



Complications due to IV-Drug Related Endocarditis

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Abstract

Infective endocarditis is a serious condition with the potential for bacteremia, sepsis, and multi-organ failure. This case presents a G4P3 female currently at 27 weeks pregnant with recent intravenous drug use. She presented to the emergency department with abdominal pain, vaginal bleeding, tachycardia, HELLP syndrome, and bilateral 3+ edema. Transthoracic echocardiography revealed an aortic valve vegetation, severe aortic insufficiency, severe mitral regurgitation, a perforation at the base of the anterior mitral valve leaflet, and an echogenic mass on the anterior mitral valve leaflet. She underwent an emergency cesarean section followed by immediate open-heart surgery. Although the patient was appropriately treated with surgery and antibiotics for the causative organism, her hospital course was complicated by cardiogenic shock, septic shock, intracranial hemorrhage, cholecystitis, and altered mental status. Once treated and stabilized, the patient left against medical advice but returned three days later with multi-organ failure. In accordance with her family's decision, she was transitioned to comfort care only and died shortly thereafter.

Introduction

Infective endocarditis is a relatively rare condition with an estimated incidence of 2.6 to 7 cases per 100,000 populations per year [1]. Common risk factors include Intravenous (IV) drug use, poor dental hygiene, and prolonged systemic infections. IV drug-related endocarditis accounts for approximately 5% of hospitalizations and 5% to 10% of total deaths [2].

Endocarditis has nonspecific symptoms and includes heart failure, new onset murmurs, fever, leukocytosis, and vegetations. Methicillin-Sensitive *Staphylococcus aureus* (MSSA) is the most common microbial agent of endocarditis in IV drug users. If endocarditis is suspected, blood cultures and a Transthoracic Echocardiogram (TTE) are recommended to evaluate for any vegetations.

Once diagnosed, current guidelines recommend empiric antibiotics including vancomycin and a cephalosporin. For a Viridans group Streptococci infection with renal or cranial nerve involvement as seen in this patient, 4 weeks of Penicillin is recommended. Due to the multi-organ effects of endocarditis, prompt diagnosis and treatment are needed to effectively manage the infection.

Case Presentation

D.M. was a 31-year-old G4P3 female at 27+5 weeks with a past medical history of Hepatitis C and active recreational heroin use. She was admitted due to severe lower abdominal pain, vaginal bleeding, decreased fetal movement, frequent contractions, and bilateral lower extremity edema. Workup in the emergency department showed signs concerning for HELLP (Hemolysis, Elevated Liver enzymes, and Low Platelets) syndrome and infective endocarditis. Significant lab values in the emergency department are the following:

Hgb: 8.5×10^3 uL

WBC: 20.7×10^3 uL

Platelets: 38×10^3 uL

PT/INR: 15/1.4. sec

Fibrinogen: 359 mg/dL

Creatinine: 1.2 mg/dL

Total bilirubin: 4.1 mg/dL

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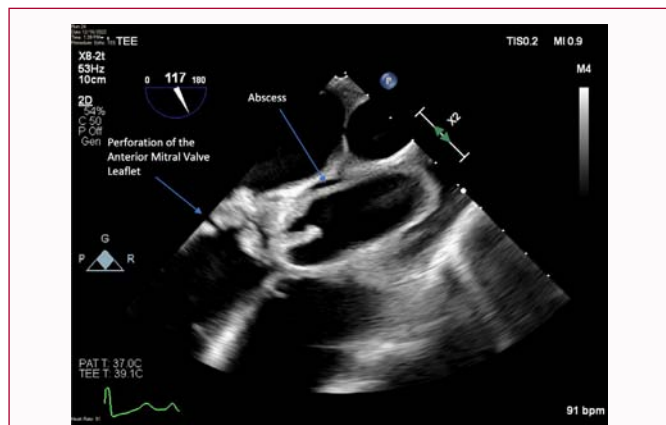


Figure 1: 2D TEE view of the abscess and perforation of the mitral valve.

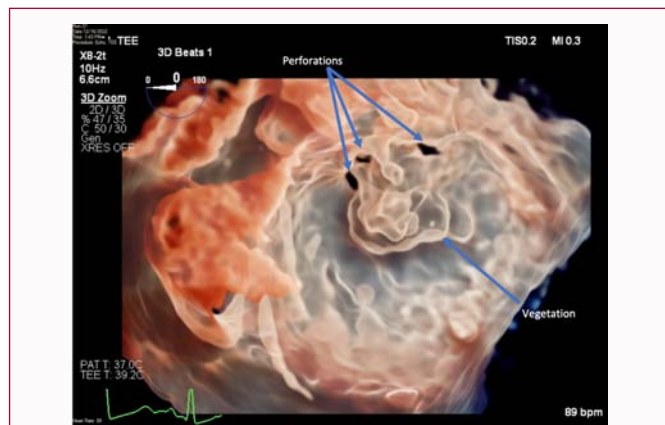


Figure 3: 3D view revealing the perforations and vegetation.



