Case Report

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Intrapericardial antibiotics and fibrinolysis to shorten course of antibiotics and prevent constrictive pericarditis in acute purulent pericarditis due to staphylococcus aureus

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Abstract

Acute purulent pericarditis, although rare in modern antibiotic era, is a life-threatening condition requiring timely diagnosis and aggressive treatment modalities. We report a successfully treated previously healthy immunocompetent 23 years old male patient diagnosed as secondary acute purulent pericarditis caused by methicillin sensitive Staphylococcus aureus with a primary skin abscess. The patient initially presented with complains of fever, chest pain and occasional cough with no significant finding in clinical examination. Electrocardiography showed widespread ST elevation and echocardiography revealed fluid collection with echogenic floaters in pericardial space. Diagnostic pericardiocentesis was done and fluid showed growth of methicillin sensitive Staphylococcus aureus. The patient was managed with anti-inflammatory drugs, appropriate intravenous antibiotic for two weeks, therapeutic pericardiocentesis with intrapericardial vancomycin instillation and fibrinolysis with alteplase to prevent constrictive pericarditis and persistent purulent pericarditis. The patient was followed up in three months and was found to have no residual disease or complication.

Keywords: Acute purulent pericarditis, Intrapericardial antibiotic, Staphylococcal pericardial effusion

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Introduction

Purulent pericarditis is defined as localized infection of pericardium and pericardial space complicated with gross purulent collection with or without the features of tamponade.

Before the advent of antibiotic therapy, purulent pericarditis was an infrequent but well recognized complication of contiguous spread from pneumococcal pneumonia or hematogenous spread from distant staphylococcal osteomyelitis.[1] Primary involvement of the pericardium without evidence of underlying infection elsewhere is very rare.[2] Globally, the most common reported organisms are staphylococci, streptococci and pneumococci however tubercular pericarditis is common in HIV infected individuals and in people living in tuberculosis endemic regions including Nepal.[3]

We present a case of a 23-year-old immunocompetent previously healthy adult patient who was diagnosed as having secondary purulent acute bacterial pericarditis caused by methicillin sensitive Staphylococcus aureus with primary skin abscess in lower back.

Case presentation

On August 10, 2022, twenty-three years old soldier who was undergoing training, with no known previous co-morbidity was admitted in our hospital, with complains of fever for three days and chest pain for one day. Fever was associated with chills and rigor, maximum temperature recorded was 1030F and which got relieved with antipyretics. Patient had retrosternal chest pain, stabbing type, mild in intensity, aggravated on inspiration along with occasional cough and relieved on sitting up. On examination, his vitals and systemic examinations revealed no apparent abnormality. On further evaluation, he had a wound of size 2.5x2.5 cm on his lower back which was initially a painful swelling, drained and closed in local medical facility but culture sensitivity test of the drained pus was not done.

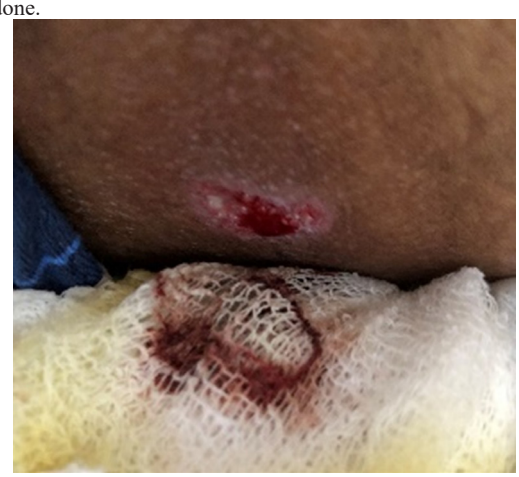

Figure 1: Drained skin abscess on lower back of patient

Patient had total leucocyte count 18,600, 72 % neutrophils and 20% lymphocytes, hemoglobin 12.5 gm% and platelet count 2,04,000/µl. His random blood sugar, renal function test, liver function test was within normal limit. Hepatitis B, C and HIV serology were non-reactive. His electrocardiogram showed ST segment elevation in all limb leads and anterolateral precordial leads. CPK-MB was 32U/L and troponin I was negative. His chest x-ray revealed no abnormality. The patient was admitted with diagnosis of acute pericarditis with injection amoxicillin clavulanate 1.2 grams three times daily, tablet colchicine 0.5mg twice daily, tablet indomethacin 50mg three times daily and pantoprazole 40mg once daily. Sequential ECG and cardiac enzymes monitoring were done for next 24 hours but were non-significant.

