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The AngioVac® Device Limits Lethal Complications of Sepsis and Severe Infective Endocarditis with a Large Tricuspid Valve Vegetation: A Case Report

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The AngioVac® device limits lethal complications of sepsis and severe infective endocarditis with a large tricuspid valve vegetation: a case report

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Background

Infective endocarditis (IE) is a microbial infection affecting the inner layer of the heart, predominantly the heart valves.^{1,2,3} Approximately 80-90% of infections are caused by *Staphylococcus*, *Streptococcus*, and *Enterococcus* species, with *Staphylococcus aureus* being most common.^{1,4} IE commonly leads to heart valve vegetations, causing a myriad of symptoms including fever, shortness of breath, chest pain, swelling in the legs, painful nodules on the fingertips (Osler nodes), painless lesions on the hands and feet (Janeway lesions), small hemorrhages in the nail bed and eyes, and flu-like symptoms.^{1,2,5} Severe IE can also lead to life-threatening complications such as heart failure, pulmonary embolism, and stroke if not adequately addressed.^{1,3,5} We present an acutely ill patient with a history of IV drug abuse and a large tricuspid valve vegetation which was debulked using the AngioVac® device to decrease the likelihood of severe life-threatening complications.

Case Presentation

Initial Presentation

A 45-year-old Hispanic male with a history of bipolar disorder, heroin use disorder, spinal abscesses, Hepatitis C, and chronic anemia presented to the emergency department with worsening shortness of breath, generalized weakness, bilateral lower extremity edema, dysuria with dark urine, and blood on toilet paper. On review of systems, the patient reported recent nausea and vomiting with no blood. He denied fever, headaches, chest pain, cough, headaches, skin changes, and diarrhea. Social history was significant for daily IV heroin use; patient did not feel comfortable disclosing when he first began using heroin. He denied any alcohol or tobacco usage. Family history was unknown.

Diagnosis and Management

A transthoracic echocardiogram (TTE) revealed a tricuspid valve (TV) vegetation measuring 4.39 x 4.35 cm with severe tricuspid regurgitation (TR). Blood cultures on admission and one day following admission both yielded gram-positive cocci; urine cultures showed no growth. Further evaluation showed the presence of *Streptococcus mitis*. The patient was started empirically on IV piperacillin/tazobactam and IV vancomycin.

Further evaluation demonstrated acute renal failure, acute on chronic anemia, and thrombocytopenia from sepsis-induced disseminated intravascular coagulation (DIC). The TV vegetation was deemed too large to be eradicated with medical therapy alone. Due to his acute status, the patient was not a candidate for open heart surgery for vegetation removal. Instead, after shared decision making with the patient and his family, minimally invasive aspiration of the mass using the AngioVac® device was performed.

