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## Background

- Lung cancer is the second most diagnosed cancer globally and the leading cause of cancer death in affluent nations (1)(2). In 2018, 504 cases were recorded in Saudi Arabia, representing 3.2% of all new cancer diagnoses (3).
- Lung cancer often coexists with coronary heart disease due to shared risk factors like smoking and aging, increasing the risk of thromboembolic complications (4).
- Advanced NSCLC has a poor prognosis, with only 29% surviving one year after chemotherapy. However, better screening, radiation, and multidisciplinary care have greatly enhanced outcomes in the past decade (5)(6).
- Osimertinib is the standard treatment for advanced NSCLC with EGFR mutations (e.g., exon 19 deletions). Combination therapy of Osimertinib, Pemetrexed and Carboplatin improves outcomes but increases the risk of cardiotoxicity, especially with prolonged use (7).
- This case involves a 61-year-old female with advanced NSCLC who developed severe cardiovascular complications after treatment, underscoring the importance of cardiovascular monitoring during therapy.

## Case presentation

### Initial Presentation: (April 2022)

- A 61-year-old Saudi female presented with a three-week history of a productive cough and 2 kg weight loss. She denied hemoptysis, tuberculosis (TB) exposure, or recent travel.
- She had a medical history of diabetes mellitus, hypertension, asthma, and shisha smoking.
- Physical exam: Fully conscious, normal vital signs except for slightly elevated blood pressure (131/73 mmHg). No cervical lymphadenopathy, finger clubbing, or lower limb edema were seen. Chest exam showed decreased breath sounds without wheezes or additional sounds.

### Investigations:

- Lab results: Elevated CRP (35 mg/L), ESR (101 mm/hr), eGFR (56 mL/min/1.73m<sup>2</sup>), mild hyponatremia, low magnesium, and hyperglycemia.
- Imaging:
  - CT identified a 7x5 cm left upper lobe mass (Figure 1)
  - PET/CT: Hypermetabolic lung mass with metastases to the brain, liver, and spleen (Fig. 2 A&B).
  - Brain MRI: Multiple enhancing supratentorial and dural-based masses (Fig. 3 A & B).
- Biopsy: Confirmed NSCLC with EGFR exon 19 deletion (p.E746\_T751del).

### Treatment and Management:

Initial therapy: Palliative whole brain radiation therapy (WBRT) for 13 days, followed by chemotherapy.

#### Chemotherapy:

- Osimertinib (80 mg/day) for four months.
- Shifted to Carboplatin and Pemetrexed for six cycles due to liver metastasis progression.
- Maintenance therapy with Pemetrexed and Osimertinib.

Outcome: Significant tumor size reduction and regression of metastases (Fig. 2 C&D).

