

Dyspnea

case reports

MUDr. Ondřej Venclíček

Department of Pulmonary Diseases and Tuberculosis - Institutions shared with
the Faculty Hospital Brno - Adult Age Medicine - Faculty of Medicine

Three patients who suffer from shortness of breath have met in the waiting room:

Go through all three patients using the inserted hyperlinks. It is possible to return from each screen to the previous one.

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Mr. P., born 1949

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Anamnesis

- Patient brought by ambulance for shortness of breath, fever and hemoptysis
- recurrent thrombophlebitis of lower extremities - warfarin since 2010, hypertension, hypercholesterolemia, susp. Chronic obstructive pulmonary disease - not yet treated
- Works as electrician
- Treated with tenaxum (antihypertensive medication), torvacard (statin), warfarin
- without allergies
- Smoker – 20 cigarettes per day from 1965 to 2012 (47 packyears)

Physical exam

- Lucid, oriented, cooperating, neurologically normal, febrile, regular heart action, dyspnea even with minimal exertion (during speech). Objectified hemoptysis - a tablespoon of fresh blood coughed into a handkerchief. Quiet breathing with discrete spastic auscultation finding bilaterally. Abdomen without pathological finding, extremities without swelling, without signs of inflammation, plantar sign negative, Homans sign negative

O2 Saturation 84%, blood pressure 130/80mmHg, puls 75' reg., body temperature 38°C, weight 85kg, height 179cm.

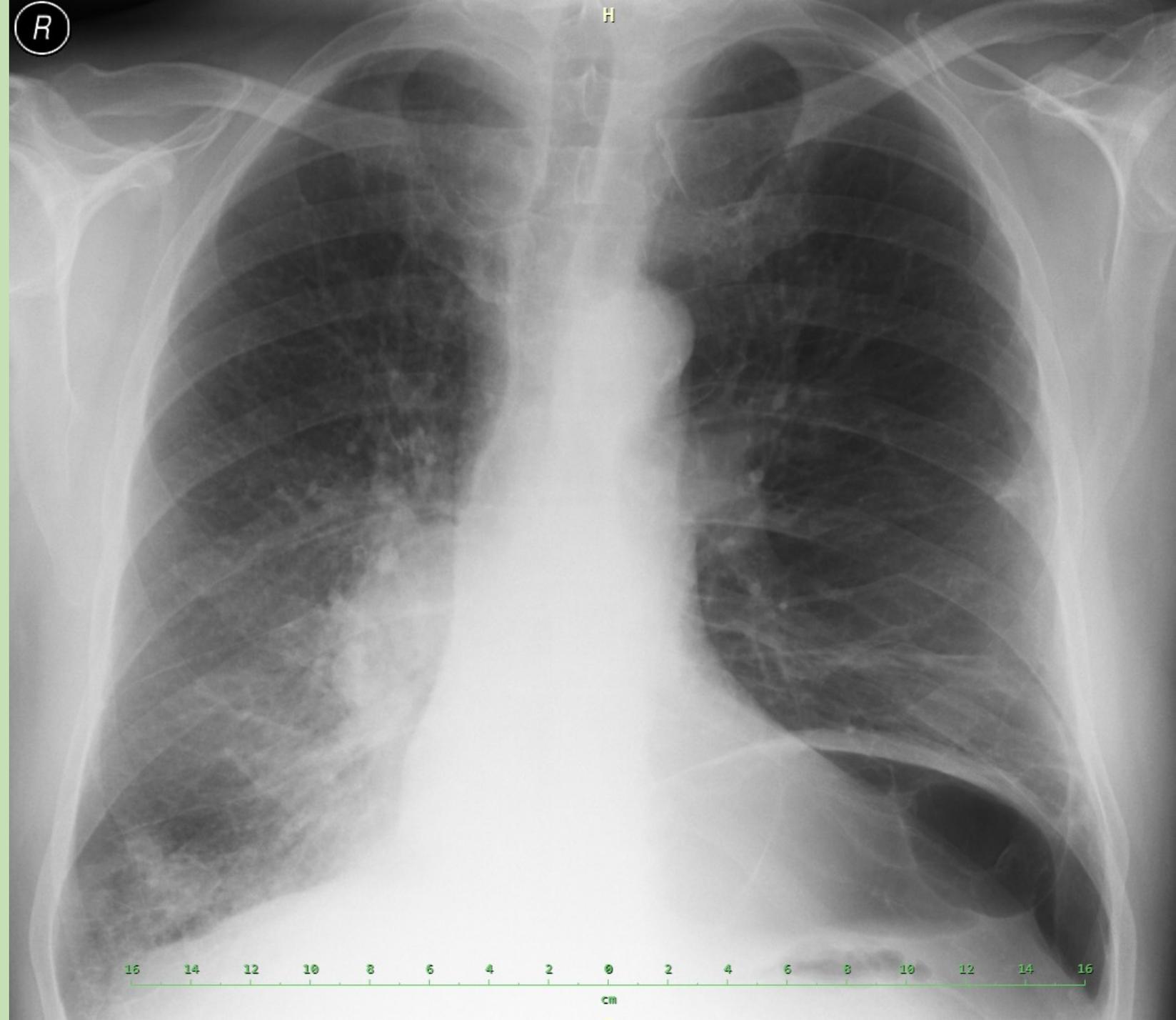
Laboratory findings

- CRP 100, leukocytes 14 tis., hemoglobin 189, hematocrit 0,46
- CRP and leukocytes are markers of inflammation that our patient seems to have. But why is hemoglobin so high? It is a consequence of adaptation to chronic hypoxemia - a secondary polyglobulia in COPD patient.

