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Pulmonary Coin Lesions

Cumulative Index
1947-1952

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I. DIFFERENTIAL DIAGNOSIS OF PULMONARY COIN LESIONS

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Introduction

The advent of mass roentgen surveys of large segments of the population has brought to focus many lesions heretofore considered rare and most usually found at autopsy. Many have been found during x-ray examination of other parts of the body in the course of which the chest is examined casually. The progress of thoracic surgery, coupled with this ever increasing application of chest radiography, has established a definite need for more accurate criteria relating to the benignancy or malignancy of many of the lesions which were formerly regarded as pathological curiosities of no clinical interest.

Because of this need and because of the ever-increasing application of surgery as a diagnostic tool, it is felt that an evaluation of our experience with solitary pulmonary lesions is justified. Furthermore, we shall endeavor to establish more accurate positive diagnostic criteria as to the nature of these lesions.

Definition

This paper will limit itself to a discussion of the relatively small, discrete, round parenchymal nodular mass, the so-called "coin lesion", arbitrarily limited in size to less than six centimeters in diameter. They may or may not contain calcium within them; are non-obstructing; are surrounded by lung parenchyma on all sides, and may or may not be associated with symptoms. Larger masses, we feel, represent a different problem and are not, therefore, included

*The statements and conclusions published by the authors are the result of their own study and do not necessarily reflect the opinions or policy of the Veterans Administration.

in this study. Nodules with fluid levels or other signs of cavitation are also excluded from this study. Cases which are considered metastatic because of a demonstrable primary tumor elsewhere have also been excluded, but an occasional metastatic nodule has been included when the primary could not be detected pre-operatively.

History

The description of pulmonary nodules in the past was limited to the gross and microscopic findings following autopsy. In 1883, Chiari⁶ was the first to describe a solitary pulmonary nodule which he classified as a chondroma. In the light of our present knowledge this probably was a hamartoma, a term coined by Albrecht², in 1904, to describe aberrant tissue in the liver but now used to describe a particular type of tumor occurring in the lung as well as in other tissues.

It has only been in recent years that solitary lung tumors have been described with increasing frequency. The recent and increasing detection of such lesions has come about primarily as a result of widespread roentgen examination of the chest and its attendant investigation of all abnormal shadows. Concomitantly, the development of surgical techniques for the safe exploration of the thorax has taken the "coin lesion" from the realm of a roentgen curiosity to a lesion which can be thoroughly investigated and definitively treated. In 1936, Graham and Singer¹⁴ reported the first three cases of resected solitary lung nodules. Since then we have gradually reached the stage where we believe that all solitary lung nodules which cannot be diagnosed with a degree of accuracy should be resected.

Incidence

There is no definitely established incidence of coin lesions as of this date. The fact that more and more are discovered as radiography is becoming universally employed as a routine screening device stresses the point that these lesions are more frequent than previously supposed. Such lesions, however, are not as prevalent, relatively speaking, as the non-discrete

infiltrating type of lesion.

Etiology

Pulmonary coin lesions can be granulomas, hamartomas, filled cysts, other benign lesions, primary carcinomas or metastatic lesions.

A granuloma can be defined as a localized mass in which there is or has been a chronic tissue reaction consisting of an accumulation of histiocytes or epithelioid cells, lymphocytes, and fibroblasts in response to an irritant. Necrosis may or may not be present. The irritants which produce granulomas in the lung may be viral, bacterial, mycotic, chemical or physical agents. All produce lesions which have similar gross appearance, and therefore all produce the same type of roentgenographic shadow. Among the specific agents found causing granulomatous response in the lung are coccidioides immitis, blastomyces dermatitidis, nocardia asteroides, brucella suis, hemophilus influenzae, atypical non-pathogenic acid fast bacillus, mineral oil, lipoid, histoplasma capsulatum, cryptococcus histolyticus, and especially mycobacterium tuberculosis.¹³ Tuberculoma is a loose classification and it usually means a tumor-like granuloma well encapsulated, showing no evidence of involvement of surrounding lung, and caused by the tubercle bacillus.

