Clinical Differentiation of Pulmonary Infarction
(Correlation of Clinical and Pathologic Findings)

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On the medical service of a neuropsychiatric hospital the clinical
diagnosis of acute pulmonary infarction can be especially difficult. Most
psychotic patients cannot relate good histories. Evaluation of symptoms
and of signs is fraught with obstacles. The classical syndrome of chest
pain, hemoptysis, consolidation of lungs, friction rub, and shock may not
be present. The laboratory studies are at times of questionable value; the
electrocardiogram may be misleading, particularly if it is used as the sole
differentiating criterion; and the x-ray studies too may be confusing. The
problem is further complicated because this lesion may coexist with or
follow pneumonia or other serious illness. In order to determine the factors
which might aid in the clinical diagnosis of pulmonary infarction, we have
reviewed the pathological material at this hospital during the five year
period January 1, 1947 to December 31, 1951; and correlated it with the
clinical findings.

In that period there were 391 deaths and post-mortem examinations were
performed in 255 instances. In 19 cases, there was pathologic evidence of
pulmonary tissue necrosis with either pulmonary arterial embolism, pul-
monary arterial thrombosis, or both; in short, there were 19 male patients
with pulmonary infarction. This incidence of 7.4 per cent is in agreement
with figures of Katz and Belt, cited by Katz.

Eighteen of the patients were white and one was a negro. No statistical
significance is attached to this finding because the majority of post-
mortems were on white people.

Table I lists the psychiatric diagnoses established for 13 of our patients
prior to death. There were also six without psychiatric diagnoses.

In our series the age distribution is shown in Table II. The majority
(58 per cent) were in the 51 to 60 age group.

Two of the 19 infarctions developed post-operatively: one, nine days
post-cholecystectomy (after leaving bed the first time); the other, 21 days
after gastric resection (in a patient still confined to bed). One suffered

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from aplastic anemia, which was confirmed by repeated bone marrow studies for a year, before developing infarction. One was thought to succumb to a cerebral thrombosis. Three were considered to have terminal pneumonia, one of whom was believed to have colon carcinoma with pulmonary metastases in addition to the pneumonia.

The remaining 12 had clinical evidence of heart disease. One had rheumatic heart disease; three hypertensive cardiovascular disease; and eight had arteriosclerotic heart disease. The detailed cardiac diagnoses are listed in Table III.

### TABLE III

- Rheumatic heart disease with bacterial endocarditis
- Hypertensive cardiovascular disease
- Hypertensive cardiovascular disease and pulmonary tuberculosis
- Hypertensive renal disease with cardiac failure
- Arteriosclerotic heart disease; acute myocardial infarction
- Arteriosclerotic heart disease; cardiac failure (two cases)
- Arteriosclerotic heart disease; cardiac failure, pneumonia
- Arteriosclerotic heart disease; cardiac failure, saddle aortic embolus
- Arteriosclerotic heart disease; pneumonia
- Arteriosclerotic heart disease; pneumonia, pulmonary tuberculosis
- Arteriosclerotic heart disease; pneumonia, decubitus ulcers

One patient developed pulmonary infarction shortly after leaving bed for the first time on the ninth day after operation. The other 18 had been in bed for many days prior to the onset of pulmonary infarction.

Eleven expired within 24 hours of the onset of the terminal syndrome; three in shock and eight in coma. The remaining eight lived longer than 24 hours, and as might be expected from the duration of their illness, seven became comatose while only one died in shock.

Pneumonia was diagnosed ante mortem in seven cases but was confirmed post-mortem in only three. Heart disease was diagnosed ante mortem in
12 cases but was confirmed post-mortem in only 10. However, six additional unsuspected cases of heart disease were found at autopsy. Thus, there were 16 of the 19 with heart disease antedating pulmonary infarction. The types of heart disease found at post-mortem are listed in Table IV.

**TABLE IV**

<table>
<thead>
<tr>
<th>Type of Heart Disease</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arteriosclerotic heart disease</td>
<td>13</td>
</tr>
<tr>
<td>Rheumatic heart disease</td>
<td>4</td>
</tr>
<tr>
<td>Congenital</td>
<td>1</td>
</tr>
<tr>
<td>Cor pulmonale (secondary)</td>
<td>1</td>
</tr>
</tbody>
</table>

Nine patients exhibited thrombo-embolic phenomena at sites other than the lungs. The sites and relative frequency are listed in Table V. The table reveals that four had intracardiac mural thrombi, three had prostatic venous thrombosis; and one had inferior vena cava thrombosis.

**TABLE V**

<table>
<thead>
<tr>
<th>Site of Thrombosis</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intracardiac mural</td>
<td>4</td>
</tr>
<tr>
<td>Prostatic venous plexus</td>
<td>3</td>
</tr>
<tr>
<td>Aorta</td>
<td>2</td>
</tr>
<tr>
<td>Spleen</td>
<td>2</td>
</tr>
<tr>
<td>Femoral artery</td>
<td>1</td>
</tr>
<tr>
<td>Iliac artery</td>
<td>1</td>
</tr>
<tr>
<td>Mesenteric artery</td>
<td>1</td>
</tr>
<tr>
<td>Inferior vena cava</td>
<td>1</td>
</tr>
<tr>
<td>Liver</td>
<td>1</td>
</tr>
</tbody>
</table>

Five had neoplastic disease; of these, two were diagnosed ante-mortem* and three at time of necropsy. They are listed in Table VI.