Figure 2: Color flow through anterior mitral valve leaflet perforation.

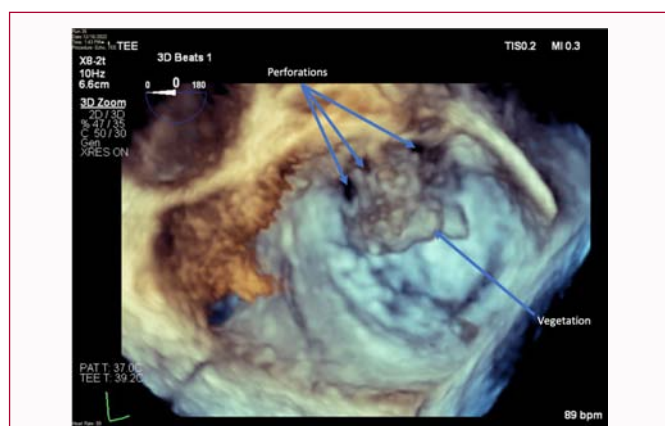


Figure 4: Alternate 3D view showing the perforations and vegetation.

AST/ALT: 197/113 units/L

Troponin: 484 ng/L

BNP: >5,000 pg/mL

Lactic acid: 5.7 mmol/L

Ammonia: 37 umol/L

Subsequent echocardiography showed left ventricle ejection fraction of 58%, a communication between the left ventricular outflow tract and left atrium, aortic valve vegetation, severe aortic insufficiency, severe mitral regurgitation, and perforation at the base of the anterior mitral valve leaflet with a 2.26 cm x 2.24 cm echogenic mass (Figures 1-4). These findings are suggestive of vegetation with a possible abscess formation.

The patient was taken immediately to the operating room for caesarean section and heart surgery. She was given magnesium, vancomycin, and cefepime by the obstetric team. On arrival to the operating room, the anesthesia team placed an arterial line and prepared for induction. After a slow controlled induction, the airway was secured and the patient was placed on the ventilator. Next, two central lines were placed in the right internal jugular vein. One central line with swan capability and the other central line for hemodialysis; insuring adequate IV access. Next, the cardiothoracic surgeons performed sternotomy, placed cannulation stitches, and prepared cardiopulmonary bypass lines. The obstetric team performed the caesarean section next and passed the newborn to the neonatal

intensive care team. The patient initially tolerated the caesarean operation well, however, as the obstetricians began to close, her right ventricular function and right ventricular dilation worsened. The obstetricians quickly closed and passed to the cardiothoracic surgeons. Prior to placing the patient urgently on cardiopulmonary bypass, she had two runs of ventricular tachycardia which converted back to sinus rhythm spontaneously. After being placed on cardiopulmonary bypass, the surgeons performed a mechanical aortic valve replacement, a mitral valve repair (patch repair of the leaflet perforation and resuspension of the anterior mitral valve leaflet to the fibrous trigone), aortic root reconstruction with bovine pericardium, repair of the left atrial to aortic root fistula and a tricuspid valve annuloplasty (DeVega annuloplasty). Her postoperative Transesophageal Echocardiogram (TEE) showed a left ventricle EF of 25%, moderate RV dysfunction, well-seated mechanical aortic valve replacement with washer jets present, moderate mitral regurgitation and trace tricuspid insufficiency. After surgery, she was moved to the Cardiovascular Intensive Care Unit (CVICU) on epinephrine 0.1 mcg/kg/min, vasopressin 7 U/h, norepinephrine 0.1 mcg/kg/min and inhaled flolan with propofol for sedation at 50 mcg/kg/min.

On POD #1, the patient's blood cultures were positive for *Strep. oralis*. She was subsequently started on Vancomycin and Ceftriaxone per Infectious Disease (ID) for endocarditis and septic shock management. On POD #3, the patient could not follow commands. A CT head revealed an Intraventricular Hemorrhage (IVH). The neurosurgical team was not able to intervene secondary to the patient's persistent thrombocytopenia. Hematology was

consulted. The hematology team suspected her thrombocytopenia was due to reactive sepsis, but due to the positive response to platelet transfusions, they chose to treat with dexamethasone as if the patient had immune (or idiopathic) thrombocytopenia. On POD #4, a large liver was noted on physical exam. Ultrasound findings suggested acute cholecystitis. In order to cover for both endocarditis and acute cholecystitis, infectious disease recommended continuing treatment with Ceftriaxone.

On POD #5, during the obstetric physical exam, the team noted cloudy serosanguineous discharge from the operative site. After a wound culture was taken, the patient was started on Metronidazole for anaerobic coverage. She was extubated on POD #8 and complained of significant pain. She was started on Methadone. At the time of extubation, her white blood cell count was consistently in a range of $16\text{-}20 \times 10^3$ uL and her platelets were 55×10^3 uL. On POD #10, the neurosurgery team permitted anticoagulation after a new CT head showed a stable IVH. A heparin drip was started.

