

Apart from acute or subacute nephritis, or in states of renal insufficiency with marked nitrogen retention, the protein intake should be maintained at normal levels.

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## BRONCHIAL CARCINOMA\*

BY

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The surgical treatment of bronchial carcinoma is now fully established and is generally accepted as the most desirable treatment of this condition at our disposal. Indeed, the success of surgery has placed bronchial carcinoma among the curable diseases, in marked contrast to the position it held a few years ago, when its diagnosis was synonymous with a death sentence. At the same time it is still a terrible disease with a high mortality, and we must remember that operation is possible in only a minority of cases. Furthermore, the importance of the problem it presents can be realized when it is stated that it occurs nearly as often as carcinoma of the stomach and of the colon.

With the establishment of the successful surgical treatment of bronchial carcinoma it becomes more and more imperative that the disease should be recognized at an early date so that the patient can be referred to the surgeon while operation is still possible. The operative technique is now largely standard, and although there will doubtless be further improvements, notably in regard to a more radical operation, the surgeon's place in treatment is now largely defined. He is, however, powerless to effect a cure unless he receives patients suitable for operation; it is impossible for him to save the advanced case. It follows, therefore, that the most important task in the management of this terrible disease lies not so much with the surgeon as with the general practitioner and the consultant physician, who are usually the first to see these patients. Although the ultimate act of treatment is in the surgeon's hands, the greatest responsibility and the greatest chance of saving the patient's life unquestionably lie in the hands of the earlier medical attendants.

I have often thought, when contemplating a patient successfully operated upon, that his life has been saved not so much by surgery as by the doctor who first made the diagnosis and who directed him to a surgeon. For this reason I will give a simple presentation of the leading clinical features of the disease, and especially the early symptoms and signs; the part that surgery plays is described chiefly to emphasize the need for early diagnosis.

## Clinical Features of Bronchial Carcinoma

Bronchial carcinoma varies considerably in its pathology, in its clinical manifestations, and in the duration of the illness it causes. Occasionally one sees patients who have lived several years with the disease, more particularly elderly patients with a slowly growing squamous-celled growth. These are the exception, and it must be remembered that the average expectation of life from the time the patient first consults his doctor is no more than six months; therefore it is useless to spend three to four months making a diagnosis and to expect the disease to be still in a curable phase. This is especially true in the case of patients below the age of 50. It is almost a truism to-day to plead for early diagnosis in cases of cancer, but the urgency justifies the emphasis.

The most important step in making a diagnosis of any disease is to think of it. So often the patient with a cancer of the lung has been observed or treated empirically

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during the critical early months of his illness, and no thought has been given to the possibility of malignant disease. This is much more likely to happen in a lung case than in an abdominal one; carcinoma of the stomach and colon have been described and taught to students for many generations. Carcinoma of the lung is a comparative newcomer; 25 years ago it was a rare disease and no great emphasis was laid upon its manifestations. Doctors who trained 20 or more years ago, therefore, were not brought up to be so "cancer-of-the-lung minded" as are students of to-day.

The approach to the diagnosis of carcinoma of the lung should be the same as for carcinoma of any other organ—that is, in a patient of cancer age any departure from normality may lead to suspicion of malignant disease. Apparently trivial symptoms arising in the stomach, colon, or rectum may well indicate malignancy, and in the same way the insidious onset of the symptoms of bronchial carcinoma constitutes its greatest menace.

By far the most common and significant early symptom is cough; this is often dry and unproductive and is equally often dismissed as "smoker's cough" or explained in a similar way. Pain and dyspnoea may occur, and pain is often the symptom that will first cause the patient to seek advice. It may be pleuritic in character; it may be a dull ache or heavy unpleasant sensation. Frank haemoptysis is less common than blood-staining or streaking of the sputum, and this is another feature that is likely to alarm the patient enough for him to seek advice. On the other hand, he may ignore slight streaking, but for the doctor this should always be a most important feature; continuous daily or nearly daily staining of the sputum is almost diagnostic.

Next to cough and pain and stained sputum the symptoms due to infection form a large and important group and usually follow obstruction to a lobar or segmental bronchus. The onset is diagnosed either as an attack of "influenza" or, if it is more severe, as "pneumonia." The patient may appear to make a complete recovery and then relapse later, or his recovery may be incomplete and he complains that he has never been really well since his attack of "influenza." A persistent cough or blood-streaking of the sputum may complete the picture. His incomplete recovery may lead to a diagnosis of "unresolved pneumonia," a diagnosis that so often means an overlooked empyema or an overlooked growth.