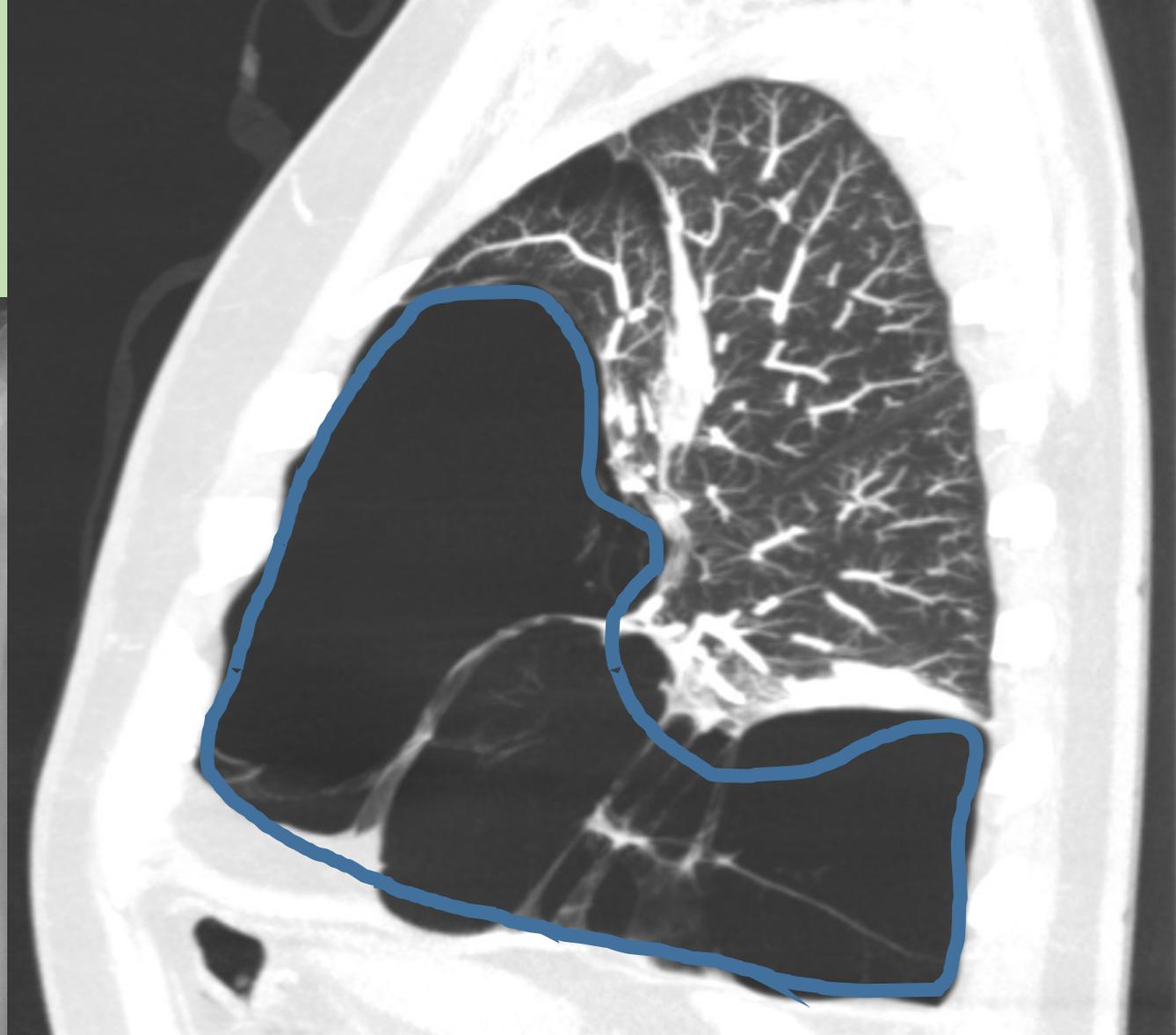
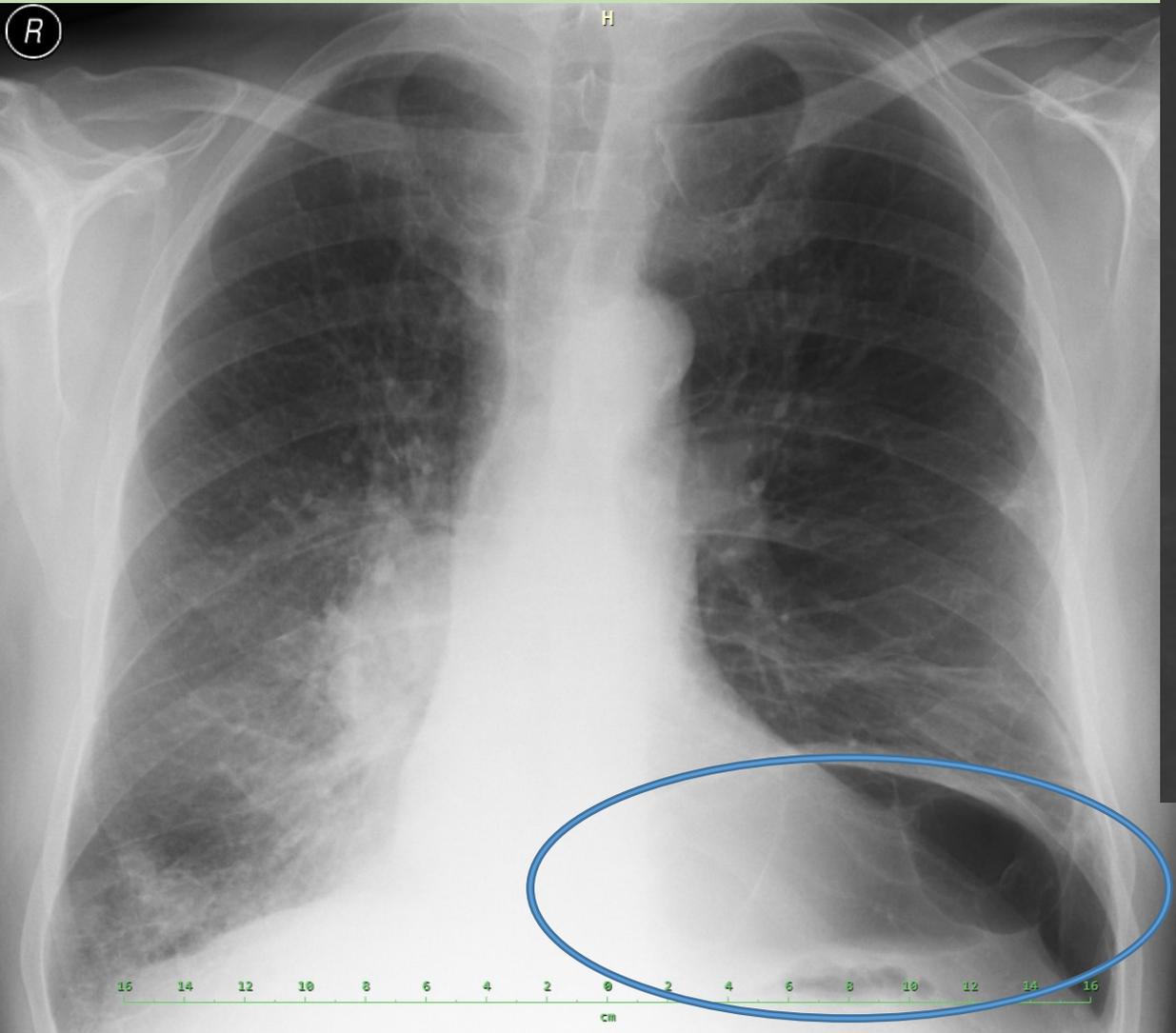
What do we actually see on the chest skiagram?

- A. [There are signs of emphysema](#)
- B. [The skiagram shows tumor](#)
- C. [The skiagram shows tumor, emphysema, and inflammatory infiltration](#)

