

**TRANS-STERNAL TRANS-PERICARDIAL CLOSURE OF
POST-PNEUMONECTOMY BRONCHOPLEURAL FISTULA****Abdulsalam Y Taha**

MB, ChB, FICMS, Professor and Head of Department of Cardiothoracic Surgery, Sulaimania Teaching Hospital, University of Sulaimania, IRAQ. E-mail: salamy_1963@hotmail.com

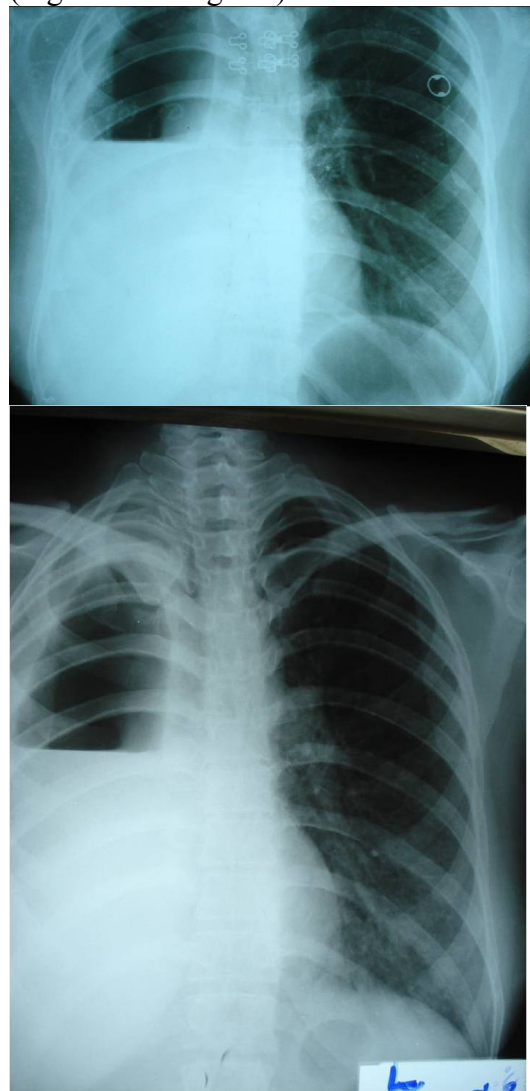
Introduction

The occurrence of a broncho-pleural fistula (BPF) after pneumonectomy is an infrequent but severe complication accompanied by a high morbidity and mortality¹. Small BPFs may heal either spontaneously or with drainage only. However, the majority of patients with persistent BPFs require operative intervention². There is no standard treatment to this complication and the successful management is a challenge to the thoracic surgeon^{3,4}. While most of the treatment options are staged operations, the trans-sternal trans-pericardial (TSTP) closure is attractive as it is a one stage operation that avoids the infected pneumonectomy space and does not result in patient's disfigurement⁵. The technique was first used in Italy and then used extensively in the former Soviet Union³. Herein, a report a case of chronic BPF after pneumonectomy successfully closed via the TSTP approach. The relevant literature is reviewed to throw light on the indications and the results of this operation.

Case:

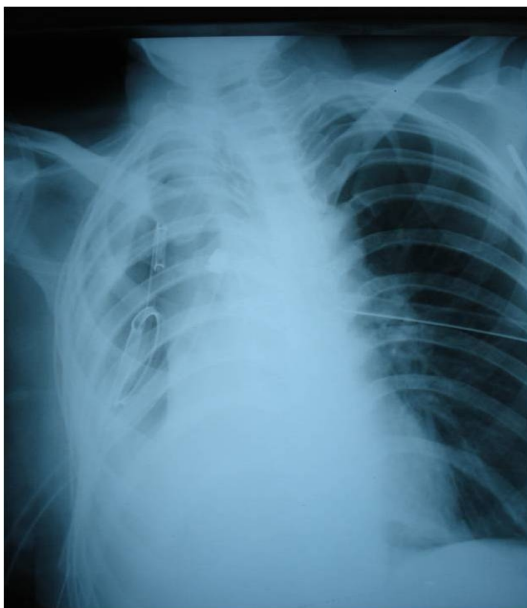
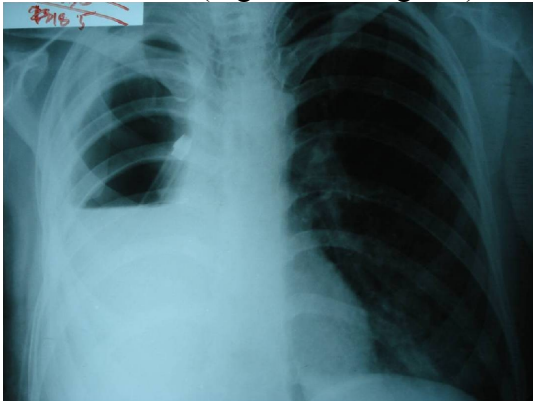
A 38 year old female patient presented with fever, shortness of breath and productive cough of few months duration. She had right thoracotomy and pneumonectomy 2 years earlier in another city for bronchogenic carcinoma. There were no operative notes but a histopathological report of bronchoscopic biopsy with a diagnosis of large cell anaplastic carcinoma. Physical

examination revealed a toxic looking dyspnoic patient. Chest auscultation showed a bronchial breathing on the right side. Chest radiograph displayed a big gas-fluid level in right pleural space (Fig 1 A and Fig 1 B).