## Diagnostic Imaging

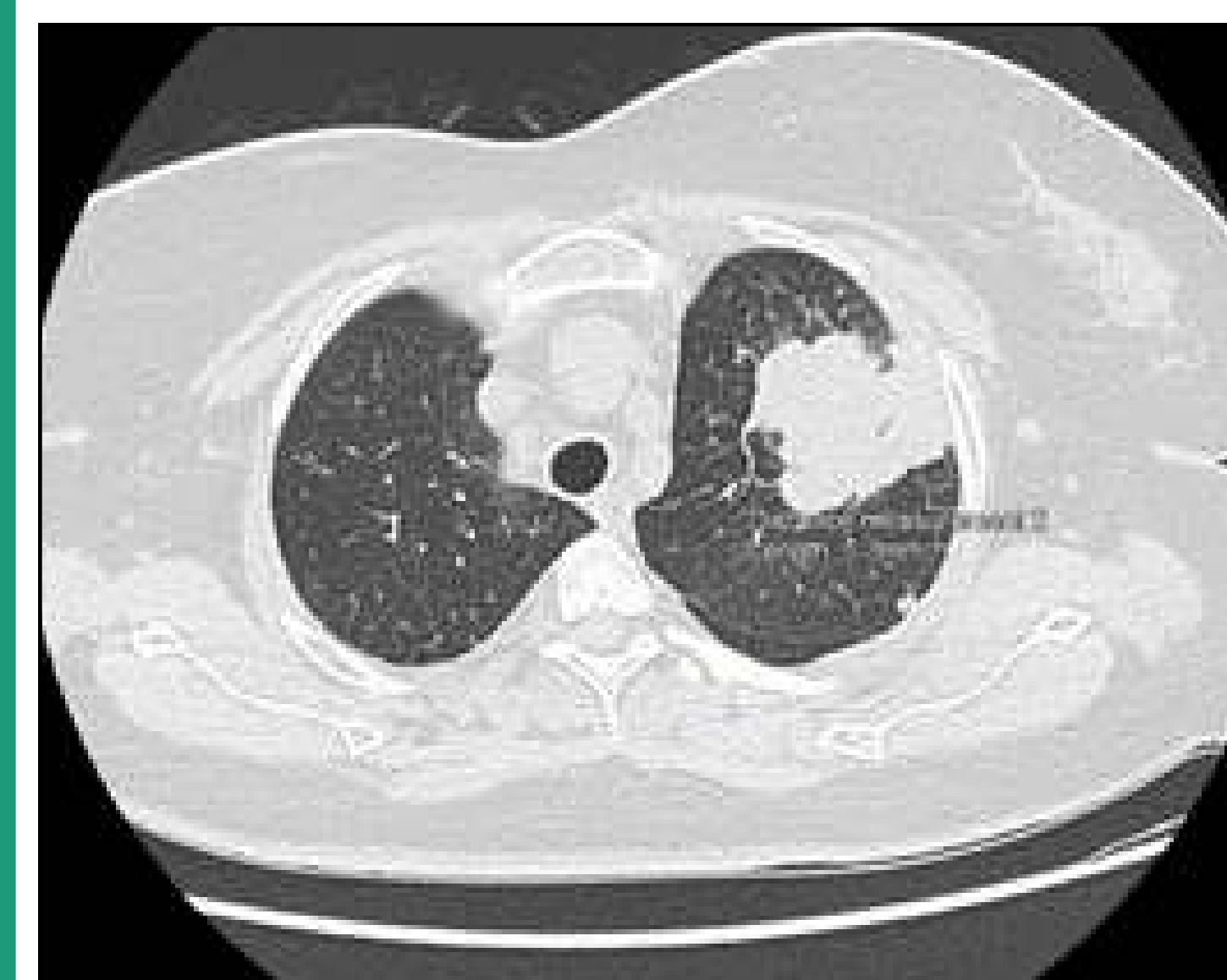


Fig. 1: CT identified a 7x5 cm left upper lobe mass

