

Hypertensive Late Hemothorax following Left Pneumonectomy

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Rezumat

Hemotorax tardiv hipertensiv după pneumonectomie

Introducere: Cancerul pulmonar este o maladie extrem de gravă, în cele mai multe cazuri simptomatologia dezvoltându-se în faze tardive ale bolii. Dezvoltarea locală tumorală cât și la distanță limitează indicația chirurgicală, de multe ori actul chirurgical fiind unul eroic. Pneumonectomiile reprezintă în cadrul rezecțiilor pulmonare, adevărate provocări, eventualele complicații postoperatorii având repercursiuni grave, amenințătoare de viață.

Material și metodă: Prezentăm cazul unei paciente, în vârstă de 66 ani, la data operației, diagnosticată cu adenocarcinom pulmonar stâng, local avansat, (tumoră de lob inferior stâng ce invadea lobul superior) la care s-a practicat în martie 2012 pneumonectomie stângă cu limfadenectomie mediastinală. Evoluția postoperatorie imediată a fost favorabilă, cu diminuarea treptată a cavității restante, cu deplasarea mediastinului spre stânga, înscriindu-se practic în registrul normal postpneumonectomie.

Rezultate: La controlul imagistic efectuat la aproximativ un an de zile postoperator, cavitatea postpneumonectomie a început să crească sub presiunea unui lichid care în loc să scadă cantitativ, era prezent într-un volum semnificativ mai mare față de examinările anterioare postoperatorii. Părerea generală

a fost că avem de a face cel mai probabil cu determinări secundare la nivelul pleurei care produc lichid pleural în exces. Evoluția ulterioară precum și operațiile efectuate, (toracoscopie + biopsie; toracotomie + biopsie) ne-au demonstrat că nu întotdeauna prima impresie este și cea adevărată.

Concluzii: Există cazuri, precum cel prezentat, care par fără soluție terapeutică. La o analiză atentă, dublată de perseverență, acestea beneficiază de rezultate remarcabile care demontează ipotezele nefaste emise anterior. Patologia asociată poate să creeze în aceste cazuri, dezechilibre asupra organismului, care să influențeze negativ evoluția locală postoperatorie.

Cuvinte cheie: cavitate post-pneumonectomie, pleura parietală, ductul toracic

Abstract

Introduction: Lung cancer is an extremely serious disease, in most cases the onset of symptoms comes in late stages of the disease. Local and distant tumor development limits the surgical indication, many times the surgical act being a heroic one. Out of all pulmonary resections pneumonectomies are real challenges as possible postoperative complications can be life-threatening.

Materials and Method: We present the case of a 66 year-old female patient at the time of surgery, diagnosed with locally advanced adenocarcinoma of the left lung (lower lobe tumor invading the upper lobe), who sustained left pneumonectomy with mediastinal lymphadenectomy in March 2012. Immediate postoperative evolution was favorable – gradual reduction of the residual cavity, with left shift of the mediastinum – basically a normal post-pneumonectomy course.

Results: Upon imagistic control at one year postoperatively

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the following was observed: the residual cavity had increased in size under the pressure of a fluid which instead of diminishing in quantity was present in a significantly higher volume than on previous postoperative examinations. The general consensus was that we are dealing with pleural metastases which were producing excess pleural fluid. The evolution of the patient and subsequent surgical interventions have demonstrated that the first impression is not always the truth.

Conclusion: There are cases, like the one presented, which seem without therapeutic solution. Upon careful analysis, doubled by perseverance, these cases benefit from spectacular results which break down grim hypotheses previously formed. Associated pathology can create in these cases an unbalance in the organism, which will negatively influence local postoperative evolution.

Key words: postpneumonectomy cavity, parietal pleura, thoracic duct

Introduction

The procedure called pneumonectomy is the surgical ablation of a lung. It is generally performed for locally advanced pulmonary neoplasm, which does not allow a limited pulmonary resection, due to the local extension.

The post-pneumonectomy residual cavity is disestablished in time by the shifting of the mediastinum, ascension of the hemidiaphragm and retraction of the intercostal spaces.

