Diaphragm Paralysis

Management of 5 consecutive cases that I was referred

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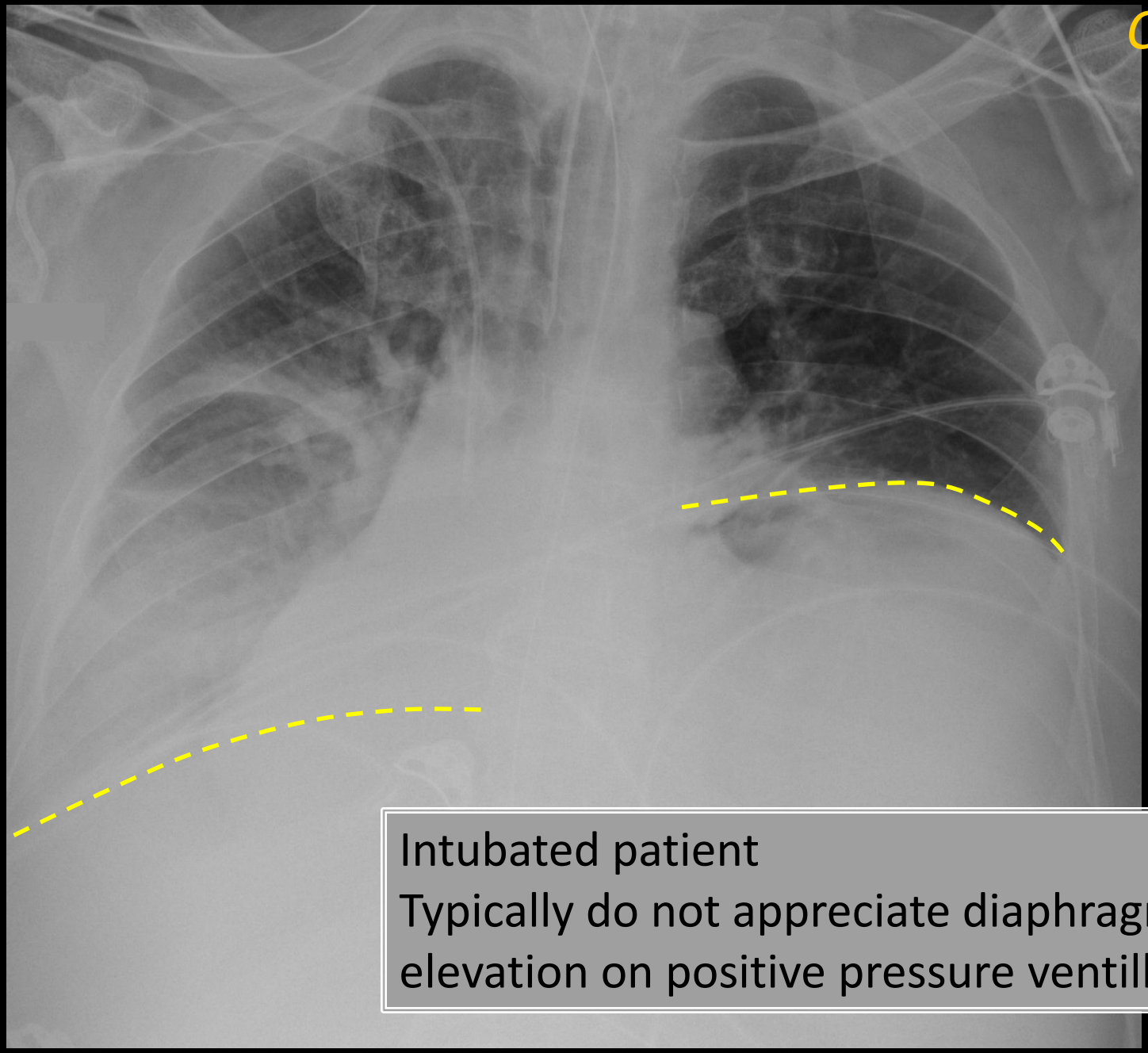
Case 1

- 54 year old previously healthy man
- Developed progressive shortness of breath and hypercapnea (CO_2 > 100 mmHg)
- Required intubation
- Chest X-ray showed marked elevation of the left hemidiaphragm


Case 1
Intubated patient
Typically do not appreciate diaphragm elevation on positive pressure ventillation

