Case Report Section

Three Cases of Circumscribed Pulmonary Opacities Simulating Tumor

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It is now 35 years since the report of the Framingham Demonstration by the National Tuberculosis Association\(^2\) and 60 years since the discovery of Roentgen rays. In the intervening period there has been a vast increase in the use of routine chest radiography and mass population x-ray surveys. In consequence, clinicians have been confronted more and more with the problem presented by the diagnosis and treatment of circumscribed pulmonary radiodensities, often called "coin lesions."

Though lesions of this type had previously been noted, it was not until relatively recently that thoracic surgery, with the impetus of improved techniques and accumulated experience, better anesthesia and the aid of antibiotics, has become a feasible procedure for the routine investigation of undiagnosed pulmonary disease. In 1936 Graham and Singer\(^4\) reported the resection of pulmonary lesions simulating tumor. They found them to be tuberculomas. Alexander\(^1\) in 1942 called attention to the problem of intrathoracic neoplasms. Subsequently, an extensive literature has appeared on the subject.

Among these lesions there are always found a number of tumors which are indistinguishable from the benign densities except by histological examination. Surgical excision, therefore, has been repeatedly advocated as the only safe therapy. The pertinent question has become, not whether a lesion of this type should be resected, but whether it is capable of complete removal.

The procedure to be followed in the period between the finding of the radiographic abnormality and the point at which thoracotomy is performed has received relatively little attention. This, in spite of the large percentage of inflammatory, granulomatous and cystic opacities exclusive of tuberculomas, reported in some large series. Overholt\(^10\) found 26 per cent (52 in 200 cases), including a large number of shadows due to bronchiectasis (Table I). Abeles and Ehrlich\(^2\) encountered 19 per cent (4 in 21 cases), while Davis and Klepser observed 11 per cent (8 in 71 cases). Storey et al.,\(^11\) on the other hand, found only a xanthogranuloma and one coccidioma in 67 cases, both of which are relatively unchangeable and require excision for diagnosis. Findings of other authors have fallen somewhere between these latitudes (Table I). Effler, Blades and Marks\(^1\) find no inflammatory lesions in young service personnel but a high incidence of tuberculomas and 29 per cent cysts (7 in 24 cases). Flavell\(^5\) tells of a small abscess

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simulating a tumor, but which later developed a fluid level and vanished after antibiotic therapy.

The cases here reported were believed at the time of admission to have pulmonary tumors because of the finding on the x-ray film of circumscribed radio-opacities. However, each patient underwent the usual diagnostic study and evaluation and received therapy for the associated conditions. Subsequently it was noted that the shadows thought to be neoplastic, had changed or disappeared. This resulted in a marked alteration in the clinical outlook and prognosis in these patients.

An awareness of the existence of lesions of this type should aid in the

<table>
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<tr>
<th>Author</th>
<th>Total Cases</th>
<th>Tumors Malignant No.</th>
<th>Tumors Benign No.</th>
<th>Tuberculoma No.</th>
<th>Cystic, Granulomatous Inflammatory No.</th>
<th>Malignant Per Cent</th>
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<td>Davis and Klepser (1960)</td>
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<td>17.5</td>
<td>2</td>
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*Miscellaneous, undetermined and other categories were used in the computation of the percentages but are not included in the table.

**Exclusive of tuberculomas.

**FIGURE 1 (CASE 1):** Posterior-anterior and lateral views of the chest taken June 24, 1954, show a rounded circumscribed opacity in the right mid-lung thought to be tumor. Posterior to this is a fusiform density representing an interlobar effusion. Inferiorly a triangular shadow is seen on the lateral view which was thought to be atelectasis.
discovery of others. Until better methods are available, each patient with circumscribed pulmonary opacities should be evaluated with a view to rapid surgical exploration. A thorough routine presurgical study will usually separate those with benign conditions from the cases which require thoracotomy.

Case 1: This 59 year old white male janitor entered the Portland Veterans Administration Hospital on November 26, 1954 complaining of shortness of breath. He had known of having hypertension for about one year, recalling that his systolic blood pressure in December, 1953 was 220. Following a hernioplasty in April, 1954, he had been relatively well until July, when he began to notice exertional dyspnea. Soon after, he developed orthopnea and spent several nights sitting on the edge of the bed because

FIGURE 2 (CASE 1): Posterior-anterior and lateral chest films taken about two weeks following admission show a change in both the size and shape of the rounded, circumscribed density and the posterior fusiform shadow. The lower triangular shadow is now absent.

FIGURE 3 (CASE 1): Posterior-anterior and lateral views taken three weeks after admission show the disappearance of all but the posterior fusiform density.
of a feeling of suffocation. These symptoms were progressive in severity. In addition, a substernal sensation of pressure developed which was precipitated by exertion and relieved by rest. He sought the advice of a physician on November 20, 1954. A chest x-ray film was taken and because of the finding of a large solitary circumscribed density in the right mid-chest he was referred to the hospital.