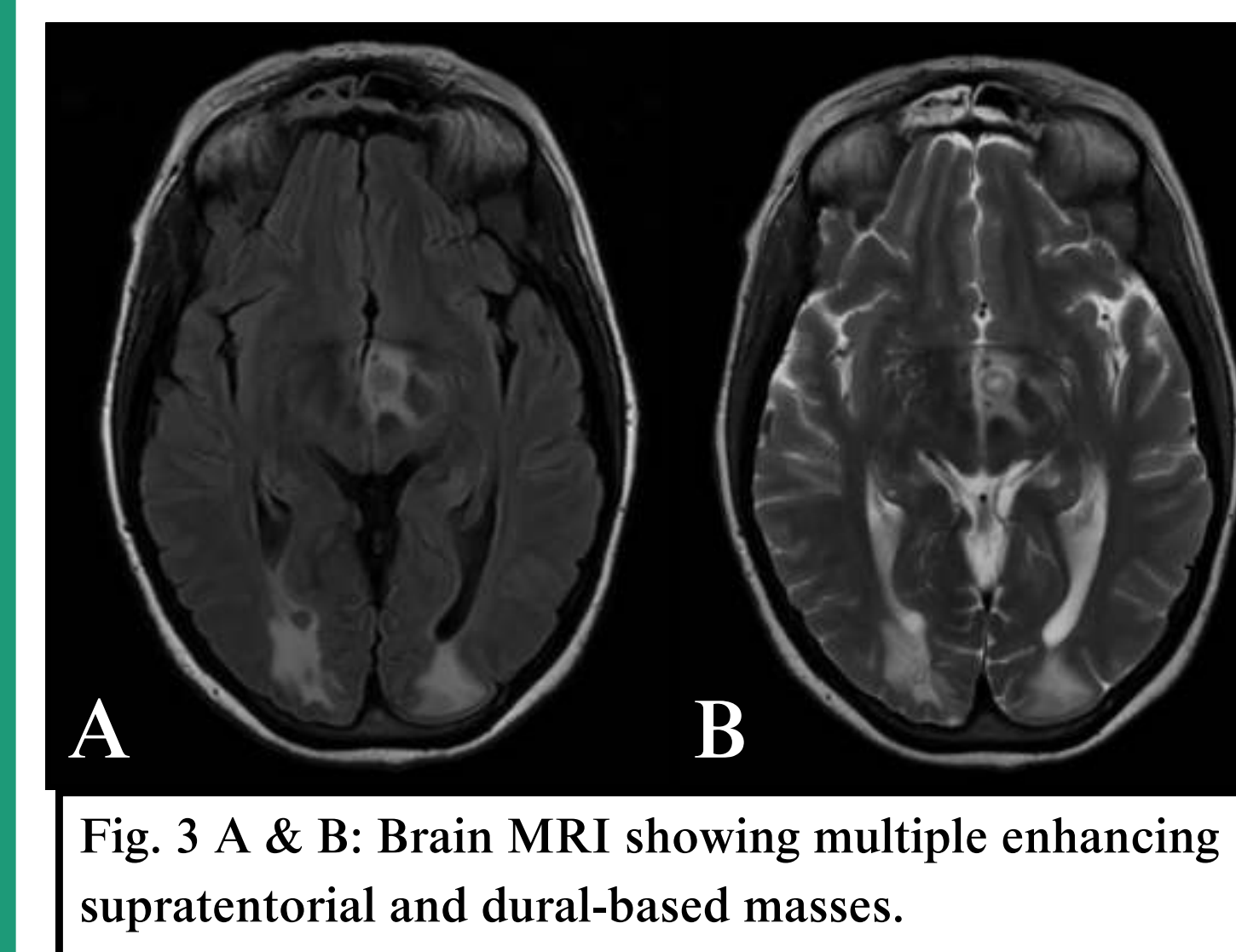


Fig. 3 A & B: Brain MRI showing multiple enhancing supratentorial and dural-based masses.