Case 1

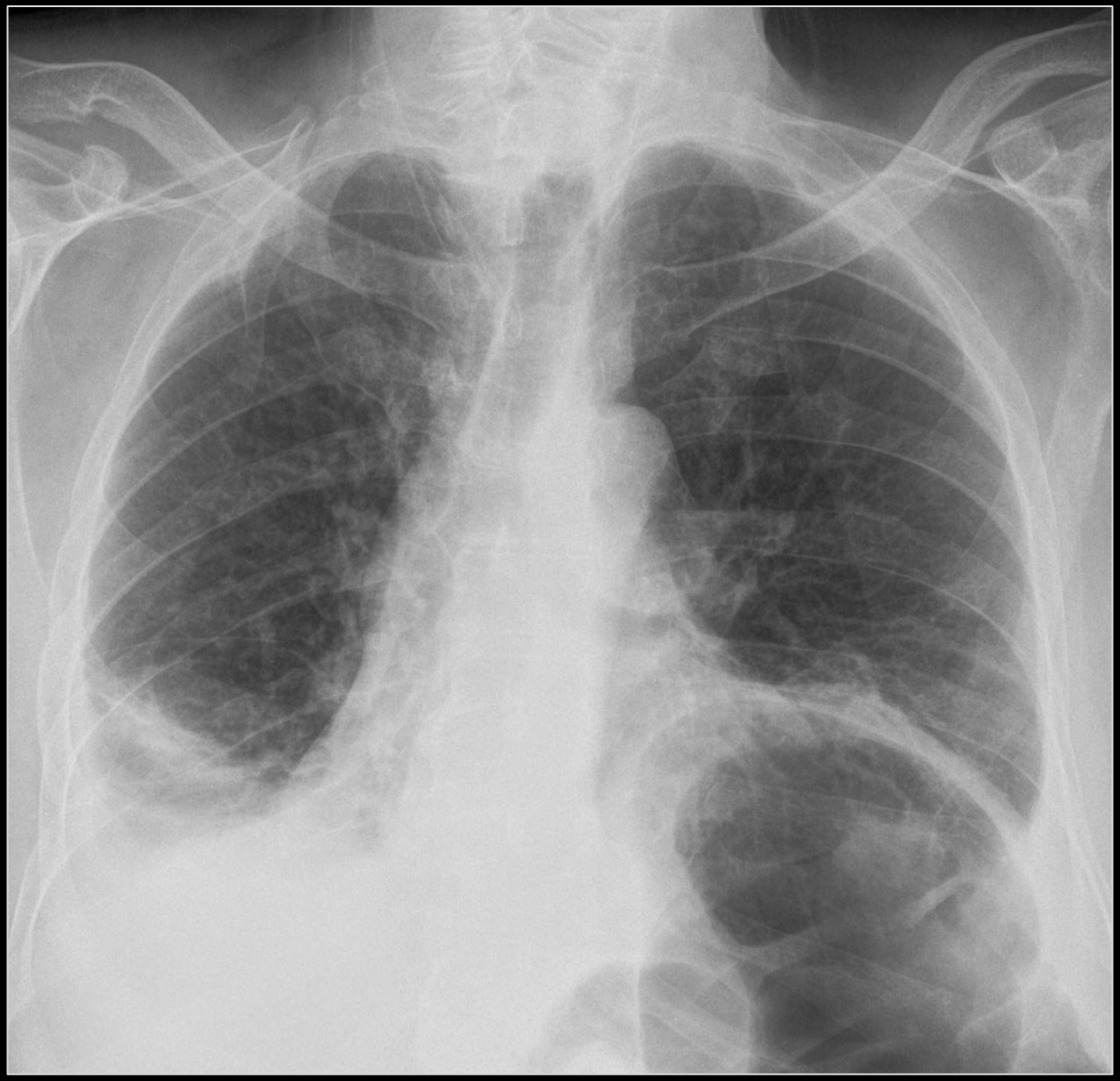
- No history of surgery or trauma
- CT of the chest did not show any evidence of malignancy
- Was unable to be weaned from the ventilator, had two attempts at extubation which failed
  - 2 hrs off vent
  - 12 hrs off vent
- Neurological evaluation
  - No focal defecits on physical examination
  - EEG normal

  Brain MRI was negative

- OR
  - Left hemidiaphragm plication
  - Tracheostomy
- Post operative course was uneventful
  - POD #2 on trach collar
  - POD #4 on trach collar for 24 hrs
  - POD # 6 right pleural effusion was drained
  - POD #11 decanulated
  - POD #13 discharged home

