no PV mass. AV = aortic valve; LA = left atrium; LV = left ventricle; PV = pulmonic valve; RA = right atrium; TEE = transesophageal echocardiography.

FIGURE 2 Pathology



Elastin stain demonstrates papillary fronds consisting of collagen and elastin fibers.

multiple cultures were obtained of urine, sputum, and bronchial washings after bronchoscopy, but none had bacterial growth. Because of the persistent MSSA bacteremia from an unknown source, a transthoracic echocardiogram was performed to rule out infective endocarditis; results were significant for moderate pulmonic valve regurgitation, but no vegetation was visualized on the valves. Therefore, a transesophageal echocardiogram (TEE) was performed on hospital day 11 which revealed a mobile, 7- × 8-mm mobile mass on the ventricular surface of the pulmonic valve with moderate regurgitation (Figure 1A, Videos 1 and 2). Differential diagnoses for the mass include either papillary fibroelastoma or bacterial vegetation.

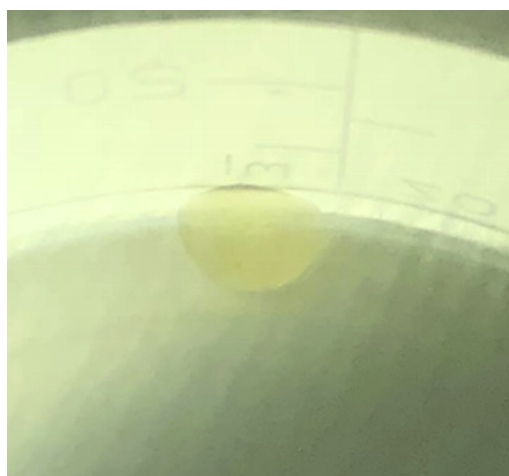
MANAGEMENT

Because of the patient's severe illness, he was deemed not to be a surgical candidate by cardiothoracic surgery for removal of the mass. On hospital day 16, the patient underwent AngioVac (Angiodynamics,

Latham, New York) mass debulking. An ultrasonography-guided approach was used to access the right and left common femoral veins. Therapeutic anticoagulation was achieved with heparin. Serial dilation was performed, and an 18-F cannula was inserted and attached to the return of the cardiopulmonary bypass. Serial dilation was performed in the right common femoral vein, and a 26-F sheath was advanced to the inferior vena cava (IVC) to the right atrial junction. A pigtail catheter was advanced to the pulmonary artery, an Amplatz Super Stiff guidewire (Boston Scientific, Marlborough, Massachusetts) was advanced through the pigtail, and then the pigtail was removed. Fluoroscopic and TEE guidance were used to advance the AngioVac cannula to the right ventricular outflow tract and steered into the side of the mass (Video 3). Right heart bypass was initiated by the AngioVac system with flow up to 3 l/min resulted in successful extraction of the mass. Repeat TEE imaging indicated complete removal of the mass without damage to the valve or worsening of known moderate regurgitation. The patient tolerated the procedure well and without complications (Figure 1B).

The mass was sent to pathology and was confirmed to be a cardiac papillary fibroelastoma (PFE). Despite having MSSA bacteremia, the culture of the PFE revealed it was infected with *Streptococcus salivarius* and *Rothia* spp (Figures 2 and 3), thus suggesting the source of the MSSA infection to be the skin. The patient was treated with linezolid and meropenem based on culture sensitivities. Follow-up blood cultures resulted in no bacterial growth.

FIGURE 3 Gross View



Gross view of the removed pulmonic valve mass.

DISCUSSION

This case was challenging because the overall clinical course was confusing due to the patient presenting with respiratory, heart, and renal failure of unclear causes. Initial and repeated blood cultures were positive for MSSA, but even after the patient was treated with appropriate intravenous antibiotics, he continued to decline. Thus, once the pulmonic valve mass was identified on TEE, these clinicians were provided with the opportunity for tissue diagnosis and culture to shed light on the overall clinical scenario. Although complete resection of the mass was not the priority, particularly as this was not reported in any cases, removing part of the mass would change the treatment strategy including the indication for, duration of, and choice of antibiotic.

Cardiac papillary fibroelastomas are uncommon benign tumors of the endocardium, accounting for 7% of all primary cardiac tumors (1). PFE typically originates in the left heart valves but are rarely seen on pulmonic valves comprising 8% of cases (2). PFE have been implicated in embolic states such as cerebral vascular events, myocardial infarction, and pulmonary embolism (1). PFE can also be a source of infection and endocarditis (3). Thus, identification and safe removal of PFE is important because of the embolic risk. Surgical excision of left-sided PFE is advised, but there is less consensus on the management of right-sided PFE. Isolated pulmonic valve endocarditis is a rare entity, as well, affecting <2% of patients with infective endocarditis (4). Differentiating

between these 2 options is only possible with surgical pathology and culture. The present case demonstrated that the minimally invasive approach afforded by AngioVac (AngioDynamics) can be used as an option for treatment.

FOLLOW-UP

The patient opted to pursue comfort care and elected to continue his care under hospice services due to overall functional decline from multisystem organ failure. He was then discharged to hospice.

CONCLUSIONS

This was a novel case of using the AngioVac system for the removal of an isolated infected PV papillary fibroelastoma. Based on these findings, uses for the AngioVac system can be extended to the extraction of right-sided tumors.

ACKNOWLEDGMENTS The authors acknowledge Huma Khan, MD, and Domenick Sorresso, MD.

AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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REFERENCES

1. Howard RA, Aldea GS, Shapira OM, Kasznica JM, Davidoff R. Papillary fibroelastoma: increasing recognition of a surgical disease. *Ann Cardiothorac Surg* 1999;68:1881-5.
2. Ibrahim M, Masters RG, Hynes M, Veinot JP, Davies RA. Papillary fibroelastoma of the pulmonary valve. *Can J Cardiol* 2006;22:509-10.
3. Koji T, Fujioka M, Imai H, et al. Infected papillary fibroelastoma attached to the atrial septum. *Circ J* 2002;66:305-7.
4. Samaroo-Campbell J, Hashmi A, Thawani R, Moskovits M, Zadushlivi D, Kamholz SL. Isolated pulmonic valve endocarditis. *Am J Case Rep* 2019; 20:151-3.

KEY WORDS AngioVac, endocarditis, infective endocarditis, papillary

APPENDIX For supplemental videos, please see the online version of this paper.