

Iconography, Physiopathology and Spontaneous Healing of a Broncho – Pleural Fistula Following a Right Pneumonectomy for NSCLC

Flavio Colaut^{1,*}, Aurelio Piazza¹, Tommaso Stecca¹, Micaela Romagnoli², Catino Cosimo², Giovanni Morana³, Marco Massani¹

¹General Surgery and Toracic, “Cà Foncello” Regional Hospital, Treviso, Italy

²Pulmonology and Thoracic Endoscopy, “Cà Foncello” Regional Hospital, Treviso, Italy

³Radiology, “Cà Foncello” Regional Hospital, Treviso, Italy

Email address:

flavio.colaut@outlook.it (F. Colaut)

*Corresponding author

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Abstract: Bronchogenic fistula with or without empyema is considered among the most life - threatening complications in lung resections. Many proceedings to treat this kind of fistula have been described in Literature, most of them are very aggressive indeed (re - do thoracotomy, re - do bronchial anastomosis, open window thoracostomy). This is a report about a patient who developed broncho – pleural fistula after nearly six months from right pneumonectomy for NSCLC. Unexpectedly in this case healing was spontaneous and requested only a chest drainage and antibiotics. Probably in this patient the fistula at the right main bronchial stump occurred on the basis of a somewhat disorder of the reparative and inflammation pathway. Propensity to infective disease (previous TB and Staphylococcus infection) could confirm this explanation.

Keywords: Broncho - Pleural Fistula, Immunological Disorders, Spontaneous Healing

1. Introduction

Broncho – pleural fistula (BPF) is one of the most challenging complication in Thoracic Surgery. It occurs in 5% of patients submitted standard pneumonectomy and in 10% of patients submitted completion pneumonectomy [1, 2]. Post-pneumonectomy empyema (PPE) as a consequence of a bronchogenic fistula presents a rate of mortality of 28% to 50% [3, 4] and the management can result very difficult. Preoperative radiation, infected lung from inflammatory disease, immunocompromised host and insulin-dependent diabetes favour the onset of a bronchial fistula. Moreover the incidence can be increased by following conditions: pneumonectomy, right – sided pneumonectomy, a long bronchial stump, residual cancer at the bronchial margin, devascularization of the bronchial stump, prolonged ventilation or reintubation after resection and surgical inexperience.

Survival of BPF depends on high index of suspicion, early diagnosis and aggressive surgical intervention [5].

2. Case Report

This is a 58 aged man, B. P., who was referred the Pneumologist at the beginning of 2021 because of thickness in the right lower lobe at Chest X – Ray and CT - Scan [Figures 1, 2] performed for emphysema and cough. Biopsy confirmed squamous cancer of the lung. On PET/CT scan a polypoid lesion of the bowel has been diagnosed and subsequently removed. Specimen resulted negative. On April 2021 he resulted quantiferon positive but there was no evidence of active TB. Then the case has been discussed within a multidisciplinary session and surgery was indicated as curative treatment. On 17/06/2021 B. P. has been submitted right thoracotomy and surgical exploration revealed a big neoplastic mass of the lower lobe involving the middle and the upper lobe. So right

pneumonectomy with systematic mediastinal lymphadenectomy have been performed. 24 hours after intervention patient referred chest pain and labs revealed Troponine increasing (131 ng/L; range 0 – 14). Ecocardiography documented hypokinesia of the left ventricle so that coronarography was done: critical stenosis of CDx (80%) was detected and further angioplasty was planned. Post – operative period was uneventful for the rest and B. P. was discharged (Figure 3) Post operative staging was: squamous cell carcinoma pT3 pN1. No chemo was planned because of angioplasty should have had to be done first. On November 2021 swelling on right chest appeared with no symptoms referred. Chest X-Ray and CT were taken and revealed empty right pleural cavity with subcutaneous emphysema [Figures 4, 5]. A broncho – pleural fistula on the main right bronchus was suspected. Bronchoscopy confirmed a broncho – pleural fistula of a few millimetres [Figure 6]. After bronchoscopy B. P. had fever and dyspnoea so that he was readmitted hospital with the diagnosis of pleural empyema. Then a chest tube was positioned and pleural fluid was drained with improving of symptoms [Figure 7]. S. agalactiae was isolated on the pleural fluid. On 12/12/21 re-do bronchoscopy was taken and the bronchial fistula was still present. On 20/12/21 patient has been discharged with the chest tube in – site and went to outpatient. Clinical condition remained well and on 13/01/22 chest tube was removed after chest X- Ray demonstrated regular fulfillment of the right pleural cavity [Figure 8, 9]. This is the reason why we decided not to perform a further bronchoscopy. On 01/02/22 B. P. was readmitted with the diagnosis of pleuro – pericarditis and healed with antiinflammatory therapy (Aspirin and Colchicyn). He was discharged on 06/02/22. Chest X- Ray and CT Scan demonstrate a regular healing of the right pleural cavity. Further therapeutic strategies planned for this patient are angiography for myocardial revascularization and subsequently chemotherapy.