Chest X-ray two weeks later

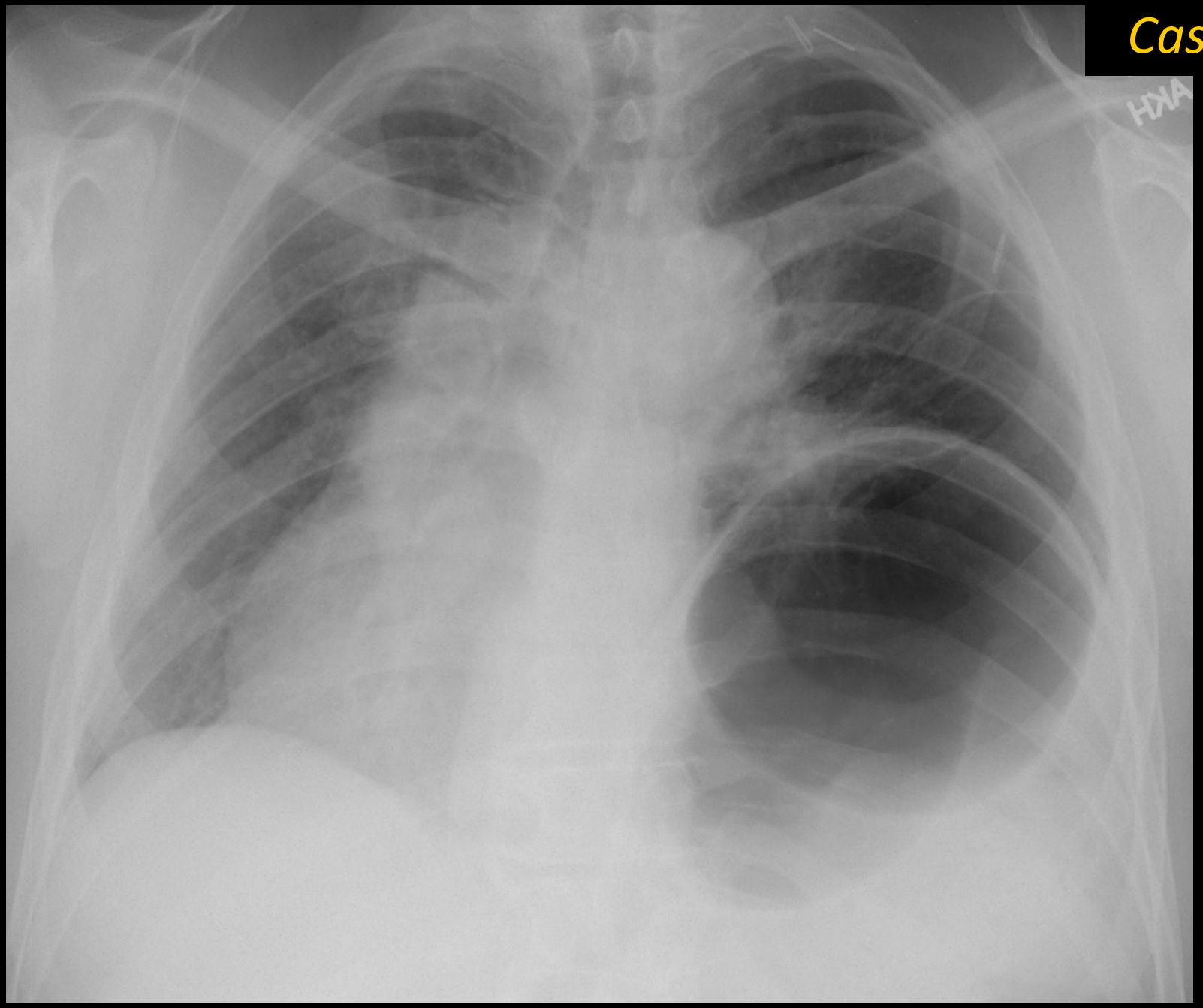
Case 1



Case 2

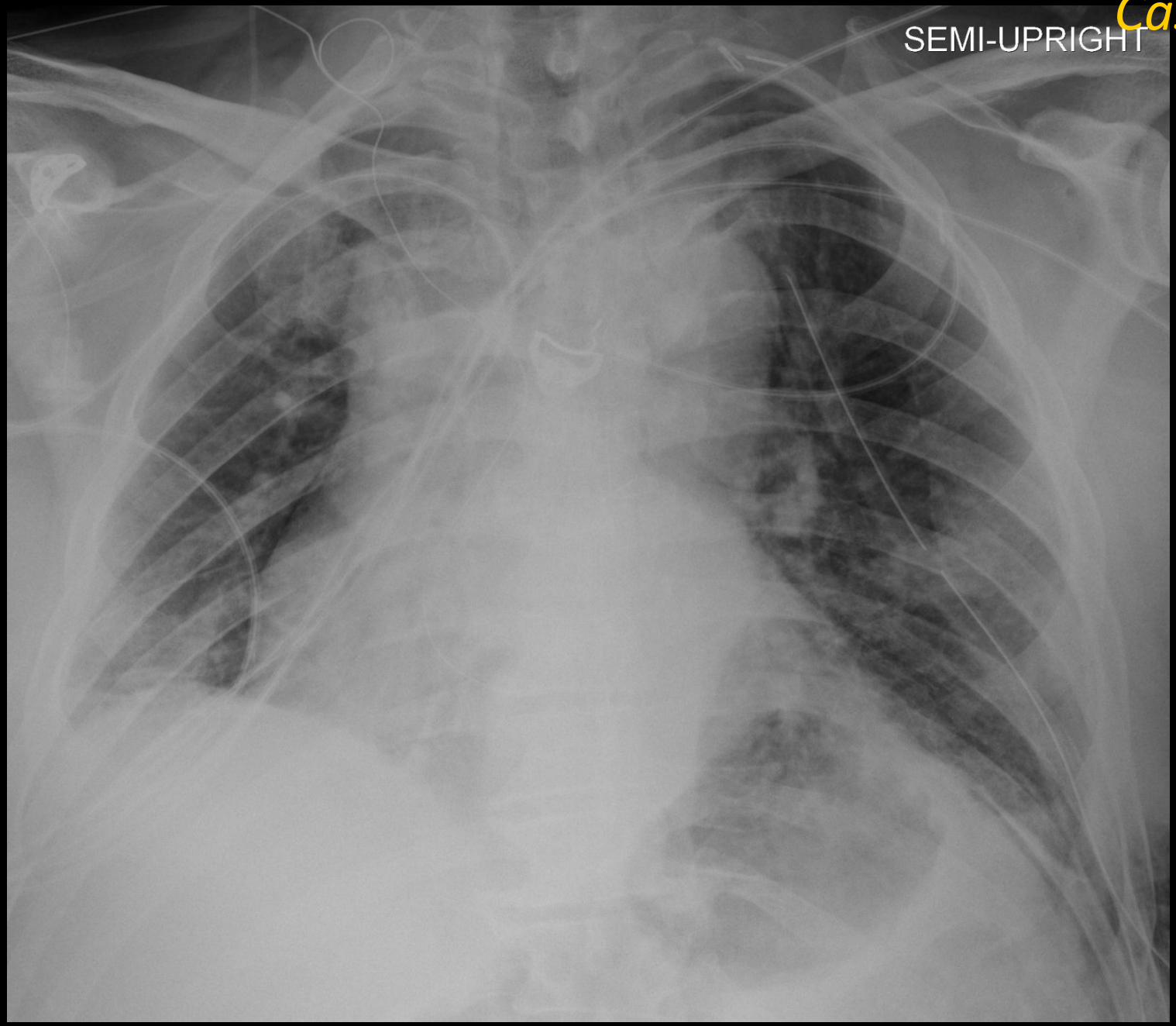
- 51 year old man with a history of a 1st rib resection 15 years previously for thoracic outlet syndrome
- Required placement of a chest tube following the procedure for a large hemothorax
- He complained of progressive shortness of breath
- Remains fairly active, but is very dyspnic and needs to rest while climbing the slope of the Ravenel bridge