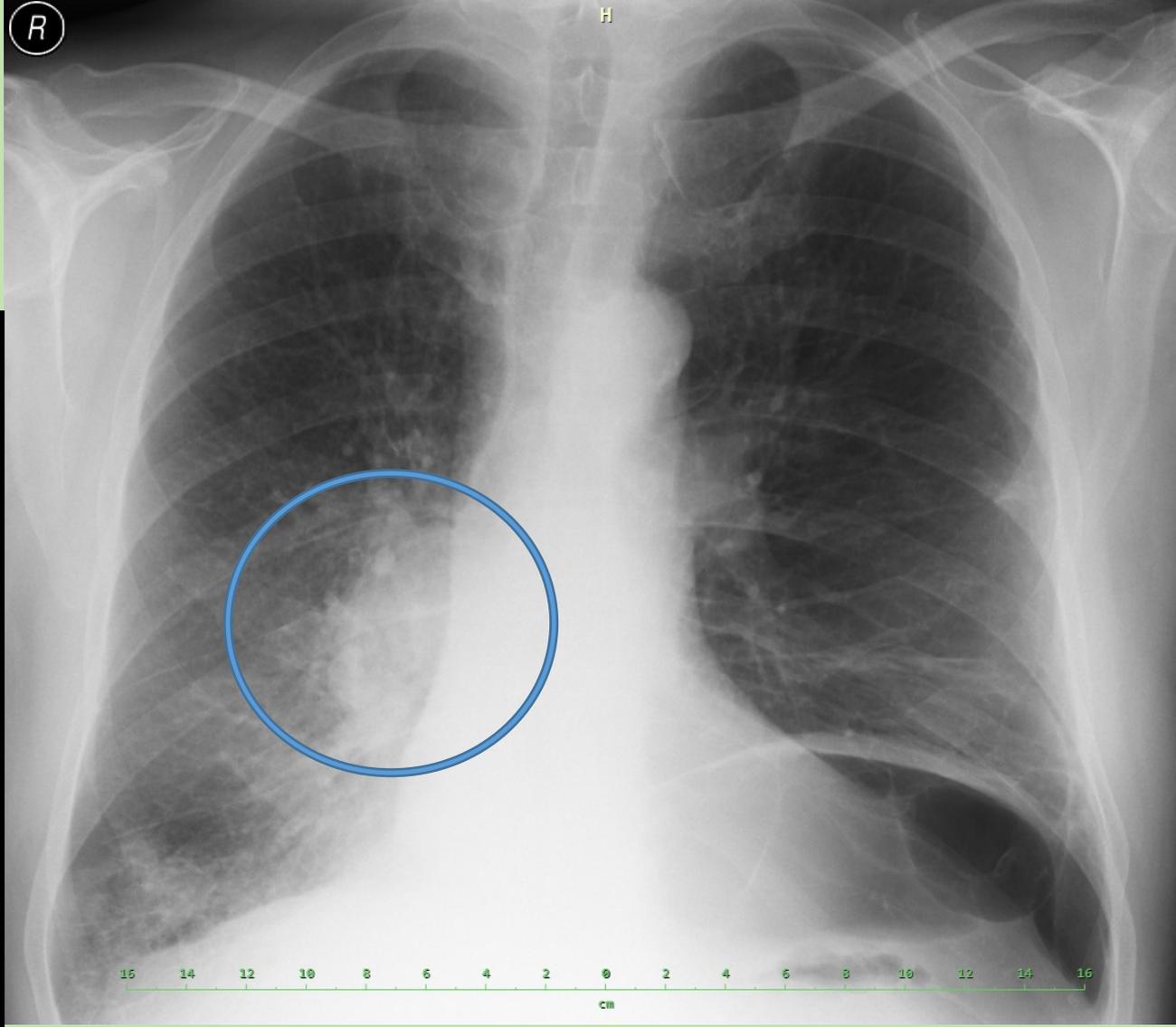
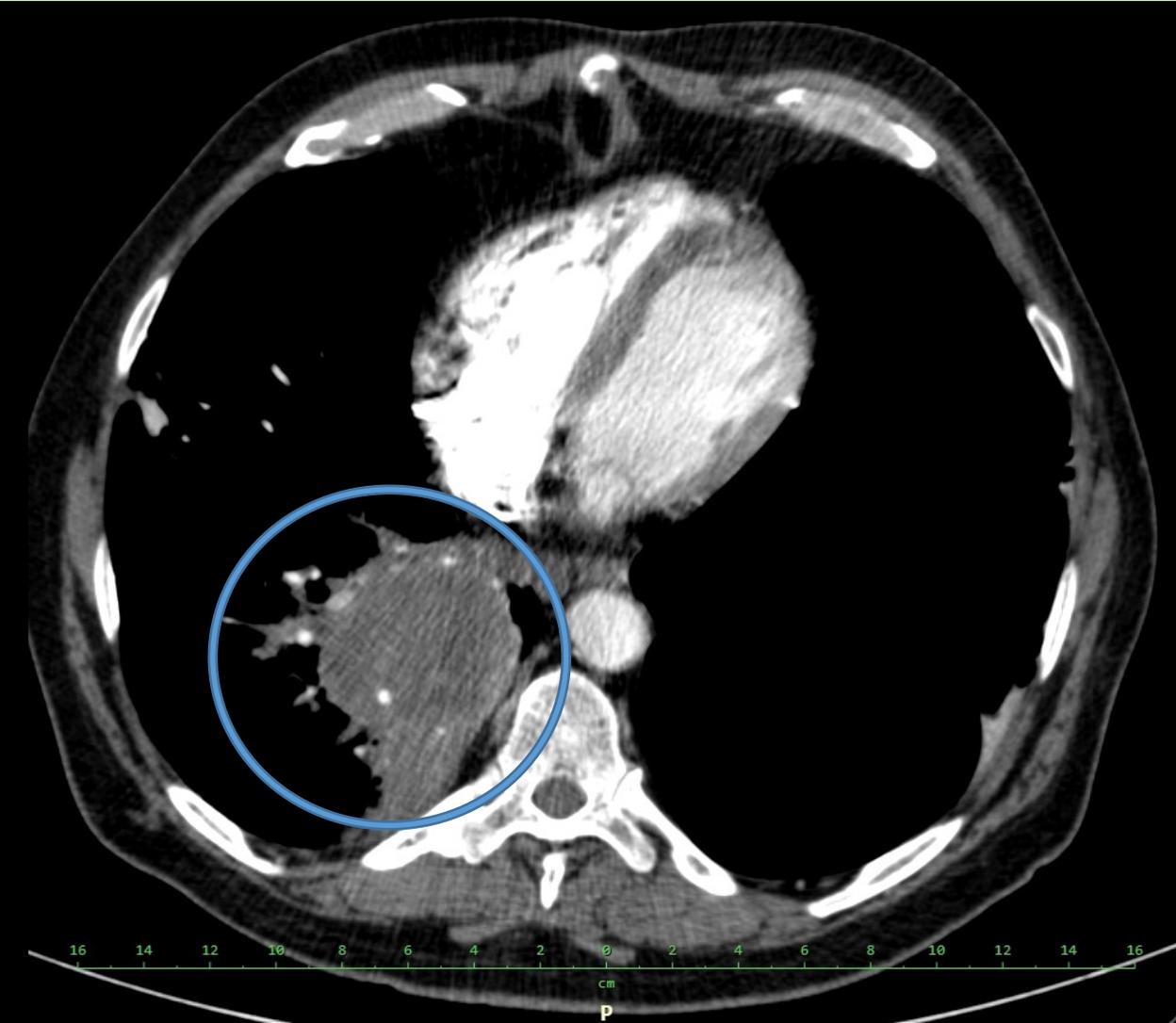
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There really are signs of emphysema present. The emphysematous bulla is marked blue. Actual extent of the bulla was shown by CT of the chest.

