

# Carcinoma of the bronchus : survival following conservative resection<sup>1</sup>

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Resection of the main bronchus with reconstruction of the air passage was first described by d'Abreu and MacHale (1952). In the same year Professor Allison referred, at the annual meeting of the Society of Thoracic Surgeons, to removal of part of the right pulmonary artery with restoration of continuity. This operation was done for patients with carcinoma. Conservative resection for carcinoma of the bronchus was fully described by Price Thomas in 1955 (1956). Since then the operation has been used by many surgeons.

From January 1958 to December 1963 I carried out 59 conservative resections of the bronchus or so-called 'sleeve resection'. For much of this time my indications for doing this operation were as follows: (1) the presence of a central carcinoma, *i.e.*, carcinoma involving the main bronchus to a lung or lobe; (2) diminished respiratory reserve, making pneumonectomy dangerous or undesirable.

The types of operation making up the group of conservative or sleeve resections can be seen in the Table. The parts of the lung saved have been listed. In six of the 18 patients in whom the left lower lobe was preserved it was necessary to resect part of the main left pulmonary artery and to restore its continuity by suturing.

TABLE  
CONSERVATIVE RESECTIONS 1958-63

Right Lung		Left Lung	
Part of Lung Saved	No.	Part of Lung Saved	No.
Right lower lobe ..	23	Left upper lobe ..	8
Right upper lobe ..	2	Left lower lobe ..	18
Right upper+middle lobe	5	Left upper lobe less	
Right upper+middle lobe		lingula+left lower	
+apical segment ..	1	lobe less apical segment	1
Right lung except for apical segment ..	1		
Total ..	32	Total ..	27

## TECHNIQUE

The techniques of resuturing the bronchi or pulmonary arteries offer no unusual difficulties to thoracic surgeons. I use interrupted monofilament nylon for the bronchial sutures, though I have tried continuous catgut and other materials. Initially I made an attempt to preserve a thin strip of mucosa across the gap in the bronchus in the hope that this would preserve ciliary action and perhaps some lymphatic drainage. This step has proved to be unnecessary.

I tried various methods of enlarging the distal lumen so that it would match up better with the proximal, but these also are not required; by spacing the stitches further apart proximally than distally an air-tight enclosure can be obtained.

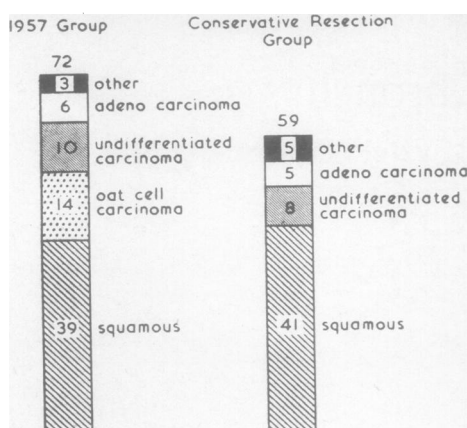
In some patients adequate resection of the bronchus leaves a number of distal bronchi to be attached to one proximal main bronchus. In such patients I sacrifice segments so that no more than two distal openings are left. These can then be sutured together at one edge and rejoined to the proximal bronchus.

If the artery needs to be sutured, I use two continuous Blalock stitches and I do this anastomosis after the bronchus has been repaired.

In all patients I do as full a mediastinal lymph node dissection as is possible.

**RESULTS** To provide a group of patients in whom the results can be compared with those of patients submitted to conservative resection is difficult. The results of surgical treatment of carcinoma of the bronchus vary widely. They depend mainly on the types of patient referred to a particular hospital and on the outlook of the surgeon who deals with them. To provide some basis for comparison of the results of conservative resection with those obtained by the well established forms of surgery I took those patients with proved carcinoma of the bronchus on whom I did resections in 1957. There were 72 in this group. When I compared the groups according to the type of growth present the distribution was as shown in Figure 1.

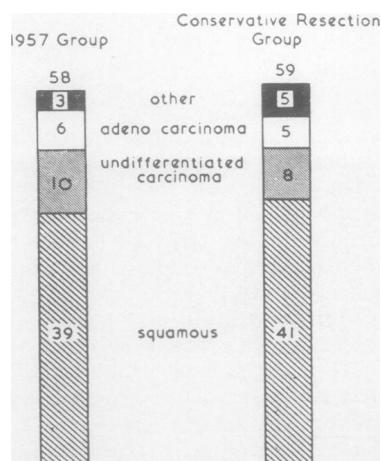
<sup>1</sup> Based on a communication delivered to the Society of Thoracic Surgeons of Great Britain and Ireland

FIG. 1. *Histological type.*

It can be seen that the second largest number of patients submitted to operation in 1957 consisted of 14 patients suffering from 'oat-celled' carcinoma. The conservative resection group contained no patients with this type of growth. This was not a deliberate policy, but it is not surprising when one considers the natural history of patients with oat-cell carcinoma.