- PMH: none
- PSH: left first rib resection
- PFTs
  - FVC 3.23 (64%)
  - FEV_1 2.32 (63%)
  - DLCO 27.9 (101%)



Case 2

- VATS plication of the left diaphragm



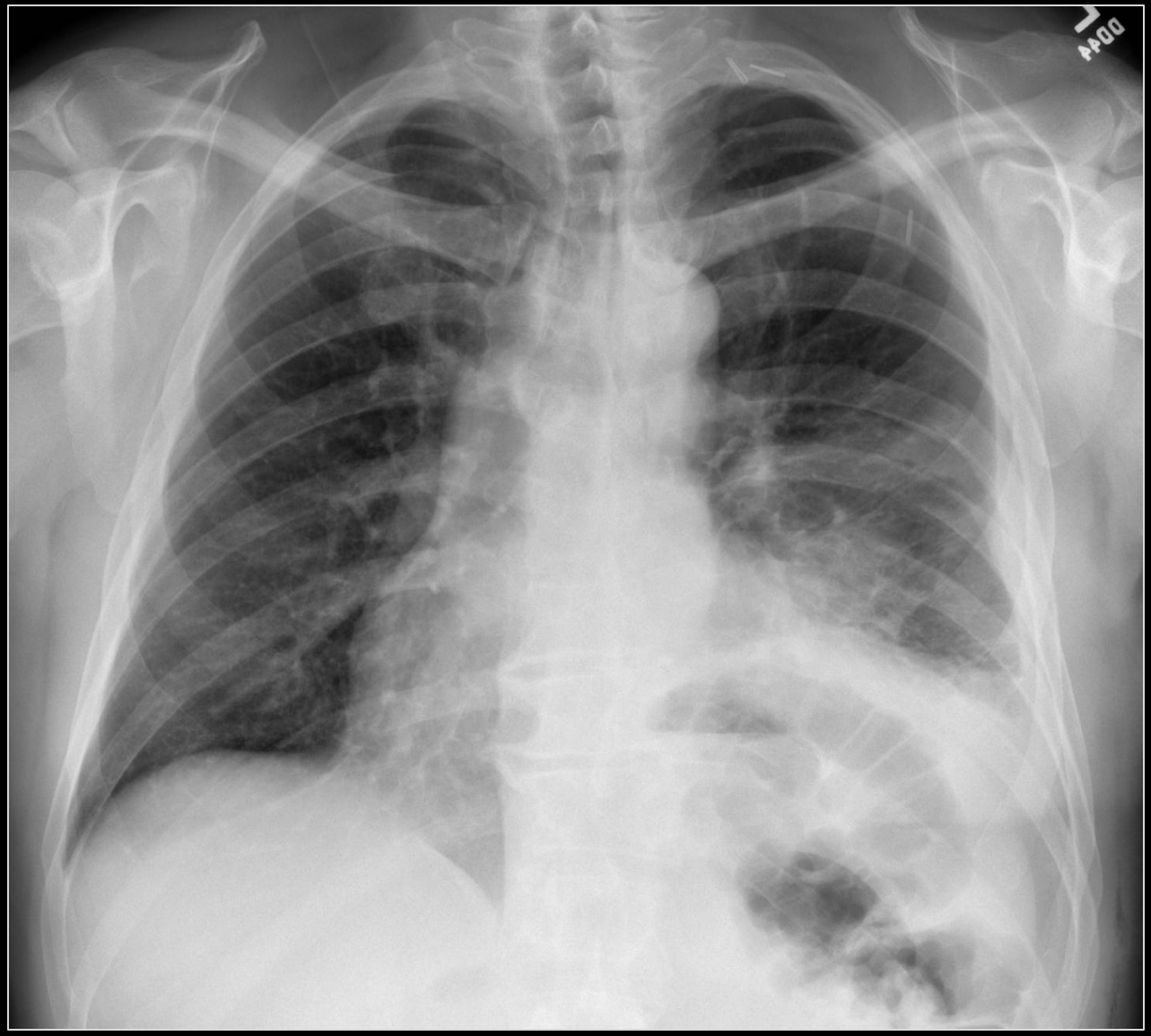
Case 2

- VATS plication of the left diaphragm
  - The initial post operative course was uncomplicated
  - POD #2 he complained of left chest pain and shortness of breath
  - A Chest X-ray showed significant elevation of the left diaphragm
- Underwent a left thoracotomy for plication of the diaphragm

- PFTs 2 months post op
  - FVC 3.88 (75%)
  - FEV_1 3.00 (75%)
  - DLCO 27.4 (101%)
- PFTs 2 years post op
  - FVC 3.69 (72%)
  - FEV_1 2.6 (66%)
  - DLCO 27.8 (101%)

