Lung Cancer and Shoulder Pain

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INTRODUCTION

PAIN IN THE SHOULDER IS A COMMON complaint which is probably exceeded in frequency only by headache and backache. However, as Furlong remarked, the pathology of the painful shoulder is still poorly understood. "Our ignorance," as he put it, "was made more obscure by such terms as neuritis, neuralgia, fibrosis and rheumatism."

It is known that lung cancer may masquerade under the above diagnostic labels. For example, Ellman mentioned a case which presented with shoulder pain and was labeled "rheumatism" until a massive pleural effusion finally drew attention to the lung lesion which was by then inoperable. Moseley was of the view that superior sulcus tumors were often misdiagnosed as "neuralgia" or "neuritis" until the ribs and cervicothoracic vertebral junction became so grossly destroyed that even palliation was almost hopeless. Similarly, Auster spoke of upper lobe tumors which cause shoulder pain and are "eventually, after a long time," diagnosed correctly.

In this paper, I propose to discuss, with particular emphasis on pathology, five cases of lung cancer which presented with pain in the shoulder. These cases were necropsied at the Western Infirmary, Glasgow, Scotland, during the years 1960 to 1962 inclusive. I think that they indicate collectively that the ambit of lung cancer for giving rise to pain in the shoulder is probably wider than is generally appreciated.

CASE REPORTS AND COMMENTS

CASE 1

A man, aged 56, was admitted with increasing symptoms of right-sided shoulder and chest pain.

At necropsy, the bronchus to the right upper lobe was found to be obstructed by tumor tissue. Peripheral to the site of obstruction, there was a large cavity which almost filled the whole of this lobe. The parietes was infiltrated over the upper lobe, especially at the thoracic inlet, where the brachial plexus was involved. The right upper bronchopulmonary lymph nodes were invaded, but the mediastinal groups of nodes showed scarcely any involvement.

CASE 2

A man of 60 years was admitted with the complaints of pain in the left shoulder, loss of weight, and several small hemoptyses.

At necropsy, which was performed by Dr. J. Hume Adams, a hard mass was felt at the apex of the left lung. On sectioning this lung, a large cavitated tumor was found apically. Dissection of the left brachial plexus showed it to be extensively infiltrated by tumor tissue where it crossed the apex of the lung. The lymph nodes at the hilum and in the mediastinum were not macroscopically abnormal.

COMMENT

The apical position of these tumors and the occurrence of pain in the neighboring shoulder are features which have been discussed by Pancoast and other writers. Indeed, the prominence given to such apical tumors has been such that, although Dec and his colleagues wished to raise among doctors the index of suspicion for lung cancer in patients with shoulder pain, they recommended that diagnostic x-ray films need be large enough to include only the upper portion of the chest and mediastinum on the same side. However, as the next two cases will demonstrate, this recommendation is of limited scope.

Let us first consider the mode of invasion of the brachial plexus. The accepted practice is to distinguish, as did Bateman between "direct" and "metastatic" involvement. It seems to me that this distinction is questionable. A detailed examination of the nerve bundles in an invaded plexus reveals noteworthy gradations in the severity of the malignant invasion:

1. Where no actual neural invasion has occurred, a few clumps of tumor cells may be discernible in the perineural lymphatics.
CASE 3
A man, 56 years of age, gave a history of pain in the right shoulder, arm and hand.

At necropsy, which was performed by Dr. A. T. Sandison, the primary growth was found in the lower lobe of the left lung. The mediastinal nodes on both sides were moderately metastasized. Grossly metastasized nodes were seen in the lower part of the neck and in the right axilla, where they produced some distortion of the brachial plexus.

Comment: In this case, the primary tumor and the affected shoulder were on the opposite sides of the body, the contralateral brachial plexus being involved. This case would seem to support the widely accepted anatomic and pathologic views that lymph from the left lower lobe usually drains into the right lymphatic duct. How-
ever, as I have shown elsewhere,

detailed dissections demonstrate that a tumor originating in any of the lobes of the lungs may exhibit metastases which predominate in the contralateral cervical lymph nodes. It should be borne in mind, therefore, that shoulder pain due to metastases in the cervical lymph nodes may be caused by a growth situated in any lobe of the same or opposite lung.

CASE 4

A man of 46 complained of pain in the left shoulder, hoarseness and increasing breathlessness. X-ray examination of the shoulder showed bone destruction and altered bone pattern.

Necropsy demonstrated that the primary lesion was at the apex of the right lung. From a thick rim of hard tumor at the right superior sulcus (Fig. 2) there arose much diffuse infiltration of the superior mediastinum. Continuing upwards, the tumor involved a chain of lymph nodes on each side of the neck. Neither brachial plexus was found to be invaded. There was no physical continuity between the invaded cervical nodes and the involved shoulder. The left lung was not affected.

Comment: As in the previous case, the primary tumor and the affected shoulder were not on the same side. By what pathway was the shoulder invaded? Willis, among others, considers that the available evidence speaks strongly against the concept of lymphatic invasion of bone. On the other hand, Johnstone and others accept that this mode of metastasis may give rise to skeletal secondaries. I believe that the patterns of metastasis displayed by lung cancer are such that lymphatic spread probably takes pride of place over the hematogenous mechanism. Perhaps the mono-block formalin-fixation method of investigating cancer metastasis, which I have previously described, may help to resolve such disputed problems, especially those that are essentially topographic in nature.