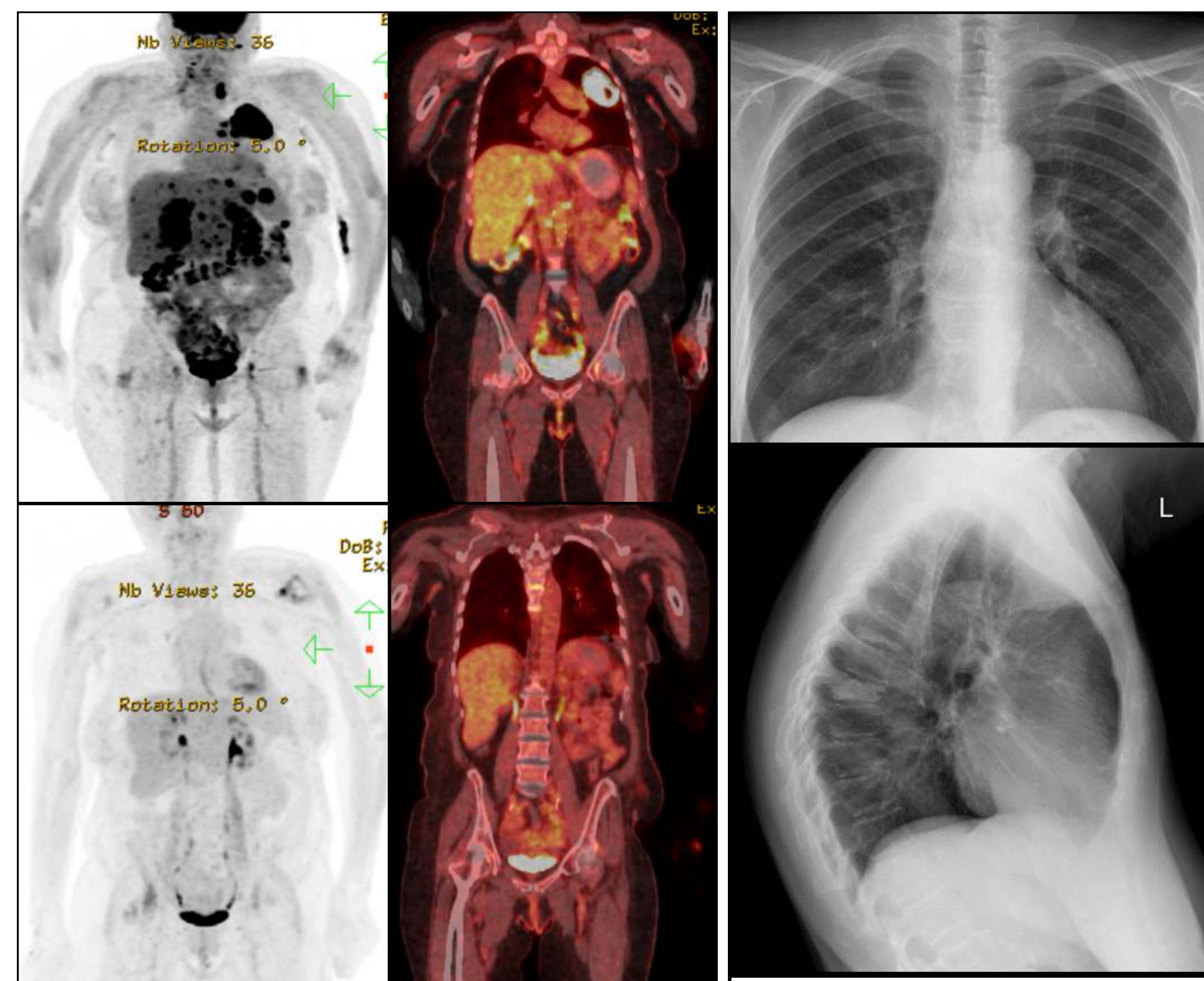


Fig. 2: A & B: Initial PET/CT showing hypermetabolic lung mass and metastases. C & D: Follow-up PET/CT showing regression of hypermetabolic lesions.



Fig. 4: AP and lateral chest x-ray showing clear lungs of both cancer and edema in June 2024