Tuberculomas may arise from encapsulation of a primary giant tuberculous focus, from encapsulation of a restricted reinfection focus, or by means of a completely blocked tuberculous cavity. Such nodules may or may not contain calcium.⁷ (Case 1)

Hamartoma, a term originated by Albrecht², in 1904, comes from the Greek word meaning "to err". He states that in this tumor one can demonstrate only an abnormal mixture of the normal developmental components of the organ in which they occur, whether it be with regard to quantity, to the arrangement, or in all three respects. It should be assumed that the origin of these tumors results from such an abnormal mixture

or from disturbances of their development. In the past chondromas have been included under this classification, but Hochberg and Pernikoff¹⁵ claim that chondromas are not hamartomas and should not be classified as such. Chondromas of the lung are a rare tumor. This separation remains a controversial problem. (Case 3)

The etiology of such entities as lung cysts, congenital or inflammatory, metastatic malignancies, and primary malignancies would require more time and explanation than the scope of this paper warrants and will of necessity be omitted. Discussions of this subject can be found in any good standard text or reference book of pathology.

Problem Facing Modern Clinicians

In the field of pulmonary disease, a unique and challenging situation has developed. We are better able to prove the existence of and to localize organic disease through the use of x-ray examination. Furthermore, radiological examination can be applied to the chest less expensively and with greater facility and accuracy than in any other area of the body. This is true because the expanded lung is lesser in density than any other internal organ; any pathologic process that alters density of tissue can be more readily located here than in tissues showing less contrast. Within the lung, the air itself acts as a contrast medium, so that the examiner is in a favored position to separate the normal from the abnormal. The determination of the nature of the abnormal process, its etiology is far more difficult and often impossible short of surgical biopsy.

The fortuitous circumstance, however, which delivers to the physician a patient with an abnormal shadow on the x-ray film creates a difficult problem in differential diagnosis. The lesion may be discovered so early in its evolutionary stages that supporting evidence may be lacking. Decisions regarding management may be more difficult, yet if the life of the patient is to be safeguarded, the decision must be correct.¹⁶

Needless to state, if thoracotomy were

a completely benign process, that would be the method of choice in the approach to the problem of definitive diagnosis. But there is even today a risk involved in this procedure and therefore universal application of thoracotomy would needlessly expose many patients with benign tumors to this risk. It is for this reason that we shall attempt to evaluate the findings in our study so that a portion of this group of patients will be spared needless risks by more accurately ascertaining the nature of their pulmonary lesions.

Roentgenologic Characteristics

Pulmonary coin lesions have no definitely diagnostic characteristics other than being round, discrete and peripheral. Some contain calcium, others do not. Generally, tuberculous lesions are more sharply circumscribed than malignant tumors. There may be calcium at the center of the tuberculous lesion. Failure to grow is no guarantee that the lesion is either tuberculous in origin or benign.¹⁷ (Case 2)

Hamartomas are circular or lobulated, may contain flecks of calcium and are usually subpleural. (Case 3)

Other granulomas cannot be differentiated from the tuberculous type if calcium is absent.

Generally speaking then, one cannot be too accurate in the evaluation of rounded discrete pulmonary nodules on the basis of the roentgen aspects alone.

Many series of pulmonary nodules have been reported in the literature. All of these series point to the inadequacy of our present day methods at arriving at a definitive diagnosis, and planning our approach accordingly. The only definitive approach expressed by all is thoracotomy and resection. Since Graham and Singer¹⁴ reported the first removal of pulmonary coin lesions in 1936, because these lesions simulate tumors and should be considered as such, all of the reported proven series propagate this theme.

O'Brien, Tuttle and Ferkaney¹⁷ reported 21 cases of pulmonary coin lesions in 1948, nine of which were malignant, eight tuberculomas and four miscellaneous tumors. These patients had minimal symptoms. They stated that the presence of calcium cannot be definitely relied upon although no cases of malignancy with calcium were cited.

Effler, Blades and Marks¹⁰ reported 24 cases of solitary lung tumors picked up on routine examination. Their pre-operative diagnosis was benign in all cases, but three turned out to be malignant, one metastatic tumor, and the remainder benign.