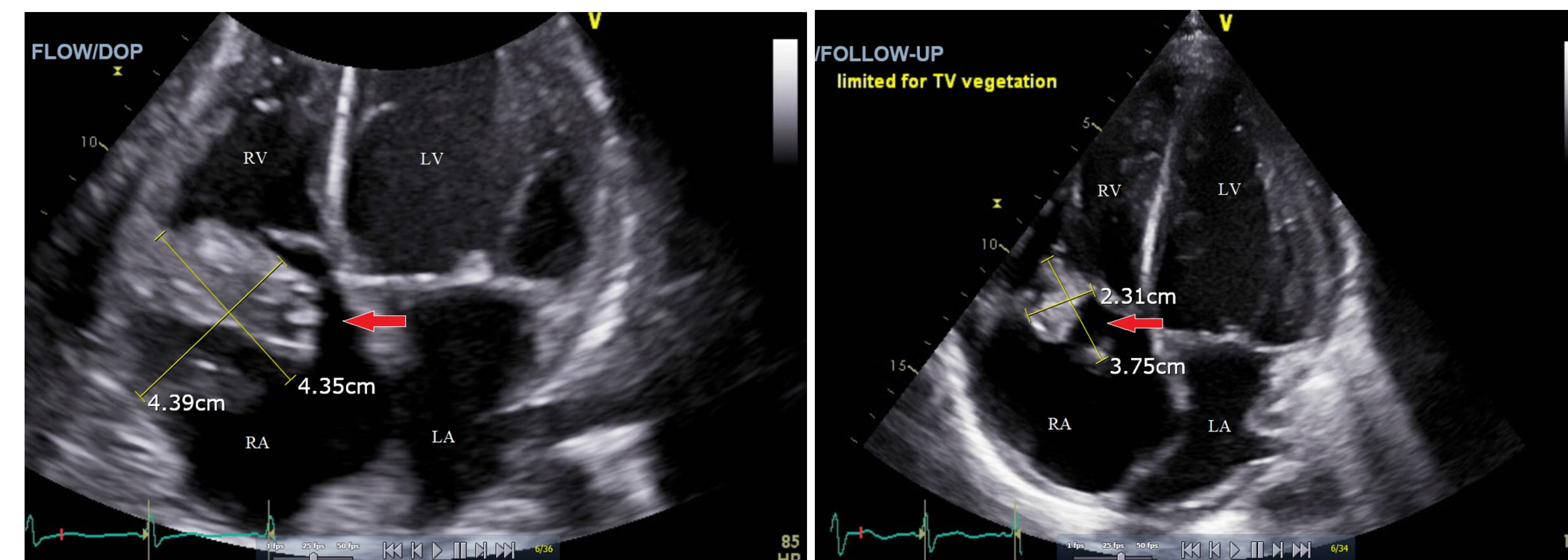


Figure 1: Transthoracic echocardiogram via four chamber view with red arrow pointing to vegetation before (left) and after (right) AngioVac® procedure. RA = right atrium, RV = right ventricle, LA = left atrium, LV = left ventricle.

Outcomes

The procedure effectively reduced the TV vegetation from 4.39 x 4.35 cm to 3.75 x 2.31 cm. One day postoperatively, three separate blood cultures were obtained, which were all negative for growth after 5 days, and the remnant of the TV vegetation was deemed sterile. The patient's initial presenting symptoms resolved. However, a follow-up TTE after the AngioVac® procedure still showed severe tricuspid regurgitation. The patient left the hospital against medical advice seven days following the procedure.

