

Case Report

Massive pleural effusion, what should we do in emergency department? a case report

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ABSTRACT

Indonesia has been known as an endemic country of tuberculosis (TB). Most of the cases are pulmonary TB, and pleural effusion is one of the common cases. Untreated pleural effusion can become massive pleural effusion, a true emergency case in the emergency room. In this report we present a 21-years-old female patient with new onset massive pleural effusion due to TB infection. A 21-year-old female patient with no previous medical illness came to ER with shortness of breaths since a week ago. Cough and unmeasured fever have been reported since a month ago. Tachypnea, extreme tachycardia, asymmetric chest movement, decreased vocal fremitus, dullness of percussion, and decreased left pulmonary sound were found. Chest x-ray showed a massive left pleural effusion with tracheal deviation. High flow nasal cannula was given due to blood gas analysis interpreting moderate respiratory distress. Thoracentesis was immediately performed with estimated 1200 CC yellow coloured fluid production. Other laboratory findings include hyponatremia and hypoalbuminemia. This patient was diagnosed with pleural effusion type pulmonary TB, treated with anti-TB drugs, mucolytic, corticosteroid, and analgesics. Serial chest x-rays showed improvement of pleural effusion. In developing countries like Indonesia, the most common causes of pleural effusion was TB infection besides malignancy. A massive pleural effusion diagnosis can be established with history taking, physical examination, chest sonography, chest x-ray, and/or CT-scan. Thoracentesis must be performed within minutes after massive pleural effusion was established.

Keywords: Massive pleural effusion, Respiratory distress, Thoracentesis, TB, Emergency department

INTRODUCTION

Indonesia has been known as an endemic country of TB. Most of the cases are pulmonary TB, and pleural effusion (PE) is one of the common cases. Untreated PE can become massive pleural effusion or sometimes called tension hydrothorax, a true emergency case.^{1,2} In this report we present a 21-years-old female patient with new onset massive pleural effusion due to TB infection.

CASE REPORT

A 21-year-old female patient with no previous medical illness came to ER with chief complaint shortness of breaths since a week ago. Dry cough and unmeasured fever have been reported since a month ago.

Vital signs showed blood pressure 100/70 mmHg, heart rate 152 x/m, respiratory rate 48 x/m, body temperature 37.5° C and oxygen saturation 88% room air (99 percentages with non-rebreathing oxygen mask 15l pm). Asymmetric chest movement, decreased vocal fremitus, dullness of percussion, and decreased left pulmonary sound were found during physical examination.

Chest x-ray showed a massive left pleural effusion with tracheal deviation. Blood gas analysis showed respiratory alkalosis with moderate respiratory distress based on P/F ratio calculation (190 mmHg). Other laboratory findings showed hyponatremia and hypoalbuminemia. Laboratory findings summarised in the Table 1 and 2.

Table 1: Blood gas analysis result.

BGA	Results	Normal range
pH	7.50	7.35-7.45
pO ₂	152.0	85-100
PCO ₂	28.7	38-42
HCO ₃ ⁻	22.6	22-26
TCO ₂	23.0	19-25
BE	-1	(-2) - (+2)
SaO ₂	100	95-100

Table 2: Laboratory tests result.

CBC	Results	Electrolyte	Results	Liver	Results	Renal	Results
HGB	14.17	Na	128.50	SGOT	37.54	BUN	7
HCT	43.7	K	3.63	SGPT	25.69	Creatinine	0.216
WBC	7.34	Cl	101.00	Alb	3.3		
PLT	319			Glucose	112		

Table 3: Pleural fluid analysis result.

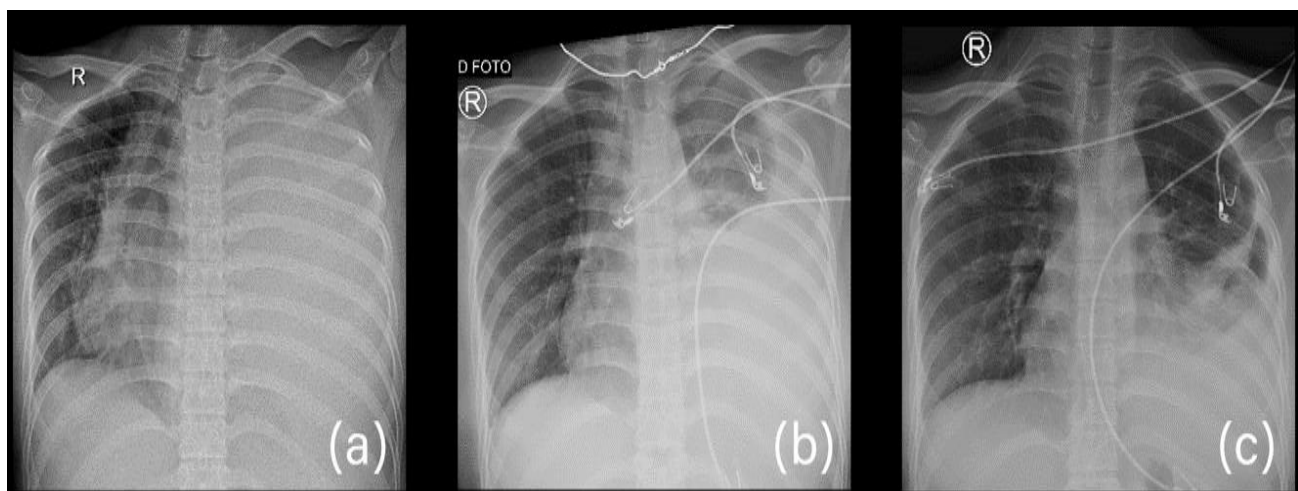
Pleural fluid	Results
Colour	Yellow
Clarity	Clear
Odour	No odour
Density	1.010
Clot	Negative
Albumin	2.7
Glucose	44
Cholesterol	107
PMN cells	4
MN cells	96
Rivalta's test	Positive