A slow evolution of the cavity, associated with an increased production of pleural fluid, is usually a result of local recurrence.

Case report

S.A. female patient, age 66, is diagnosed in March 2012 with a pulmonary tumor of the left lower lobe (LLL).

The CT examination shows a tumoral mass of 46/50 mm with an irregular contour, localized apically in the LLL, contacting the oblique fissure and crossing over into the apical-dorsal segment (Fig. 1).

Bronchoscopy: without proliferative elements in the right bronchial tree; on the left side, pseudo infiltrative erythema on the last ring of the left main bronchus and at the origin of the lower lobar bronchus; the upper left lobar bronchus is normal.

The ventilatory function was normal, with a postoperative FEV1 = 76.4%, the cardiological consult indicating normal cardiac function.

Based on the obtained data and comparing it with the intraoperative aspect of the lesion, a left pneumonectomy with mediastinal lymphadenectomy was performed.

The histopathological (HP) report revealed an adenocarcinoma of the left lung with no lymph node invasion (T3NoMo).



Figure 1. Chest CT performed before left pneumonectomy

The postoperative evolution was favorable, encumbered in the second postoperative day by an episode of atrial fibrillation, remitted under specific treatment.

The patient receives oncological treatment, with imagistic control at 6 months after and one year after surgery.

While thoracic CT performed at 6 months after surgery showed fluid accumulation in the post-surgical residual cavity, with the mediastinum slightly shifted to the left, the CT performed at one year after surgery revealed a residual thoracic cavity containing fluids, with a moderate mass effect on the mediastinum and the heart. Neither examination showed oncological changes (Fig. 2).

At approximately 15 months after surgery, the patient

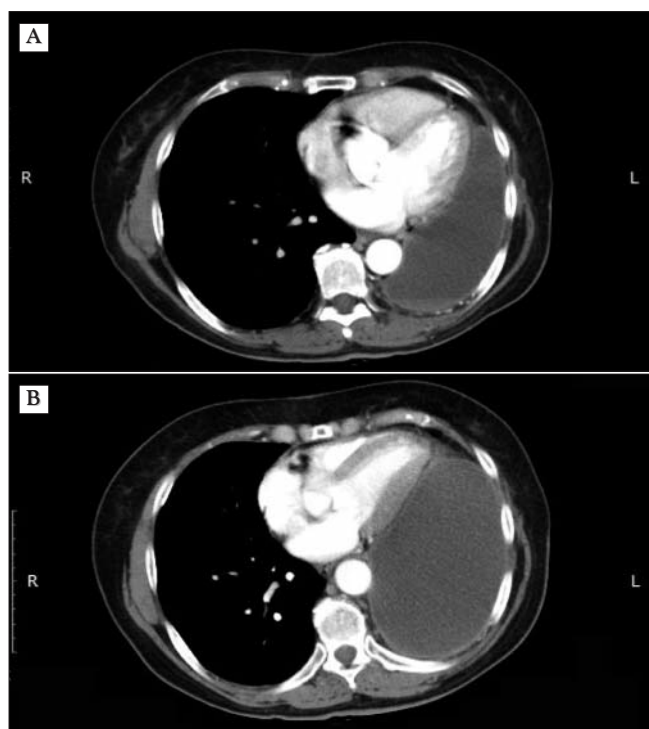


Figure 2. Chest CT performed at 6 months and 1 year postpneumonectomy

presents in our clinic, complaining of fatigue and dyspnea at little effort. The clinical examination we performed also revealed marked edema of the arm. The echo-Doppler exam of the venous system performed before hospitalization reveals thrombosis of the left internal jugular vein, the subclavian vein, and the left axillary vein.

Cervical and thoracic CT shows important fluid accumulation in the left hemithorax, which causes right shift of the mediastinum, and also a discrete fluid accumulation in the right pleural cavity.

The cardiac ultrasound shows a right-sided displacement of the heart and heart failure.

Surgical intervention is decided for the evacuation of the fluid but also for diagnostic purposes. Thoracoscopy is performed and approximately 2.7 liters of brown hue pleural fluid are evacuated. The thoracic cavity presents hyperemic, fragile parietal pleura, with excrescences on its entire surface, of the same aspect with the rest of the pleura. Multiple biopsies are performed without significant bleeding.