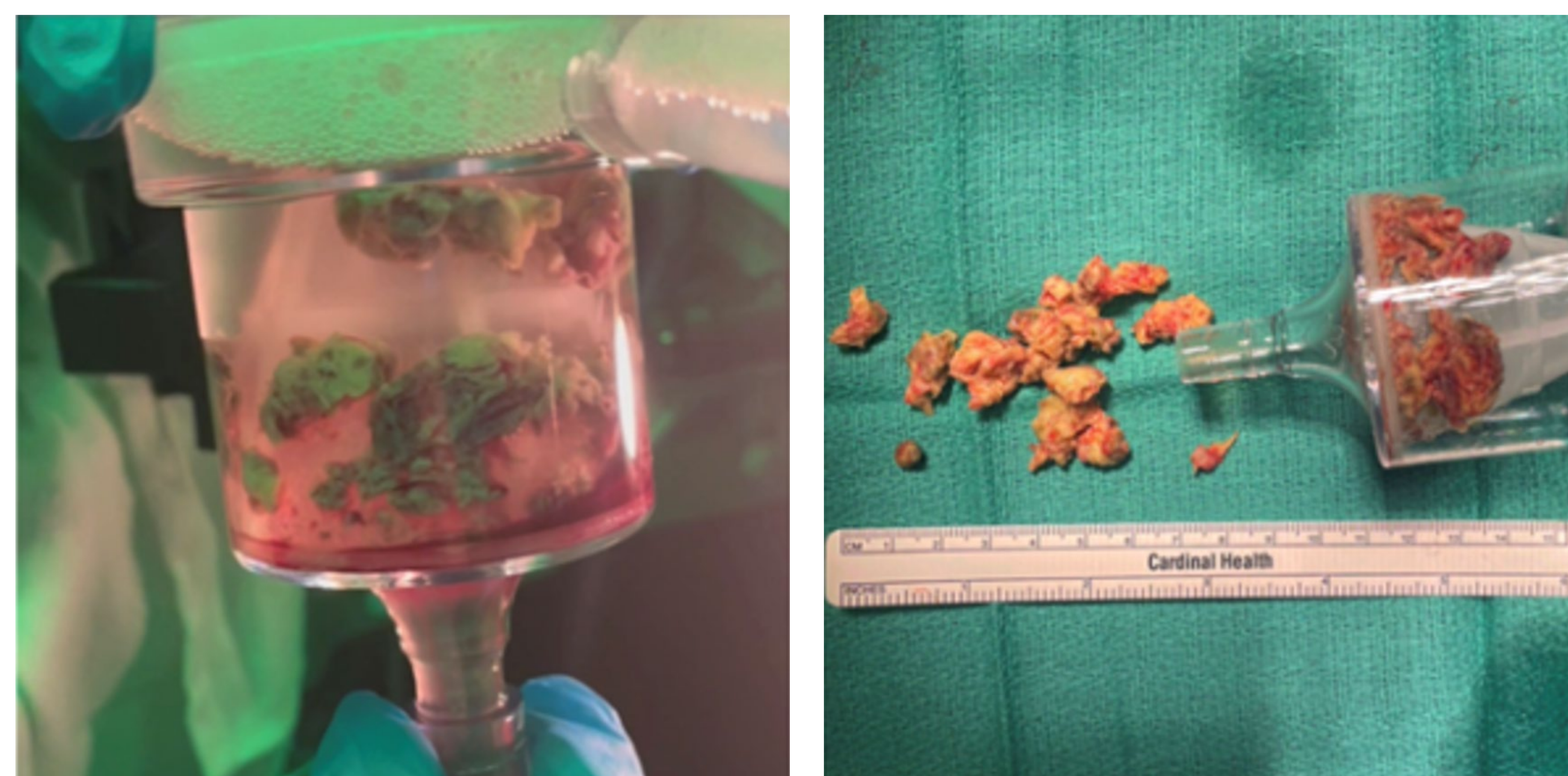


Figure 2: Gross postoperative findings of debulked vegetation inside of AngioVac® (left) and after specimen was dispensed from AngioVac® (right).

Discussion

The AngioVac® is a percutaneous vacuum-based device able to aspirate materials from the intravascular system.^{6,7} First approved for use in 2014, the AngioVac® was commonly used to aspirate ilioacaval, pulmonary, upper extremity, and right heart chamber thrombi.⁷ However, a few recent studies have noted its efficacy in also treating TV endocarditis, especially during instances when open heart surgery is contraindicated. With this in mind, the patient was deemed an adequate candidate for the procedure. To our knowledge, it is the largest TV vegetation to be aspirated using the AngioVac® device reported in literature.

One limitation of the AngioVac® device is the slow pace at which the vegetation could be aspirated. After two hours of ongoing aspiration, the decision was made intraoperatively not to continue with aspiration, in order to prevent potential complications such as uncontrolled bleeding and irreversible valvular damage. Nevertheless, the treatment was successful at reducing the size of the vegetation which allowed for adequate antibiotic penetration. Although severe TR remained due to the vegetation remnant, the procedure was successful in completely sterilizing the vegetation and bloodstream.

Debulking the TV vegetation, in addition to the administration of IV antibiotics and initiation of hemodialysis, was necessary to resolve the patient's presenting symptoms of worsening shortness of breath and generalized weakness. Although not curative, this advanced intervention prevented acute decompensation and averted looming life-threatening complications.

Conclusions

The AngioVac® proved to be an effective alternative to treating a severe case of tricuspid valve endocarditis where cardiothoracic surgery was contraindicated due to comorbid diseases such as thrombocytopenia, anemia, and acute renal failure. Debulking of the vegetation with the AngioVac® device led to improvement of initial symptoms and complete sterilization of the heart valve and bloodstream.

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