

Open window thoracostomy for the treatment of bronchopleural cutaneous fistula – case report

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Abstract

Pleural empyema and bronchopleural fistula (the communication between the pleural space and the airways) are early or late complications of various diseases. We present the case of a 29-year-old patient operated for cavitary pulmonary tuberculosis and giant caseoma at the age of seven, who also had fibrocavitary pulmonary tuberculosis positive for mycobacterium tuberculosis at the age of 19. The patient presented with low grade fever, chills, sweating, cough with mucopurulent sputum, dyspnea on mild exertion, perioral cyanosis, cyanosis of the limbs at exertion, anorexia, weight loss and skin suppuration on the left side of thorax. The diagnosis of chronic pulmonary suppuration, the failure of conservative therapy (multiple antibiotic treatments in the last three years), the presence and size of the bronchopleural cutaneous fistula, the patient's surgical history (presence of "lifesaving" sutures), as well as his immunocompromised state required that conservative medical treatment (antibiotics, antimycotics and supportive medication for six months) be associated with surgery. An open window thoracostomy was selected over segmentectomy or lobectomy due to their associated risks caused by anatomic changes in the large vessels. The open window thoracostomy should not be forgotten or abandoned as it may be the only approach that ensures patient survival and the effective management of the residual cavity and chronic suppuration in selected cases.

Keywords: empyema, bronchopleural fistula, open window thoracostomy

Rezumat

Toracostomie cu fereastră deschisă pentru tratamentul fistulei cutanate bronhopleurale – prezentare de caz
Empiemul pleural și fistula bronhopleurală (comunicarea între spațiul pleural și arborele bronșic) sunt complicații precoce sau tardive ale diverselor situații patologice. Prezentăm cazul unui pacient de 29 de ani operat pentru tuberculoză cavitară și cazeom gigant la vârsta de 7 ani, care a prezentat și tuberculoză pulmonară fibrocavitară pozitivă la 19 ani. Pacientul s-a prezentat cu subfebrilitate, frisoane, transpirații, tuse cu expectorație muco-purulentă, dispnee la eforturi mici, cianoză periorală, cianoză a extremităților la efort, anorexie, scădere ponderală și supurație cutanată latero-toracică stângă. Diagnosticul de supurație pulmonară cronică, eșecul terapiei conservatoare (multiple tratamente antibiotice în ultimii trei ani), prezența și dimensiunea fistulei bronhopleurale cutanate, istoricul chirurgical al pacientului (prezența de suturi „de necesitate”), ca și statusul imunitar precar au impus ca tratamentul medical conservator să fie asociat cu tratament chirurgical. S-a ales efectuarea unei toracostomii cu fereastră deschisă, și nu a unei segmentectomii sau lobectomii, din cauza riscurilor crescute date de modificările anatomice ale vaselor mari. Toracostomia cu fereastră deschisă nu trebuie omisă sau abandonată, fiind uneori singura metodă care asigură supraviețuirea pacientului și managementul eficient al cavității reziduale și al supurației cronice.
Cuvinte-cheie: empiem, fistulă bronhopleurală, toracostomie cu fereastră deschisă

Introduction

Pleural empyema and bronchopleural fistulas (communications between the pleural space and the airways) are immediate or late complications of different conditions accompanied by a high morbidity and mortality, prolonged hospitalization and increased use of resources¹. The presence of bronchopleural fistulas increases the morbidity and mortality rate of empyema itself by maintaining the contamination of pleural space and aspiration of pleural fluid inside the lungs². Early treatment and fighting the acute infection can litigate the appearance of chronic suppuration. The management of empyema will be carried out depending upon the infectious status of the lungs, characteristics of the pleural space and the presence of fistulas. The current concept towards surgical treatment of thoracic empyema in the presence of bronchopleural fistula is based upon the opinion of experts, rather than the results of clinical studies³.

Case report

We present the case of a patient of 29 years old belonging to an urban habitat of lower socio-economic status, non-smoker, without occupation, with a personal history

of hallucinogenic drug usage (around 7 months and a withdrawal period since 2010), history of pulmonary tuberculosis (1988, at the age of 7) and history of surgical drainage of a gigantic caseum residing in superior segment of the left lobe along with multiple cavernous formations in the lingula. Perioperatively, the patient had a massive hemorrhage (severe) which was controlled by suturing the pulmonary hilum (suture and ligation *en bloc*) considered to be an extreme measure. At 19 years of age (2001), the patient suffered from secondary fibrocavitary pulmonary tuberculosis in the left apical lobe, nodular infiltration of the right inferior lobe having positive smears and culture for *Mycobacterium Tuberculosis*. In 2008 he returned to the clinic presenting infection of the left lateral thoracic wall and he was discharged later without respecting the indications given by the doctors. He then again revisited the clinic in 2011 presenting an altered general status, fever, chills, perspiration, productive cough, purulent expectoration, dyspnea on mild effort, peri-oral cyanosis and cyanosis of the extremities appearing after effort, loss of appetite, loss of weight and cutaneous suppurative infection of the left lateral thoracic wall (affirmatively has been present there for the past 3 years).



