



Readiness for pericardiocentesis in cardiac tamponade: A case report

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Abstract

Mortality is preventable in cardiac tamponade. We report a 23-year old woman with massive pericardial effusion who had an adverse outcome. We discuss measures which if followed will improve outcome in emergency pericardiocentesis.

Key words: Pericardiocentesis, initiative, cardiac tamponade

Case report

A 23-year-old female presented to the general outpatient with cough for four months, productive of mucoid sputum, associated with hemoptysis, recurrent fever, widespread joint pains, weakness, weight loss and night sweats. Five days to presentation she developed leg swelling, with dyspnea on exertion, orthopnea and chest pain radiating to the right upper side of the back. On examination, she looked chronically ill, had bilateral pitting edema up to the sacral region. Her blood pressure was 100/70mmHg. Pulse was 120/minute, temperature 37.00C, respiration 30/minute, with apex beat at 6th left intercostals space, mid-clavicular, bibasal crepitations, distended abdomen, a tender liver palpable 8cm below right costal margin. Oxygen saturation was 97%.

Investigations results showing erythrocyte sedimentation rate of 170 mm/hour(0-15), albumin was 2.2(3.5-5.2)g/dl, serum creatinine 0.7mg/dl (0.5-1.5), urea 41mg/dl (13-43), sodium 134.9mmol/L (135-145), potassium 4.6mmol/L (3.5-5.5) chloride 108.0mmol/L (98-115), packed cell volume was 21.9% and haemoglobin 6.6g/dl. The white blood cell count was $7.3 \times 10^3/\mu\text{l}$ (4.0-12.0) but the result of the differentials was not retrieved. Culture of the pericardial fluid yielded no bacterial growth after 48hours incubation while the GeneXpert assay for microbacterium was negative. Electrocardiogram showed sinus tachycardia, the axis was normal, and PR and QRS intervals were normal, there were no ectopic beats or ventricular hypertrophy. Chest radiograph showed cardiomegaly with cardiothoracic ratio of 61.3%, unfolded aorta and interstitial edema. Two-dimensional echocardiogram showed severe pericardial effusion about 4.5cm with strands (Figure 1), severe tricuspid regurgitation with jet area of 12cm², ejection fraction was 78.7% and fractional shortening 46.9%, and left atrial compression. Antinuclear antibodies, antidouble-stranded DNAab, pericardial fluid analysis, cytology and were requested but not obtained.

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An impression of cardiac tamponade with background connective tissue disease was made. She was placed on intravenous frusemide 80mg twice daily, tablet spironolactone 25mg daily, tablet dabigatran 110 mg twice daily, blood transfusion, 3 units of packed cells, to give one unit daily under cover of frusemide.



Figure 1: Massive pericardial effusion

She was initially referred to university of Nigeria teaching hospital for pericardiocentesis, but relatives could not afford the trip. The cardiologist attempted his first pericardiocentesis, draining about 10mls of fluid, while expecting the cardiothoracic surgeons to take her up in the theatre that same day. It turned out that the visiting cardiothoracic surgeon was unable to operate for time, deferring to the next visit. Four days later, while a repeat pericardiocentesis was being arranged, the patient died.

Discussion

Patients may present with life-threatening cardiac tamponade. Many physicians are hesitant to carry out pericardiocentesis, deferring the procedure to cardiothoracic surgeons. The reasons for this include lack of needed equipment and fear about the procedure. Many centres however lack cardiothoracic surgeons, and waiting time may lead to avoidable deaths. This article examines points which if observed, physicians can safely undertake pericardiocentesis.

The standard pericardiocentesis kit include a long (7 cm) 18-gauge needle and inner stylet, which are advanced stepwise with serial stylet removal/insertion to check for fluid return.¹ The smaller gauge is associated with better outcome in the face of accidental perforation of the myocardium. However, the lack should not deter efforts in life-threatening cases. A case has been reported in Afghanistan where doctors not having the standard kit, improvised with an intravenous needle and a catheter, and guided the needle with an obstetric ultrasound, saving the girl's life.² This urges encouragement, initiative and improvising when needed to save a life. In our case a 21G

intravenous cannula was used for pericardiocentesis. Inserting the needle such that ultrasound rays meet it at an acute angle give better visualization of the needle on the ultrasound.³

An echocardiogram may not be available in some hospitals, but ultrasound machines are commonplace and will reveal massive effusions.⁴ It will also reveal a suitable site for aspiration. Traditionally, a subcostal (subxyphoid) approach is regarded as the safest route, but pericardial effusion is not always evenly distributed; so ultrasound determination of the ideal entry site is advocated.⁵

The optimal entry site is where the pericardial space is closest to the probe and the fluid accumulation is maximal, with no intervening vital organs, and this site is more often para-apical. In our patient, para-apical areas showed maximal fluid accumulation, and were used. Greater success rate and a minor complication rate have also been reported when the entry site is selected with ultrasound, rather than routine using a subcostal approach.⁶ Ultrasound guidance helps locate ideal site of insertion, direct movement toward the heart, and estimate the distance from skin to fluid. It helps avoid accidental punctures of the heart, lung and liver.

Anaesthesia with lignocaine is advised to reduce patient discomfort. The needle may encounter a rib, usually when using an apical approach. If this happens, withdraw and redirect the needle above the rib to avoid the neurovascular bundle lying beneath the rib.²

Whenever attempted, sufficient volume of fluid should be aspirated, and this may have improved outcome in our patient. The volume to aspirate should be envisaged before the procedure, 250ml⁷ to 1000ml⁴ of fluid having been reported as safe. Drainage of up to 1.5 litres of pericardial fluid over a period of 15 minutes may trigger cardiac decompensation.⁸

The most dreaded complication is cardiac puncture, which may be recognized by movement of the needle with each heartbeat and fast dripping of blood from the needle lumen and calls for cardiac surgery intervention. Pericardiocentesis should not ordinarily be undertaken without a team to handle possible complications. However, in life-threatening cases, pericardiocentesis even in a deficient setting can keep the patient alive for subsequent definitive surgery. Antibiotic

prophylaxis is indicated when the procedure is an emergency without adequate asepsis.⁹ Patients typically receive a broad spectrum cephalosporin antibiotic.

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