I decided to exclude these 14 patients from the 1957 group to give a fairer basis for the comparison. This left 58 patients for consideration in the 1957 group to be compared with the 59 in the sleeve resection or conservative group.

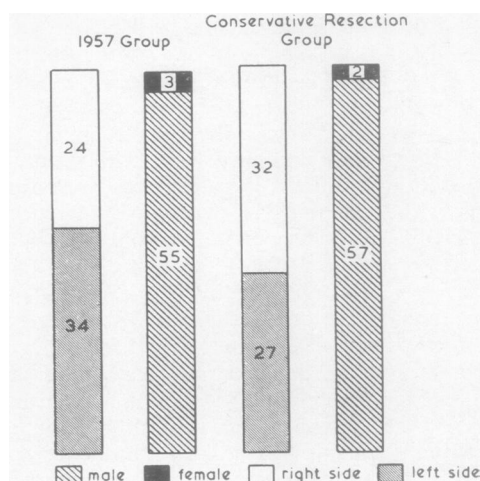
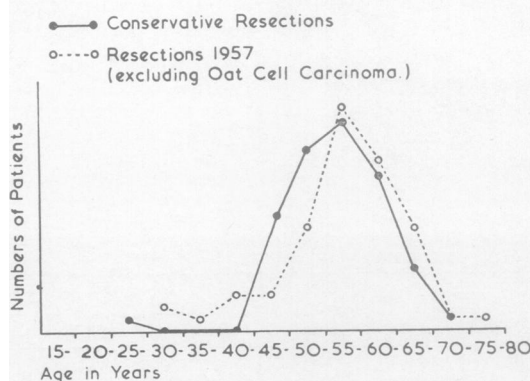
Figure 2 shows the types of growth found in the two groups. They are practically identical.

FIG. 2. *Histological type, excluding oat-cell carcinoma.*

The side of operation and the sex incidence are shown in Figure 3. Again the figures are closely similar.

Finally, Figure 4 shows the ages of patients who sustained the two types of operation; once more there is a close correlation.

The two groups of patients correspond in age, sex, type of growth, and side of operation. They are drawn from the same population and treated by the one surgeon, and I claim, therefore, that they can fairly be compared.

FIG. 3. *Side of operation and sex.*FIG. 4. *Age groups.*

#### MORTALITY

Five of the 59 patients who had conservative resection died in hospital. They are regarded as operative deaths. Necropsies were carried out in

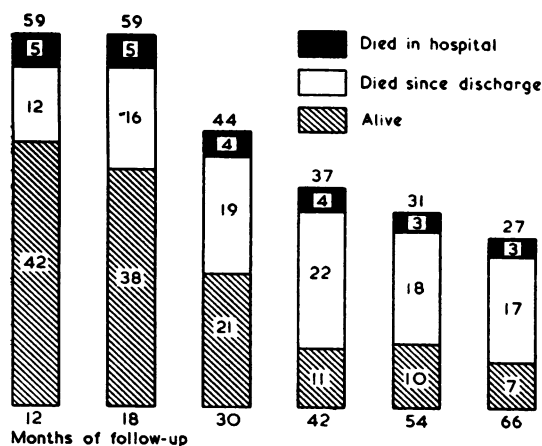


FIG. 5. Results of conservative resections.

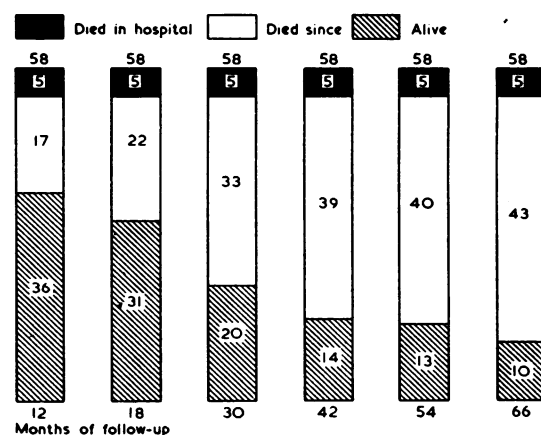


FIG. 6. Results of 1957 resections (excluding oat-cell carcinoma).

all. The causes of death were reported to be pulmonary embolism (2); pneumonia (1); perforated duodenal ulcer (1); and no cause found (1).

The patient who died of perforation of a duodenal ulcer was on heavy doses of steroids for a considerable time before operation to deal with bronchial spasm. The perforation was silent and the diagnosis was not made before death.

