Five-year Survival without Symptoms of Superior Sulcus Tumor*

Report of a Case

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Since five-year survivals of patients with superior sulcus malignancy have been so rarely noted in the literature, it seems worthwhile to report a patient who is well and without evidence of recurrent disease or metastases five years and nine months after operation and x-ray therapy.

It would be superfluous to review the many articles which have been written on superior sulcus tumors. Pancoast1 directed clinical attention to these tumors in 1924. Herbut and Watson2 reviewed the literature in 1946 and tabulated the symptoms, and also the varieties of tumors which cause this syndrome. Chardack and MacCallum3 completed the review of the literature in 1953 and in 19564 reported the five-year survival of a patient with a superior sulcus tumor following surgery and irradia-

tion. A more aggressive approach and a somewhat more optimistic attitude toward these lesions has been recently suggested by Shaw, Paulson and Kee.5

CASE REPORT

W.B.H., a 33-year-old white postmaster, in the summer of 1956 noted pain in the right shoulder radiating down the right arm and into the hand with increasing difficulty in writing. This was followed by some weight loss, easy fatigability, a non-productive cough, profuse perspiration at night, and increasing severity of pain. He was diagnosed by his private physician as having arthritis of the spine and had on one occasion a diagnosis of subdeltoid bursitis. He was admitted to the Veterans Administration Hospital in Dublin, Georgia on July 16, 1956. Chest x-ray films (Fig. 1) showed an abnormal mass in the right apex measuring approximately 6 cm. in diameter. A roentgenogram of the chest showed no evidence of metastases and he was transferred to the Atlanta Veterans Administration Hospital on July 19, 1956.

His past history was essentially normal except for a duodenal ulcer for which he had been hospitalized on five separate occasions. Physical examination revealed a young, six-foot, white man, slightly below average weight. There was no Horner’s syndrome; there was slight atrophy of the muscles of the shoulder girdle on the right side and some weakness of the intrinsic muscles of the hand.

Hemoglobin was 11.5 grams, hematocrit 42, sedimentation rate 45, white blood cell count 7,050, with a normal differential count. Urinalysis was within normal limits. Papanicolaou studies revealed class II cells in the sputum. The roentgenograms of the chest taken seven days earlier in the Dublin Hospital showed a somewhat rounded density in the right apex which, on lateral view, appeared to be posterior. Tomograms showed a mass in the right apex extending practically throughout the apex with no evidence of bony involvement or destruction. There was no pulsation noted on fluoroscopic examination and there were good diaphragmatic excursions bilaterally.

Figure 1: July 24, 1956, preoperative x-ray film demonstrating tumor in right apex.

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**Deceased.
Bronchoscopic findings on July 23, 1956 were normal, except for a minimal amount of mucoid bronchial secretions bilaterally. The Papanicolaou studies of the bronchial secretions, particularly from the right upper lobe bronchus, showed no evidence of malignancy.

Operative Procedure. On July 27, 1956, operation was performed jointly by two of the authors. With the patient in the left lateral position, an incision was made in the parascapular region of the posterior shoulder area, curving around the scapula anteriorly and crossing the anterior chest wall at the level of the fourth rib. The trapezius and the rhomboid muscles were divided in addition to the muscles severed in the standard thoraectomy incision. The pleural cavity was entered through the fourth interspace and the thoracic cavity was explored. It was noted that a tumor presented itself at the thoracic inlet and seemed to invade the apical segment of the right upper lobe. The mediastinum appeared to be free of enlarged lymph nodes. It was decided that this was a true superior sulcus tumor and resection of the thoracic wall in this region, as well as a portion of the involved lung, was indicated. Very little of the lung itself seemed to be involved and wedge resection of the apical portion of the right upper lobe was performed. Frozen section revealed the edges of this to be free of tumor. The lung was retracted and the tumor was freed from the apex of the chest. To obtain adequate margins around the tumor and complete exposure, it was necessary to resect part of the first, second and third ribs. The adjacent intercostal muscles and vessels were removed. After this was done, it was found that the tumor could be mobilized and it was possible to dissect it off the brachial plexus and subclavian vessels. The subclavian vessels were not grossly involved, but they were closely approximated by the tumor. The tumor was in close proximity to the inferior cords of the brachial plexus and there were several large vascular trunks connecting the tumor with the upper intercostal vessels. The tumor was likewise closely associated with, but did not actively invade, the innominate artery.