In many cases it is only when infection behind the growth is well established or chronic that wasting, anaemia, and obvious deterioration of health occur. It is hopeless to wait for obvious signs of ill-health before thinking of a diagnosis of cancer of the lung. One often hears the remark that the patient looks so well that the diagnosis seems unlikely. This is definitely the wrong attitude to the disease. The diagnosis should be thought of and, if possible, confirmed while the patient is still in good health. The patient who looks ill at first glance is rarely one for whom anything useful can be done: the hand of death is upon him.

Occasionally, and especially in elderly patients, the first symptoms consist solely of a vague deterioration of health, loss of weight, loss of strength, and anaemia. Lung symptoms may be trivial or even absent, and the lung lesion may be recognized only accidentally during radiography of the alimentary canal, or if it is specifically looked for.

Unfortunately, in a number of patients the first symptoms may be mortal and due to a metastasis, such as palsy of the left recurrent laryngeal nerve, pain due to invasion of the brachial plexus, dyspnoea from massive pleural effusion, or cerebral or spinal symptoms from a metastasis in the central nervous system.

## Diagnosis

Physical signs in the chest may be varied or may be almost entirely absent. Reliance upon the stethoscope is unsafe; an early diagnosis can scarcely ever be made with it. The only physical signs that are highly suggestive of malignant disease are gross dullness not due to fluid and stridor due to partial bronchial occlusion. The supraclavicular glands should always be carefully palpated; the axillary glands are less often involved.

The greatest help comes from *radiography*, and the sooner it is realized that by its means alone can most cases be recognized reasonably early the sooner will this dread disease become more treatable. The radiographic appearances may be numerous and obscure, but even if equivocal they should lead to further investigation by other means. In general the next step should be *bronchoscopy*—bronchograms should not be taken first; they are often inconclusive and redundant.

In difficult cases in which the diagnosis remains unconfirmed, examination of the sputum for malignant cells by Dudgeon's (1936) wet-film method may prove valuable. Barium examination of the oesophagus should be used in every case to exclude distortion or narrowing from glandular metastases.

Finally, thoracotomy may be needed to establish a diagnosis; indeed, it is often the last logical clinical examination, not only for diagnosis but in the assessment of operability.

## Operability of Bronchial Carcinoma

Bronchial carcinoma is, unfortunately, still not amenable to surgery in more than a small percentage of cases. This is for several reasons. Often the disease occurs in the elderly or frail; in hospital practice it is unusual to find many patients over the age of 60 fit enough to stand a pneumonectomy. Again, in many cases, according to some observers as high as 40%, the first sign of the disease comes from a fatal extension. Mass radiography has led to the discovery of a few growths in an early and operable phase; it has also emphasized the inherent gravity of the condition in that many growths so discovered are found to be already beyond cure. Proof that the greatest hope must come from alertness and skill in making an earlier diagnosis rests on a consideration of analysis of the figures of operability over a series of years. Thus my own experience based on all cases seen in the years 1941-7 is as follows:

Total No. of cases seen (1941-7)	..	..	..	..	666
Thoracotomy advised	..	..	..	..	131
" accepted	..	..	..	..	125
Inoperable at thoracotomy	..	..	..	..	50
Operable by pneumonectomy	..	..	..	..	63
" lobectomy	..	..	..	..	12
					75

The average operability over the whole seven years is 11%. In the last three years, however, the figures were:

1945	..	..	..	..	..	15%
1946	..	..	..	..	..	13%
1947	..	..	..	..	..	21%
Total No. of cases	..	..	..	..	315	
Operable cases	..	..	..	..	52	(16.5%)

In an earlier survey (Brock, 1943) the operability rate in a series of 224 cases was 8%.

I think it will be agreed that these figures are distinctly encouraging. A certain amount of the improvement is due to technical advances, such as intrapericardial resection, which enable growths that would have been inoperable a few years ago to be removed successfully, but in general the improvement seems to be due to patients being sent earlier. In other words, many of these patients owe their lives not so much to the surgeon as to the general practitioner or the physician who saw them first.

Tudor Edwards (1946) found an operability rate of 7%. Some surgeons have published figures with a very high operability rate—e.g., Rienhoff (1944), 181 cases, 71 (39%) operable—but it is certain that in such series gross selection has occurred before the patients reached the surgeon. Even though in my own work I see a large number of cases without selection I am aware that the overall operability is less than that given above. The figures given by the British Empire Cancer Campaign (1943) of their investigations carried out in 1938, in which the operability was 1.4%, are too pessimistic and were almost certainly due to a paucity of expert surgical facilities. It is reasonable to state that the present operability rate of bronchial carcinoma is about 15%, and the indications are that this figure will continue to improve for a few years more.