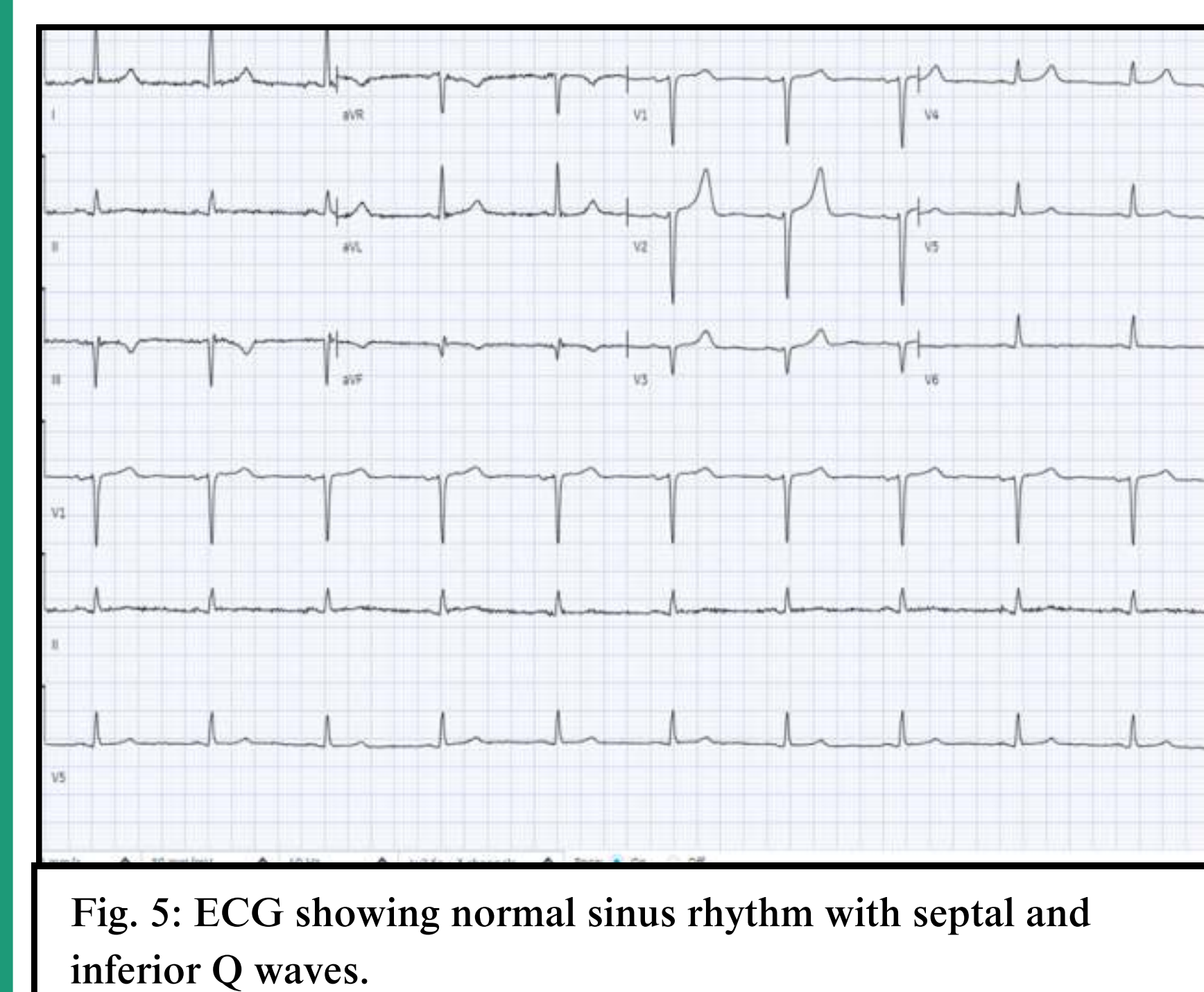


Fig. 5: ECG showing normal sinus rhythm with septal and inferior Q waves.