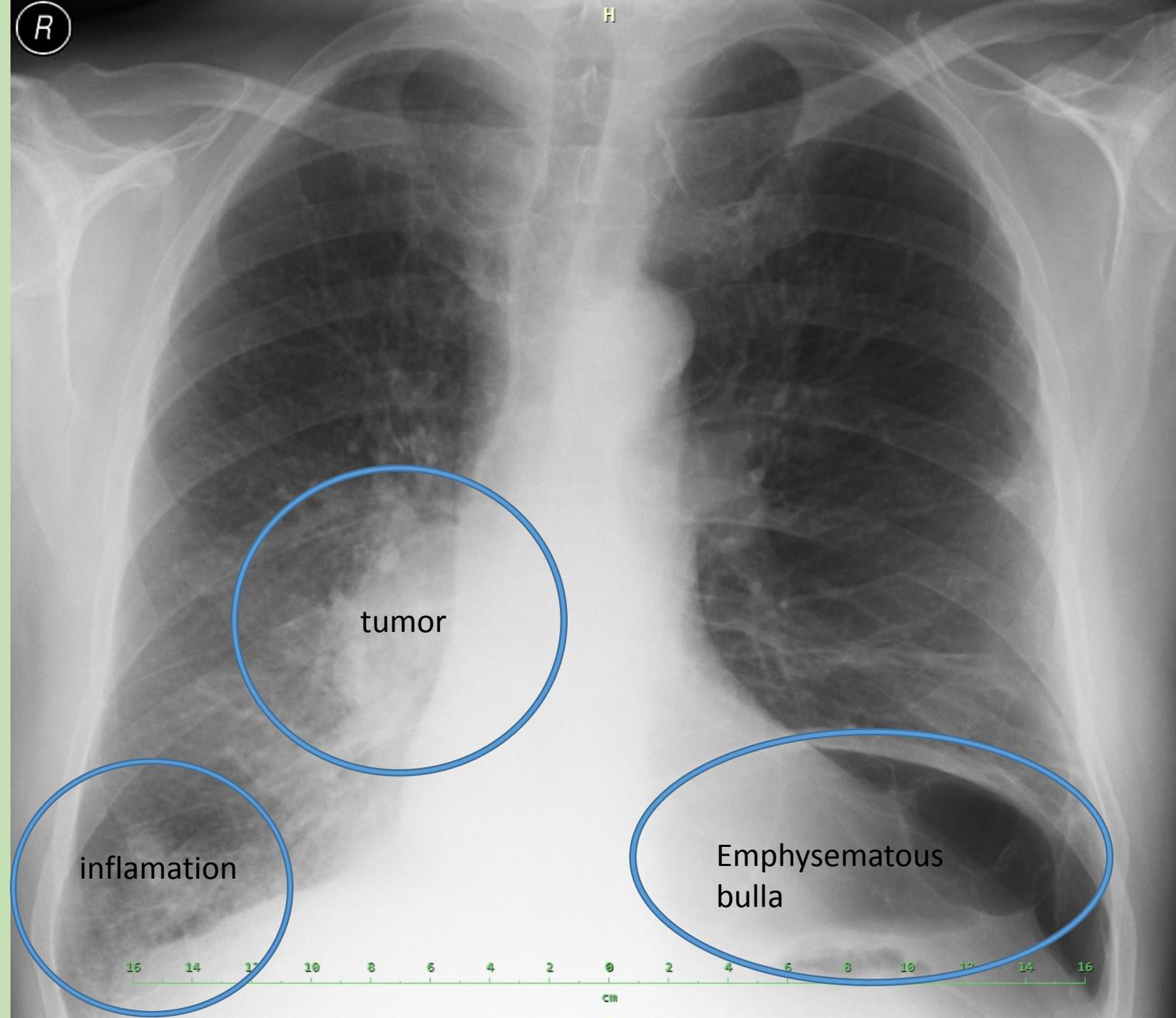


The picture also shows infiltration of tumor etiology. It is better seen on a CT of the chest, which was done later.



The skiagram of Mr. P.'s chest is rich in findings.

In correlation with other examinations and findings, we can say in retrospect that these were the following pathologies:



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Functional examination of the lungs

Since the patient suffers from dyspnea, it would be useful to know more about how the lungs manage their function. Therefore, we will perform:

- A. [Complete functional examination of the lungs \(spirometry, plethysmography, diffusion, arterial blood gases\)](#)
- B. [examination of arterial blood gases only](#)

Complete functional examination

- The patient was unable to undergo complete functional examination of the lungs (spirometry, plethysmography, diffusion) due to severe dyspnea, and with regard to hemoptysis it would not be appropriate to perform examinations requiring forced breathing maneuvers - hemoptysis could worsen with fatal consequences.

Examination of blood gasses

- [In this case, we were satisfied with the examination of arterial blood gases](#): pH: 7.391, pCO₂: 6.82, pO₂: 6.0, HCO₃: 31.1, SO₂: 79.4% - hypercapnic-hypoxemic respiratory insufficiency, thanks to compensatory mechanisms so far without respiratory acidosis. Finding compatible with a diagnosis of chronic obstructive pulmonary disease.

Diagnosis

- From the performed examinations, we found out that the cause of Mr. P.'s problems is the exacerbation of untreated chronic obstructive pulmonary disease (COPD), which arose on the basis of ongoing pneumonia, which developed in the tumor-affected lung.
- In this case, hemoptysis is a symptom of lung cancer, hemostatics were used with good effect in medication, and we also know that we will treat exacerbations of COPD and pneumonia. Staging chest CT revealed a locally advanced, inoperable tumor, without distant metastases (T4N2M0, clinical stage IIIB). What do we do to obtain a morphological diagnosis of a tumor?
 - A. [send the patient for bronchoscopy](#)
 - B. [send the patient for resection of the affected lung](#)
 - C. [take oncomarkers](#)

Bronchoscopy

- In this case, the right option. The least invasive procedure that provided the diagnosis. Direct and indirect signs of tumor in the right joint bronchus have been described bronchoscopically. From a sample taken from pathological endobronchial tissue it was possible to establish a morphological diagnosis - squamous carcinoma.
- Note: in 2011 only chemotherapy was available within the pharmacotherapy of squamous cell carcinoma, today (in 2020) the obtained tissue would be further examined for markers that predict a probability of immunotherapy treatment success.

Surgical option

- We always try to obtain the diagnosis with the least invasive procedure, in this case bronchoscopy.
- Note: Due to the fact that according to CT of the chest it is an inoperable tumor, curative surgical treatment is not possible in this case. Even if the finding was operable in terms of local progression and metastatic impairment, our patient has such a compromised ventilation reserve due to COPD with emphysema, that he would not withstand resection of any part of lung tissue.

Oncomarkers

- Oncomarkers are not specific enough to give us a clear diagnosis, but they are suitable for monitoring the development of the disease. Therefore, it is advisable to take them at the beginning of lung cancer treatment to determine the baseline values. When monitoring lung tumors, we use CEA and CYFRA in non-small cell lung cancer (NSCLC) and proGRP in small cell lung cancer (SCLC).

Therapy

- Treatment of pneumonia with a broad-spectrum antibiotic (amoxicillin-clavulonate) and complex bronchodilator treatment of exacerbation of COPD (inhaled parasymphatholytic, inhaled β -sympathomimetic, corticoids, aminophylline), hemostatic therapy of hemoptysis were started immediately.
- Mr. P. successfully went through the therapy of pneumonia and exacerbation of COPD and got into a condition in which he was able to undergo bronchoscopy and oncological treatment. Performance status was evaluated as 1 after the cessation of acute problems.
- After obtaining a morphological diagnosis, chemotherapy of squamous cell carcinoma consisting of vinorelbine + platinum derivative was planned.
- However, the night before the planned administration of chemotherapy, despite the hemostatik therapy, there was a recurrence of hemoptysis and the patient died because of terminal hemoptoe.

