Rapid progression of constrictive physiology due to acute isolated suppurative pericarditis

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Introduction

Pericarditis
- Well described in pediatric patients
- Variable presentation and acuity
- Unique challenges with rare organisms, atypical presentation and clinical decompensation

Unique Case
- Methicillin-resistant Staphylococcus aureus (MRSA) pericarditis
- No Bacteremia
- Presenting with tamponade physiology
- Rapid development of constrictive physiology with pericardial drain.

Case Description

Presentation:
- A 5-year-old, healthy, male
- Presented to a rural emergency department with non-specific abdominal pain
  - Reassuring exam and abdominal CT
  - Two days later returned to the same emergency department
  - Hypoxic, hypotensive, and tachycardic
  - Leukocytosis, electrolyte derangement, and transaminitis
  - Hemodynamic instability
  - Bedside ultrasound: large pleural and pericardial effusions with evidence of cardiac tamponade.

Emergency Room Intervention:
- Pericardiocentesis with 150cc of pericardial fluid removed.
- Intubated with three minutes of CPR prior to ROSC
- Started on empiric vancomycin and ceftriaxone and transferred to tertiary center

ICU Course:
- Pericardial drain placement
- Extubated hospital day 2 with improving clinical condition
- Pericardial fluid culture identified methicillin-resistant Staphylococcus aureus
- IV vancomycin and ceftriaxone
- Hospital day 3
  - Echo demonstrated constrictive physiology (**Figure 1**).
  - Clinical deterioration with decreased perfusion and increased heart rate
  - Semi-elective intubation
  - Internal jugular central venous line was placed measuring central venous pressures of 21-25 mmHg.
  - Worsening hypotension, requiring initiation of inotropic support. With worsening constrictive physiology, the decision was made to proceed with surgical intervention in the form of pericardiectomy and epicardial stripping

OR Course and Findings:
- Thick, fibrinous exudate over the entire epicardial surface (**Figure 2**).
- Epicardial exudate peeled off the epicardial surface using forceps and a periosteal elevator. This was performed over the entire right ventricular surface, including the anterior wall and the base, and the lateral wall.
- Posterior wall could not be completely stripped so a posterior pericardial window to the left pleural space was performed
- Intraoperative TEE noted normal biventricular size and systolic function.
- Normalization of the CVP to 13 mmHg.

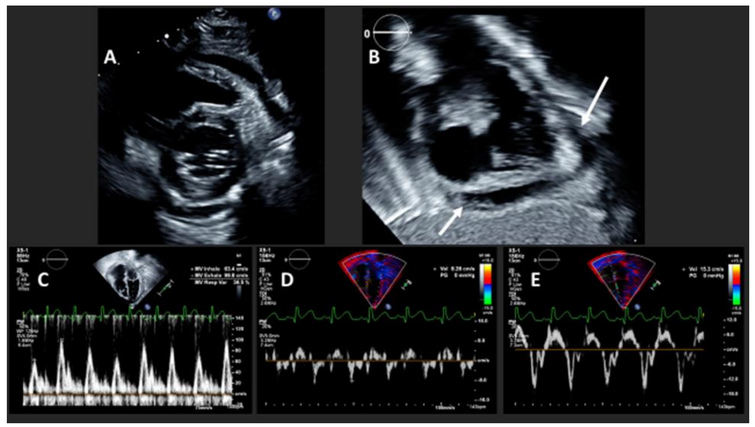

Figure 1 : Echocardiographic Findings. Echocardiogram on post-procedure day 2 showed small, circumferential pericardial effusion from the parasternal long axis (A) and subcostal coronal (B) views with potential loculation (white arrows). There was significant respiratory variation to mitral inflow (C) along with decreased lateral (D) and increased medial (E) mitral annular e' velocities consistent with constrictive physiology.