Figure 1. Chest X-ray: limited hyperlucency in upper left lobe and linear opacities tractioning the trachea, mediastinum and heart and pulling up the left hilum; nodular opacities disseminated in right lung, more prominent at the apex

The physical examination reveals: 2 fistulous orifices at the level of the skin of left lateral thoracic wall which expels pus along with air, upon the examination of the respiratory apparatus there were revealed: vesicular murmur, prolonged inspiration and bilateral basal crackles.

Biological parameters were as follows: Sa O₂ = 90%; Pa O₂ = 60 mm Hg; P CO₂ = 48 mm Hg; leukocytosis; ESR = 48 mm in 1 hour and CRP = 9.52 mg/ml (sign of inflammation). Serology for HIV infection was negative. Examination of sputum and the secretion from the wound were found to be smear negative for AFB (acid fast bacilli), the culture was negative for *Mycobacterium Tuberculosis*. But there were found a non specific flora of *methicilin resistant staphylococcus aureus* whereas mycological studies revealed the presence of *Aspergillus*.

Antero-posterior chest radiography reveals: hypertransparency with a double wall effect of the left superior lobe along with linear opacities which creates traction upon the trachea, mediastinum as well as the heart resulting in an ascension of the left hilum. There can also be seen nodular opacities disseminated in the right pulmonary field, more obvious towards the apex of the right lobe (Figure 1).

Thoracic CT scan reveals: apical right pulmonary fibrosis with retraction along with some air pockets, some out of which had tissular content within (aspect of aspergillosis). Towards the left side there can be seen an apical pulmonary retractile fibrosis along with some air pockets, as well as the superior mediastinum retracted

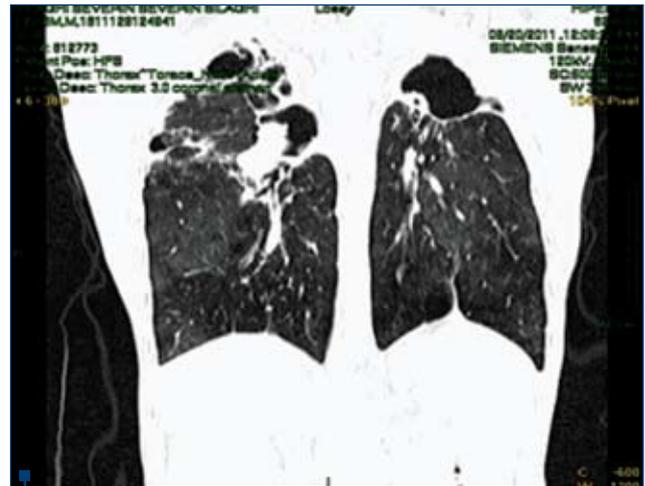


Figure 2. Thoracic CT scan: right - apical pulmonary retractile fibrosis including aeric cavities, some with tissue solid content (suggestive of aspergillosis). Left: apical retractile pulmonary fibrosis including several cavities (one 7 cm large), upper mediastinum shifted to left, important distortions of the mediastinum

towards the left side resulting in total distortion of the whole pulmonary field (Figure 2).

Bronchoscopic examination reveals modifications like post tuberculous status of the bronchi, broncho-pleural fistula of about 8 mm at the level of left superior lobar branches of the left bronchus, precisely the one supplying apico-dorsal segment of the left pulmonary lobe. Injection of methylene blue dye in fistulous tract and appearance of the dye after some hours at the level of the skin confirms the presence of broncho-pleuro-cutaneous fistula.

Diagnosis of chronic pulmonary suppurative infections, failure of the multiple conservative antibiotic treatments (multiple treatments in the past three years), presence of a large broncho-pleuro-cutaneous fistula, surgical history of the patient (presence of the sutures at the level of hilum) and the severe morbid condition of the patient implies the association of conservative medical therapy (antibiotic, antimycotic and supportive therapy for a period of 6 months) followed by surgical intervention.