Mr. D., born 1963

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Anamnesis

- the patient comes for shortness of breath and cough, lasting several weeks, the problems are slowly escalating.
- Recurrent thrombophlebitis of both lower extremities
- Uses Clexane 0.8ml s.c. 1-0-1 at 12 o'clock, Lioton gel for the right lower limb once a day
- Former smoker, previously up to 10cig / day about 8 years
- Without allergies
- Works in a foundry

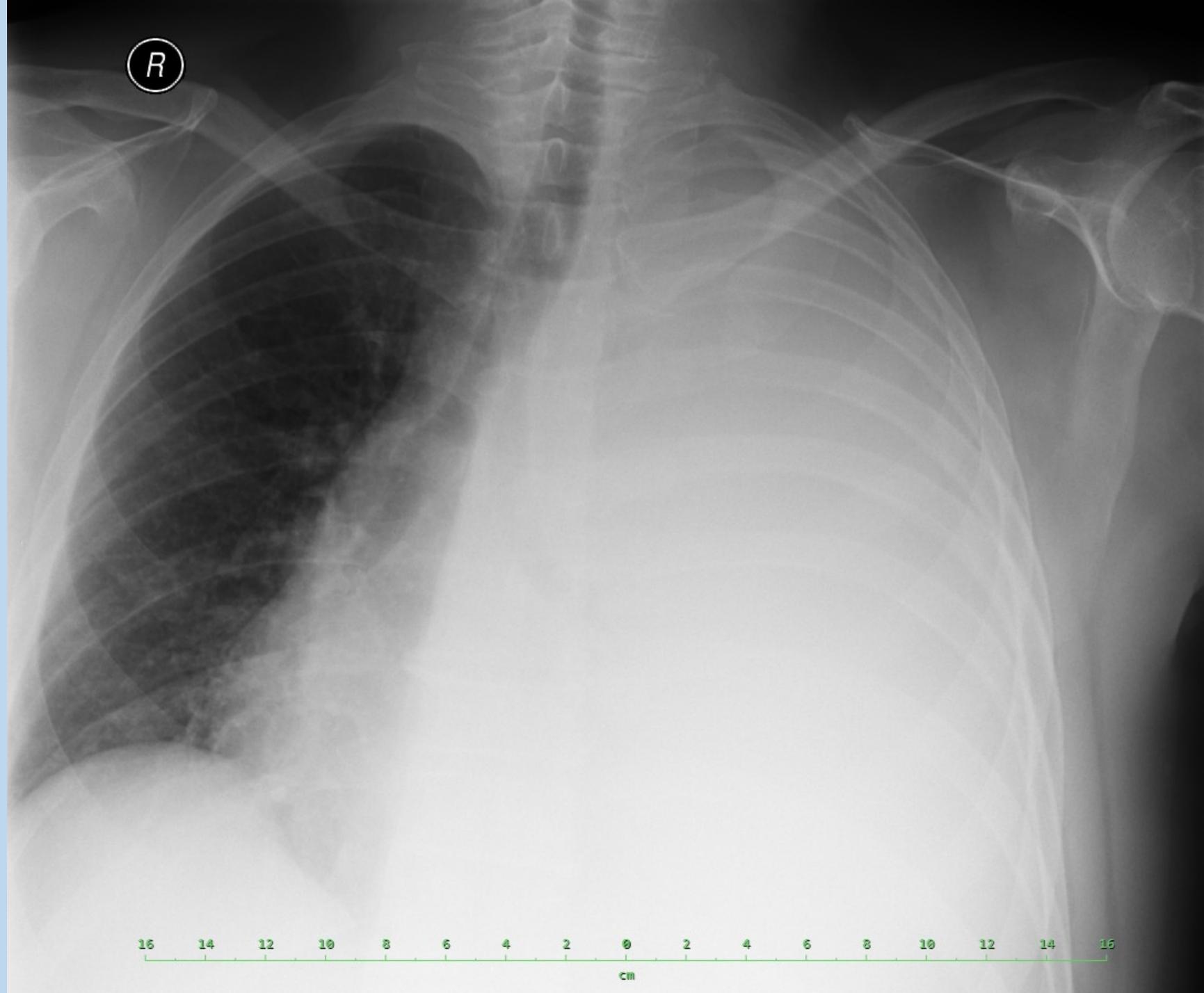
Physical and laboratory examination

- Lucid, oriented, cooperating, neurologically normal, cardiac action regular, afebrile, dyspnea even with mild exertion, breathing on the left side weakened in the whole range, abdomen without pathology, extremities without swelling, without signs of inflammation, Homans and plantar signs negative.
- O₂ saturation 97%, blood pressure 110/60mmHg, puls 105 'reg., body temperature 36.0°C, weight 93kg, height 191cm.
- Hemoglobin 118, Leukocytes 12 000, CRP 40

What are we looking at? Intentionally, in addition to the correct option, there is one common student tip:

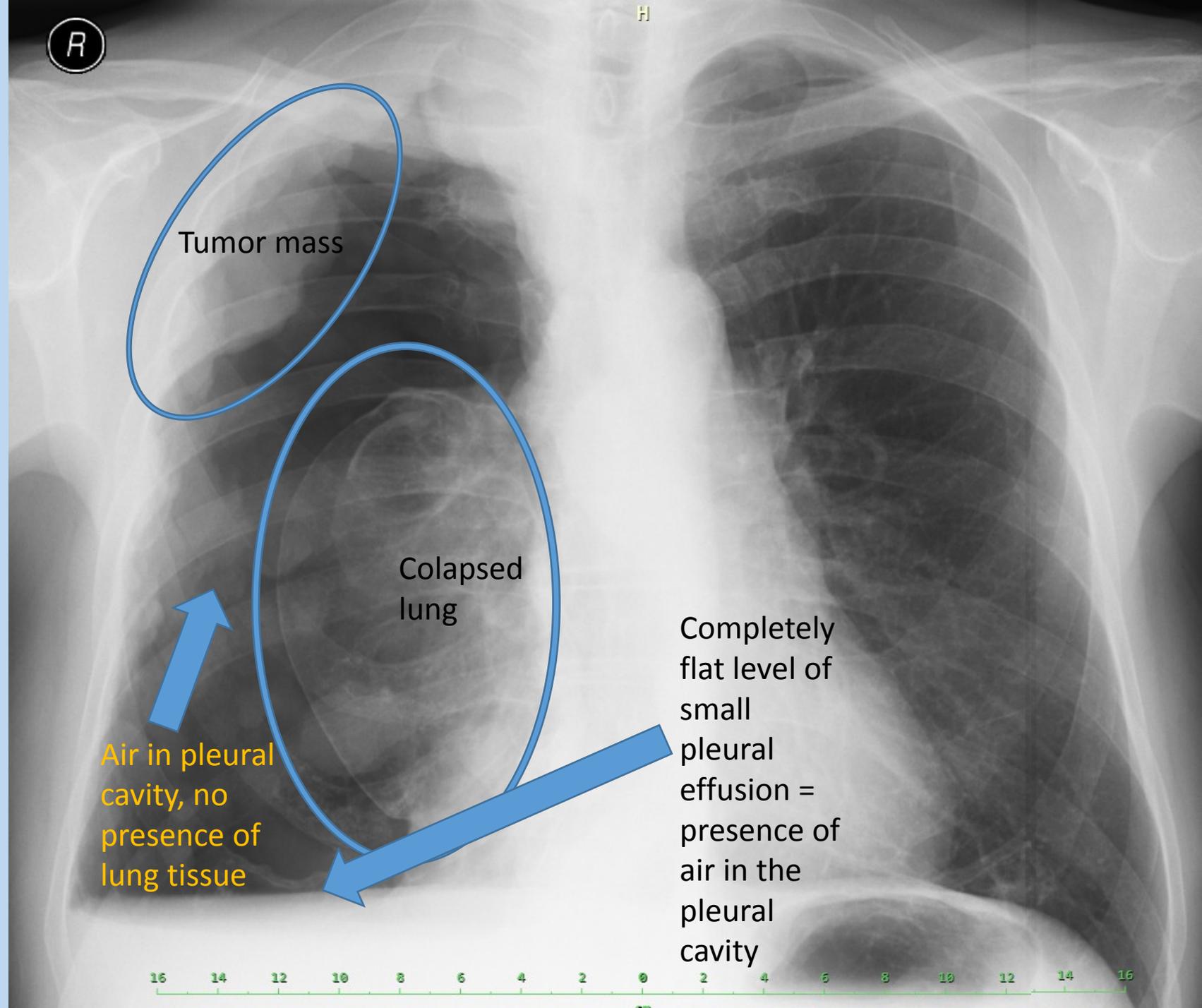
- A. [Pneumothorax](#)
- B. [Pleural effusion](#)

