Hong Kong College of Physicians
Case report for Interim Assessment
Specialty Board of Advanced Internal Medicine (AIM)

For AIM Training, case reports should be submitted in the prescribed format together with the application form for Interim Assessment at least EIGHT Weeks before the date of Interim Assessment

Name of candidate (print and sign):
Hospital and Unit: Specialty:
Name of supervisor (print and sign):
Date(s) and place (hospital) of patient encounter: 07/2019 – 10/2019
Date of report submission: 3/3/2021

Title: Purulent pneumococcal pericarditis: an uncommon but severe form of invasive pneumococcal disease

Case History:

A 68-year-old lady who is a non-smoker and non-drinker, with independent functional status and unremarkable past medical history, was admitted to the medical ward for sepsis. She presented with low grade fever, as well as mild dry cough and shortness of breath on exertion. There were no chills or rigor. She denied chest pain or hemoptysis, nor any urinary symptoms. There were no contact or travelling history, as well as no significant drug history. Family history was unremarkable without significant cardiopulmonary or malignant diseases.

Physical examination, at admission, showed tachycardia with regular pulse rate up to 110beats/minute with low grade fever. The blood pressure was 120/80mmHg and patient was lying flat comfortably on room air. Auscultation of the chest revealed bilateral basal crepitations. There were elevated jugular venous pressure (JVP) just above mid-neck and mild bilateral lower limb pitting edema. Auscultation of the heart did not reveal murmur, muffled heart sound or pericardial rub. There was no palpable cervical lymph nodes or finger clubbing.

Blood tests showed elevated inflammatory markers, with white cell count (WCC) 19 x 10^9/L and C-reactive protein (CRP) 222mg/l. There was mixed

pattern of deranged liver function test, with total bilirubin 21µmol/l, total alkaline phosphatase (ALP) 1037IU/l and alanine transaminase (ALT) 148IU/l. Electrocardiogram (ECG) revealed sinus tachycardia with occasional premature atrial contractions. Chest X-ray showed cardiomegaly and a globular heart configuration, suggestive of pericardial effusion. Otherwise no consolidation was noted over bilateral lungs (Fig. 1).

Ultrasound of the hepatobiliary system revealed bilateral pleural effusion, together with engorged hepatic veins and inferior vena cava (IVC) suggestive of underlying heart failure. The deranged liver function was likely due to congested liver.

In view of the chest X-ray abnormalities together with features of heart failure, a bedside handheld echocardiogram was performed. It showed a 2.5cm thick inferolateral pericardial effusion with systolic right atrial (RA) collapse and a 2cm engorged IVC suggestive of impending cardiac tamponade. Otherwise the left ventricular ejection fraction (LVEF) remained normal.

Urgent pericardiocentesis yielded pus. Biochemical investigations of the pus showed pH value of 6.6, markedly elevated lactate dehydrogenase (LDH) 15,031U/l and neutrophilia 120,000/cmm. The pus grew *Streptococcus pneumoniae* sensitive to penicillin (minimum inhibitory concentration [MIC] 0.06µg/ml). Cytology did not show malignant cells.

Thus the diagnosis of purulent pneumococcal pericarditis with pericardial empyema was made. Patient was treated with intravenous (IV) ceftriaxone.

Computed tomography (CT) scan of the thorax showed prominent reactive mediastinal lymph nodes, without any evidence of lung abscess or consolidation. Blood culture did not yield positive growth after five days of incubation. Serology for human immunodeficiency virus (HIV) was negative.

Patient’s condition improved with IV ceftriaxone and the pericardial drain was removed after three days when the pericardial pus output became minimal with echocardiogram showing minimal pericardial effusion left. Mild LV septal bouncing was noted on echocardiogram. Daily colchicine 0.5mg was started empirically for suspected constrictive pericarditis.

In view of improving clinical conditions, cardiothoracic surgeons suggested to continue medical therapy for pericardial pneumococcal empyema. Patient was subsequently discharged after two weeks of IV ceftriaxone followed by two weeks of oral amoxicillin for a total four-week antibiotics therapy.

However two months later, during a follow-up CT scan for the previously noted mediastinal lymph nodes, worsening of the pericardial effusion up to 4.5cm thick was incidentally noted with compressed heart chambers (Fig. 2). Patient was thus readmitted with urgent pericardiocentesis performed. Turbid fluid was yielded with marked neutrophilia again. Bacterial culture this time was negative but polymerase chain reaction (PCR) test showed positive result for *Streptococcus pneumoniae* serotype 23F.

IV ceftriaxone was started again with pericardial drain placed in-situ. Subsequently the drain clotted up on day 6 and was removed. Repeated echocardiogram showed no tamponade features but loculated pericardial effusion in LV posterolateral aspect and right ventricle (RV) free wall, which deemed difficult for percutaneous drainage. Cardiothoracic surgeons suggested for conservative management with prolonged course of antibiotics, and not for surgical drainage or pericardiectomy. Subsequently patient was put on four weeks of IV ceftriaxone followed by four weeks of oral amoxicillin/clavulanic acid.