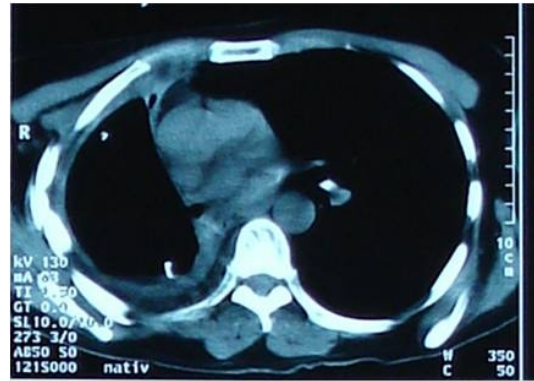


The clinical and radiographic picture was consistent with a post-pneumonectomy

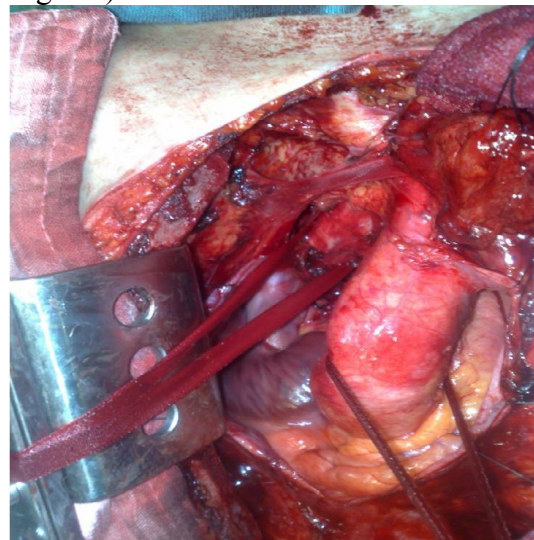
fistula (BPF). Following admission to the thoracic surgical ward, right tube thoracostomy was placed and large amount of thick pus coupled with air was drained. A sample of pus was sent for relevant laboratory tests. Antibiotics were prescribed. The patient was positioned semi recumbent and told to avoid lying on her left side. Air leak persisted; however, there was a significant improvement in her respiration and the general look. Day after day, her nutrition also improved. In order to sterilize the empyema cavity, a small catheter was introduced under local anaesthesia in the second intercostal space for irrigation with normal saline and antibiotics (Fig 2 A and Fig 2 B).

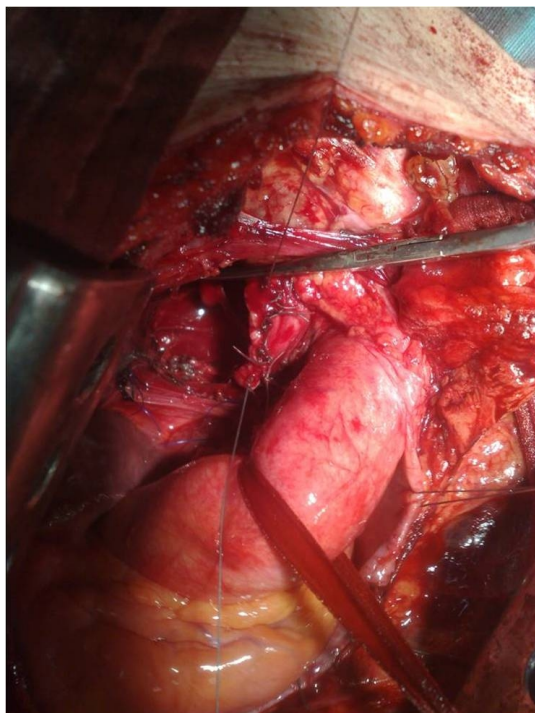


CT scan of the chest revealed thickened pleura with long bronchial stump (Fig 3).



Fiberoptic bronchoscopy showed no evidence of recurrent tumor but the bronchial stump was long as the line of bronchial section seemed to be at bronchial level. Under GA, median sternotomy was done. By blunt and sharp dissection, the thymus gland was lifted off the pericardium. The pericardium was opened. The pericardial edges were retracted by stay sutures. Dissection and encirclement of the ascending aorta with a tape was done. The aorta was retracted to the left while the SVC was retracted to the right. The right pulmonary artery stump was dissected and encircled by a tape. It was then divided and its 2 ends sutured by 2 layers of 4 0 Prolene. The last structure to deal with was the remnant of right main bronchus. It was dissected free and encircled; divided and the 2 ends were closed by interrupted 2 0 vicryl sutures. The bronchial closure was enforced by thymus tissue (Fig 4 A and Fig 4 B).





