- OLBERT, F. (1962): Wandlungen der Klinischen Problematik des Bronchus Karzinoms im letzten Jahrzehnt, II Die röntgenologische Erfassung von Verdachtsfällen, *Med. Klin.*, **57**, 428.
- PAPANICOLAOU, G. N. (1942): New Procedure for Staining Vaginal Smears, *Science*, **95**, 438.
- PAPANICOLAOU, G. N. (1949): A Survey of the Actualities and Potentialities of Exfoliative Cytology in Cancer Diagnosis, *Ann. intern. Med.*, **31**, 661.
- REYNDERS, H. (1963): Mediastinoscopie, Thesis, Amsterdam.

- ROOKE, E. D., EATON, L. M., LAMBERT, E. H., and HODGSON, C. H. (1960): Myasthenia and Malignant Intrathoracic Tumour, *Med. Clin. N. Amer.*, **44**, 977.
- SALZER, G., WENZL, M., JENNY, R. H., and STANGL, A. (1952): Das Bronchus-carcinom, Wien: Springer Verlag.
- SCHAAR, P. J.v.d., and ZANTEN, M. E.v. (1965): Experience with Mediastinoscopy, *Thorax*, **20**, 211.
- SCHUSTER, N. (1955): Cancer Cells in the Sputum, *Tubercle.*, **36**, 350.

THE TREATMENT OF CARCINOMA OF THE BRONCHUS

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In 1933, the first successful pneumonectomy for carcinoma of the lung was carried out. This patient—a doctor—lived for almost thirty years without recurrence, and died in 1963 at the age of seventy-nine. Not all the early cases of this type of surgery had such a successful course, and it was not until endotracheal anaesthesia, antibiotics and blood became readily available that lobectomy and pneumonectomy became routine procedures in the treatment of lung cancer. In the immediate post-war period, the risks of operation were acceptable, but the long-term results were still disappointing, and British surgeons, who have always taken an aggressive attitude towards this disease, had a chance to take a second look at their results so as to discover the reasons for their apparent failure and develop new techniques which could extend the scope of the operation and at the same time bring about improvements in the long-term survival rate.

An important step forward was made when Allison showed that it was possible to take the pulmonary vessels inside the pericardium. Up to this time, it had been usual to tie the pulmonary artery first, as it was felt that this might reduce the amount of blood lost by pooling in the lung. Aylwin (1951) working on the same unit, emphasised the importance of early, or primary, vein ligation as a means of reducing the risks of blood stream dissemination of tumour due to manipulation of the lesion at the time of operation, and showed how this procedure was associated with a significant reduction in the number of early post-operative recurrences. With the same object in mind, Brock and Whytehead (1955) applying the principles of cancer surgery as carried out elsewhere in the body, described what they termed "radical resection", in which the affected lung, with its fascial connections and

lymphatic field is removed in one block. This work was largely based on earlier anatomical studies of the lymphatics of the lungs and mediastinum, which did not necessarily always take account of the direction of spread of the tumour in the lymphatic system. Nohl (1956), in a study of clinical and operative material, made careful note of the gland involvement from tumours in different situations, and showed that in many cases, particularly where the disease is in an upper lobe, lobectomy provides as radical a cancer removal as pneumonectomy; thus confirming the experience of Belcher (1956) who has been a firm exponent of lobectomy as a means of removing cancer because it causes less respiratory disability and allows a higher proportion of patients to continue in their former employment. Price Thomas (1959) and Jones (1959) extended the advantages of lobectomy by carrying out sleeve resections of the main bronchi with re-anastomosis of the lower lobes to the trachea, conserving functioning lung that would otherwise be unnecessarily removed by pneumonectomy. This is particularly important in the older age groups and those with poor respiratory reserve, for whom pneumonectomy carries a greatly increased mortality. Occasionally it has been possible to extend the principles of sleeve resection to the pulmonary artery.