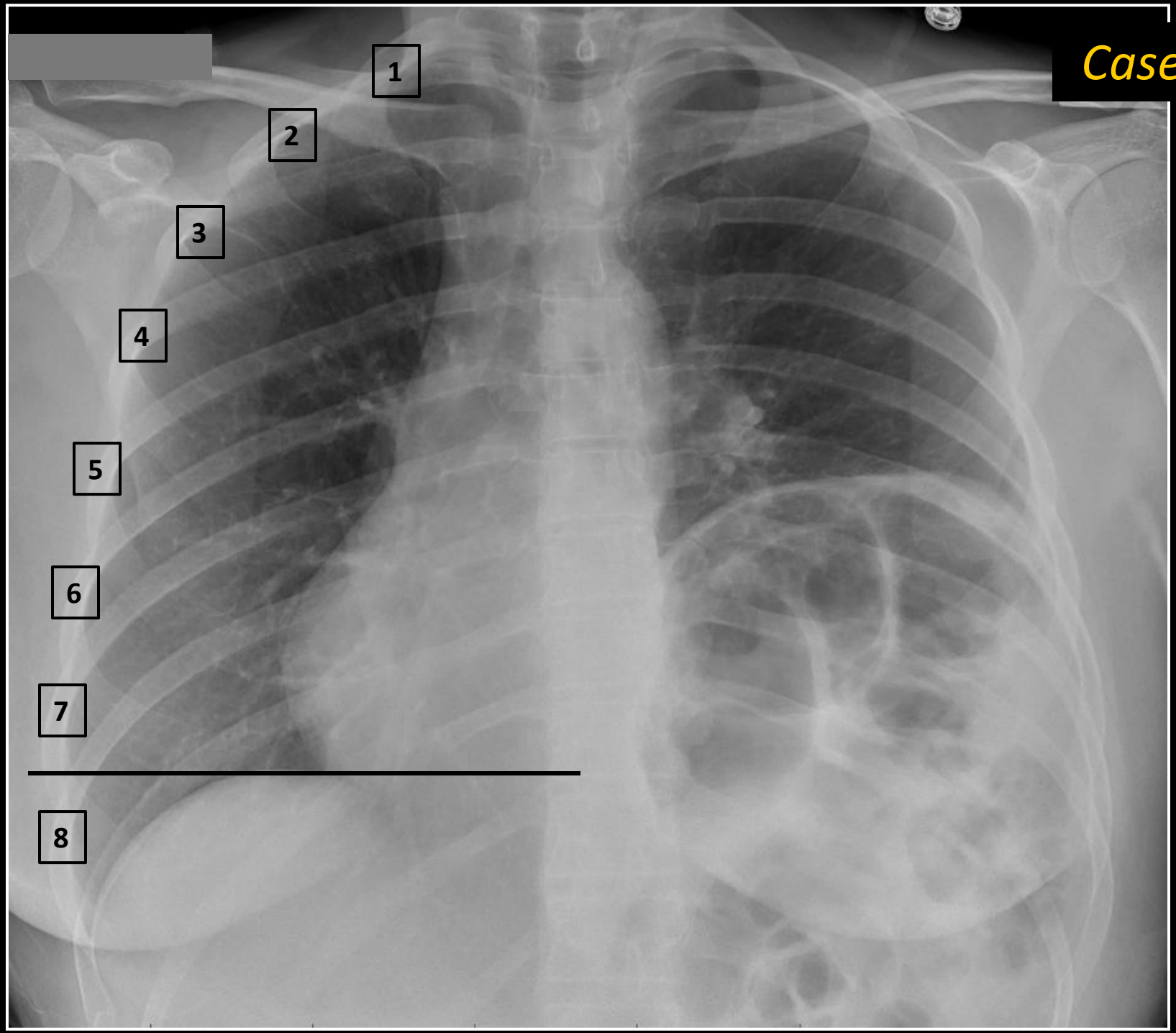
Chest X-ray three weeks later

Case 2



Case 3

- 45 yo woman presented syncope and chest pressure
- Chronic shortness of breath
  - substantially worse for the past 4 months
- Previously could walk 6 miles, but now walks < 1/2 mile
- No trauma or viral illness that preceded her dyspnea
- She becomes very dyspnic while lying down, and she is only able to lye on her left side
- A chest X-ray and a CT performed 4 months previously showed significant elevation of the left hemidiaphragm
