

# POST PNEUMONECTOMY BRONCHOPLEURAL FISTULAE

SHAHKAR AHMAD SHAH, AMIR BILAL, ZAHOOR AHMAD AND D WATSON

*Department of Cardio Thoracic surgery,  
Postgraduate Medical Institute,  
Lady Reading Hospital, Peshawar  
East Birmingham Hospital, Birmingham.*

## SUMMARY

Bronchopleural fistula (BPF) occurs in a significantly high percentage of pneumonectomy patients (16.5% in our study) and carries a significant mortality of 9.5% over 5 years. A retrospective study was carried out to identify risk factors. 19 patients out of 115 developed BPF in a district general hospital over a 5 year period. Two died before any treatment could be instituted. Three died from recurrence of cancer over the next 3 years. Five were alive and well at the end of 5 years. There were 9 other deaths, due to unrelated causes. Major risk factors are extensive lymphnode dissection (often unnecessary), right side, completion pneumonectomy, inflammatory disease and development of chest and space infections. BPF carries fairly high mortality (2/19) i.e. 10.5%. Better patient selection, awareness of the pitfalls and good surgical technique with meticulous dissection, together with a high index of suspicion postoperatively, could well reduce the incidence and mortality of post pneumonectomy BPF.

## INTRODUCTION

BPF remains one of the most dreaded and not an uncommon complication following pneumonectomy. The results can be dramatically fatal, with the patient expiring within seconds, or it may manifest itself as a chronic debilitating cough and ill health. In either cases, BPF remains one of the major causes of mortality and morbidity following pneumonectomy. An attempt is made here to identify the risk factors and suggest preventive measures by a retrospective analysis of pneumonectomies.

## MATERIAL AND METHODS

Over a 5 year period 115 pneumonectomies were carried out by one surgical team at a district general hospital. There were 99 males and 16 females with ages ranging from 43-75 years, with mean age of 59 years. All patients except one had lung cancer, the one exception had bronchiectasis.

The histological cell types are shown in table-I.

## RESULTS

Out of the total 19 patients who developed BPF 14 were right sided while

TABLE - I  
HISTOLOGICAL CELL TYPES

	TOTAL	BPF
SQUAMOUS	80	14(73)
ADENO	7	
OAT CELL	7	1
UNDIFFERENTRATED	7	1
CARCINOI	3	2
PRIMARY LUNG SARCOMA	2	
HISTOLOGY NOT KNOWN	8	
BRONCHICETESIS	1	1

only 5 were left sided. This translates into 73% (out of the total 42) on the right side and 14% (out of total 73) on the left side. 103 patients had stapled closure of the bronchus and out of them 18 developed BPF, while only 1 out of the 12 hand sutured ones developed BPF. Out of the 63 patients, who had extensive dissection and clearance of glands. 13(20.6%) developed BPF and of these histologically positive glands were only 13/63. Of the 56 who had routine pneumonectomy only 6(10.7%) developed BPF.

Out of the total group of 115 patients, 3 patients had residual pneumonectomies, out of which 2 developed BPF. One patient had pneumonectomy for bronchiectasis and he too developed BPF. 51 out of 115 patients developed postoperative complications. They were Table-III.

11 out of 19 patients developed BPF within first 30 days while the other 8 were detected within 3 months. The acute patients presented with sudden onset of dyspnea and coughing up of space fluid, while the chronic patients were detected because of the failure of pneumonectomy space to fill. The definitive forms of treatment offered were. Table-IV.

Two patients died before any definitive form of treatment could be offered.

19 out of 115 patients with male: female of 99:16, and mean age of 59 years developed BPF following pneumonectomy. Two died before any definitive treatment could be offered. The remaining 17, after

TABLE – II  
FISTULA SIZE

	Extensive dissection	Routine pneumonectomy
-LARGE	11(83%)	1(17%)
-PINHOLE	2(15%)	5(83%)

TABLE – III  
BPF

	No	BPF
SPUTUM POSITIVE CHEST INFECTION	19	7
WOUND INFECTION	12	4
ARRHYTHMIAS	18	3
SPACE INFECTIONS	9	8

initial stabilization, were treated by one of the various modalities listed in Table. V patients were alive and well at the end of five years. 3 died of recurrence of carcinoma while nine others died of unrelated causes.

## DISCUSSION

Curative surgical resection remains the treatment of choice for patients with operable lung cancer.<sup>1,2</sup> Pneumonectomy constitutes 12% of curative surgical resections for lung cancer.<sup>2,3,4</sup> One of the most dreaded complications of pneumonectomy remains BPF.<sup>3,4,8,11,12</sup> In our series, 16.5% of patients undergoing pneumonectomy developed BPF. An attempt is made to analyse the cause of this high incidence and identify risk factors.