Sharp and Kinsella¹⁹, in 1950, reported a series of 96 lung nodules, 55 of which were proved. Of their proved cases, 15 were malignant, 22 inflammatory and 18 benign tumors. They state that the presence of calcium does not establish the benign or malignant nature of the process but failed to cite specific examples. Growth or lack of growth is not an absolute diagnostic factor in these nodules. They concluded that the accurate pre-operative diagnosis of the nature of these lesions is impossible in the vast majority of instances.

In Table I is shown the frequency of the various types of lesions reported in the previous series and those in the series presented here.

Material for Study

Our series contains 106 cases which have been observed in the past five years at the Minneapolis Veterans Administration Hospital and the University of Minnesota Hospitals. Of this number, 58 have been proved by surgery, the remainder still being under observation. Of the resected 58 cases, 34 per cent were malignant, 38 per cent were inflammatory, and 28 per cent were benign tumors. The malignancies were comprised of 75 per cent bronchogenic carcinoma, 15 per cent metastatic lesions, 5 per cent fibrosarcomas, and 5 per cent alveolar cell carcinomas. Therefore, one-third of the resected cases were malignant and the remainder non-malignant. It is

important to note that all of the malignancies occurred in patients over 50 years of age.

Table I

	<u>Number of Cases Proven</u>	<u>Malignant</u>	<u>Inflammatory</u>	<u>Benign</u>
Effler	16	44%	50%	6%
O'Brien, Tuttle, Ferkaney	21	43%	47%	10%
Effler, Blades, Marks	24	17%	29%	54%
Sharp, Kinsella	55	27%	40%	33%
Davis, Klepser	67	55%	32%	13%
Fink, Asta	<u>58</u>	<u>34%</u>	<u>38%</u>	<u>28%</u>
Total	241	37%	39%	24%

Table II

Discrete Pulmonary Nodules

Proven	58
<u>Malignant</u>	20 (34%)
Bronchogenic carcinoma	15
Alveolar cell carcinoma	1
Fibrosarcoma	1
Metastatic nodule	3
<u>Inflammatory</u>	22 (38%)
Granuloma	
Tuberculoma	19
Non-specific	3
<u>Benign Tumor</u>	16 (28%)
Hamartoma	8
Bronchogenic cyst	3
Adenoma	1
Cholesteatoma	1
A-V fistula	1
Pleural fat	1
Thickened pleura	1
Undiagnosed	48

Table III

Proven Cases

Cases	58
<u>Calcium Evident</u>	15 (25%)
Inflammatory	8
Benign tumor	7
<u>No Calcium Evident</u>	43 (75%)
Inflammatory	14
Benign tumor	9
Malignant	20

Techniques of Roentgen Examination

In most of our cases, a pre-operative attempt to secure roentgen evidence of the presence of calcium was made with techniques that include the routine postero-anterior and lateral views of the chest, penetrated Bucky films taken over the lesion, and body section roentgenography.

The postero-anterior and lateral views of the chest enable a localization of the lesion with regard to its relationship to the thoracic cage, mediastinal structures and pulmonary parenchyma.

Penetrated Bucky films help elicit calcium in a lesion, if present in ade-

quate amounts, by burning through the less dense surrounding tissues and structures. However, superimposition of structures that are as dense or more dense than the lesion will confuse the true make-up of the lesion and it is for this reason that body section roentgenography is employed. By moving the x-ray tube and film in opposite directions during the course of an exposure, sharp definitions may be obtained at a certain depth within the body while the remaining structures in front and behind this level are blurred by the motion. This will enable the determination of the distance of the lesion from the chest wall, bring the lesion into sharp focus and elicit calcium if roentgenologically discernible.