Postoperative evolution is favorable, with serohematic pleural drainage without active bleeding aspect. Suppression of the drain is done at 48 hours after surgery, and discharge on the 5th day after surgery.

The HP report of the parietal pleura biopsy refutes the suspicion of metastasis: necrotic detritus, fibrous connective tissue bands with chronic inflammatory infiltrate.

The patient continues oncological treatment postoperatively; an antithrombotic therapy with LMWH 0.6 ml BID is also started.

Immediately after surgery clinical status improved significantly, but at about 4 months after the last intervention, it degrades again with the recurrence of dyspnea at small effort.

The CT scan showed at this time a voluminous collection with parafluid density occupying the entire left hemithorax, exerting mass effect on the heart and mediastinum, pushing them parasagittally to the right (Fig. 3). The cardiologic consult sets the diagnosis of class IV NYHA heart failure by cardiac compression and hypodiastolia; urgent decompression is recommended. Complete blood count also shows significant anemia.

Evacuative thoracentesis is attempted, without success. Surgical intervention remaining the only solution, an open approach to evacuation and pleurectomy is decided upon with the purpose of removal of possible excess pleural fluid producing metastases.

A large "sickle" anterolateral left thoracotomy with resection of the 5th lateral costal arch was performed, for an optimal approach for performing the pleurectomy (Fig. 4). On entering the pleural cavity about 2,500 ml of brown hue pleural fluid with many old clots (Fig. 5) are evacuated. The parietal pleura is hyperemic with patches of inflammatory pachypleuritis areas, without suspicious neoplastic lesions and no obvious source of bleeding. The extemporaneous examination of the parietal pleura showed massive infiltration without neoplastic damage. Upon considering the absence of pleural metastases and the presence of massive local inflammation, it is decided not to perform the pleurectomy. The cavity is

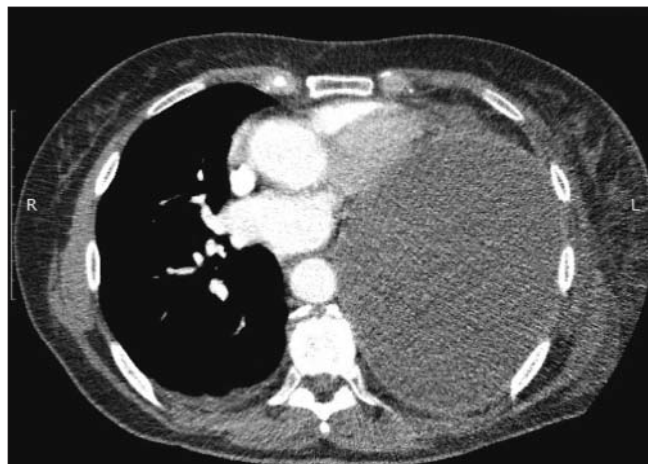


Figure 3. Chest CT - heart compression



Figure 4. "Sickle" thoracotomy with lateral resection of the Vth rib

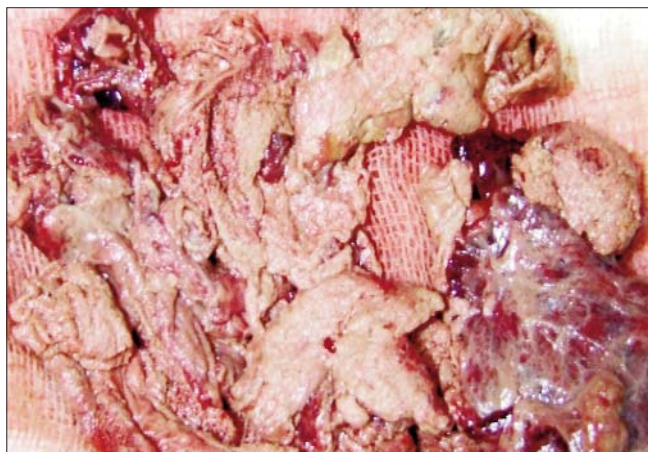


Figure 5. Old clots evacuated from the cavity

drained, and the drainage left in place until regional architecture is consolidated. The anticoagulant treatment is also suppressed, due to the old bleeding discovered intraoperatively and the recanalization of the venous thromboses highlighted by the echo-Doppler examination.