Considering the risks of a segmentectomy or a lobectomy (due to modifications of the trajectories of the big vessels) an open window thoracostomy was performed (Eloesser window). This surgical procedure was performed under local anesthesia. At the level of skin two fistulous orifices were found, continuing within the thoracic muscle layer up to the axilla. At the level of the second intercostal space on the left anterior axillary line the orifices were communicating with the pleural space. A bronchial fistula was found. The fistulous tracts were excised and a thoracostomy of around 4/4 cm diameter exteriorizing the pleuro-parietal fistula was performed by suturing the skin with the pahi-parietal pleura. Lavage of the thoracic cavity along with dressing of the thoracostomy was done.

The postoperative evolution of the patient was good. Improvement of the general status, weight gain, reduced



Figure 3. Thoracostoma at the level of pleuro-parietal fistula, of about 4/4 cm, space II on anterior axillary line

expectoration, reduced secretions from the wound, reduction of inflammatory signs and an increased tolerance of the patient to effort were observed (Figure 3). Thoracic CT scan performed during follow-up described sequellar changes of the left apical pulmonary fibrotic area gaining a postoperative aspect. Postoperative thoracoscopy performed after 6 months shows the presence of granulation tissue and a significant reduction of the secretions. Closing of the window and elimination of the residual pleural space were achieved by myoplasty and topographic thoracoplasty.

Discussion

The most frequent cause of broncho-pleural fistulas are the pulmonary resections (between 1% and 28%) followed by chronic infections with complications like necrosis, neoplasms, chemo and radiotherapies, spontaneous and posttraumatic pneumothorax and tuberculosis⁴ followed by acute respiratory distress syndrome and gastro-intestinal conditions¹. The incidence of fistula is higher in patients having post-tuberculosis sequels⁵.

Francois Regnard and his colleagues have proposed a classification of the fistulas depending upon their appearance related to the moment of surgical intervention. The classification is as follows:

- Grade I fistulas (within the first 2 weeks after intervention, with a high risk of aspiration as well as a high rate of mortality during this period);
- Grade II fistulas (within 14 – 90 days of surgical intervention);

- Grade III fistulas (appearance after 90 days, in some cases fistula may appear even after an interval of 5-10 years after surgery)².

After 90 days fibro thorax is formed and pleural space becomes compartmented into small spaces. It is difficult to explain the process of fistula formation as well the method through which its appearance can be prevented. Postoperative follow-up is performed routinely up to 5 years⁶. Drainage of the empyemic cavity is essential to control the sepsis. Inefficiency of the conservative measures like pleural drainage of the collection through a closed drainage tube and prevention of aspiration along with the failure of the antibiotic therapy leads to the decision of performing a thoracostomy with an open window in these patients having sepsis and fistula^{3, 7}.

Management of these cases requires revision of the etiology and predisposing conditions along with the evaluation of the therapeutic options which includes medical treatment (antibiotherapy, supports associated with bronchoscopy and use of different ligands) as well as surgical procedures (without any presenting general consensus, the therapy should be individualized according to each case).

Open drainage of the pleural cavity along with its irrigation is a method that has been used for the first time 40 years ago by Clagett and Gevaci (while introducing the treatment in two steps of empyema appearing after pneumotomy). Later on, Poirolero and assoc. had modified the procedure by adding bronchial sutures with intrathoracic muscular transposition⁹. In those cases where the fistulas are less than 8 cm and the anesthetic risk for the surgical intervention is high, an endoscopic approach can be tried. The open window drainage in two steps comprises of step I, where the drainage of the cavity is achieved, followed by nutritional rehabilitation; and step II - the surgical step which involves the obliteration of the cavity^{1, 2}. Studies suggest the mean duration which the window has to be maintained is 6 months (between 1 and 36 months), depending upon the presence of abundance of granulation tissue, absence of supuration and nutritional status of the patient. Presence of the fistula is not a contraindication for the closing of the window². As soon as the objectives are reached (in case of post-neoplastic fistulas, not less than 6 months), the window can be closed. The postoperative complications that can appear are pain, mortality and necrosis of the graft tissue (which may need re-transposition).

Conclusion

Thoracostomy with large open window, followed by intrathoracic transposition of muscular flaps, is a safe measure of the management of empyema with bronchopulmonary fistulas^{2, 10}. In same situation, „open window” can be the only option available which can assure the survival of the patient and elimination of any later-phase residual cavities and that's why this procedure should never be over-locked or abandoned. ■

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