High flow nasal cannula (HFNC) was given based on BGA result. Thoracentesis was immediately performed with estimated 1200 CC yellow coloured fluid was removed. Patient's respiratory rates returns near normal and no complications after procedure.

Pleural fluid analysis (Table 3) showed yellow coloured pleural fluid, low glucose level, mononuclear cells domination and positive results of Rivalta's test. This patient was diagnosed with pleural effusion due to TB infection, treated with anti- TB drugs, mucolytic, corticosteroid, albumin supplements and analgesics.

In the 3rd day hospitalisation, 2nd thoracentesis was done with around 700 CC fluid removed. Serial chest x-rays showed resolution of pleural effusion shown in the in Figure 1.

Patient was discharged after six days hospitalization with negative results of sputum examination. One week later, the patient came to lung and respiratory clinic for follow up evaluation. The patient was told to continue the anti-TB drugs and finish the six-month program at public health centre.

**Figure 1 (A-C): Improvement in serial chest X-rays evaluation, chest X-ray in emergency room, X-ray day after 1st thoracentesis, X-ray after second thoracentesis.**

DISCUSSION

Pleural effusion is a condition that is fluid accumulation in pleural space. The most common cause is due to malignancy or infection. In developing countries like Indonesia, pulmonary TB is a common cause of PE.^{1,3} Untreated PE can become massive pleural effusion or called tension hydrothorax that can cause mediastinal compression, and mimic cardiac tamponade physiology (Beck's Triad), a life threatening case, that may worse to cardiac arrest.^{4,5}

Diagnosis of PE can be established from history taking with patient's chief complain mostly shortness of breath, chest pain and dry cough. In physical examination we can find asymmetrical chest movement, reduced vocal fremitus, dullness in percussion and decreased or loss of pulmonary sound. In tension hydrothorax cases, severe tachypnea or respiratory distress may presents.^{1,6,7}

Supporting diagnosis that can be done include chest sonography, x-ray, and CT-scan. In chest x-ray we can find blunt costophrenic angle, free-flowing pleural fluid and meniscus sign. Ultrasound has more accuracy to estimates effusion volume, helps thoracentesis procedure and has better visualization than CT scan. We can also find Quad sign or Sinusoid sign during lung ultrasonography. CT-scan rarely perform due to cost efficiency.^{1,6,7}

The presence of respiratory distress indicates that oxygen supplementation need to be given. While looking for the cause, non-rebreathing mask, HFNC or non-invasive ventilation (NIV) can be given. In severe causes, intubation may be done if PaCO₂ above 100 mmHg, respiratory rate above 30x/min and oxygen saturation below 80% with NIV oxygen support.⁸ We gave HFNC to this patient to maintain good oxygenation.

Pleural effusion with impaired respiratory function need an immediate intervention. Thoracentesis on midaxillary 5th intercostal space with large IV-linecatheter (14-16 G) can be performed. The safe range of pleural fluid that we can remove is 1000-1500 ml at one time. This amount can prevent pulmonary oedema or severe hypotension. Another complication is pneumothorax (5%). Ultrasound-guided thoracentesis can be used to minimize complications. Except in emergency situation (tension hydrothorax, respiratory distress, pleural empyema), thoracentesis can be performed in working hours.^{4,9-11} In this patient we found no complications occurred after immediate thoracentesis.

Pleural fluid analysis is usually performed. From macroscopic appearance, yellow-milky colour can be chylothorax or empyema and the red one is malignancy effusion. Based on Light's criteria, we measured pleural fluid-serum's protein ratio 0.8 (>0.5) that means this patient had exudate PE. Positive Rivalta's test also supports that we got a exudate pleural fluid. Low glucose level in pleural fluid indicates an empyema, TB or

malignancy causes.¹ Microbiology examinations and cytology tests like adenosine deaminase (ADA), carcinoembryonic antigen (CEA), and/or immunoglobulin G4 (IgG4) can be performed if the underlying cause remains unclear.^{2,7}

In the end we diagnosed this patient with respiratory distress due to pleural effusion type pulmonary TB. Although sputum examination show negative result, early progression of pleural effusion indicates this was caused by TB infection. TB guidelines also conclude that beside bacteriology confirmed, anti- TB drugs can be given based on patient's condition.^{2,12}

CONCLUSION

Massive pleural effusion or tension hydrothorax is true emergency case and need immediate intervention. Early progression of pleural effusion in patient with no previous medical illness may be due to TB infection.

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