After homeostasis, a mediastinal drain was placed and the wound closed in the routine way. The patient was extubated in the theatre and transferred to the ICU. The postoperative course was smooth. Air leak immediately and completely ceased. There was no evidence of recurrence during one year of follow-up.

Discussion

The occurrence of a BPF after pneumonectomy is an infrequent but serious complication associated with a high morbidity and mortality.

In the early postoperative phase (up to 2 weeks after lung resection), immediate operation through the pneumonectomy cavity for resection and re-closure of the stump is recommended. However, the management of chronic BPF and empyaema has been a subject of controversy. Both the time of re-intervention and the type of surgical technique reported by various authors differ^{1,6&7}. No technique can be applied to all patients^{8,9}.

Bronchoscopic cauterization of the fistula, application of fibrin glue and bone spongiosa are only effective in a

limited number of patients and are accompanied by a high percentage of relapses^{8,9}.

Surgical interventions include repeat thoracotomy, open window thoracotomy, plastic procedures using myo-vascular flaps or omentum, as well as complete thoracoplasty. The main disadvantage of these methods is the access via infected pneumonectomy cavity and a long period of hospitalization^{8,9}.

The TSTP closure was first described in Italy in 1961 and has been extensively used in the former Soviet Union. In 1985, its use was renovated in North America by Balden and Mark³.

This approach has valid theoretical advantages: a relatively well-tolerated median sternotomy, the avoidance of dealing directly with areas of postoperative scarring and chronic sepsis and the avoidance of chest wall deformity. The single disadvantage is that residual empyaema space is not dealt with at the same session unlike thoracoplasty or thoracomyoplasty³.

Ginsberg and colleagues suggested that the TSTP approach is the most effective method for BPF closure when other strategies have failed³. I do not agree with this suggestion and I think that TSTP should be used as a primary operation to save the patient from unnecessary operations and complications.

Preoperative bronchoscopic inspection of the size and length of the bronchial stump as well as its course is necessary. Direct closure is improbable if the bronchial stump is shorter than 1 cm or if a residual cancerous tissue is detected⁵.

Prior to surgery the pneumonectomy cavity needs to be drained by a chest tube, and rinsed and cleaned with normal saline solution or povidone iodine daily⁵. To reflect on our case; this patient has presented the classical clinical and radiographic features of chronic post-pneumonectomy BPF and empyaema.

She had a diagnosis of bronchogenic carcinoma but we doubt this as she had no local recurrence or systemic spread 2 years after surgery without chemotherapy or radiotherapy. The occurrence of BPF in this lady might be related to a long bronchial stump. We did a full assessment of her prior to surgery i.e., plain chest radiograph, culture and sensitivity testing of pus, bronchoscopy and CT scan of the chest. Though we had no previous expertise with TSTP approach, we elected to use it after a thorough literature review which revealed attractive advantages over other procedures. We used a hand sewing technique for both pulmonary artery and bronchial stumps, though staplers when available can make the operation quicker, safer and simpler.

Conclusion: Post-pneumonectomy BPF

is a serious complication especially when combined with empyaema.

There is no standard therapy for this complication and its successful management is a challenge to the thoracic surgeon.

TSTP management of bronchus stump fistula after pneumonectomy is highly effective and offers good advantages over the direct approach through the infected empyaema cavity. Its attractiveness is due to being a single stage operation avoiding patient's disfigurement. Per-operative preventive measures should always be considered.

Proper selection of patients and surgeon's familiarity with the procedure is important.

I recommend this technique to be used as a primary operation in a suitable candidate.

References

- 1-Baldwin JC and Marks JBD. Treatment of bronchopleural fistula after pneumonectomy. J Thorac Cardiovasc Surg 1985; 90: 813-817.
- 2-Dale K. Multer et al. Delayed closure of persistent bronchopleural fistula. Chest 2002; 121; 1703-1704.
- 3-Yael Refaely et al. Transsternal Transpericardial Closure of a postlobectomy Bronchopleural Fistula. Ann Thorac Surg 2002; 73: 635-6.
- 4-Aart Brutel de la Riviere et al. Transsternal Closure of Bronchopleural Fistula after Pneumonectomy. Ann Thorac Surg 1997; 64: 954-9.
- 5- G. Stamatis et al. Transsternal Transpericardial operations in the treatment of bronchopleural fistulas after pneumonectomy. Eur J Cardio-thorac Surg. 1996; 10: 83-86.
- 6- Hankins JR et al. Bronchopleural Fistula. J Thorac Cardiovasc Surg; 1978, 76: 755-762
- 7-Hler-Madsen K et al. Management of bronchopleural fistula following pneumonectomy. Scand J Thorac Cardiovasc Surg 1984; 18: 263-266
- 8- Pridun N, Radl H, Schlag G. Einneues biologisches Implanatzum Verschlul bronchopleuraler Fisteln. Herz Thorax Gefagchir 1987; 1 (Suppl): 1
- 9- Torre M et al. Endoscopic gluing of bronchopleural fistula. Ann Thorac Surg 1987; 43: 295-297