The tumor was traced cephalad and posteriorty until it appeared to enter the intervertebral foramen of the seventh cervical vertebra and apparently a very small remnant of the tumor remained in this foramen and was identified by placement of two silver clips. This marked the limit of operability from this approach. It was felt that the silver clips would be a guide in removing any remaining tumor by subsequent laminectomy and also serve as a marker for radiologic treatment. The fourth and fifth ribs were approximated and the chest wall was closed in a routine manner. Two thoracotomy tubes were placed in the right chest. The patient's recovery was uneventful. Horner's syndrome was noted on the right side during the postoperative course.

On August 23, 1956, Dr. Charles Dowman performed a lower cervical laminectomy on the right side and a thorough search and frozen section revealed no residual tumor.

Pathology Report

Gross Description: Tissue was removed from three anatomic sites. The mass removed from the pulmonary sulcus measures 9.0 x 4.0 x 4.0 cm. At the mid region, there is a slight constriction and attached to this area there is a small sheet of pleura and small fragments of lung. The tissue is hard, and on section is greyish white with scattered irregular areas of necrosis. Accompanying this mass is a tiny fragment of nondescript tissue removed from the intervertebral foramen (T1), and fragments of the first, second and third ribs. A second specimen removed from the apex of the right pleural cavity consists of two pieces of tissue which measure 1.5 x 1.0 x 0.75 cm. each. They have the appear-

Figure 2 (upper): The tumor cells are pleomorphic and undifferentiated. Cytoplasm is scant, the nuclei are atypical and there are several scattered mitotic figures. Hematoxylin and eosin x350.

Figure 3: The densely cellular neoplasm is on the left and is separated from the lung by an obliquely placed densely fibrous pleura. The pulmonary parenchyma on the right contains scattered areas of fibrosis with chronic non-specific inflammatory changes. No tumor traverses the pleura. Hematoxylin and eosin x22.5.
ance of lung and pleura. The third specimen
taken from the chest wall measures 6.5 x 4.0 x
2.9 cm. On section, it consists of voluntary
muscle with no significant gross changes.

Microscopic Description: The sections reveal
a neoplasm which is composed of numerous
closely packed cells arranged in sheets and short
columns. These are supported by varying widths
dense collagenous connective tissue. The tumor
cells do not form any recognizable structures.
The cells are medium sized and vary from
round to oval in shape. Where they are closely
packed, they become irregular in shape. Cellular
outlines are indistinct, cytoplasm is scant and
eosinophilic. The nuclei vary from round to
plump-oval in shape. Nuclear membranes are
thin; chromatin varies from fine to coarse, the
former predominating. Some cells contain promi-
nent nucleoli; but these are not enlarged. Occa-
sional cells have completely hyperchromatic nu-
clei. Mitotic figures are rare, but pyknotic changes
are common (Fig. 2). Large areas of tumor cells
are completely necrotic. About the necrotic
areas and in the connective tissue bands there
are infiltrations of lymphocytes. Vascularity is
decreased. The tumor approaches and is adherent
to the thickened fibrosed pleura, but does not
invade it (Fig. 3). The pleura contains focal
collections of lymphocytes.

The subjacent lung reveals some irregular
area of nodular thickening of alveolar walls due
to accumulations of lymphocytes.

The tissue removed from the intervertebral
foramen consists of tumor which is similar in
appearance to that described above.

The tissue removed from the right apex con-
sists of collapsed pulmonary parenchyma with
minimal chronic nonspecific inflammatory
changes, the pleura is thickened. The specimen
taken from the thoracic wall reveals normal
striated muscle. There are no histologic abnor-
malities of the submitted ribs.

Diagnosis: Malignant neoplasm, type unclassi-
cified, right pulmonary sulcus, with extension into
the intervertebral foramen (T1).