- Brain MRI was unremarkable
- A fluoroscopic sniff test was performed that demonstrated a paralyzed left hemidiaphragm with paradoxical motion
- PFTs: FVC 2.77 (75%), FEV1 1.96 (66%) and DLCO 18.6 (75%)


Case 3
1
2
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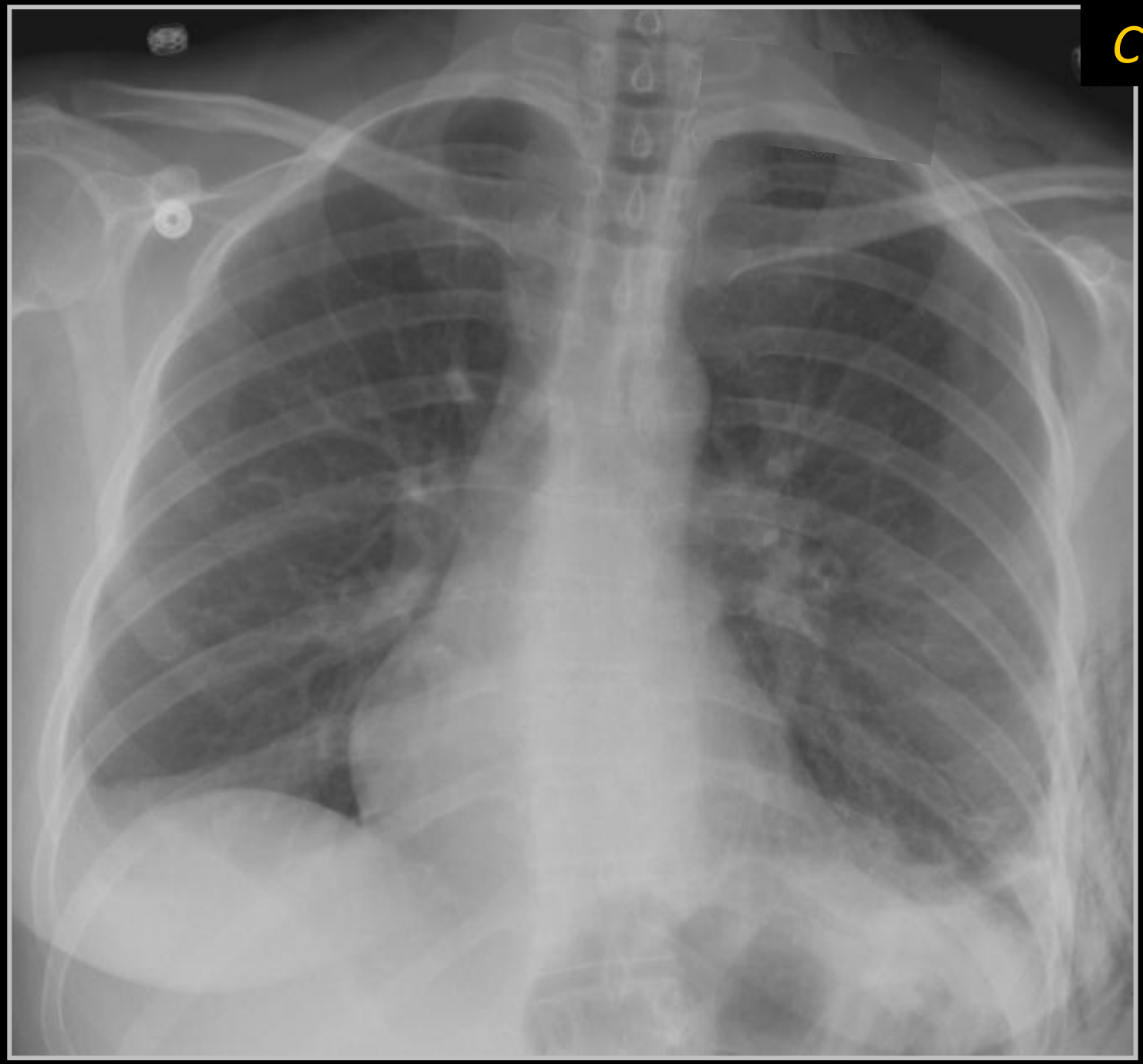
- Left VATS plication of the diaphragm
- She was seen 3 weeks after her operation for a routine follow up visit
- Could sleep lying flat without dyspnea
- Dyspnea was significantly improved