The control group of 115 patients had a fairly typical age distribution of 43-75 years with a mean age of 59 years. This correlates well with the incidence of lung cancer in this age group.<sup>10</sup> The sexual distribution of 99 males to 16 females is a bit tilted in favour of males, as the incidence of lung cancer in females is not that low.<sup>2</sup>

Histologically the BPF group is dominated by squamous cell carcinoma 73% and this correlates well with the statistics for lung cancer.<sup>2,3</sup> After considering the general factors of age, sex, histology, we come to the specific risk factors identified in our group. They are:-

TABLE - IV

HISTACRYL GLUE APPLIATION	3
CAUTERIZATION	6
RECONSTRUCTION	2
CONSERVATIVE	6

- i. Right sided pneumonectomies had a higher incidence 14% of BPF as compared to left sided 7%. This correlates with the shorter length of the right main bronchus and less tissue being available to cover the stump. The higher incidence of BPF in (R) sided pneumonectomies has also been found in other series.<sup>1,2,3,4,5,6,7,8,10,11,12</sup>
- ii. Completion pneumonectomies too had a high incidence with 2 out of 3 (66%) developing BPF. Although this is too small a number to draw any major conclusions, it is still representative and in keeping with the literature for completion pneumonectomies.<sup>2,6,8</sup>
- iii. Extensive lymph node dissection in the peribronchial and carinas area was noted to have a high incidence of BPF 13% as opposed to 6% of routine pneumonectomies. The devascularization, caused by the extensive dissection, would lead to poor healing, necrosis and giving way of the bronchial stump, leading to a BPF. Ironically only 16/53 patients 14% of these intensively dissected lymph nodes showed evidence of malignancy.
- iv. Pulmonary infection in the postoperative period resulted in a higher incidence of BPF. Haemophilus influenzae was found to be the main causative organism in postop chest infections. The development of BPF will have been due to infecting organism, chest physiotherapy and raised intrabronchial pressure during deep breathing and

coughing. Space infection too possibly caused sloughing off of the stump leading to BPF. This correlates with other series.<sup>6,7,9</sup>

- v. One patient had pneumonectomy for bronchiectases, and developed BPF, giving a 100% incidence. A single case cannot be used to draw statistically significant conclusions, but this correlates well with Reed's series on pneumonectomy for chronic infection.<sup>2</sup>

### CONCLUSION

BPF following pneumonectomy can be avoided by better patient selection, better surgical technique avoiding extensive dissection prevention and prompt treatments of infections, and greater vigilance coupled with prompt treatments postoperatively would reduce the morbidity and mortality. However right sided, completion pneumonectomies and inflammatory lung disease would continue to be associated with a higher incidence.

### REFERENCES

1. Goldstraw P, Mannam G, Michail P, Kaplan D. Surgical treatment of non-small cell lung cancer with N, disease. *J Thoracic Cardiovas Surg* 1993.
2. The society of Cardiothoracic surgeons of Great Britain and Ireland. Returns of UK Thoracic Surgery Registrar 1994.
3. Ginsberg RJ, Hill LD, Eagan RT, Thomas P, Mountain C, Deslanriers J, et al. Modern thirty day operative mortality for surgical resections in lung cancer. *J Thorax and Cardiovascular Surg.* 1983; 86: 654.
4. Deneffe G, Lacquet LM, Verbeken E, and Verment G. Surgical Treatment of Bronchogenic Carcinoma a retrospective study of 720 thoracotomies, *Ann Thor Surg* 1988; 45: 380.
5. O' Meara JB and Slade PR: Disappearance of fluid form the post pneumonectomy

- spece. J Thoracic and Cardiovasc Surg 1974; 67: 621.
6. Perelmen MI, Rymko LP and Ambatiello GP: Bronchopbural fistula: Surgery after pneumonectomy. In Grilbo HC and Eschapane H, International Trends in General Thoracic Surgery, 1987; 2: 407.
  7. Smith DE, Kerish AF, Chepmen JP and Takaro T. Healing of the bronchial stump after pulmonary resection J Thoracic and Cardiovasc Surg. 1963; 46: 548.
  8. Suarze J, Clagett T and Brown AL: The post pneumonectomy space: Factors influencing its obliteration. J Thoracic and Cardiovasc Surg. 1969; 57: 539.
  9. Rosenfeldt FL, McGibreg D, Braimbridge MV and Watson DA: Comparison between irrigation and conventional treatment for empyema and pneumonectomy spece infection.
  10. Pairolero PC, Arnold PG and Peihlere JM: Intrathoracic transposition of extrathoracic skeletal muscle. J Thoracic and Cardiovasc Surg 1983; 86: 809.
  11. Pairolere PC and Arnold PG: Broncho-pleural fistula. Treatment by transposition of pectoralis major muscle. J Thoracic and Cardiovasc surg 1980; 79: 142.
  12. Muers MF. Survival in non-small cell lung cancer: Physicians opinion compared with prognostic factors. Thorax 1990; 54: 804.