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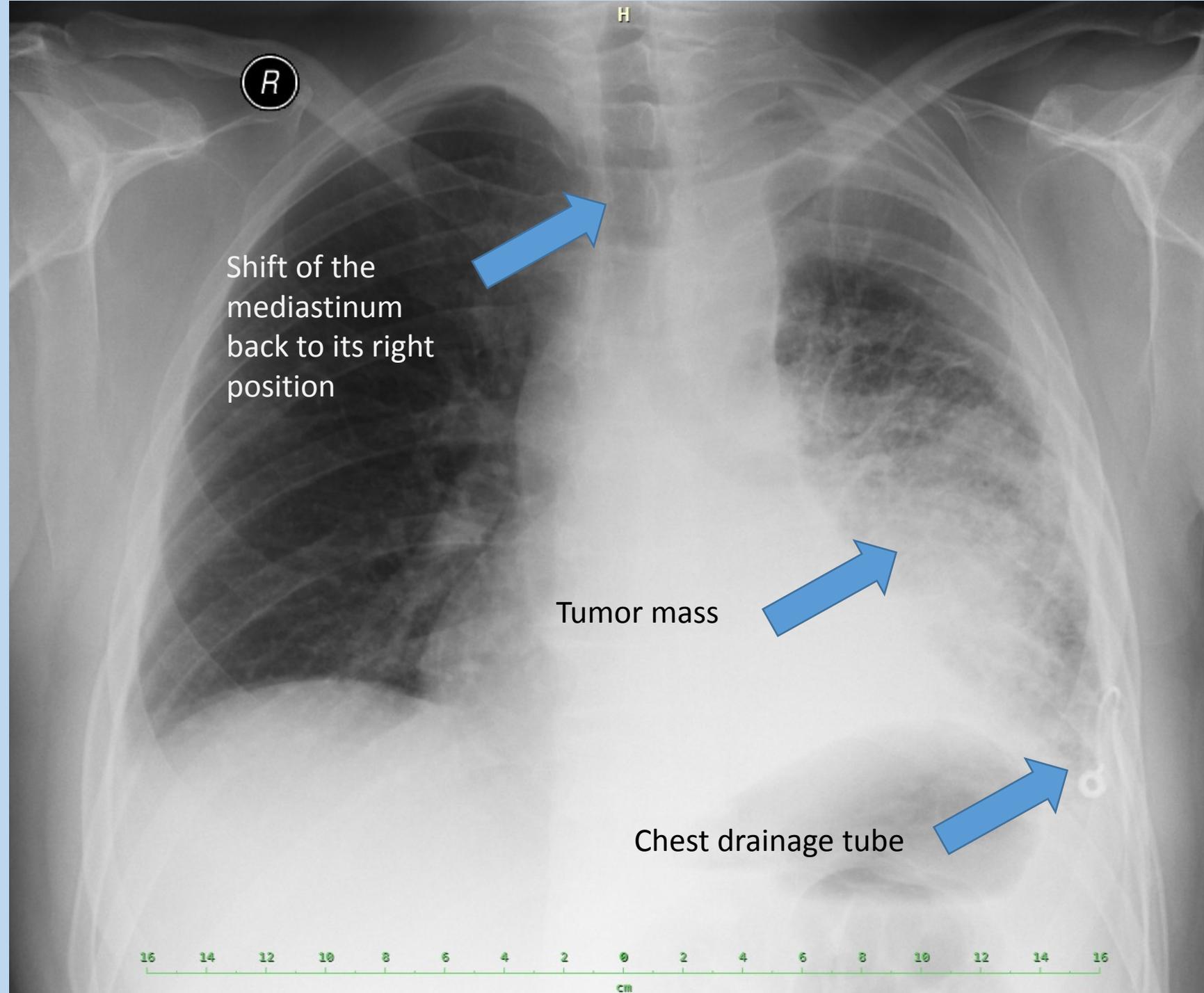
It is not pneumothorax, the air is black on the X-ray. Typical pneumothorax looks like this (here in a picture of a patient with malignant mesothelioma):

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The original image shows a massive pleural effusion, which pushes the mediastinal structures to the healthy side with its volume. This image shows the condition after chest drainage:

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Functional examination

- At the beginning, the patient was unable to undergo a functional examination due to severe dyspnea, so we were satisfied with the examination of blood gases, which was without respiratory insufficiency. Subsequently, the patient underwent lung function tests. The result was moderate restrictive ventilation disorder - a picture of the "absence" of a functional lung parenchyma due to the presence of extensive tumor infiltration.

Diagnosis and therapy

- After the evacuation of the effusion, a tumor mass hidden in the fluid appeared on the skiagram of the chest.
- According to staging CT of the chest, the clinical stage was IV, T2N2M1a - metastatic involvement of the pleura with cytologically confirmed malignant pleural effusion. Bronchoscopic examination succeeded in obtaining a morphological diagnosis - adenocarcinoma, according to molecular genetic examination without the presence of driving mutations EGFR or ALK – the patient was started on chemotherapy in combination pemetrexed + platinum derivative.
- After II. cycle of chemotherapy (about 6 weeks of treatment), the progression of the disease was noted and the patient was started on erlotinib – I. generation inhibitor of EGFR tyrosine kinase activity. However, erlotinib treatment did not have a significant effect either, and after three months it was discontinued for further disease progression, and only symptomatic treatment continued. The patient died 4 weeks after stopping erlotinib treatment with evidence of terminal cancer progression.