The patient in whom no cause of death was found at necropsy developed a low blood pressure during operation. The operation was done early in the series and, as both bronchus and artery required repair, it was rather prolonged. After operation we failed to get his blood pressure up. I regard this man's death as an avoidable one.

It will be noted that two of the five patients died from pulmonary embolism. This is becoming an increasingly common cause of post-operative death in my unit, and so far our efforts to avoid it have been unsuccessful.

**RESULTS** The patients in the conservative resection group were assessed in June, 1965. The minimum follow-up period is one and a half years, and this extends up to seven and a half years. The numbers to be considered lessen as the time increases; whereas the 58 patients of the 1957 group are considered year by year. All patients in both groups have been followed up to date. None has been lost.

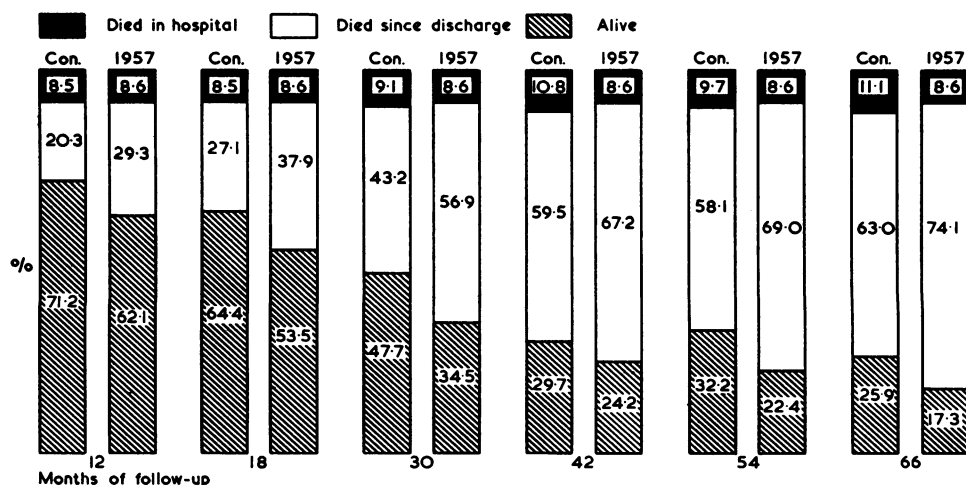


FIG. 7. Results of conservative resections and 1957 resections (survival distribution percentage).

Figure 5 shows the actual numbers of patients in the conservative resection group followed up for one year to five and a half years. It will be noted that 27 have been followed up for five and a half years or more.

Figure 6 shows the actual numbers of patients in the 1957 group followed up for corresponding periods. The mortality is the same—five patients have died in each group.

These figures converted into percentages are shown side by side in Figure 7. The high operative percentage mortality in the five-and-a-half-year follow-up group of conservative or sleeve resections is due to one patient—the avoidable death to which I referred. It can be seen that the survival of patients treated by conservative resection is better at all periods of the follow-up.

#### DISCUSSION

Although I do as full a mediastinal lymph node dissection as possible in patients having conservative resections, I do not think that this is as complete as when pneumonectomy is done. Theoretically, recurrence of carcinoma should be more frequent when sleeve resection is done because of the less adequate dissection. To counter-balance this the patients should gain from the preservation of respiratory function. When comparing the results of the two groups, I should like to emphasize that, in both, the figures are based on the total number of patients who had a resection done. None has been excluded from consideration, none has been lost to follow-up. The survival of patients treated by sleeve resection is better at all periods of the follow-up. It is not surprising that

the early mortality is less than in the group which includes pneumonectomies; the preservation of respiratory tissue would account for this. At five and a half or more years, however, 25.9% of all patients who had a conservative resection done are alive and presumably 'cured', compared with 17.3% of those patients treated by the classical methods of lobectomy or pneumonectomy. Thus I submit that the preservation of respiratory function should take precedence over radical removal in the surgical treatment of carcinoma of the bronchus.

#### SUMMARY

Fifty-nine patients were submitted to conservative resection of the bronchus for carcinoma in 1958–63. They were followed up for one and a half to seven and a half years. The results are compared with those of 58 patients submitted to established operations for carcinoma in 1957.

The results suggest that conservative or 'sleeve' resection of the bronchus should replace pneumonectomy as the operation of choice in the surgical treatment of bronchial carcinoma.

I should like to acknowledge the generous assistance provided by Dr. J. A. H. Waterhouse, of the Department of Medical Statistics of the University of Birmingham, and by Miss Levi, of the Regional Cancer Registry.

#### REFERENCES

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