Using these techniques, it was possible to discern calcium pre-operatively in 20 per cent of the resected lesions; in the same group it was found that calcium was present post-operatively in 25 per cent of the resected lesions following microscopic study. We discovered that all of these lesions with calcium in them were inflammatory or benign masses and that of the remaining tumors, more than half were benign despite the roentgenologic absence of demonstrable calcium. (Table III)

Many writers on the subject have hinted that the presence of calcium in these lesions is presumptive evidence of their benign nature, but there are those who have stated that these criteria are not absolute and have postulated the incorporation of a calcified inflammatory focus in a malignant growth or calcification in a metastatic osteogenic sarcoma. There has been one report in the literature of calcium occurring in a primary malignant tumor of the lung, but this is the only reported instance and leads one to believe that perhaps this was a co-incidental incorporation of a calcified focus as mentioned above. It is also conceivable that calcium can occur in necrotic malignant tissue as it is seen to occur in other types of necrotic tissue, but the time factor probably limits the deposition of enough calcium to be visible roentgenologically before symptoms arise from the presence of the tumor or before the patient succumbs to

the disease. These possibilities, at any rate, appear very remote and for all practical purposes have no bearing on the problem confronting us. Whether we are correct in assuming this and whether we can further assume that calcification in a discrete rounded pulmonary nodule precludes malignancy, only time will tell.

In this series, we have 48 cases which have not yet been proved, and many of which probably never will be because of the obvious benignancy of their pulmonary nodules. Of these 48 cases, 71 per cent have calcium in them as detected by our various radiographic techniques, and 50 per cent of these have been followed more than one year with no evidence of change. The remaining cases were either discovered too recently to permit adequate follow-up or for various reasons were not followed at all.

The remainder of the cases had no radiologic evidence of calcium and of these, 30 per cent have been followed more than one year with no evidence of change.

Most writers on the subject conclude that surgery is the only logical approach to this problem, for we are never absolutely certain of our diagnosis with our present day methods. An analysis of cases or series of solitary pulmonary lesions found in the literature reveal an incidence of malignancy varying from 17 to 55 per cent, depending upon the age spread in the series reported, the older the patients the higher the incidence of malignancy.

Davis and Klepser⁸ reported 67 cases of proved intrapulmonary tumors and found 55 per cent to be malignant. The remainder were not malignant and covered the gamut of findings such as our series did. Their average ages were 49.5 years, ours were 48.8 years. These authors state that although it is recognized that calcification does occur within these solitary tumors, its presence would aid in excluding a malignant process and therefore the problem of differential diagnosis becomes simplified. They have seen numerous examples of calcification within a solitary tumor and its presence

most often indicates an inflammatory granuloma or hamartoma. They did not attempt to evaluate their tumors from the standpoint of the presence or absence of calcium and concluded that pre-operative determination of the precise nature of a solitary tumor is practically impossible. Others state that the presence of calcium has never been observed roentgenographically within primary malignant tumors.^{7,12}

Effler⁹ reports 16 patients with solitary lung tumors with an average age of 50 years. Following surgery they had no operative mortality, but had complications in two patients. Six of these patients had peripheral bronchogenic carcinoma, another had a solitary metastatic hypernephroma. In eight patients the tumors were found to be localized tuberculous lesions of various degrees of chronicity. In one, a hamartoma of the lung was removed. In the entire group of 16, two lesions were found which in their opinion appeared incapable of potential damage: the hamartoma and one fibrotic laminated tuberculoma.

Abeles and Chaves¹ reported 13 cases of pulmonary coin lesions with calcification in which no evidence of malignant growth was demonstrated either by operation or prolonged observation.

The difficulty in establishing a pre-operative diagnosis in these solitary tumors is the chief basis for the surgical intervention universally advocated by chest surgeons.

Confronted with an isolated pulmonary nodule, all the means at our disposal should be employed in an attempt to determine its nature. History and physical examination should be thoroughly done to determine whether this is a metastasis, inflammatory in nature, or related to any disease entity if present. Roentgen procedures including studies of the gastrointestinal tract, urinary tract and the respiratory tract should be employed. Studies of the sputum for organisms and malignant cells should be done, skin tests for fungi and tuberculosis should be employed, and serum agglutinin titers

should be investigated. Many of these procedures will not bear fruit if the nodule is peripheral and does not communicate with a bronchus. For example, studies of bronchial secretions are of no avail under these circumstances, and if there were a communication with a bronchus the tumor would have to exfoliate cells or spew forth organisms. Bronchographic studies are of no avail if there is no bronchial involvement or if the nodule is too peripheral in the lung. Bronchoscopy is fruitless under these circumstances because of the limitation of the instruments. Skin tests for sensitivity to various fungi and mycobacterium tuberculosis, if positive, only infer that the patient has been sensitized in the past and lends little to the nature of the lung nodule.