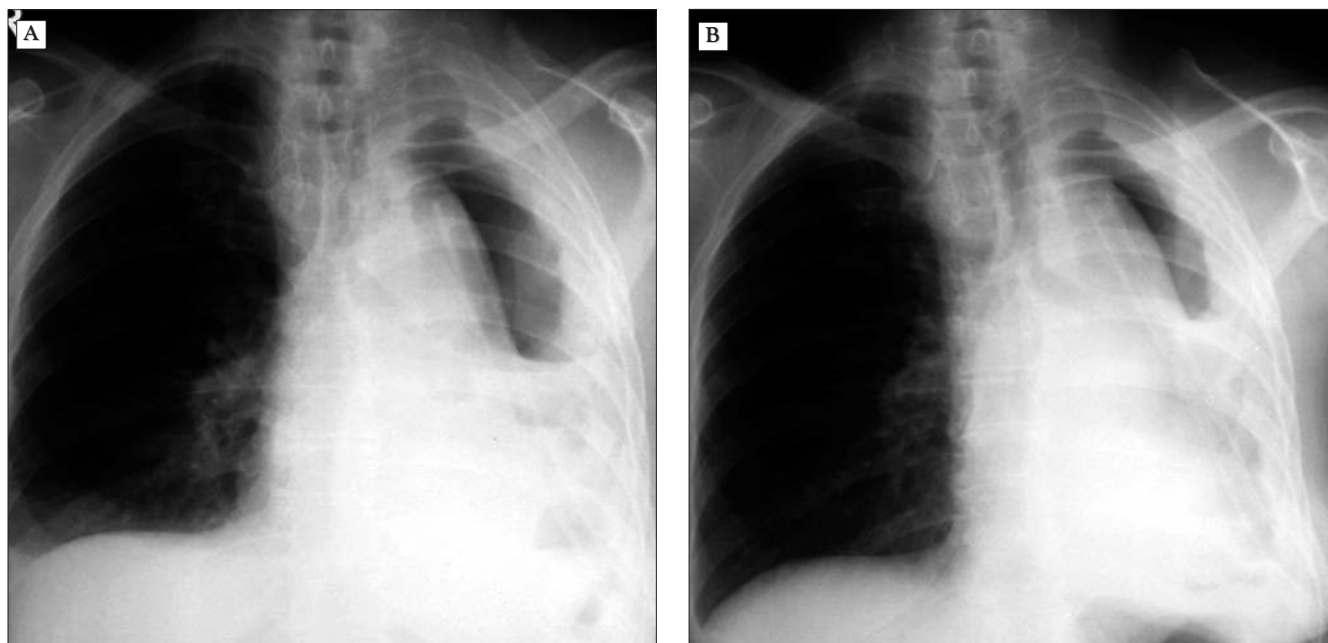


Figure 6. Postoperative evolution with diminishing remaining cavity

Postoperative evolution is favorable, both clinically and imagistically, with ipsilateral mediastinal shift and considerable reduction of the post-pneumonectomy residual cavity (Fig. 6).

The patient is to be discharged (still in hospital at the time when this presentation was written), and drainage to be suppressed depending on the local evolution of the cavity.

Discussion

The normal evolution of the residual cavity after pneumonectomy consists in reduction of the cavity by the shifting of the mediastinum to the same side, ascension of the hemidiaphragm and retraction of the thoracic wall by narrowing of the intercostal spaces. The remaining residual cavity is filled with pleural fluid which transforms into the fibrinoid body. The whole process takes about 3-4 weeks, with observed evolutions of up to 7 months (1).

After the resorption of the pleural fluid the mediastinal shift continues, followed by the partial herniation of the contralateral lung.