It was found at that time that he had had cough for about four weeks productive of up to one hundred ml of mucoid sputum daily. He had noted occasional blood tinging. Also, he recalled having had two episodes of gross hematuria in July, 1954. None had occurred before or since.

Physical examination revealed an irritable, pale white male of asthenic build, slightly dyspneic at rest. The temperature was normal, pulse 90 and regular and the blood pressure was 238/138. Significant findings included flame shaped hemorrhages in the fundi, copper wiring of the arterioles and papilledema. The chest expanded well and equally on both sides and was resonant to percussion throughout. Breath sounds were normal except in the upper half of the right chest anteriorly where there was a decrease in the intensity of transmission. Over the base of the right lung laterally, there were heard a few crepitant rales. The cardiac apical impulse was palpable in the sixth intercostal space in the anterior axillary line and was forceful. At the cardiac apex a loud, low pitched murmur was present and transmitted into the axilla. Over the right second intercostal space parasternally a soft high pitched murmur was heard, and it was transmitted into the neck. The aortic second sound was increased in intensity and louder than the second pulmonic sound. The remainder of the physical examination was unremarkable.

Laboratory studies included hemoglobin 11.6 grams, red blood cell count 3.67 million, and white cell count 7200 with normal differential count. Urinalysis revealed albuminuria varying from one to two plus and ranged in specific gravity from 1.005 to 1.010. Formed elements included 3-4 rbc/HPF and 5-10 wbc/HPF as well as occasional hyaline and granular casts. Blood serology was negative and the blood urea nitrogen was 45.5 mgm. per cent.

A postero-anterior x-ray film of the chest had been taken March 1, 1954 and showed moderate cardiac enlargement and obliteration of the right costophrenic angle, but no parenchymal infiltration. At the time of admission to the hospital a postero-anterior x-ray film showed considerable cardiac enlargement and a six centimeter circular density in the fourth intercostal space anteriorly on the right (Fig. 1). A lateral view indicated the opacity to be in the mid chest anterior to the hilum. A fusiform, density was present in the right upper chest in the area of the interlobar fissure, posterior to the hilum. In the right lower chest was a triangular density with its apex in the hilum and extending downward adjacent to the heart.

Because of signs and symptoms of congestive heart failure and the presence of elevated venous pressure and circulation time, he was digitalized and given a low

**FIGURE 4**

*Figure 4 (Case 2)*: Posterior-anterior view film taken on August 1, 1953, demonstrates a rounded opacity just lateral to the left cardiac border at the eleventh posterior rib.

**FIGURE 5**

*Figure 5 (Case 2)*: Follow-up chest film taken May 12, 1954, illustrates the disappearance of the density present ten months previously.
salt diet. Subsequent chest x-ray films indicated first a decrease in the size and a change in the shape of the rounded density, then its complete disappearance. The fusiform density in the upper chest also decreased in size but did not entirely regress (Figs. 2 and 3).

Case 2: This 58 year old white male farmer was admitted on August 18, 1953 to the Portland Veterans Administration Hospital because of easy fatigability, and chronic cough productive of mucopurulent sputum for about two years. Previously he had been in good general health.

At the time of admission temperature, pulse and respiration had been normal. Blood pressure was within normal range. Significant findings included slight increase in the AP diameter of the chest. It was symmetrical and normal respiratory movements were observed bilaterally. The breath sounds were vesicular throughout and the percussion note was normal. No evidence of consolidation or fluid was obtained. However, crepitant rales were heard over the left chest anteriorly and laterally at the margin of the left cardiac border. The remainder of the physical examination was unremarkable.

Laboratory reports indicated a normal hemogram with white cell count of 7800 and normal differential count. No abnormality was found in the urine and the blood serology was negative. The blood urea nitrogen was 14.7 mgm. per cent. A first strength intradermal tuberculin test was faintly positive but coccidioidin and histoplasmin skin tests were negative. Sputum cultures were negative for acid fast bacilli.

At the time of admission a posterior-anterior x-ray film of the chest showed the presence of a rounded radiodensity on the left just lateral to the cardiac silhouette (Fig. 4).

He was put to bed and instructed in postural drainage because he was expectorating one cup of mucopurulent sputum daily. He remained afebrile throughout the hospital stay and, in view of the normal white cell count, no antibiotic therapy was given.

Bronchography, bronchoscopy and surgery were under consideration when a repeat chest film revealed a decrease in the size of the radio-opacity, which subsequently disappeared (Fig. 5).

The patient was discharged asymptomatic three weeks following admission.

Case 3: This 30 year old white male logger was first admitted to the Portland Veterans Administration Hospital on July 14, 1953 because of shortness of breath and a "mass in the lung."

He believed that he had had rheumatic fever with joint pains at the age of seven years, but he knew of no heart disease. Following the acute illness he felt well and was under no limitations insofar as physical activity was concerned.