Postoperative Course and Follow-up: The
patient was treated with deep x-ray therapy, 220
KV (H.V.L. 2.35 Cu.), from September 13 to
October 19, 1956. This included 27 treatments
in 37 days, 2800 r anteriorly and 2600 r posteri-
ornly to a portal that included the lower cervical
area and apex of the right lung. Tumor dose
estimated to the midline was 4300 r.

Clinical Course: There was a slow, but steady
increase in muscle function of the right shoulder
girdle and right arm. By December 19, 1956,
there was only residual soreness and pain over
the lower right neck. The patient had gained five
or six pounds in weight and required no nar-
cotics. No motor dysfunction was noted. Chest
x-ray film showed no evidence of metastases.

By January 22, 1957, there was an additional
weight gain and marked improvement of the
discomfort in the arm. Winged scapula was pre-
ent. By July 19, 1957, the patient had continued
to gain weight, but still had some pain in his
right arm. However, he had resumed his work
in the postoffice. By September 19, 1957, he had
good use of his right arm and hand without any
clinical evidence of muscle atrophy.

On April 10, 1961, and March 12, 1962, fol-
low-up examinations revealed that the patient
was asymptomatic except for arthritic pains in
the neck that seemed to be related to changes
in the weather. Chest x-ray films on April 10,
1961 (Fig. 4) showed no changes over the pre-
vious postoperative x-ray film. He was doing
well clinically and there was no evidence of
residual disease or metastases when he was last
seen on March 12, 1962.

Discussion

The experience of being confronted with
a five-year survival following the removal of
an anaplastic neoplasm from the tho-
racic inlet has been responsible for re-
evaluating our concept of the ominous
prognosis for neoplasms in this location.
The five-year survival of a patient reported
by Chardack and MacCallum and the
recent suggestion by Shaw, Paulson and
Kee of a more aggressive approach further stimulated our reconsideration.

Review of the subject by Herbut and Watson included 134 cases in the literature with 17 cases added. Within this group, 100 cases were of pulmonary origin, 30 cases had lesions primary in other locations, and 21 were described as primary in the neck with no other neoplasm found. In this latter group of 21, detailed data on eight excluded the presence of a primary neoplasm elsewhere.

These statistics suggest that roughly 13 per cent of the patients presenting with thoracic inlet tumors associated with the Pancoast syndrome may conceivably be candidates for radical surgery followed by radiation. To this might be added an additional small group where the neoplasm takes origin in the peripheral region of an upper lobe and has extended into the thoracic inlet without spread or metastases.

Thus, patients presenting with the Pancoast syndrome should be approached with the idea of excluding primary neoplastic disease elsewhere as far as our methods of study allow. With as much clearance of this problem as can be obtained, it is felt that exploration and radical extirpation of the neoplasm, with or without part or all of the subjacent upper lobe of the lung, is indicated. Granted that some cases in this group will not be benefited, the chance for a five-year survival and/or a cure as illustrated in Chardack and MacCallum's case and in our reported case is present.

The histologic morphology of eight cases in neoplasms confined to the neck as reviewed and described by Herbut and Watson were as follows:

<table>
<thead>
<tr>
<th>Neoplasm</th>
<th>Cases</th>
</tr>
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<tbody>
<tr>
<td>Squamous cell carcinoma</td>
<td>5</td>
</tr>
<tr>
<td>Squamous cell and adenomatous carcinoma</td>
<td>1</td>
</tr>
<tr>
<td>Anaplastic carcinoma</td>
<td>1</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>1</td>
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</tbody>
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The case we have reported is anaplastic carcinoma. Desirable as it may be to identify the nature of the neoplasm, this is not possible. Conjecture as to its histogenesis remains glorified guesswork. The issue resolves itself in the appreciation that one should not be overly impressed by the apparent degree of histologic malignancy. The more important aspect is the extent and degree of local spread of the neoplasm—factors which influence the resectability regardless of the histologic pattern.

In view of the various patterns encountered in these lesions which are confined to the thoracic inlet, we are impressed with the opinion expressed by Herbut and Watson that some of these tumors may originate in bronchogenic rests. The various histologic patterns reported for this small group certainly conform with the various patterns found in bronchogenic carcinoma.

REFERENCES