Case 3

Case 4

- 74 year old man became acutely short of breath
- CT was negative for PE but did reveal elevated diaphragms bilaterally
- His dyspnea has persisted
- It was markedly worse when he is supine although he was still able to sleep supine or lying on either side
- Large meals make him more dyspnic
- Lost 20 pounds
- He is able to exercise
  - He has good muscle strength
  - minimal shortness of breath except when exerting himself
- Does not think that any of his peripheral muscle strength in arms or legs has noticeably changed
- Diaphragm fluoroscopy has been reported as normal

PMH:

DM

Prostate cancer

CAD- stent RCA

MEDICATIONS:

Atrovent

Glimepiride

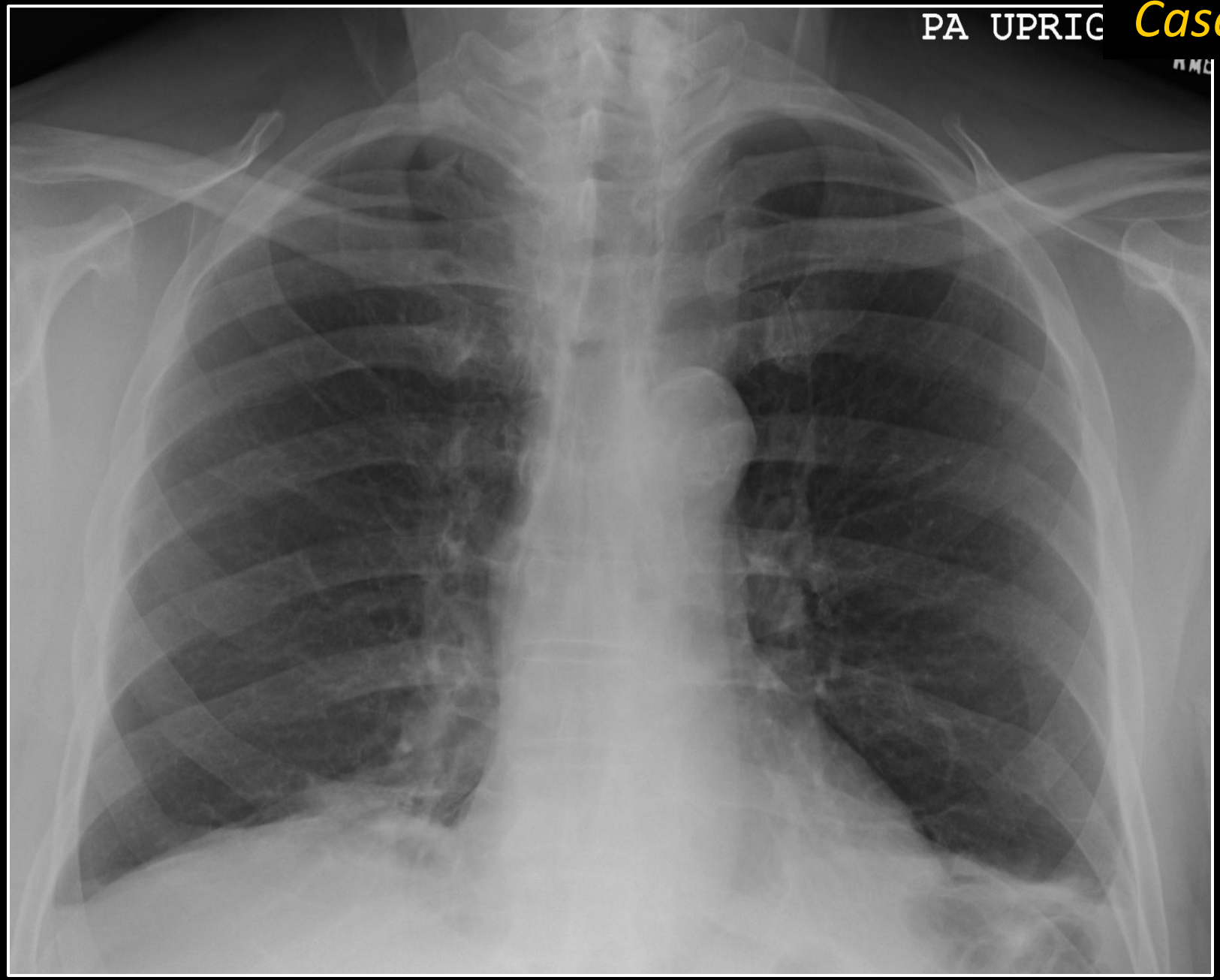
Metformin

Simvastatin

Symbicort

PFTs

- FVC 2.08 L (51%)
- FEV_1 1.34L (46%)
- DLCO 19.8



Case 4

Case 5

- 78 yo man with progressive dyspnea over the past several years
- 50% reduction in his pulmonary function in 10 months
  - coincides a cervical spinal fusion the anterior right neck
- Able to walk 200 feet
- Prior to his cervical operation he could walk the length of a football field
- He denies any fevers, chills cough or other respiratory symptoms
- Unable to sleep with right side down / always sleeps with left side down
- Able to breathe comfortably sitting completely upright, but severely dyspnic when reclining