An attempt to secure old chest films of these patients is of inestimable value in helping determine the nature of their lesion. If available, these films will permit the roentgenologist to determine progression or regression in size, stability, predisposing conditions if any and the nature of the healing progress if inflammatory. Many evidences of malignancy can be determined in their very earliest phases when chances are best for cure. That early diagnosis is of prime importance in lung tumors, particularly if they are malignant, cannot be denied by anyone, and procrastination in the definitive treatment of suspected lesions may lead to dire consequences for both patient and physician. The consensus of opinion is to err on the side of resection.⁴ With this approach we are all in agreement.

It is well known that bronchogenic carcinoma, if it arises in the peripheral portion of the lung and does not obstruct a bronchus early, may simulate a benign pulmonary nodule. Such carcinomas arise in smaller bronchi in any portion of the lung; although some may appear well circumscribed they are usually infiltrated. (Case 4) Because this peripheral type of bronchogenic carcinoma offers the most hope surgically¹⁴, it is of utmost importance that an immediate attack be instituted promptly as a life prolonging measure. It is for this reason that one of the important diagnostic procedures in the diagnosis

of this tumor is bronchoscopy¹¹, enabling one to obtain secretions for cell studies, despite the fact that these tumors cannot be seen by bronchoscopists.¹⁴ Alveolar cell carcinoma, a much more rare type of primary pulmonary malignancy¹⁰, can simulate bronchogenic carcinoma and metastatic carcinoma. The clinical features of this tumor are identical to those of other lung tumors⁷ and therefore exact diagnosis is difficult. The roentgen findings in alveolar cell carcinoma are non-specific¹³, the most frequent observation being multiple focal densities varying in size scattered throughout the involved lung parenchyma. These densities are most frequently diagnosed as tuberculosis or mycotic infections. The only laboratory procedure of diagnostic significance is the examination of the sputum, when present, for malignant cells. The differentiation of the above type of malignancy from metastasis is not difficult, in most instances, for metastases, for the greater part, are multiple and discrete and serial films over a relatively short period of time reveal evident change in them. True, there will be cases of single metastases, with the primary as yet unknown, which require the same approach as any discrete uncalcified pulmonary nodule.

The presence of calcium in these nodules almost completely precludes malignancy, but then the cry arises that these lesions, although not malignant, are nevertheless foci of infection, which though stable at present are potentially the source of future spread of infection, particularly of tuberculosis.

It has been reported that complete calcification, that is, the deposition of calcium salts, essentially of calcium phosphate, in a caseous area leading to its calcareousness or petrification, occasionally even to ossification, is the most reliable and the only irreversible healing process of the caseous tubercle lesion itself. No proof has been offered for the contention that calcium salts can be resorbed after once having led to petrification and, in

this fashion, can cause reactivation of the disease process.³

Roentgen evidence of calcification, however, does not imply petrification for experiments have shown that lesions of low intensity can contain considerable amounts of calcium, enough, in fact, to be compatible with petrification, yet in lesions larger than one centimeter in diameter petrification is comparatively rare. However, in order to register with an opacity compatible with our arbitrary roentgen standards for calcification, a tuberculous lesion has to be packed with calcium salts. On the other hand, low density values do not signify the absence of calcium; in fact, calcium may then be present in amounts sufficient for complete petrification although on roentgen examination they could not be recognized as calcifications.

An attempt to try to correlate the configuration of calcification with the type of tumor in which it exists is hinted at in the literature, but nothing conclusive can be determined. In our experience calcium in hamartomas tends to be deposited in a punctate manner centrally whereas calcium in tuberculomas tends to be laminated and peripheral. (Case 5) This, however, is only a tendency and all types of configurations have been found in all types of benign tumors when calcium is present. It is difficult then to determine the type of tumor by the configuration of evident calcium.