CASE 5

A man of 68 presented with pain in the right shoulder and breathlessness.

At necropsy, which was performed by Dr. A. T. Sandison, the right lung was found to be occupied by a bulky tumor which replaced almost the whole of this lung. (Elsewhere, I have illustrated in Fig. 1 the dissection of this tumor.) The primary growth arose from the right main bronchus and extended to within 1 cm. of the carina. A few right-sided hilar nodes were alone invaded.

Comment: This is probably the type of case in which neoplastic invasion of the pleura and intercostal nerves may be responsible for the radiation of pain into the upper extremity. With regard to the intercostal nerves, the posterior spinal roots and not the anterior ones are thought to be involved. This and the other uncertain facets of the pathology of pain in the shoulder require further clarification.

SUMMARY

Lung cancer occasionally presents with pain in the shoulder. As this manifestation is still not widely appreciated, cases of this nature have been known to masquerade for long under such diagnostic labels as neuritis, neuralgia, fibrositis and rheumatism. Hitherto, almost exclusive attention has been paid to apical pulmonary tumors which involve the supracleavicular brachial plexus and cause pain in the ipsilateral shoulder. In order to present a broader concept, the pathologic features of five cases of primary carcinoma of the lung have been used to show that when this tumor gives rise to shoulder pain, the site of origin may be discovered either in the ipsilateral pulmonary apex or in the other parts of the ipsilateral or contralateral lung.

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RESUMEN

Se encuentra dolor en el hombro ocasionalmente en el cáncer del pulmón. Como esta manifestación no es estudiada ampliamente aún, se han encontrado casos en que este dolor empeza por largo tiempo bajo el rubro de neuritis, neuralgia, fibrositis y reumatismo. Hasta hoy se pone atención casi exclusivamente sobre los tumores apicales que afectan al plexo braquial y causan dolor del mismo lado. Para presentar un concepto más amplio las características patológicas de cinco casos de carcinoma primario del pulmón se han usado para mostrar cuando este...
tumor da lugar al dolor en el hombro, el sitio del origen del dolor puede ser descubierto ya sea en el vértece ipsilateral o en otras partes del mismo lado o en el pulmón contrario.

RESUMÉ

Le cancer du poumon se présente de temps en temps avec une douleur de l'épaule. Comme cette manifestation n'est pas encore interprétée de façon habituelle, on sait que des cas de cette nature se sont observés, pendant longtemps, sous des étiquettes diagnostiques telles que neurite, névralgie, fibrose et rhumatisme. Jusqu'ici, on a porté une attention presque exclusive aux tumeurs pulmonaires apicales, qui atteignent le plexus brachial sus-jacent, et provoque une douleur dans l'épaule du même côté. Afin de présenter une conceptions plus large, l'auteur a utilisé les caractéristiques pathologiques de cinq cas de cancer primaire du poumon, pour montrer que lorsque cette tumeur donne naissance à une douleur de l'épaule, le siège de l'origine peut être découvert soit dans l'apex pulmonaire du même côté, ou dans les autres parties du poumon homolatéral ou contralatéral.

ZUSAMMENFASSUNG

Es kommt gelegentlich Lungenkrebs mit Schulterschmerz vor. Da diese Manifestation noch nicht in größerem Maße Aufmerksamkeit gefunden hat, so wurden Fälle dieser Art bisher unter solchen diagnostischen Bezeichnungen wie Neuritis, Neuralgie, Fibrositis und Rheumatismus verborgen gehalten. Fast ausschließlich Aufmerksamkeit wurde bisher den Lungenspitzen-tumoren zugewandt, die die Teile des oberhalb des Schlüsselbeines gelegenen Plexus brachialis betreffen und zu Schmerzscheinungen in der gleichseitigen Schulter führt. Um eine größere Übersicht zu gewinnen, wurden die pathologisch-anatomischen Befunde von 5 Fällen von primären Lungenkarzinom dazu, benutzt, um zu zeigen, daß, wenn ein solcher Tumor Anlaß zu Schmerzen in der Schulter gibt, die Ursprungsseite sich ermitteln läßt entweder in der gleichseitigen Lungenspitze oder in anderen Abschnitten der gleichen oder der gegenseitigen Lunge.

REFERENCES

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BLOOD ENZYMES IN TUBERCULOSIS

Serum pseudocholinesterase activity was determined in 70 persons. Of them, 40 had various forms of active tuberculosis (group I), and 20 were tuberculin positive, but without any tuberculous lesions (group II). In both groups, the determinations were carried out twice: before the Mantoux test and 48 hours after the administration of tuberculin. In ten patients with active pulmonary tuberculosis, pseudocholinesterase activity was determined twice within a 48-hour interval without administration of tuberculin (group III, control). It was found that in tuberculin positive persons, both with tuberculosis and without tuberculous lesions, the administration of tuberculin brings about a decrease in sChE. This is probably a result of immuno-allergic reaction which occurs after the administration of tuberculin in the body of tuberculin positive subjects.