

Under Pressure?

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SUBJECTIVE

70-yo male with PMH of Waldenstrom's macroglobulinemia and chronic, bilateral pleural effusions presents with **altered mental status** and **dyspnea**.

OBJECTIVE

Physical Exam:

VS: BP 110/70 HR 80 RR 30 Sat 92% on 4L

Gen: Cachectic and chronically-ill.

Neuro: A&OX3, but **slow to respond**.

Pulm: Breath sounds **markedly diminished**.

Extremities: Bilateral pitting edema.

(VBG #1: 7.34/63/30/34).

CT chest: Bilateral effusions, **no pulmonary embolus**.

FIRST CHEST RADIOGRAPH



ED COURSE

Over the next hour, the patient became increasingly sleepy and confused.

(VBG #2: 7.21/81/50/33)

BIPAP was initiated for **acute hypercarbic respiratory failure**.

Unfortunately, he became increasingly lethargic despite 90 minutes of BIPAP, and his tidal volumes were poor (250cc).

(VBG #3: 7.23/74/30/30)

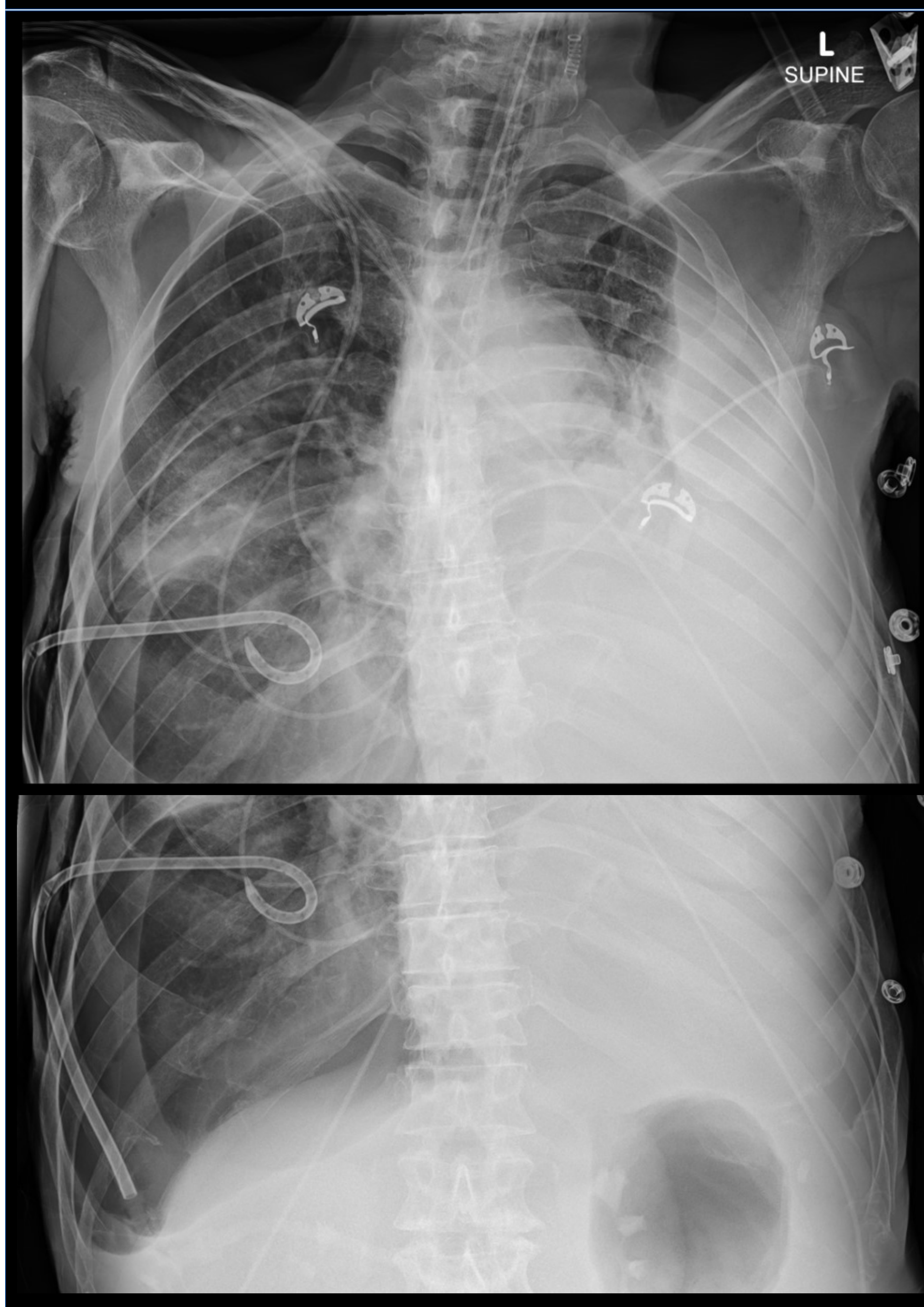
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INTERVENTION

The patient was **intubated** and an ultrasound-assisted **pigtail catheter** was placed, without perceived complication. There was immediate return of 800ml serosanguinous fluid. Tidal volumes improved (400cc) and he remained **hemodynamically stable**.

POST-PROCEDURE RADIOGRAPH



CASE QUESTIONS

1. What do you see in this post-procedure chest radiograph?
2. Does this patient need a large-bore chest tube?

CASE RESOLUTION

- The radiograph depicts reduced pleural effusion and a right basilar **pneumothorax ex vacuo (PEV)**. This was initially thought to be iatrogenic. However, it was later confirmed to be PEV by the inpatient pulmonology service when the patient had persistent non-expanding lung over several days.
- This patient **did not need a large bore chest tube** because PEV is a benign finding following large volume thoracentesis. Furthermore, he was clinically better, not worse.

DISCUSSION

- PEV is a **common** complication of large volume thoracentesis in patients with malignant pleural effusion (up to 31%).¹
- PEV occurs when the lung is unable to fully re-expand due to chronic atelectasis, adhesions, or mass. The opposing forces of the chest wall and nonexpanding lung cause negative intrapleural pressure, which results in transient leakage of air from the lung into the pleural space.²
- Because the air is under negative pressure, it is **not associated with tension physiology**, and **does not benefit from a chest tube**.^{1,3}
- **PEV patients are typically asymptomatic**, which differentiates this phenomenon from iatrogenic pneumothorax.^{1,3,4} Furthermore, because PEV is caused by non-expanding lung, the pneumothorax will persist for many days, despite treatment.^{3,4}
- Although this phenomenon is common and inherently benign, **it portends a poor prognosis**, with one study reporting a mean survival of only 157 days.⁴
- PEV can be confirmed with pleural manometry and newer ultrasound techniques.⁵

TAKE HOME POINTS

- PEV is a common finding following large volume thoracentesis and is caused by negative pressure between the non-expanding lung and expanding chest wall.
- PEV does not cause worsening dyspnea or tension physiology; therefore, placement of a chest tube is unhelpful and should be avoided.