An attempt to determine the residual infectivity of the primary complex of tuberculosis was made by culturing material from apparently stable Ghon or hilar nodes and only one of 68 cases was positive for tuberculosis, despite the microscopic evidence of activity. It was therefore concluded that the presence or absence of viable or virulent organisms of mycobacterium tuberculosis in the lesions of the primary complex of tuberculosis cannot be established by morphological appearances alone.¹¹

Selectivity as to the type of tuberculoma to remove surgically is advocated. The calcified lesion without evidence of breakdown is the one to be treated con-

servatively. This conservative management is advocated in the older age group and in individuals with diminished respiratory reserve. The incidence of postoperative complications, when added to the mortality rate of pneumonectomy, lobectomy or local excision, probably makes operation more hazardous than the conservative approach in this type of case.

Tuberculomas without calcium and tuberculomas that are calcified but exhibit areas of central radiolucency constitute a threat to the continued well being of the patient because of the danger of imminent spread of the tuberculous process to the surrounding lung tissues. These should be excised surgically.⁷

A pathologic evaluation of a series of tuberculous lesions known to be present from three months to 14 years prior to surgery and which included seven specimens of solitary or coin lesions revealed patent bronchial communication with the large necrotic focus in six of the seven specimens.¹⁶ This lends support to the belief by some men that these tuberculomas are "time bombs" and should be removed surgically.

An evaluation of the surgical management of small pulmonary tuberculous lesions in a series by Chamberlain, Storey, Klopstock and Daniels⁵ indicates that progress is being made in the eradication of the disease in this manner, but much is yet to be desired as evidenced by the number of deaths and postoperative complications and reactivation of the disease.

The consensus of opinion favors removal of non-calcified tuberculous foci and those calcified tuberculous foci that show evidence of central breakdown. The tuberculomas that are well calcified should be watched.

Other granulomas, although not occurring as frequently as tuberculomas, are treated in much the same manner as tuberculomas with the presence or absence of calcium determining the method

of approach.

Summary

It is evident from the foregoing discussion that pulmonary coin lesions should be thoroughly investigated before deciding the type of definitive treatment to be employed. If the lesion is not calcified and if no definite diagnosis can be established, surgery should be immediately employed in its removal.

The presence of calcium in a lesion should cause the weighing of the surgical approach with more gravity. The patient's age, physical status and the nature of calcification should be important factors in determining the definitive approach. If there is evidence of radiolucent areas in a calcified nodule which is considered a tuberculoma, then surgery in an attempt to prevent spread of the tuberculous process may be employed. If there is no evidence of breakdown, then the patient may be followed at regular frequent intervals with chest films to enable an evaluation of the nodule over a period of time. If surgery is contemplated in these cases, then the degree of benefit must be weighed against the mortality and morbidity following thoracotomy, excision biopsy, wedge resection, lobectomy and pneumonectomy.

Case Reports

The following cases are representative of the group of proven cases studied.

Case 1

, a 39-year old white male, was admitted to the Veterans Administration Hospital in October, 1951, because of a pulmonary nodule discovered on routine chest x-ray. He was asymptomatic with a negative past history except for two episodes of pneumonia in childhood, and a history of pleurisy in 1944.

Physical examination was negative. Bronchoscopy, laboratory studies and sputum examinations were negative.

X-ray studies revealed a nodule in the

right middle lobe, measuring two centimeters in diameter. Bronchograms were negative and planigraphy revealed a discrete nodule with central calcification. X-ray diagnosis was tuberculoma.

The patient was operated upon November 14, 1951. A 2.5 centimeter nodule with caseation in the center was removed by wedge resection from the right middle lobe. Microscopic studies revealed the nodule to be a tuberculoma, inactive.

Postoperatively, the patient developed a pleural effusion which absorbed spontaneously after three weeks.

Case 2

a 59-year old white male, was admitted to the Veterans Administration Hospital in October, 1951. In 1947, a left lower lobe nodule was first observed on a routine chest film. A recheck in 1948 revealed some questionable flecks of calcium. A recheck in 1951 revealed the nodule to have grown. The patient's symptoms were weakness, a ten pound weight loss, and a small amount of hemoptysis on two occasions prior to admission following a chest wall injury.

Physical examination was entirely negative.

Laboratory studies revealed a hemoglobin of 13 grams, negative sputum for tubercle bacilli, and positive sputum for tumor cells. Bronchoscopy was negative.