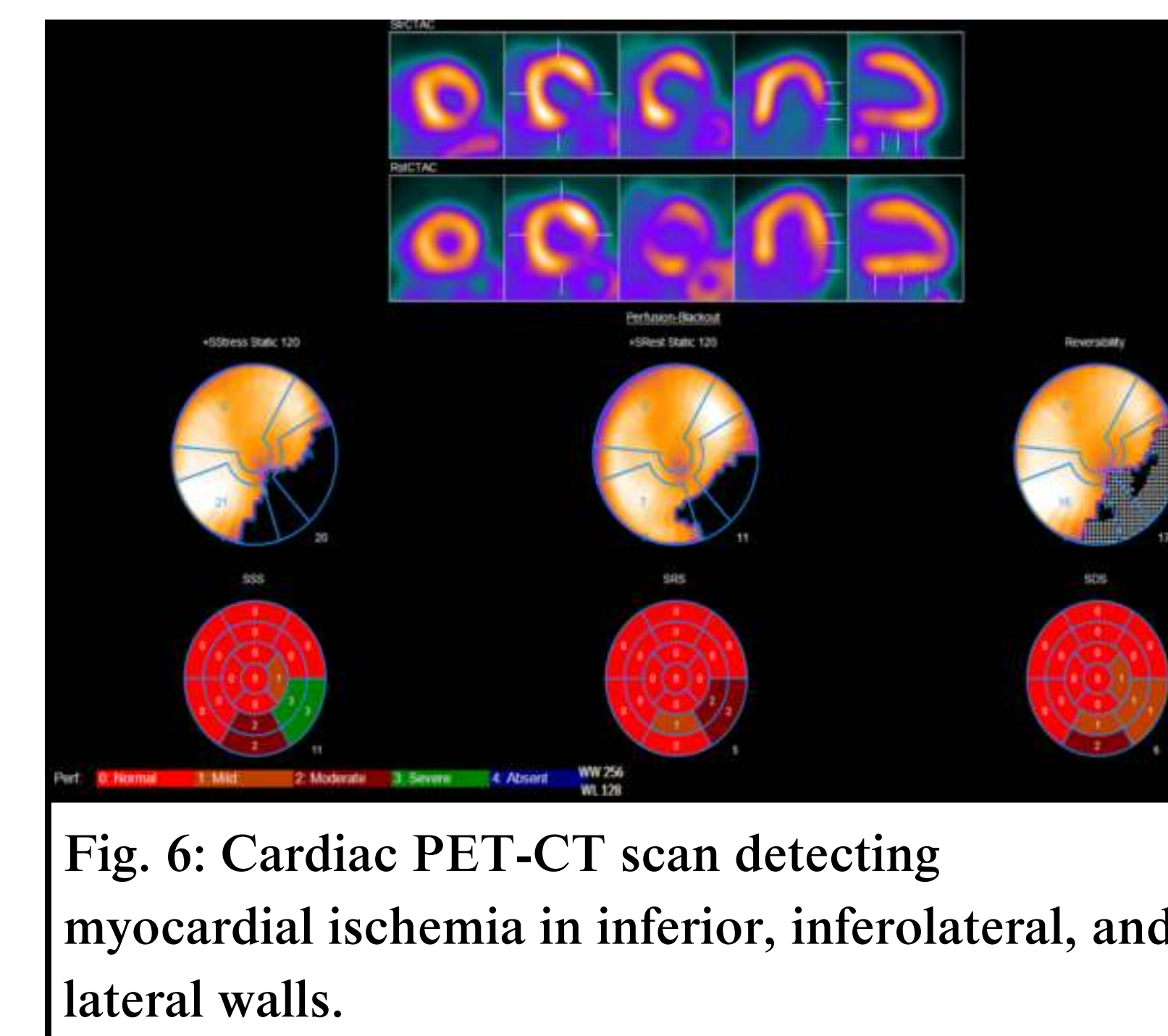


Fig. 6: Cardiac PET-CT scan detecting myocardial ischemia in inferior, inferolateral, and lateral walls.