In 1945 while in the army he noted the onset of joint pains and swelling and was hospitalized. He was told that he had rheumatic fever and one of the valves in the

**FIGURE 6**

*Figure 6 (Case 3):* Posterior-anterior view of the chest at the time of admission show a rounded, circumscribed opacity in the right mid-chest.—

**FIGURE 7**

*Figure 7 (Case 3):* Posterior-anterior view of the chest taken on December 15, 1954, three months following admission, indicates a loss of the rounded opacity.
heart was leaking. He was discharged from the armed forces because of this disability.

He returned to his home in Oregon and worked as a logger until 1952, a year prior to admission. At that time he had to discontinue work because of shortness of breath and tightness in the chest. After exertion he noted an exacerbation of his cough with occasional production of blood tinged sputum. He lost 20 pounds during this period.

He sought advice from his personal physician who took a chest x-ray film. A large, rounded radiodensity was seen in the right mid-chest and this was thought to represent a tumor mass for which he should be hospitalized.

Physical examination at the time of admission revealed a white male who did not appear to be acutely ill and who had a normal pulse, blood pressure and temperature. Respirations were not rapid. Significant findings included a symmetrical chest with no observable abnormalities except for a prominent apex beat 9 cm. to the left of the midsternal line in the sixth intercostal space. Percussion and fremitus were normal but auscultation revealed sibilant rales throughout both lung fields and crepitant rales at both pulmonary bases posteriorly. A rough, loud presystolic murmur and a low amplitude, medium pitched systolic murmur were heard in the area of the cardiac apex. In addition, a high pitched, soft diastolic murmur was present over the right second intercostal space parasternally and it was heard transmitted down the left side of the sternum. No other significant physical finding was observed.

Laboratory reports indicated a normal hemogram and urinalysis. The serology was negative and the blood urea nitrogen 14.0 mgm. per cent.

Chest x-ray film at the time of admission revealed the presence of a rounded, circumscribed opacity in the right mid-lung field (Fig. 6). It was thought that he had rheumatic heart disease, inactive with mitral stenosis, mild mitral valve insufficiency and slight aortic valvular insufficiency. The venous pressure and circulation time were found to be elevated and digitalization was accomplished. At the same time, because of cough and expectoration of mucopurulent sputum penicillin was given intramuscularly.

Subsequent chest films showed the disappearance of the rounded infiltrate in the mid-chest. In its place were seen persistent band-like densities thought to be due to pleural thickening (Fig. 7). Shortly thereafter he underwent mitral commissurotomy and was subsequently discharged improved.

Discussion

Three cases are presented in which circumscribed, rounded radiodensities were observed in the admission chest film. In Case 1 the x-ray film was interpreted as showing a solitary spherical mass in the right mid-lung field with atelectasis of the right middle lobe and an interlobar effusion between the lower and upper lobes posterior to the hilum. Because of the history of hematuria and the circumscribed pulmonary opacity it was thought that he had a pulmonary tumor, likely metastatic from the kidney. Cardiovascular disease and the existence of hypertension were also recognized. Therefore, digitalis, a low salt diet and bed rest were instituted. Subsequent chest films first revealed a decrease in the size of the rounded opacity (Figure 2), then its complete disappearance (Figure 3). It became evident that the shadow was not due to tumor, but more likely to an interlobar effusion caused by congestive heart failure.

An admission chest x-ray film showed a rounded density just to the left of the cardiac silhouette in Case 2. This was thought possibly to represent a tumor. Because he was expectorating much sputum, he was instructed in postural drainage but no specific medication or antibiotic was given. In the meantime a thorough presurgical evaluation was planned. Repeat x-ray films first indicated a marked diminution in size, then the absence of the density (Figures 4 and 5). This was then thought to be due to an inflammatory process associated with chronic bronchitis or bronchiectasis.

Case 3 was admitted because of cough, blood streaked sputum and the
presence of a rounded density in the right mid-lung field which was thought to be a tumor mass. Physical examination promptly revealed the presence of rheumatic heart disease. Evidence for congestive heart failure was discovered and digitalis and bed rest were instituted. The circumscribed shadow in the right chest was still thought to be a separate process. However, subsequent films revealed its regression and disappearance. It was then considered to be pleural effusion, though an inflammatory condition cannot be eliminated, inasmuch as penicillin was also given.

In each case the admission diagnosis was pulmonary tumor. Though the prognosis seemed poor, thorough routine clinical studies were carried out and therapy was instituted. The outlook changed in the three cases. The first is still in the hospital, but his cardiac insufficiency is under effective treatment and he should soon expect discharge. Case 2 left the hospital three weeks after admission and remains in good general health though there are frequent respiratory infections. Case 3 underwent mitral commissurotomy following which he was discharged improved.

Cases of this type should have repeated chest films, including laterals and obliques when the nature of the lesion is not well defined; in addition, a detailed history, a complete physical examination, hemogram, urinalysis, blood urea nitrogen or nonprotein nitrogen should be obtained. Other studies will be required depending upon the characteristics of the individual case. Bronchoscopy and bronchography are often helpful.

Early thoracotomy, usually not later than two to three weeks after admission, should follow a thorough evaluation unless the patient is considered inoperable.

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REFERENCES