Case 5

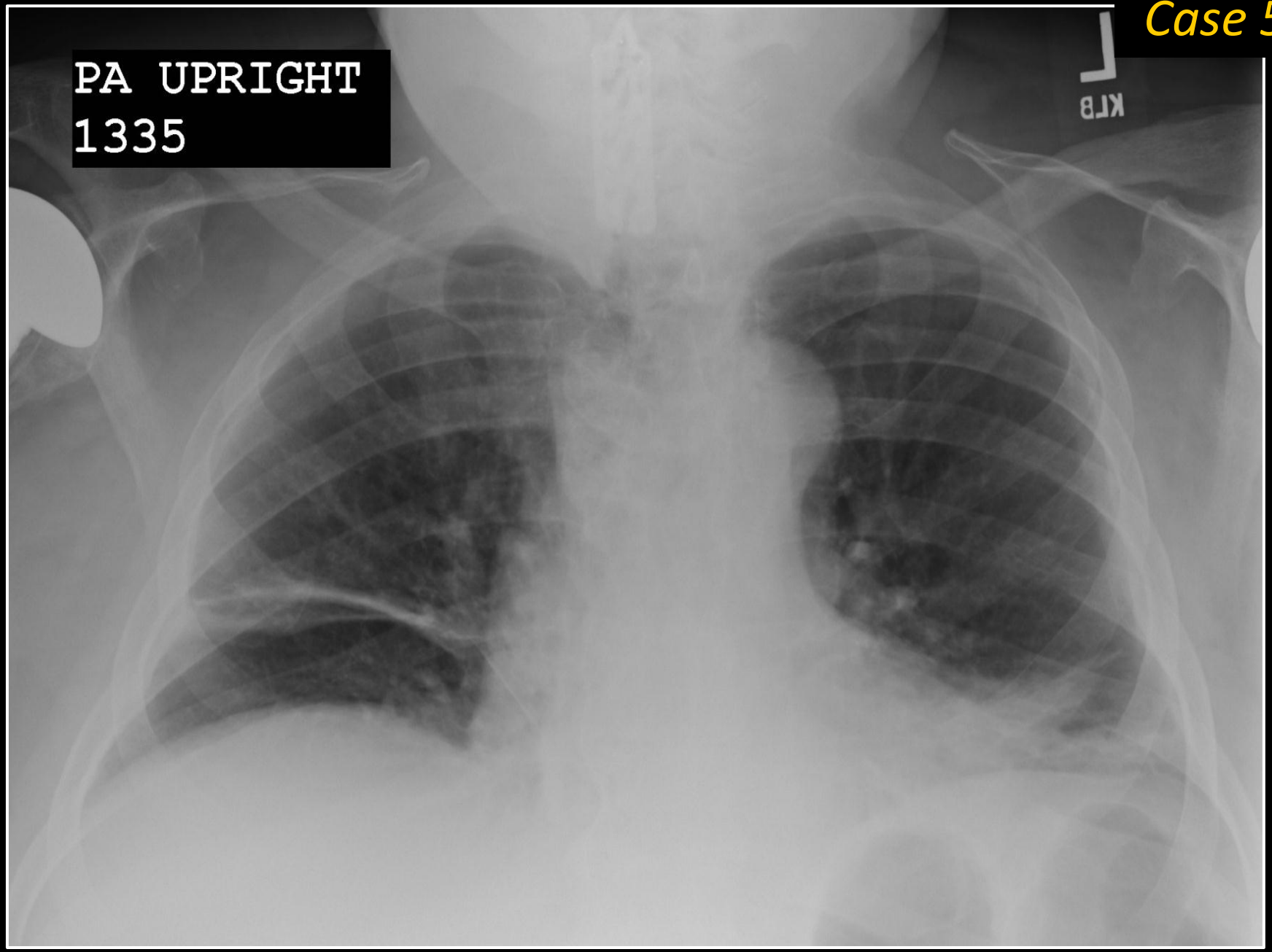
PMH:

- Obstructive sleep apnea
- Seizures
- Restless leg syndrome
- Asthma
- Diaphragm Paresis

PSH:

- Cervical spine fusion
- Lumbar fusion
- Left shoulder
- Right shoulder
- Cataracts
- Cholecystectomy
- Carpal tunnel release
- Appendectomy
- Tonsillectomy
- Pilonidal cyst

Case 5



FVC 1.15 (33%)

FEV_1 0.75 (31%)

DLCO 22.7

sO_2 93% on 3 L nasal cannula

- Fluoro sniff test
- Left diaphragm: 2.5 cm of excursion
- Right diaphragm: 1.0 cm excursion
- No shift of the mediastinum
- Findings are compatible with paresis but not paralysis of the right phrenic nerve

Case 5

- Enrolled in pulmonary rehabilitation
  - Able to walk 300 ft
  - Also riding stationary bicycle
- Subjective dyspnea improved butt still short of breath with minimal activity
- Remained very interested in diaphragm plication
- His referring pulmonologist also very interested in diaphragm plication

- Underwent right thoracotomy for diaphragm plication
- Surgery was uneventful
- Discharged home on POD #5

- Enrolled in pulmonary rehabilitation (again)
- 2 months after surgery was able to walk 300 ft

Case 5