Serial echocardiograms were performed in two-month intervals and showed resolved pericardial effusion without features of constrictive pericarditis. The LVEF was all along preserved.

A 13-valent pneumococcal conjugate vaccine, followed by a 23-valent pneumococcal polysaccharide vaccine were administered to the patient to prevent further invasive pneumococcal disease.

Discussion and literature review:

Invasive pneumococcal disease remains a significant morbidity and mortality worldwide, especially in those with old age, chronic disease or immunocompromised state. Alanee *et al* showed in a prospective study that older age ≥ 65-year and severity of the disease have significant association with mortality.[1] Clinical manifestations and severity vary among sites of

infection, in which pneumococcal meningitis is the most frequent complication from bacteraemia. Purulent pericarditis from invasive pneumococcal disease is rare in antibiotics era but remains a severe disease.

Purulent pericarditis is usually caused by haematogenous spread or direct spread from infection in close proximity to the pericardium, such as the myocardium or any sub-diaphragmatic focus. However, our patient has demonstrated primary purulent pneumococcal pericarditis without bacteraemia or evidence of infection in close proximity to the heart.

As well, patients with acute purulent pericarditis are classically unwell and septic-looking with high fever, tachycardia and/or chest pain, as opposed to our patient whom has remained stable with low grade fever and mild shortness of breath only. A 20-year retrospective study has commented that many patients with purulent pericarditis do not have classical presentation with diagnosis only made at autopsy or after cardiac tamponade has developed.[2] This highlights the importance of thorough physical examination and timely investigations to arrive at the diagnosis and thus to prevent the establishment of cardiac tamponade and mortality.

Purulent pneumococcal pericarditis, similar to other causes of purulent pericarditis, is treated by antibiotics and pericardial drainage.[3] For antibiotics treatment, susceptibility of *Streptococcus pneumoniae* to penicillin alters choices of antibiotics. For penicillin-susceptible *Streptococcus pneumoniae* (PSSP), defined by MIC ≤ 0.06μg/ml for meningitis or ≤ 2μg/ml for non-meningitis, third-generation cephalosporin such as ceftriaxone or penicillin monotherapy can be used. A prospective study on 844 patients with pneumococcal bacteraemia has shown that even discordant antibiotics therapy (i.e. inactive *in vitro*) with penicillin or third generation cephalosporin (e.g. cefotaxime, ceftriaxone) has statistically similar mortality rate with concordant antibiotics therapy (i.e. active *in vitro*).[4] IV antibiotics should be kept until the signs of infection have resolved with responding inflammatory markers (e.g. WCC, CRP). The entire course of antibiotics should be kept for at least four weeks for purulent pneumococcal pericarditis with pericardial empyema. As illustrated

in our patient that she has received four weeks of ceftriaxone and amoxicillin as the initial therapy.

Pericardial drainage is achieved with pericardiocentesis as performed in our patient. However, drainage of the thick empyema may result in loculations within the pericardium leading to pericardial constriction.[2] Surgical approaches including pericardiotomy or pericardiectomy are possible alternatives but carry surgical risks.[3] Yet despite adequate treatment, constrictive pericarditis is reported to occur in up to 15% of patients following purulent bacterial pericarditis.[5]

Echocardiogram with doppler flow analysis is essential for the diagnosis of constrictive pericarditis.[6] Septal bouncing, depicted by abrupt transient rightward movement of the interventricular septum, is one of the echocardiographic features of constrictive pericarditis, and was seen in our patient. Other features include increased pericardial thickness, moderate bi-atrial enlargement and hypermobile atrioventricular valves etc. As of our patient who presented with early stage of hemodynamically stable constrictive pericarditis, medical therapy with anti-inflammatory agent(s) should be initiated. Despite the gastrointestinal side effects, colchicine has been the anti-inflammatory drug of choice for treatment of acute and recurrent pericarditis. In a landmark double-blinded trial, 240 patients were randomly assigned to receive colchicine (0.5mg twice daily for patients >70kg or 0.5mg daily for those ≤70kg) or placebo in addition to conventional anti-inflammatory therapy (with either aspirin or ibuprofen). The colchicine group significantly reduced the rate of incessant or recurrent pericarditis, with overall similar rate of adverse events between both groups.[7] Another meta-analysis has added value on colchicine as a safe and efficacious agent for primary and secondary prevention of constrictive pericarditis.[8] Nonetheless, pericardiectomy remains the only definitive treatment for those who fail medical therapy.[6]

Afterall, prevention is always better than cure. 13-valent pneumococcal conjugate vaccine (PCV) and 23-valent pneumococcal polysaccharide vaccine (PPSV) are available to induce immunity against certain serotypes of *Streptococcus pneumoniae* and the vaccines have been shown efficacious in preventing vaccine-type invasive pneumococcal disease.[9] Apart from

immunocompromised patients, those with significant chronic diseases (such as chronic liver/lung/heart diseases) and elderly aged ≥65-year as suggested by Centres for Disease Control and Prevention (CDC),[10] as well as those with history of invasive pneumococcal disease should be vaccinated, thus reducing the risk of contracting the disease including purulent pneumococcal pericarditis.