X-ray studies revealed the nodule to be two centimeters in diameter in 1948, and 3.5 centimeters in diameter in 1951. Bronchograms revealed an occluded bronchus leading to the apical portion of the left lower lobe. Planigraphy revealed no demonstrable calcium.

On November 5, 1951, a left pneumotomy was performed. Examination of the specimen revealed a nodule measuring 3 x 4 x 2.5 centimeters in the dorsal apical segment of the left lower lobe with two small bronchi traced into the mass. The cut surface of the mass

showed small areas of hemorrhage.

Microscopic study of sections from the mass revealed it to be a bronchogenic adenocarcinoma, not encapsulated but fairly well circumscribed.

The patient was well on May 1, 1952.

Case 3

, a 53-year old white male, was admitted to the Veterans Administration Hospital in October, 1951, with a history of low grade fever for six months, cough, sputum, and weight loss. In 1943, he had been discharged from the army for a "spot on his lungs".

Physical examination was essentially negative.

Laboratory studies revealed a hemoglobin of 13.8 grams, a negative sputum and a sedimentation rate of 20 millimeters in one hour.

X-ray studies revealed a nodule two centimeters in diameter, in the anterior portion of the right middle lobe. Planigraphy revealed no evidence of calcium or cavitation. On November 9, 1951, the nodule was removed by wedge resection from the right middle lobe.

Microscopic study of sections from the nodule revealed cartilage and other lung elements, but no calcium was present. The diagnosis was hamartoma.

The postoperative period was uneventful.

Case 4

, a 56-year old white male, was admitted to the Veterans Administration Hospital with the complaint of shortness of breath and cough beginning two years before. X-rays in the fall of 1947, revealed a mass in the right upper lobe. He was then explored but not resected. A biopsy was taken and this revealed a bronchogenic carcinoma.

Physical examination revealed an enlarged right jugular vein and postoperative changes over the right anterior

thorax. The examination was otherwise negative.

Laboratory studies revealed a sedimentation rate of 22 millimeters in one hour. The sputum was negative for cells.

X-ray studies revealed a mass in the right upper anterior thorax.

The patient refused surgery.

Case 5

, a 41-year old white male, was admitted to the Veterans Administration Hospital in June, 1951, for a small nodule in the right lung which was detected by his private physician eight days previously. The patient was asymptomatic and his physical examination and laboratory studies were negative.

X-ray studies revealed a nodule at the base of the right upper lobe anteriorly, containing calcium.

On July 9, 1951, the nodule was removed surgically by wedge resection from the right upper lobe above the minor fissure. The nodule measured 2 x 3 centimeters.

Study of the specimen revealed it to be made up of caseous material which microscopically showed no evidence of activity. There was peripheral calcium present.

The microscopic diagnosis was tuberculoma with peripheral calcification.

Conclusions

1. Round discrete pulmonary nodules should be immediately investigated when found, employing all our diagnostic armamentarium and a good history including old chest films if available.
2. Non-calcified lesions require more expediency in their work-up than do calcified lesions.
3. Twenty-five per cent of our lesions

contained calcium and none were malignant.

4. Of the remaining 75 per cent of our lesions, less than one-half were malignant.
5. In the absence of a definitive diagnosis, surgery should be the procedure of choice immediately.

Bibliography

1. Abeles, H. and Chaves, A. C. The Significance of Calcification in Pulmonary Coin Lesions. Radiology, 58:199-203, 1952.
2. Albrecht, Verhoudt, d. deutsch path. Gesellsch. 7:153-157, 1904.
3. Bloch, R. G. Tuberculous Calcification: A Clinical and Experimental Study. Am.J.Roent., 59:853-864, 1948.
4. Carson, W. Carcinoma of the Lung. J.Ind.State Med.Soc., 43:288, 1950.
5. Chamberlain, J. M., Storey, C. F., Klopstock, R., Daniels, C. F. The Small Pulmonary Lesion: Surgical Management. Tr.Nat.Tuberc.Assn., 47:226-231, 1951.
6. Chiari, Zur Kenntnis der Bronchialgeschwulste. Prager Med.Woch., 8:497, 1883.
7. Culver, G. J., Concannon, J. P., and MacManus, J. E. Pulmonary Tuberculomas: Pathogenesis, Diagnosis and Management. J.Thoracic Surgery, 20:798, 1950.
8. Davis, E. W., and Klepser, G. Significance of Solitary Intrapulmonary Tumors. Surg.Clin.No.America, 30:1707-1715, 1950.
9. Effler, D. B. Solitary Lung Tumors. Amer.Rev.Tuber., 63:252-254, 1951.