Mrs. H., born 1953

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Anamnesis

- Patient comes for exertional dyspnea lasting several weeks, except for shortness of breath without problems, does not cough, without temperatures.
- varicose veins of lower extremities, hypertension, gallstones, carpal tunnel surgery, depressive syndrome
- Uses Lorista H, Citalec
- Smoker - 15 cig/day from early youth
- Without allergies
- Administrative worker

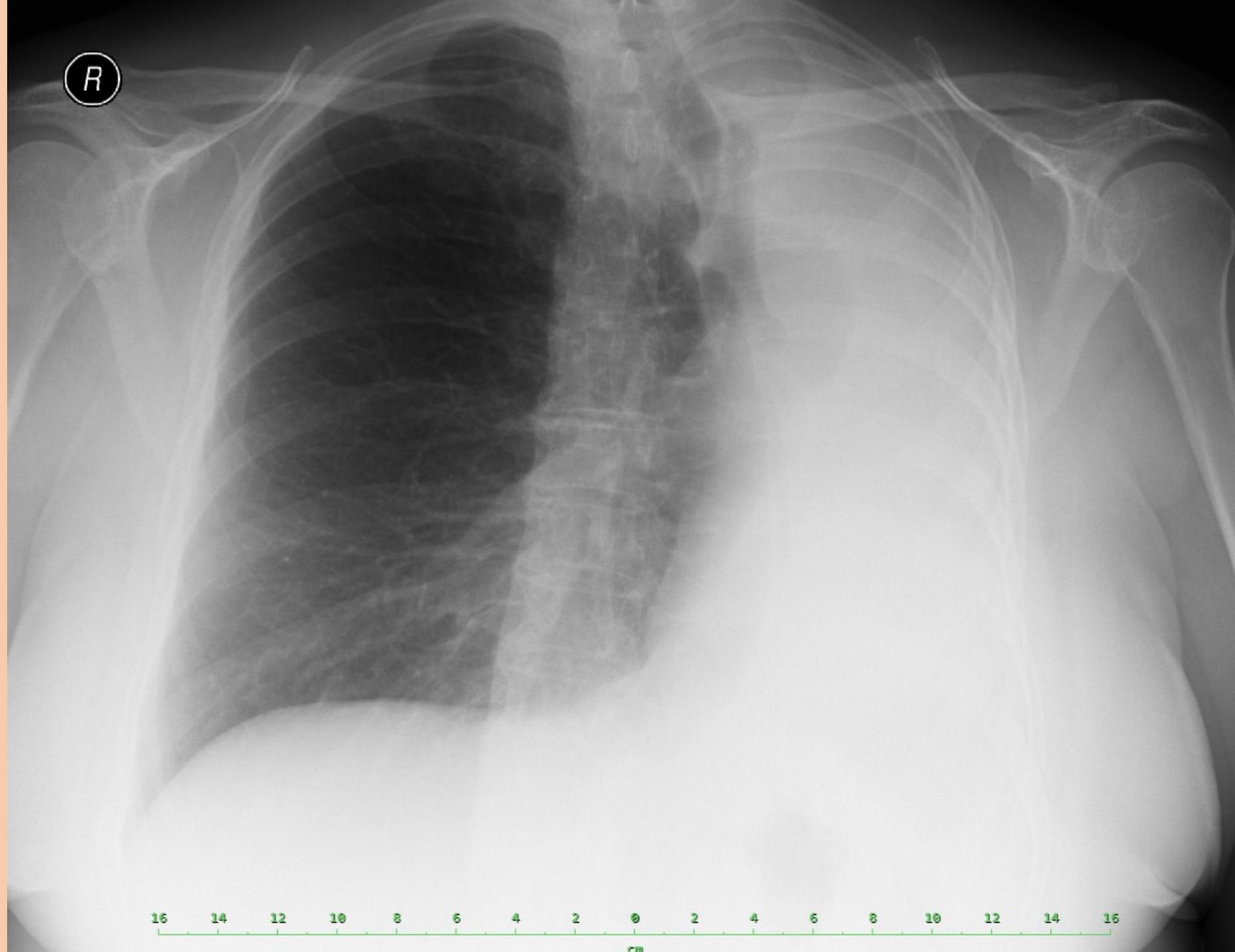
Physical and laboratory examination

- Lucid, oriented, cooperating, neurologically normal, cardiac action regular, afebrile, shortness of breath when walking, breathing on the left side weakend in the whole range, abdomen without pathology, extremities without swelling, no signs of inflammation, varices calm, Homans and plantar signs negative.
- O2 saturation 94%, blood pressure 120/80mmHg, puls 72 'reg., body temperature 36.6 ° C, weight 80kg, height 162cm.
- Laboratory examination without serious pathologies

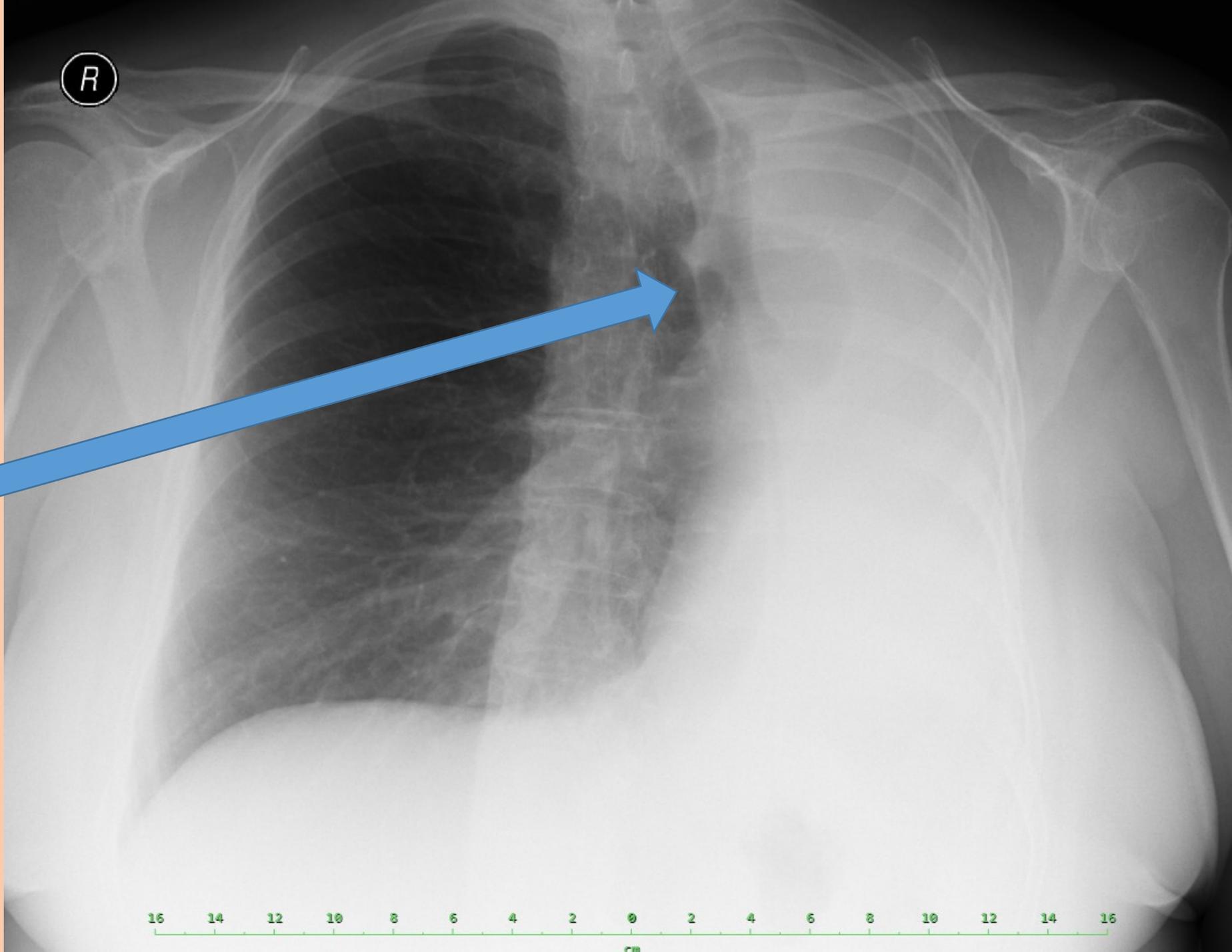
What pathology is found on the chest skiagram?