Figure 1. Chest X Ray before operation.

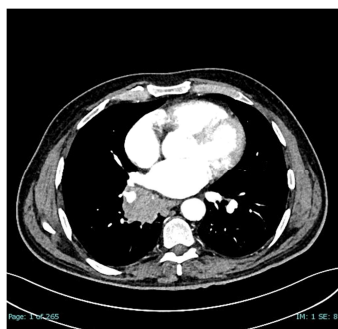


Figure 2. CT Scan before operation.



Figure 3. Chest X Ray after right pneumonectomy (regular healing of the right pleural cavity).



Figure 4. Chest X Ray after patient discharge (no fluid in the right pleural cavity; right subcutaneous emphysema).

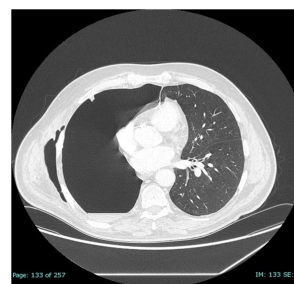


Figure 5. CT Scan after patient discharge (no fluid in the right pleural cavity; right subcutaneous emphysema).



Figure 6. Bronchoscopy; microscopic fistula on the right main bronchial stump (bleb).



Figure 7. Chest X Ray after the drainage tube has been positioned (note negative pressure in the right pleural space).



Figure 8. Chest X Ray (regular fulfilling of the right pleural cavity after the drainage tube has been clamped).

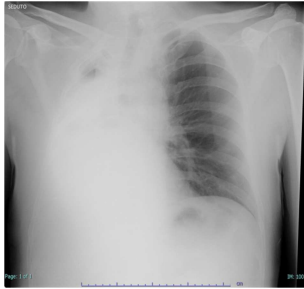


Figure 9. Chest X Ray; the drainage tube has been removed, regular healing of the right pleural cavity.

3. Discussion

BPF are related to a failure of the bronchial stump healing process with or without residue of tumor locally.

The standard treatments for BPF with or without empyema due to BPF are pleural drainage, irrigation and surgical repair. Surgical repair of BPF includes not only direct simple repair but also BPF coverage using vascularized pedicle flaps and especially for those patients who received preoperative radio or chemotherapy [6-9]. European Association of Cardiothoracic Surgeons in 2015 indicated drainage, antibiotics and even video-assisted thoracic surgery (VATS) for PPE without fistula, but in case of PPE with bronchial fistula more invasive techniques have been recommended [10-13]. Reported risk factors for BPF include an index operation for benign disease, right pneumonectomy, completion pneumonectomy, diminished pulmonary reserve and an extended lymph node dissection [14]. The case we present received benefit from chest tube and antibiotics only, just like is reported in other experiences for early mild cases of BPF with empyema [15].

4. Conclusion

On the basis of anamnestic notes, the main pathology (lung cancer) and the post-operative complication (broncho – pleural fistula) we can make the following considerations upon this case:

1) previous TB infection, documented by positive quantiferon test, 2) infection from right ankle from *Staphylococcus Aureus* and 3) occurrence of lung cancer can reasonably lead to the suspicion of a common aetiological factor. In fact it is justified to rule out failures of the surgical

technique, since fistula occurred more than five months after intervention. Similarly fistula could not be related to lung cancer, because intervention has been performed with radical clearance of the neoplasm (*hystological specimen: squamous cell carcinoma of the right lung of 6,3 x 5 cm; lymphonodes were negative in 4R, 7 and 9R; 3 out of 6 peribronchial lymphonodes resulted positive. Bronchial margins of resection resulted free from disease*). On the contrary it seems more acceptable that fistula should have been caused by somewhat related to malfunction of healing - reparative process of bronchial stump. The common factor between lung cancer and infection (*Staphylococcus Aureus* and *Mycobacterium*) probably must be identified in an impaired function of inflammatory pathway with or without a misdiagnosed immunological disease [16-18].

The aspect of the fistula, that presented only a few millimeters of patency, and its uneventful course can reasonably justify this explanation. In fact fistula requested only a chest tube, antibiotics, adequate nutrition and rest to come into a complete healing. Other similar cases have been reported in Literature [19].

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