On POD #11, she became febrile for the first time in the ICU. A T2 bacterial panel grew *Enterococcus faecalis* and the central line was removed. Infectious disease ordered Daptomycin for 7 days, then Ceftriaxone for 5 weeks to finish her endocarditis treatment. On POD #12, she passed a speech evaluation and was cleared for a diet. She lost a tooth overnight and swallowed it. The Oral Maxillofacial Surgeons (OMFS) were consulted and teeth extraction was planned to mitigate the risk her teeth posed to her heart valves.

On POD #17, the patient went to the operating room for a full mouth extraction with the OMFS service. The procedure was uncomplicated with minimal blood loss. She was extubated in the operating room and recovered well. She was transferred out of the CVICU following the procedure. At this point in her hospital course, her WBC count was 9.3×10^3 uL and RBC count was 8.3×10^3 uL. Her platelets had been consistently rising over the past 7 days, reaching 214×10^3 uL at time of transfer.

On POD #18 from her cardiac procedure and POD #1 following full mouth extraction, she left the hospital Against Medical Advice (AMA) without antibiotics or anticoagulation.

Three days later, she returned to the hospital by ambulance in respiratory distress. She was intubated in the emergency department. She was diagnosed with septic shock, congestive heart failure, respiratory failure, renal failure, and multifocal pneumonia. Her notable labs were the following:

WBC: 16.1×10^3 uL

Lactic acid: 9.0 mmol/L

ABG: 7.245/38.2/104.0/16.6 with a base deficit of 10.0

BNP: 2115 pg/mL

She was started on norepinephrine and vasopressin for hemodynamic support and given Vancomycin and Zosyn for antibiotics.

She was admitted to the intensive care unit. ID was consulted for sepsis and leukocytosis. Her caesarean wound culture grew *Pseudomonas aeruginosa*, and blood cultures grew Gram Positive Cocci. Cardiothoracic surgery was consulted for management following her recent admission. She continued to have worsening metabolic acidosis and hypotension requiring multiple vasopressors.

Nephrology was consulted for Continuous Renal Replacement Therapy (CRRT), but she was unable to tolerate it due to hemodynamic instability. Her acidosis continued to worsen with a pH decreasing to 6.99. A family meeting was held due to the patient's declining condition and multi-organ failure. The decision was made to discontinue aggressive care and continue with comfort care. She died shortly after aggressive care was withdrawn.

Discussion

Infective endocarditis is an infection of the endocardium that typically affects heart valves. The condition is most commonly caused by non-sterile injections, dental procedures, or distant primary infections. In terms of the pathogenesis, a localized infection leads to bacteremia, resulting in the bacterial colonization of heart valves. Over time, the formation of fibrin clots around the vegetation leads to the destruction of the heart valve.

If endocarditis is suspected, guidelines state that Transthoracic Echocardiography (TTE) should be performed to assess for any masses [3]. The patient presented in this case was an active drug user which likely resulted in her severe aortic insufficiency, severe mitral regurgitation, and an echogenic mass on the aortic valve and mitral valve with subsequent abscess and fistula formation.

Guideline-directed medical therapy states for cases of endocarditis, infectious disease needs to be consulted followed by empiric antibiotic therapy after blood cultures are taken. Empiric antibiotic therapy for native valve endocarditis usually consists of vancomycin plus a cephalosporin. After the patient's surgery, blood cultures were positive for *Strep. oralis*. In a study published by the American Heart Association, *Strep. oralis* has a prevalence rate of 19.4% [4]. The antibiotic regimen was narrowed down to high-dose Penicillin to combat the identified bacterial infection.

Post-op, the patient continued to need vasopressor support and likely suffered from mixed cardiogenic and distributive shock due to heart failure and bacteremia. The patient also had thrombocytopenia, likely due to reactive sepsis primarily from infective endocarditis. Thrombocytopenia has been posed as a potential prognostic marker in patients with endocarditis. In a study published by the European Heart Journal analyzing patients diagnosed with endocarditis with and without thrombocytopenia, higher mortality was observed in patients with thrombocytopenia [5]. Hematology treated the patient with dexamethasone as if she had Immune Thrombocytopenic Purpura (ITP) due to the lack of schistocytes on blood smear and a negative ADAMSTS13 test.

Throughout the hospital course, the patient developed acute cholecystitis which prompted a change of antibiotics to Ceftriaxone to cover for both endocarditis and cholecystitis. Infective endocarditis with concurrent cholecystitis is an extremely rare but recognized association. Given the patient's sepsis, this case supports the evidence that the gallbladder may be a site of septic metastasis during infection.

The complex hospital course supports the widespread effects of endocarditis and its multi-organ effects due to bacteremia. Bacteriological cure rates exceed 98% in patients who complete 4 weeks of therapy with parenteral Penicillin or Ceftriaxone for infective endocarditis caused by highly Penicillin-susceptible Viridans Group Streptococci (VGS) [6]. This confirms that early detection and guideline-directed management are essential to prevent further bacterial infection and successfully treat endocarditis.

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