**The Operation**

The surgical treatment of carcinoma of any organ is based on a radical removal of the organ together with as wide a removal as possible of its associated lymphatic field. This has led to the employment of dissection pneumonectomy as the proper operation for bronchial carcinoma, for only in this way can one hope in most cases to remove the growth widely together with the lymphatic glands. Lobectomy is rarely possible or desirable, and many surgeons condemn it out of hand as a wrong operation. I would not go so far as this, because I have found that in properly selected cases it is still an operation of great value and one that can give good results. I still use it in certain elderly patients who are suffering from a peripheral or parenchymatous type of growth and in whom the hilum appears clear. I have in all used it 15 times in 101 operable cases and have been well pleased with the results, which compare favourably with those of pneumonectomy (Table I).

TABLE I.—Results of Lobectomy

Died from operation	1
Died since operation	5
Survived 3 years	1*
" 18 months	1
" under 1 year	3
Alive and well after operation	9
Over 7 years	1
" 3 "	3
" 2 "	3
" 1 year	1
Under 1 year	1

\* Suicide

Except for selected cases, however, radical pneumonectomy must remain the operation of choice. As with all operations, one evolves towards a more efficient and more radical procedure, and from simple dissection pneumonectomy we have progressed to intrapericardial pneumonectomy. If the pericardium is widely opened and that part of the sac surrounding the hilar structures is removed together with the lung, a much more radical, and often much easier, operation is possible. Lately I have extended the operation still further to include a complete block dissection of all the accessible mediastinal glands from the superior thoracic inlet down to and including those in and around the main bronchi and continuing down to the level of the diaphragm. This glandular removal includes all the associated connective tissue in the mediastinum. I have called the operation "block-dissection pneumonectomy." It is just as well tolerated by most patients as the usual simple extrapericardial dissection operation. It is of course not possible to make a complete removal of all the lymphatic field, as the connexions are so widespread and complicated, which is one of the reasons for the gravity of bronchial carcinoma. Moreover, there is always the peril of a blood-borne metastasis having already occurred. Block-dissection pneumonectomy is, however, the only logical evolution of surgical treatment, and time alone will prove whether it is

more effective than the less radical operations. I am at present engaged in a careful study of the glandular field removed at operation to try to correlate the condition of this with the ultimate fate of the patient. At present the results are based on a mixture of operations starting from the very early ones—often done rather falteringly in the early days, with a higher mortality and, doubtless as a result of the less complete removals done at that time, with a correspondingly greater tendency to earlier recurrence. My own figures as they stand at present are shown in Table II.

TABLE II.—Results of Operation

No. of cases	101
Lobectomy	15
Pneumonectomy	86
Died from operation	18
Died since operation*	28
Survived 4 years	1
" up to 3 years	3
" " 2½ "	1
" " 2 "	1
" " 1½ "	4
" " 1 year	6
" " 6 months	12
Alive and well after operation	55
Over 9 years	1
" 7 "	3
" 6 "	2
" 5 "	2
" 3 "	10
" 2 "	7
" 1 year	11
Under 1 year	19

\* Three of these patients died from causes other than recurrence; the rest died of recurrence of carcinoma either in the chest or elsewhere.

Considering these figures represent an experience over some 15 years, during which approximately 1,000 cases of bronchial carcinoma have been seen, they make somewhat gloomy reading. Nevertheless it is possible to read a great deal of hope into them, seeing that without surgery scarcely any one of the 55 patients now alive and well would have survived; of the 28 who died since operation many obtained great benefit, a number enjoyed a useful extra span of life, and in many cases death came in a kinder form than would have been the case with the primary growth untreated.

Table III includes the largest groups of figures published by other surgeons, with my own series added.

TABLE III.—Collected Figures of Operative Mortality

	No. of cases	Deaths
Edwards (1946)	70	12 (17%)
Graham (1944)	70	21 (30%)
Rienhoff (1944)	71	15 (21%)
Ochsner, Dixon, and De Bakey (1945)	58	16 (27%)
Clagett and Brindley (1944)	43	14 (32%)
Sellers, Cruickshank, and Billimoria (1947)	130	19 (15%)
Brock	101	18 (18%)
	543	115 (21%)

There remains much room for improvement, and, while a part of the responsibility for this must rest with the surgeon to better his technique and the efficiency of his curative operation, the greater responsibility rests with those who have the task of making the diagnosis or thinking of the diagnosis and referring the patient for expert investigation and treatment. In this lies the greatest hope of further improvement in our results.

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