- A. [Pleural effusion](#)
- B. [Atelectasis](#)

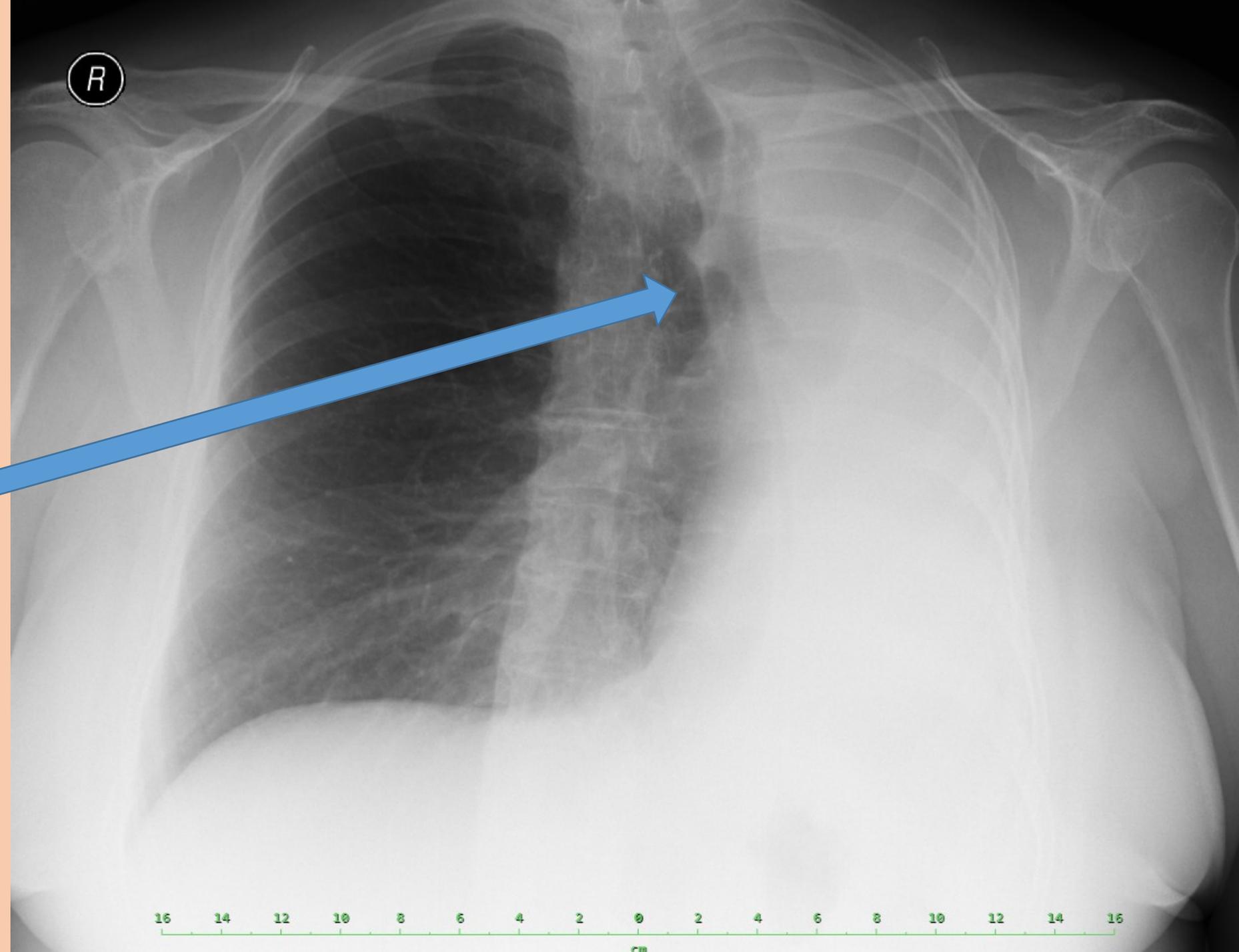
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A typical example of a large effusion is Mr. D., in whom the pressure of the fluid overpressed the mediastinal structures to the healthy side. In Mrs. H., however, we observe the opposite phenomenon - the shift of mediastinal structures to the side of pathology. It is therefore not a effusion in this case.



It is atelectasis. Due to endobronchial pathology, the air supply to the left lung was closed, which thus became airless, then the unaffected side developed compensatively and the mediastinum shifted to the pathological side.



Functional examination of the lungs

- Examination of arterial blood gases: pH 7.41, pCO₂ 5.5, pO₂ 9.6, HCO₃ 25.9 - without respiratory insufficiency
- Functional examination of the lungs, similarly to the case of Mr. D., showed a restrictive ventilation disorder.

Diagnosis and therapy

- Mrs. H. underwent bronchoscopy and was diagnosed with small cell lung cancer. According to staging chest CT clinical stage IV - T4N2M1b - with metastasis of the left adrenal gland.
- The endobronchial finding, which caused atelectasis of the left lung, was found in the left main bronchus and was suitable for laser treatment. The patient therefore underwent palliative endobronchial procedure with the intention of clearing the left main bronchus. During the procedure, however, only a part of the tumor mass was removed and the desired effect was not achieved.
- After endobronchial procedure, the patient underwent 4 cycles of chemotherapy consisting of platinum derivative + etoposide. The clinical effect of the treatment was good and the patient's quality of life was satisfactory. Cancer progression and death occurred 5 months after treatment. The overall condition of the patient at the time of progression allowed only symptomatic treatment.

Conclusion

- The common denominator of all the cases you went through was the presence of lung cancer. However, the causes of dyspnea were various - in the first case exacerbation of COPD, in the second effusion and in the third atelectasis. The skiagram of the chest was absolutely essential for the diagnosis in all cases - a simple and accessible examination.
- All three patients were smokers. Mr. D. and Mr. P. suffered from recurrent lower limb thrombosis. This diagnosis occurs more common in cancer patients - cancer is a procoagulant condition.
- In patients with COPD and lung cancer, differential diagnosis of dyspnea may be difficult - it may be tumor progression, exacerbation of COPD, infectious complication, a combination of the situations named above, or a completely different cause, for example pulmonary embolism.