TREATMENT BY THE INSERTION OF RADON SEEDS

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The treatment of carcinoma of the bronchus is very often difficult because the disease may have made considerable progress before any sign or symptom gives indication of its presence, or because it may develop during the course of a persistent and old-standing cough of many years duration, without alteration or addition of symptoms. It may spread along the lumen of the bronchi, along fascial planes or into the parenchyma of the lung. It forms metastases at an early date in the mediastinal glands, and also readily in the liver, pancreas, and brain without except perhaps in the latter case, any new symptoms. Unlike many of the malignant growths in the upper respiratory passages it gives no indication in its very early stages of its presence, and is often extremely difficult to diagnose, even with radiography and bronchoscopy, especially if it is situate in a secondary bronchus and does not occlude it.

Thus it is that the number of cases which are diagnosed in a condition fit for surgical removal is limited. Surgical removal—of a lobe or a lung—is the ideal method of treatment, and the difficulties and dangers of such operations are being gradually overcome. The result is that there are many cases of carcinoma of the bronchus that are not suitable for such operative treatment, but lend themselves to radiotherapy. This consists either of implantation into the tumour mass—by the bronchoscope or by a thoracotomy—of radon in containers or of radium. or of telecurietherapy. The object of this article is to discuss the scope, details and prospects of implantation through the bronchoscope of small radon containers into the mass of the growth. It is obvious that for such treatment to be practicable the growth should be not only visible through the bronchoscope, but also within reach of the introducing instrument. It is possible to see certain tumour masses lying some distance along a lateral bronchus by means of the prismatic telescope, but, so far, an instrument which can be passed up such a bronchus and deliver the seeds “round the corner” has not been developed. The tumours most accessible are those in the main and descending bronchi, whilst those just inside the upper lobe bronchi are within reach in many cases. Those in the middle lobe bronchi, fortunately rare, are visible in the right angle telescope, but are almost impossible to reach with seeds.

The amount of tumour formation in the bronchus is not a deterrent, and only those cases need be refused where the general condition is so seriously affected that the patient is almost moribund, where there is great extension into the lung parenchyma, or where there are obvious secondary deposits. Although in many of these cases there is not the expectation of ultimate cure, the condition of the patient may be greatly improved by destruction of the tumour mass in the bronchial lumen and the re-opening of the airway with consequent re-expansion of distal portions of the lung and drainage of retained secretion. Such patients who may be bedridden and dyspnoeic before treatment will in the space of two or three weeks be able to get up and live a comparatively normal life if only for a few months, and many of them return to work. The period of resumed good health varies—in some for six months, in others for a year, and in an appreciable number for periods up to five years, with an occasional one for more than that period. One patient is alive and well after more than ten years, although there was a recurrence early in the seventh year, from which he has apparently recovered.

Experience of some hundred and fifty cases has not given any help in estimating which type of case is likely to respond better to treatment than others. It is obvious that the less advanced cases have a better prognosis, but even so many comparatively extensive growths have done better than others which do not appear to have progressed so far. The average age of a long series when first seen was about fifty years, and it seems to be a fact that patients of about this age or younger respond better than the older ones. Patients over the age of sixty years have consistently shown little improvement after radon implantation, even when their tumours are of comparatively slight degree. The very successful cases are fairly evenly divided between the squamous celled and the non-squamous celled tumours, but in taking the averages, the expectation of life is greater in the non-squamous than in the squamous type of tumour. In a series of sixty-seven cases treated and another of thirty-three untreated it was found that the average period of survival of the treated as compared with the untreated cases

was almost doubled in the squamous celled, but was trebled in the non-squamous type. It is true at the same time that the period of survival in the untreated squamous type is longer than in the untreated non-squamous cases, and the final result seems to be that the treated squamous and non-squamous types survive about the same length of time. The proportion of men to women is about ten or twelve to one, but even allowing for this disproportion the numbers of women who have responded well is very small, certainly smaller than in the case of the men.

The radon seeds are inserted, under cocaine and adrenalin anaesthesia, after introducing the bronchoscope in the ordinary way. This method of treatment has been carried out at the Brompton Hospital for some fifteen or sixteen years. At first the seeds were introduced directly into the tumour mass by a trocar and canula type of introducer, then for a considerable period were inserted in special tubular containers in which the seeds were placed in grooves inside the wall of the container, the lumen being free for the discharge of secretion and for respiration. This method has certain advantages, but one of its difficulties is that of keeping the container in position. There is a tendency for the lumen to become blocked by inspissated secretions and then for it to be coughed out. It may be expelled from the mouth, or it may only reach the trachea and then be drawn back into the other bronchus, or in other cases it may reach the pharynx and then be swallowed. Springs and hooks may be added and help in the retention of the container, but none of them are entirely satisfactory. It has been the writer's practice for many years now to insert radon seeds directly into the growth by means of the radon seed gun designed by Mr. F. J. Cleminson. This, when loaded, carries ten seeds which are inserted one by one into selected and different parts of the growth, under visual control and without taking the inserter from the bronchoscope. The seeds are of silver with a half millimetre screening, and may contain one, two or three millicuries of radon. They are inserted into the growth and no attempts are made to remove them. A varying number—sometimes all—find their way out and are coughed up, but some may be retained for many years without causing any symptoms. The amount of radon to be used has, as always, presented difficulties. In the early stages of the direct insertion twelve to eighteen millicuries were used. In the container the same dose was applied at first, but when increased to twenty-four millicuries and left in position for five days or so caused a number of severe haemorrhages due to necrosis, and the dose was again reduced. On the resumption of direct insertion application of from twelve to eighteen millicuries was used, and the dose was stepped up to thirty millicuries, at first with an apparent improvement in results, and a report was made in January 1941 of these results. Further observation of the results of these implantations, and the gradually accumulating information from reports of the late progress and postmortem findings have shown that the smaller doses used originally have produced better results. Naturally in the earlier stages the heavier doses have caused a more rapid and extensive destruction of tumour mass, but recurrence has taken place more often and there have been more examples of severe haemorrhage. It has been found that all those cases which have survived for a number of years have been treated with small doses of about twelve millicuries, even if the application of a similar dose has been repeated at intervals. It is now the writer's practice to insert ten to twelve millicuries and to repeat the application in about two months time.

Successive reports of the method of treatment as carried out at Brompton by the writer have been published, showing the results obtained in 27, 67 and 100 cases of histologically proved carcinomata. Of the 100 cases treated 22 lived for more than a year, and 10 have lived for more than two years. The most successful case, already referred to, was a non-squamous case which was treated in December 1932, returned to his work as a fish-porter in Billingsgate, recurred, and was treated again successfully in January 1939 and in 1940-41 was working in London in a demolition squad. Three others are still alive and well after four and five years, and one other after seven years.

It is felt at Brompton that all patients who are likely to be cured by surgical removal should have the benefit of this treatment, but that those who are not fit to undergo these manipulations should have the chance of radon implantation unless they are either moribund or show evidence of secondary deposits.

REFERENCES

- Journal of Laryngology*, 1933. 48. 733.
Ibid., 1937. 52. 733.
Ibid., 1941. 56. 1.