The Evaluation of Roentgen Therapy in the
Management of Non-Resectable
Carcinoma of the Lung

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Carcinoma of the lung may be treated successfully by surgical excision when the lesion is confined to the lung; however, in the majority of patients the disease is too far advanced for any type of excisional therapy when the diagnosis is established. Therefore, most patients must be offered some other modality of therapy or left untreated. Roentgen therapy is often employed but its value is disputed. There are those who maintain that no patient benefits, while others maintain that most patients may be improved. When the average duration of life is studied the picture is dismal, regardless of therapy, for life expectancy usually does not exceed six months. Ariel and his co-workers found that the average duration of life in patients treated with deep x-ray therapy, in histologically proved lesions, was 5.0 months as compared to a survival of 4.2 months in patients receiving no treatment. Watson gives a similar report in a review of 611 cases in which the duration of life without therapy was 3.1 months as compared to 5.7 months with radiotherapy. In view of the fact that therapy often requires one month for administration, the differences in survival rates reported are insignificant.

On the other hand, there are reports of patients who have survived for long periods following roentgen therapy. Shultz found that no patient survived as long as two years without treatment, whereas 5 per cent of treated patients in his series survived for this period, and four (1 per cent) of those treated survived five years. Smithers reports a five year survival rate of 4.1 per cent in patients with non-resectable lesions who are treated by x-ray.

Regardless of the effect upon longevity, roentgen therapy must be considered as an aid in palliation. Blashard reported success in 83 per cent of 35 patients treated for relief of symptoms.

This study was undertaken to assess the effect of roentgen therapy with regard to relief of symptoms and the prolongation of life at the Veterans Administration Hospital, Houston, Texas.

Material

The records of all patients having a diagnosis of carcinoma of the lung admitted to the Veterans Administration Hospital, Houston, Texas, from April, 1949 through December, 1956 were reviewed. Those who were treated by surgical excision of their tumor, those in whom the diagnosis was made only at necropsy, and those who had received treatment elsewhere, were excluded from the study. Also excluded were patients in

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whom the diagnosis was made only on clinical evidence. There remained 225 patients with histologic evidence of carcinoma of the lung who received primary treatment in this hospital. Thirty-nine were found to have a non-resectable tumor at the time of exploratory thoracotomy, while 186 were considered inoperable on the basis of bronchoscopic findings or on the basis of distant metastases.

All were men. The age range was 25 to 79 years, and the diagnosis was most commonly made in those in the 6th and 7th decades (Table 1). Almost two-thirds of the tumors were squamous cell type (Table 2).

The usual admitting complaints were cough, pain, loss of weight, shortness of breath, hemoptysis, or a combination of these symptoms, but, as in other studies, the symptoms depended upon the location of
the tumor. Included in this series were 21 whose first symptoms were
neurologic, presumed to be due to cerebral or spinal cord metastases.
Of interest is the fact that there were seven totally asymptomatic pa-
tients, the lesion having been discovered on a routine roentgenogram
of the chest.

One hundred per cent follow-up was achieved.

Treatment

One hundred and twenty-two patients were given only symptomatic
and supportive therapy, while 103 received radio-therapy. Since all had
far-advanced disease, the tumor dose was calculated to give optimum
palliation without adding to the patient's discomfort. When the disease
appeared localized, a potential curative dose of 5,000 roentgens was
delivered through four ports over a four and one half week period. The
dose was administered with 220 KV machine with a half value layer of
2 mm. of copper, 50 cms. distance, with the size of ports to conform to
the primary tumor and enlarged nodes in each patient. In many in-
stances a considerably lower tumor dose was given to minimize systemic,
cutaneous, or pulmonary reactions, and to avoid production of general
debility.

Results

All of the 225 patients were dead at the time the study was under-
taken. The longest survival of a patient without roentgen therapy was
22 months, while in the treated patients the longest survival was 42
months. The average survival time for those patients without therapy
was 1.9 months as compared to an average of 5.9 months with roentgen
therapy. When those patients who died within one month without treat-
ment, and, therefore, would not have been considered candidates for
radio-therapy, are excluded from the tabulation, the average survival
rate for the untreated patients is 2.3 months.
Records concerning relief of symptoms are admittedly unprecise and subjective. Nevertheless, sufficient data were recorded in the charts to show complete relief of symptoms in approximately 20 per cent, while an additional 50 per cent received partial or moderate relief of symptoms. The remaining 30 per cent had no benefit. These records were made by the physician caring directly for the patient rather than by the radio-therapist. Progress notes by the therapist are much more optimistic and suggest a more favorable response.

Analysis of these data indicates that age had no appreciable effect upon survival time. Those in the fourth decade had the longest average survival time, but the total number is not large enough to draw the conclusion that those in this age group live longer. However, the concept that the younger patients have more rapid tumor growth is not valid when one is dealing with non-resectable lesions (Table 3).

An analysis according to cell type showed that this factor made little difference in the survival rate. Whereas, superficial inspection of these figures would indicate that the columnar cell carcinoma is more responsive to roentgen therapy than other types, the number of cases is so small that there is no statistically significant difference between the survival time in the treated and untreated. In patients with squamous cell carcinoma the difference between the two groups is statistically significant (p<.001), (Table 4).