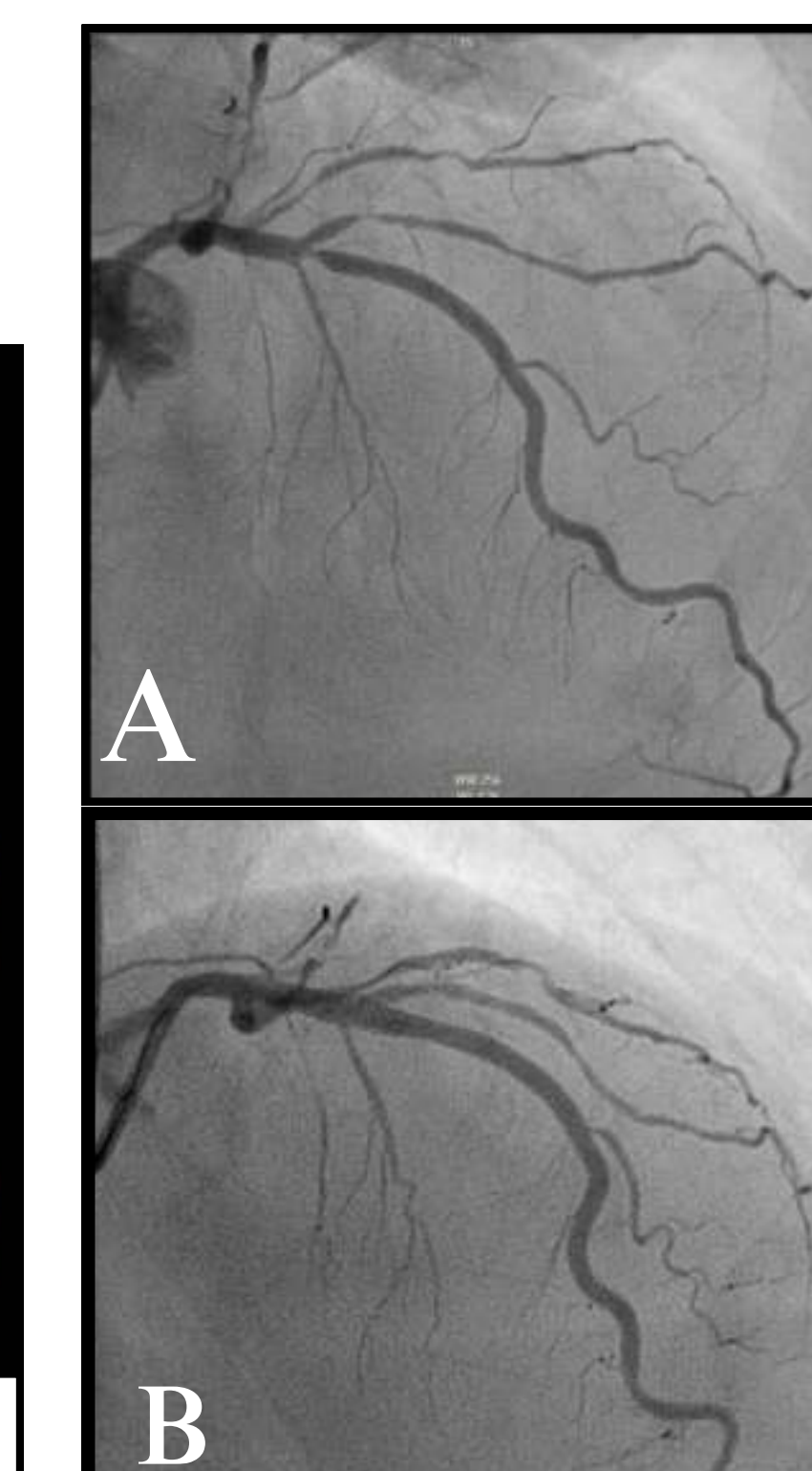


Fig. 7: (A) Coronary angiography showing 90% stenosis in LAD. (B) Post-PCI angiography demonstrating successful stenting of the LAD artery.

## Case presentation (continued)

### Cardiovascular Complications (June 2024)

- Suddenly developed severe shortness of breath and was diagnosed with acute pulmonary edema at another hospital. Cardiology evaluation was obtained in our hospital:
  - Echocardiogram: No significant abnormalities.
  - Chest X-ray: Clear lungs, ruling out any signs of cancer recurrence or pulmonary edema (Fig. 4).
  - ECG: Normal sinus rhythm with septal and inferior Q waves (Fig. 5).
  - Lab results: Elevated NT-proBNP (266.7 pmol/L) and BNP (44.7 pmol/L), indicating heart failure.
  - Cardiac PET/CT: Significant ischemia in the inferior and lateral walls (Fig. 6).
  - Diagnostic catheterization: Critical lesion in the left anterior descending (LAD) artery (Fig. 7A).
  - After oncology clearance, she successfully underwent PCI with stent placement (Fig. 7 B).

## Discussion and Learning Points

- The patient was diagnosed with poorly differentiated NSCLC, confirmed through PET-CT and MRI, which showed metastases to the liver, spleen, and brain. The tumor was TTF1 positive with scattered P40+ cells, suggesting an adenosquamous carcinoma
- Extensive imaging and molecular diagnostics (e.g., EGFR exon 19 deletion) are crucial for evaluating disease spread and guiding treatment plans (8)(9).
- Surgery was not an option due to metastases. The patient received radiation therapy for local control, particularly to manage brain metastases using WBRT. Chemotherapy initially involved Osimertinib, followed by Carboplatin and Pemetrexed.
- Two years later, The patient developed pulmonary edema and LAD stenosis, treated with PCI, highlighting the need for cardiovascular monitoring during aggressive cancer treatments due to the increased risk of cardiovascular disease (10).
- This case highlights the value of integrating oncology and cardiology care, with early multidisciplinary involvement improving outcomes and managing complications effectively.

### Key takeaways:

- This case demonstrates successful management of both metastatic NSCLC and severe coronary artery disease through a multidisciplinary approach.
- Advanced imaging, particularly PET-CT, played a crucial role in both cancer follow-up and cardiovascular risk stratification.
- Proactive cardiac monitoring is essential for patients undergoing intensive oncological treatments.

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