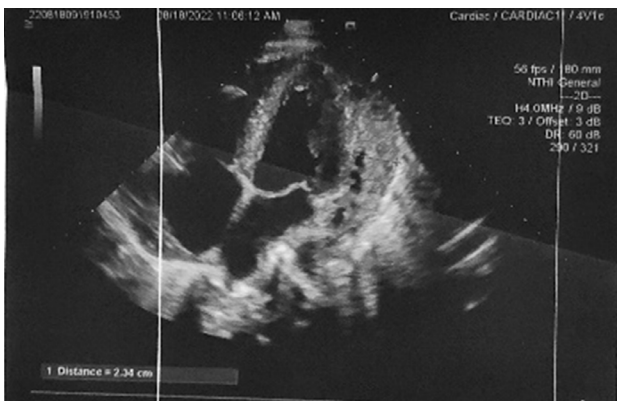

Figure 2: Echocardiograph with pericardial effusion

2D echocardiography showed moderate pericardial effusion with echogenic floaters in pericardial space. Echocardiography guided pericardial tapping was done through subxiphoid approach and 20ml of yellowish pus like fluid was aspirated. Sample was sent for culture sensitivity testing, gram staining, ZN staining and adenosine deaminase level. With the diagnosis of purulent pericardial effusion, antibiotics were upgraded empirically: injection meropenem 2gram x TDS, injection vancomycin 1gram twice daily and injection metronidazole 500mg x TDS. Next day patient's covid-19 PCR report was positive and was shifted to covid ICU.

On day 3, echocardiography revealed large pericardial effusion with impending tamponade, left ventricular systolic dysfunction with ejection fraction 30%. Immediately double lumen 12Fr dialysis catheter was inserted into the pericardial space via subxiphoid approach under echocardiography guidance and emergency bedside pericardiocentesis was done. About 800ml purulent hemorrhagic fluid was aspirated and then pericardial washout was done with continuous irrigation and drain using 500ml normal saline. One episode of ventricular tachycardia was encountered during the procedure and managed immediately; post procedure vital parameters were normal.

Contrast enhanced computed tomography (CECT) of chest, abdomen and pelvis was done which revealed heterogeneously enhancing nodular lesions in bilateral lungs likely infective (D/D- septic emboli), moderate pericardial effusion with features of pericarditis, moderate bilateral pleural effusion.

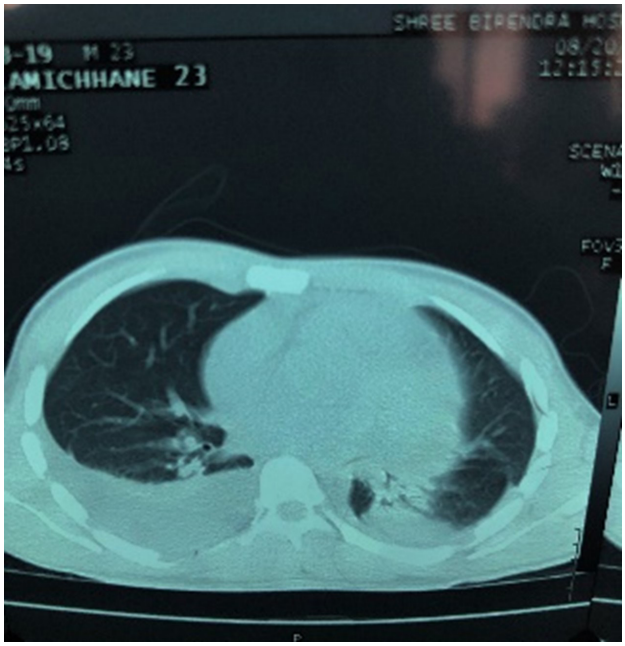

Figure 3: CECT image showing heterogeneously enhancing nodular lesions, moderate pericardial effusion, bilateral pleural effusion.

Pericardial fluid culture sensitivity report revealed methicillin sensitive Staphylococcus aureus (MSSA), ZN stain revealed no acid fast bacilli and ADA level was normal. Injection vancomycin one gram in 50ml normal saline was instilled into the pericardial cavity daily for three doses.