**TABLE 4**

<table>
<thead>
<tr>
<th></th>
<th>PER CENT</th>
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<tbody>
<tr>
<td>Squamous</td>
<td>65.7</td>
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<tr>
<td>Reserve</td>
<td>20</td>
</tr>
<tr>
<td>Columnar</td>
<td>5.8</td>
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<tr>
<td>Mixed</td>
<td>5.8</td>
</tr>
<tr>
<td>Unknown</td>
<td>2.7</td>
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**INCI DENCE ACCORDING TO CELL TYPE**
Discussion

Our data indicate that roentgen therapy may prolong life, but that the average increase in survival time is only three months. In other studies, as previously noted, the increase in survival time is even less striking. Consequently, it becomes almost a matter of philosophy as to whether one should treat an asymptomatic patient, particularly if hospitalization is required for roentgen therapy, when the anticipated increase in survival is so short.

On the other hand, there seems little doubt concerning the value of x-ray therapy in those patients with symptoms. Although not all will be relieved, the incidence of improvement is so high that its value is unquestionable. Therefore, radio-therapy is to be recommended whenever symptoms exist.

Other studies have indicated that certain types of tumors are more responsive to x-ray treatment than others, thus Kutz found that squamous cell carcinoma responded well, while treatment of undifferentiated types was ineffective. Our study does not support this contention, and it is our feeling that all types of carcinomas should be treated regardless of the cell type. It is of interest that the patients with squamous cell carcinomas had the shortest survival time. It is this cell type which is responsible for the majority of long term survival in surgically treated patients. It would thus appear that squamous cell is more likely to remain localized during a period when active surgical intervention is possible than other histologic types, but once the tumor has broken its bounds and disseminated to the point of becoming non-resectable, cell type is of little importance. Under such circumstances all types of carcinoma of the lung are highly malignant, and the survival time is short.

It was discouraging to find that the mortality rate had been 100 per cent. One would have hoped for at least one five year survival out of 225 cases. Failure of any patient to live for this period again points out the poor prognosis in this disease and it is to be hoped that new modalities will be forthcoming in the near future. Nevertheless, until such time, x-ray will maintain its place as a valuable therapeutic agent when administered judiciously.

SUMMARY

The records of 225 patients with non-resectable carcinomas of the lung were reviewed. One hundred and three were given treatment with roentgen therapy, while 122 had only supportive therapy. All were dead at the time of the study, the longest survival time being 42 months. Patients treated with x-ray lived an average of 5.2 months as compared with a survival of 1.9 months in the untreated cases. In treated patients symptoms were partially or completely relieved in 70 per cent. It is concluded that x-ray therapy is a valuable agent in the control of symptoms in inoperable carcinoma of the lung and may, at times, result in prolongation of life.

RESUMEN

Se han revisado las historias de 225 enfermos de carcinoma pulmonar no resecable. A 103 se les aplicó Roentgentherapie en tanto que en 122 sólo se usó la terapia de soporte. Al hacer este estudio todos habían muerto, siendo la mayor sobrevida de 42 meses. Los pacientes tratados con roentgentherapie sobrevivieron 5.2 meses por término medio, en tanto los casos no tratados sólo sobrevivieron 1.9 meses. En los casos tratados los síntomas fueron aliviados completa o parcialmente en el 70 por ciento de los casos. Se concluye que la roentgentherapie es útil agente para el control de los síntomas del carcinoma inoperable del pulmón y a veces puede obtenerse con él la prolongación de la vida.

RESUMÉ

Les dossiers de 225 malades atteints de cancers inopérables du poumon ont été étudiés. 103 subirent un traitement radiothérapique, tandis que 122 ne reçurent qu'une thérapeutique palliative. Tous étaient décédés au moment de l'étude, la plus longue survie ayant été de 42 mois. Les malades traités par la radiothérapie vécurent une moyenne de 5.2 mois comparativement à une survie de 1.9 mois pour les cas non traités. Chez les malades traités, les troubles furent partiellement ou complètement soulagés dans 70% des cas. Les auteurs concluent que la radiothérapie est un agent de valeur pour supprimer les manifestations cliniques du cancer inopérable du poumon. Elle peut, de temps en temps, être à l'origine d'une prolongation de l'existence.

ZUSAMMENFASSUNG

Durchsicht der Krankengeschichten von 225 Patienten mit nicht mehr operablen Lungencarcinom. 103 erhielten eine Behandlung mit Röntgenstrahlen, während 122 nur allgemein unterstützend behandelt wurden. Z.Zt. der Untersuchung waren alle verstorben, wobei die längste Überlebenszeit 42 Monate Betrug. Kranke, die mit Röntgenstrahlen behandelt wurden, lebten durchschnittlich 5.2 Monate im Vergleich zu 1.9 Monaten Überlebenszeit bei nicht behandelten Fällen. Bei den behandelten Patienten
wurden die Symptome z.T. oder zur Gänze behoben in 70%. Es wird gefolgt, dass die Strahlentherapie eine wertvolle Methode darstellt zur Behebung der Symptome bei inoperablen Lungencarcinom und gelegentlich eine Verlängerung des Lebens bewirken kann.

REFERENCES