According to one study (Suarez & all - 1969) (2) out of 37 patients who had undergone pneumonectomy, in only 10 cases the fluid was absorbed completely. This opinion is also supported by Biondetii in a 1982 study, which shows that in only 1/3 of the patients was the fluid absorbed completely out of the residual cavity.

The normal course mentioned above can be modified by a series of post-pneumonectomy complications: empyema, broncho-pleural fistula, hemothorax and local recurrence.

The post-pneumonectomy empyema is most of the time accompanied by a broncho-pleural fistula. It usually appears in the immediate postoperative period, rarely after a longer

one. The clinical picture consists of fever, leucocytosis, and malaise.

In our case, there have not been any signs of a possible empyema at any of the presentations in the clinic, the patient being afebrile, with no leucocytosis. Furthermore, the bacteriological analysis of the pleural fluid did not reveal the presence of germs in the examined fluid.

The broncho-pleural fistula is a postoperative complication which usually appears in the first 2 weeks after surgery. The late onset is usually the result of empyema fistulization from the residual cavity, into the bronchial stump. Besides the signs present for empyema, which are associated, the radiological exam shows an alteration of the air-fluid level given by the increased quantity of air in the cavity. The imaging investigations performed by us have not shown suggestive changes for us to suspect the presence of a fistula, and the patient did not exhibit signs of infection, and did not present episodes of productive cough, which are characteristic for a fistulization.

When the pleura is affected by the presence of metastases, there is an increase in capillary permeability as a consequence of the inflammatory process generated by the neoplastic invasion. Furthermore, lymphatic drainage is blocked by the neoplastic invasion at various levels (3). In the case presented neither pleural invasion (all histopathological and IHC exams being negative), nor mediastinal lymph node involvement (no adenopathies on the CT examinations) were observed.

It is possible that lymphatic drainage was affected by other causes. The patient was diagnosed at the beginning in June 2013 with thrombosis of the left jugular and left subclavian veins. It is at the confluence of the jugular and subclavian veins that the thoracic duct (collector of the left pleural lymphatics) has its outlet. The outlet is formed by either a single trunk

(80%) or by multiple trunks (20%) (4,5). 60% of the time the thoracic duct can flow into the jugular vein, or into the subclavian vein (6). It is possible, according to the presented data, that the thoracic duct outlet to have been affected, thus producing a retrograde stasis in the parietal pleura and an incapacity to absorb the postpneumectomy cavity fluid. This theory is supported by the residual cavity fluid quantity increase at the onset of the thrombosis previously described.

Severe obstruction of the thoracic duct can produce the rupture of its tributaries with extravasation of lymph and the onset of chylothorax (7). We do not have data to either confirm or infirm the presence of chylothorax, as we do not have a lymphangiography to show the effects of the obstruction on the thoracic duct.

Intraoperative discovery of old clots supports the theory of an intracavitary bleeding. This is possible taking into account that the patient was administered a long term anticoagulant treatment with LMWH in high doses (Clexane - 0,6 ml BID), which could have determined diffuse pleural bleeding with increase of the fluid volume.

The standard coagulogram performed during hospitalization was never abnormal, but the effects of enoxaparin on the Xa and IIa factors cannot be evaluated through routine tests.

We must also take into account the compressive effect on the heart due to the excess pleural fluid which generated heart failure (according to the cardiac ultrasound performed). Cardiac impairment contributed in turn to the build-up of fluid in the residual cavity leading to a vicious circle.

The solution for the presented case is in maintaining the drainage of the residual space until definitive shift of the adjacent structures and establishment of a definitive regional architecture. To be noted are the reversal of the heart failure, resolution of the venous thrombosis confirmed by the last echo-Doppler exam, the anticoagulant treatment being stopped to prevent local hemorrhage.

Conclusions

Most likely, the fluid increase was generated by the impairment of the lymphatic drainage of the parietal pleura by partial obstruction of the thoracic duct at its outlet. Also contributing was the intracavitary bleeding, as well as the generated heart failure.

The initially suspected local relapse was refuted by the data resulted from the investigations and by the performed surgical treatment, which proves that the first impression is not always true.

Every case has to be thoroughly investigated and treated even if, at a given point along the way, the therapeutic resources seem to be exhausted.

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