**TABLE VI**

<table>
<thead>
<tr>
<th>Type of Neoplasm</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Carcinoma of tongue</td>
<td>1</td>
</tr>
<tr>
<td>*Carcinoma colon of colon with metastases to lungs</td>
<td>1</td>
</tr>
<tr>
<td>Carcinoma of colon</td>
<td>1</td>
</tr>
<tr>
<td>Carcinoma of pancreas</td>
<td>1</td>
</tr>
<tr>
<td>Meningioma</td>
<td>1</td>
</tr>
</tbody>
</table>

**Discussion**

There is an idea prevalent in the literature and exemplified by White that psychotic individuals, particularly schizophrenics, rarely have heart disease. Unpublished data from this hospital indicate that schizophrenics suffer from heart disease at least as frequently as do the general population. Our data indicates that during the period considered there were 133 post-mortem examinations on psychiatric patients. The diagnosis was schizophrenia in 36 per cent. Table I indicates that there were four schizophrenics who developed pulmonary infarctions. We should like to emphasize that pulmonary infarction is not rare in schizophrenics.
In 1947-48, one of us studied 1,172 psychotic patients in this hospital; those in the age group 51 to 60 numbered 666 (57 per cent). Our data (Table II) indicates that 58 per cent of the infarctions occurred in this same age group. Age per se does not appear to be an etiologic factor in pulmonary infarction since the proportion in the 51 to 60 range was found to be similar in the hospital population and in the present study (vide supra).

Although pneumonia was diagnosed ante-mortem in seven cases it was confirmed only in three. Since the clinical and laboratory findings are often similar, the two conditions are frequently confused. When an elderly patient confined to bed develops the clinical picture of pneumonia, it is necessary to exclude pulmonary infarction.

During the period, considered the gross autopsy incidence of heart disease at the hospital, among the psychotic patients, was 71 per cent. In our group with pulmonary infarction, the gross autopsy incidence of heart disease was 84 per cent. This is considerably greater than the 30 per cent implied by Katz and Walsh in citing data of Hampton and Castleman.

Disease of the heart itself may not play a role in the causation of pulmonary infarction but we feel, as do Musser and Moran, that cardiovascular disease in general predisposes to thrombo-embolic phenomena. This may be particularly so with regard to atherosclerosis. It may be a coincidence but in our 19 cases with pulmonary infarction not one evidenced stigmata of syphilitic cardiovascular disease at autopsy, yet during this same period 19 per cent of those with heart disease evidenced at post-mortem had lesions of syphilitic cardiovascular disease. This absence of syphilitic cardiovascular disease in our group may be related to pathogenesis. In syphilis the tunica media is involved, particularly in the proximal ascending aorta; while in atherosclerosis the intima is more involved. Perhaps the intimal lesions predispose more to thrombus formation, than do primary medial lesions.

In our 19 patients 18 had been in bed many days before the onset of pulmonary infarction and one developed infarction shortly after leaving bed the first time in nine days. Immobilization in the supine position is a predisposing factor. This is in agreement with current thought.

Neoplasms were found in five (26 per cent) patients with pulmonary infarction, but in only 16 per cent of all the autopsies on psychotic patients done during the same period. Although this is a small series; it may be that neoplastic disease predisposes to thrombo-embolic disorders.

SUMMARY

1) Nineteen patients with pathologic evidence of pulmonary infarction were studied in a neuropsychiatric hospital.
2) Clinical and pathologic diagnoses were correlated.
3) The occurrence of pulmonary infarction in psychotic individuals is not uncommon.
4) Certain predisposing factors were elicited.
5) Pulmonary infarction and pneumonia are often confused clinically.
6) Cardiovascular disease, posture, and neoplasms appear to play significant roles in the causation of pulmonary infarction.

RESUMEN
1) En un hospital de psiconeuróticos, se estudiaron diecinueve enfermos con evidencias de infarto pulmonar.
2) Los diagnósticos clínico y patológico, se correlacionaron.
3) La frecuencia del infarto pulmonar en los sujetos con padecimientos psicóticos, no es fuera de lo común.
4) Se descubren ciertos factores predisponentes.
5) El infarto pulmonar y la neumonía, son a menudo confundidos clínicamente.
6) Parece que las enfermedades cardiovasculares, las posiciones, y las neoplasias, desempeñan papel importante para causar los infartos del pulmón.

RESUME
1) L'auteur étudie dans un hôpital neuro-psychiatrique 19 malades atteints d'infarctus pulmonaire certain.
2) La clinique et l'anatomie pathologique se montrèrent d'accord.
3) La survenue d'infarctus pulmonaire chez les individus atteints de troubles mentaux n'est pas exceptionnelle.
4) L'auteur à éliminé certains facteurs prédisposants.
5) Il y a souvent confusion entre infarctus pulmonaire et pneumonie.
6) Les affections cardio-vasculaires, le décubitus prolongé, et les affections néoplasiques paraissent jouer un rôle important dans l'étiologie de l'infarctus pulmonaire.

REFERENCES
4 Abraham, Albert: Unpublished data.