On day 5, patient developed intrapericardial septations and localized fluid collection, constrictive physiology in ECHO with dilated non collapsible vena cava with expiratory hepatic venous flow reversal, septal bounce, significant mitral and tricuspid flow variation and annulus reversus. With diagnosis of effusive constrictive physiology, intraperitoneal fibrinolysis was done using 20mg alteplase in 60 ml normal saline and flushed with additional 20ml normal saline. Around 180ml fluid was aspirated after three hours of instillation. There was no further septations or localization of effusion so the catheter was removed on Day 10. After two weeks of intravenous antibiotics, patient developed fever with maximum temperature of 101.7oF. Physical examinations, laboratory reports including serum procalcitonin and chest radiography revealed no abnormality. With suspicion of drug induced fever, antibiotics were stopped and the fever subsided after 24 hours. The patient was discharged on tablet ramipril 1.25mg once daily, tablet metoprolol succinate 12.5mg once daily, tablet colchicine 0.5mg once daily, tablet torsemide 10mg once daily for 2 weeks. Echocardiography before discharge revealed no features of constriction with normal inferior vena cava with no flow reversal, normal mitral annular relaxation pattern, no significant flow variation, normal left ventricular ejection fraction, mild tricuspid regurgitation with tricuspid regurgitation peak gradient 25mmHg.

After three months of discharge from hospital, the patient was followed up in cardiology OPD. He was asymptomatic, 2D echocardiography revealed normal inferior vena cava size, no septal bounce, normal mitral/ tricuspid flow variation, normal left ventricular ejection fraction.

Discussion

Prior to modern antibiotics era, purulent pericarditis was a frequent complication of pneumococcal pneumonia however in recent times, most cases reported are associated with bloodstream infections, thoracic surgery or trauma or immunosuppression. One study done in The John Hopkins Hospital to determine the spectrum of predisposing factors of purulent pericarditis where the patients of purulent pericarditis were examined at autopsy before 1943 (group I) and after 1943 (group II) with total of 190 patients, majority of patients had a primary infectious disease like pneumonia (49.6%), endocarditis (7.5%), bone and skin infection.[4]

Study related to organism associated with pathogenesis of purulent pericarditis among 113 cases, 93 percent of cases having preceding pneumonia had pneumococcus.[5] In another study, among the cases of purulent pericarditis due to hematogenous spread, most common etiologic organisms were strains of Staphylococcus, pneumococcus and various streptococci.[6] Another case series with twenty six cases of purulent pericarditis, 45 percent of cases was caused by gram positive organisms with Staphylococcus aureus being the most common (31 percent).[7] Similarly the organism responsible for pathogenesis of purulent pericarditis in our case was methicillin sensitive Staphylococcus aureus.

Acute purulent pericarditis is typically characterized by high fever, tachycardia, chest pain and cough.[8] In one case series, the mean duration of symptoms before hospital visit was three days.[7] Similarly our patient presented with complains of fever, chest pain and occasional cough for three days. According to European society of cardiology (ESC) guideline 2015, electrocardiographic finding of widespread ST-segment elevation has been reported as a typical hallmark sign of acute pericarditis, also seen in our patient.8 As per ESC guideline 2015, the main stay of treatment in acute pericarditis and pericardial effusion is NSAIDs, colchicine in low weight adjusted dose, pathogen directed antimicrobial use and pericardiocentesis which was followed in our patient.[8]

Antibiotic therapy for bacterial pericarditis is usually prolonged, at least 4 weeks of broad spectrum antibiotics is needed until resolution of fever and all signs of infection.[9] But in our patient, short course of antibiotics for two weeks was sufficient. This shortened course of intravenous antibiotics could be due to instillation of antibiotic directly into the pericardial space.

Fibrin formation appears to be a major risk factor for constrictive pericarditis and persistent purulent pericarditis which later needs pericardiectomy for complete eradication of infection. Hence, intrapericardial fibrinolysis during pericardiocentesis may be considered as a less invasive effort to prevent the complications and need of surgical intervention later.[10] Regular pericardiocentesis and fibrinolysis with intrapericardial alteplase was done in our patient.

Acute purulent pericarditis is a life threatening condition with reported mortality rates between 20 and 30 percent and constrictive pericarditis occurs over the course in at least 3.5% of cases.[10] However we were able to successfully treat the patient and prevent the occurrence of severe complications.

Conclusion

Acute purulent bacterial pericarditis, although a rare entity in our regular practice, should always be considered in patients with signs and symptoms of pericarditis that could be spread from contiguous pulmonary infection or by bacteremia from distant focus. Keeping in mind the rapid progression and fulminant course of this condition, timely recognition and appropriate treatment is of paramount significance for a successful outcome.

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