In summary, purulent pneumococcal pericarditis is a rare but severe form of invasive pneumococcal disease. Early recognition and timely treatment help to reduce mortality, yet constrictive pericarditis remains a serious complication. Rather than to treat, eligible ones should be vaccinated to reduce the risk of getting the disease.

Tables and figures:

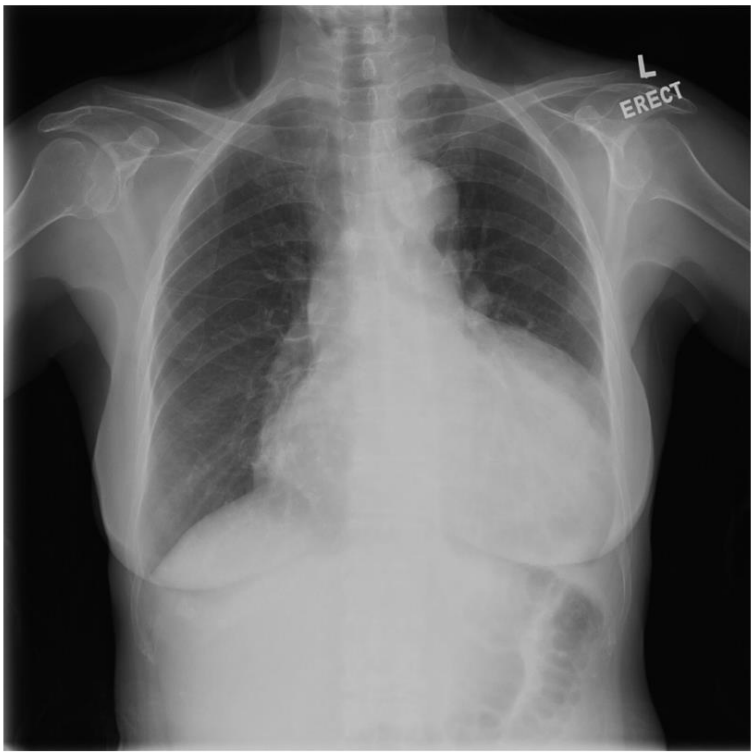

Figure 1. Chest X-ray showing cardiomegaly with globular heart configuration, suggestive of pericardial effusion

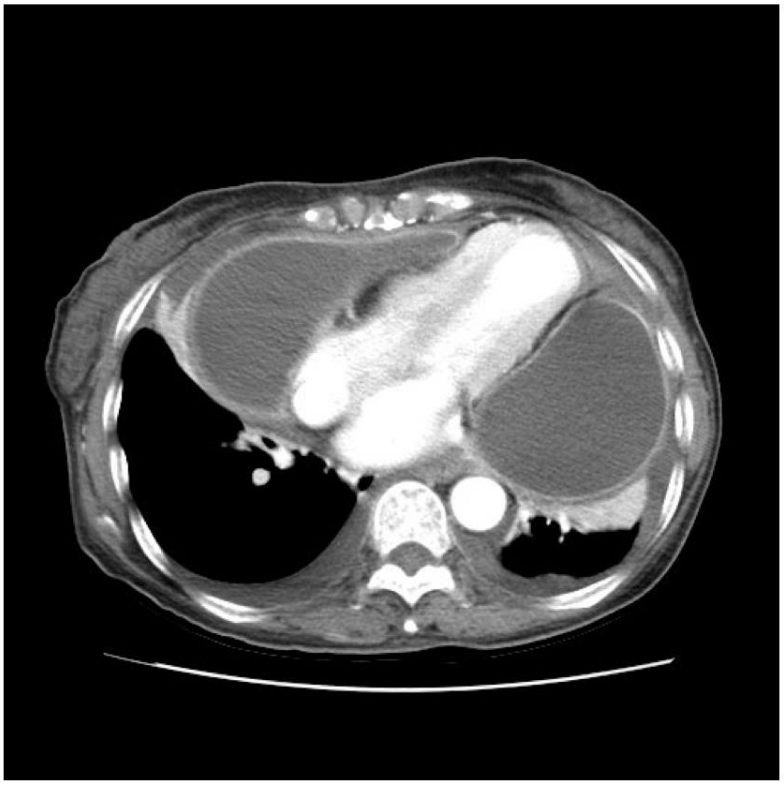

Figure 2. CT scan showing a thick pericardial effusion (with compressed heart chambers)

Reference:

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No of words in Case History and Discussion (excluding references):___1,491____
(should be between 1000-2000)

Declaration

I hereby declare that the case report submitted represents my own work and adheres to the prescribed format. I have been in clinical contact with the case selected. The case report has not been submitted to any assessment board or publication and it is NOT related to my second specialty(ies), if any. My consent is hereby given to the College to keep a copy of my case report, in written and/or electronic, at the College Secretariat and allow the public to have free access to the work for reference.

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(signature of Trainee)

Endorsed by Supervisor *

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