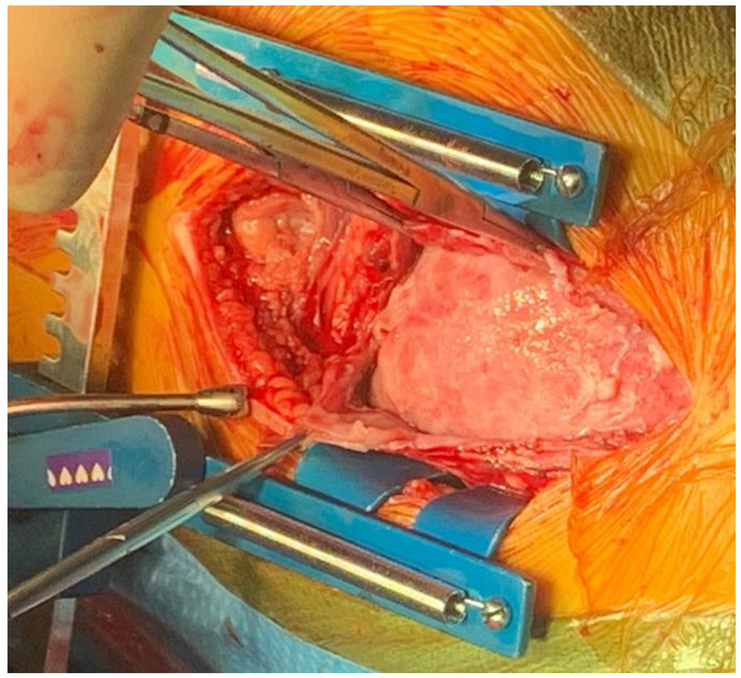

Figure 2 : Thick, fibrinous exudate over the entire epicardial surface

Discussion

While early diagnoses of cardiac tamponade and constrictive pericarditis can improve morbidity and mortality, there is limited information regarding the diagnosis, management, and treatment of acute, constrictive pericarditis in pediatric patients.

Advanced imaging is often used to aid in the diagnosis of constrictive pericarditis. Imaging modalities utilized in patients with constrictive pericarditis include computed tomography (CT), magnetic resonance imaging (MRI), and cardiac catheterization. Echocardiography has proven to be reliable in the diagnosis of constrictive pericarditis, and CT or MRI have been performed on patients to further define pericardial calcification, inflammation, and thickening.[1] Due to rapid patient deterioration as described in this case, elevated central venous pressures, and echocardiographic findings consistent with constriction, our multi-disciplinary team elected to proceed with surgical intervention and forgo advanced imaging.

Despite increasing cases of MRSA in pediatric patients, the epidemiology of acute, constrictive MRSA pericarditis remains unclear. Primary, purulent pericarditis is rare amongst the pediatric population, as most are identified to have a concurrent site of infection such as pneumonia, soft tissue or bone infection as the primary source of infection.[2] This is in direct contrast with our patient whose blood cultures remained negative, and no overt source of infection was ever identified outside of the pericardial fluid.

Prompt initiation of empiric antibiotic therapy for patients with suspected infectious, constrictive pericarditis is beneficial, however, guidelines are not well defined. Throughout our literature review, empiric vancomycin and ceftriaxone were administered in order to cover for MSSA and MRSA, and antibiotic therapy was adjusted once cultures resulted.

Conclusion/Summary

Unique case of pediatric pericarditis:
- Many cases idiopathic and infectious etiologies often secondary to an identifiable source
- This case describes an isolated MRSA infective pericarditis with acute decompensation

Secondary decompensation
- This case highlights the need for close monitoring even after initial stabilization
- Despite drain placement, constrictive physiology developed within two days secondary to a thick exudate adherent to the epicardial surface in the absence of beactermia.

Intervention decisions
- While multiple imaging modalities are available to define constrictive pericarditis, surgical disposition was driven by the clinical course and echocardiographic findings.
- Pericardiectomy via median sternotomy can be safely performed in the pediatric population, with special consideration to avoid phrenic nerve injury, with prompt resolution of constrictive physiology.

References

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2. Abdel-Haq N, Moussa Z, Farhat MH, Chandrasekar L, Asmar BI. Infectious and Noninfectious Acute Pericarditis in Children: An 11-Year Experience. Int J Pediatr. 2018 Nov 8;2018:5450697. doi: 10.1155/2018/5450697. PMID: 30532791; PMCID: PMC6250032.