There can be no doubt that the more radical procedures give the best chance of cancer cure, yet nobody at the time of operation can judge which patient will or will not have a long-term survival apparently free from disease. There are strong reasons for treating the individual patient rather than the disease. Analysis of the results of operation produce two apparently paradoxical findings. Firstly, with earlier diagnosis and earlier surgery, there has not been an increase in the percentage of long-term survivors. This

can be explained by the inclusion of a higher proportion of cases with undifferentiated tumours or unrevealed distant metastases. The survival figures in both surgical and non-surgical cases show that squamous-cell carcinoma is associated with the best prognosis and oat-cell carcinoma with the worst. Secondly, where surgery has only managed an incomplete removal of the tumour, the results are often much better than had been expected. Abbey Smith (1963) reports a 10% five year survival rate following non-curative operations, and this has led him to attempt resection in every case that, after careful pre-operative clinical assessment, has been deemed suitable for operation. By so doing, he is able to report an operability rate of 96%, yet he estimates that only one in every eight patients seen was operated on, and there must be almost an equal number that never get referred to a surgeon.

Although the number of cases of lung cancer arising each year continues to show a steady increase, there does not seem to have been any significant alteration in the pattern of the disease. Most surgeons report an operability rate that is slightly better than two out of three, with a hospital mortality around 10% and a five-year survival rate, in those who leave hospital after resection, of about 30%. It does not look as if these figures can be improved by any further extension of surgery. As far as the individual patient—rather than operation statistics—is concerned, his best hope is in early surgery, and it is important to press for early diagnosis and to insist that every case of haemoptysis and persistent, irritating cough should have a chest radiograph and, if necessary, a bronchoscopy. All doubtful lung shadows should be dealt with surgically, particularly if they have been present for more than a month. The presenting symptoms may not always refer to the chest and frequently the lung lesion is discovered during the course of a barium meal or other investigation, so it is a wise policy to obtain a chest radiograph at the onset of the investigation of any new illness.

Radiotherapy, given before or after surgery, has done nothing to improve the results. Given pre-operatively, there is a greatly increased risk of poor healing, bronchial fistula and infection. Post-operatively, it is difficult to give a satisfactory therapeutic dose to the desired area without causing damage to the remaining lung tissue.

As a means of primary treatment, some centres with modern equipment have been able to report encouraging results in a limited number of cases. As a means of palliation, it is useful in relieving the distressing symptoms of superior vena caval obstruction and the pain from bony metastases and other local recurrences following surgery.

The use of cytotoxic drugs in conjunction with surgery is being practised in several centres, but as yet no clear obvious advantages have become apparent. Their effect is not sufficiently specific for them to be considered as a form of primary treatment. Pushed to the limit, it is possible to obtain clinical and radiological evidence of regression of tumour, but this is usually at the expense of distressing toxic symptoms.

The best hopes for the future lie not in surgery, radiotherapy or chemotherapy, but along the lines of preventive medicine. The association of lung cancer with smoking has been proved beyond all reasonable doubt.

REFERENCES

- AYLWIN, J. A. (1951): Avoidable Vascular Spread in Resection for Bronchial Carcinoma, *Thorax*, **6**, 250.
- BELCHER, J. R. (1956): Lobectomy for Bronchial Carcinoma, *Lancet*, **i**, 349.
- BLADES, B. (1958): Presidential Address, *J. thorac. Surg.*, **36**, 285.
- BRIDGE, RUSSELL and WHYTEHEAD, L. L. (1955): Radical Pneumonectomy for Bronchial Carcinoma, *Brit. J. Surg.*, **43**, 8.
- BROMLEY, L. L., and SZUR, L. (1955): Combined Radiotherapy and Resection for Carcinoma of the Bronchus, *Lancet*, **ii**, 937.
- GOLDMAN, K. P. (1965): Histology of Lung Cancer in Relation to Prognosis, *Thorax*, **20**, 298.
- JONES, P. H. (1959): Lobectomy and Bronchial Anastomosis in the Surgery of Bronchial Carcinoma, *Ann. roy. Coll. Surg. Engl.*, **25**, 20.
- NOHL, H. C. (1956): An Investigation into Lymphatic and Vascular Spread of Carcinoma of the Bronchus, *Thorax*, **11**, 172.
- PRICE THOMAS, Sir Clement (1959): Conservative and Extensive Resection for Carcinoma of the Lung, *Ann. roy. Coll. Surg. Engl.*, **24**, 345.
- SMITH, R. ABBEY (1963): Surgery in the Treatment of Locally Advanced Lung Carcinoma, *Thorax*, **18**, 21.
- SMITH, R. ABBEY (1964): The Results of Raising the Resectability Rate in Operations for Lung Carcinoma, *J. thorac. Surg.*, **48**, 418.