10. Effler, D. B., Blades, B., and Marks, E.
The Problem of the Solitary Lung Tumors.
Surgery, 24:917-928, 1948.
11. Feldman, W. H. and Baggenstoss, A. H.
Residual Infectivity of the Primary Complex of Tuberculosis.
Am.J.Path.,4:473, 1938.
12. Fink, D. L.
Coin Lesions of the Lung.
Minn.Med. 34:554, 1951.
13. Good, C. A., Clagett, O. T., Weed, L. A.
Non-tuberculous Diseases of the Chest and Related Matters: Granuloma of the Lung: Differential Diagnoses.
Tr.Nat.Tuberc.Assn.,47:294-302, 1951.
14. Graham, E. A., and Singer, J. J.
Three Cases of Calcified Pulmonary Abscess (Tuberculous) Simulating Tumor.
J.Th.Surg.,6:173, 1936.
15. Hochberg, L. A. and Pernikoff, M.
Primary Chondromas of the Lung.
Dis.Chest.,17:337-346, 1950.
16. Medlar, E. M.
Symposium of Treatment of Pulmonary Tuberculosis: Basic Pathologic Concepts.
Tr.Nat.Tuberc. Assn.,47:245-248,1951.
17. O'Brien, E. J., Tuttle, W. M., and Ferkaney, J. E.
Management of the Pulmonary "Coin" Lesion.
Surg.Cl.No.Amer.,28:1313-1322, 1948.
18. Overholt, R. H.
The Value of Exploration in Silent Lung Disease.
Dis.Chest, 20:111-125, 1951.
19. Sharp, D. V. and Kinsella, T. J.
Significance of the Isolated Pulmonary Nodule.
Minnesota Medicine, 33:886-888, 1950.

II. MEDICAL SCHOOL NEWS

Coming Event

June 23-28 Continuation Course in Otolaryngology for Specialists.

* * *

Minnesota Medical Foundation Trustees Meet

On Monday evening, May 26, the Board of Trustees of the Minnesota Medical Foundation met at the Radisson Hotel. The scholarship program was reviewed. Dr. Donald Cowling secured \$2000 for four scholarships of \$500 each for the academic year 1951-52. These were for graduates of state colleges in Minnesota who were entering the University of Minnesota Medical School. Dr. Cowling has secured \$3000 for 1952-53 which insure six such scholarships for the coming academic year. The Board also recommended six additional scholarships from fluid funds of the Foundation for 1952-53 with the candidates to be selected on the basis of need and ability. Thus during the coming year twelve \$500 scholarships will be made available through the Minnesota Medical Foundation. Dr. Cowling was commended for his outstanding efforts in behalf of the scholarship program. The Advisory Scholarship Committee consists of: Dr. Howard Horns, Chairman, Dr. Erling Platou, and Dr. Wesley Spink. Additional individuals to act as an advisory committee will be Dr. Frank Elias of Duluth and Dr. Fritz Schade of Worthington.

The date selected for Foundation Day is Thursday, October 2, 1952. Dr. William Middleton, Dean of the School of Medicine at the University of Wisconsin, has accepted the invitation to be the Foundation Day speaker.

Dr. James Dawson, Professor and Head of the Department of Pathology, was elected Minnesota Medical Foundation lecturer for 1953 to give the annual lectureship at the Minnesota State Medical Association meeting.

Dr. Robert B. Howard, Editor of the Bulletin, and Director, Department of Continuation Medical Education, was named an ex-officio member of the Board of Trustees of the Foundation in order to provide a close liaison between the activities of his office dealing with the Bulletin and the objectives of the Minnesota Medical Foundation.

* * *

Thank You, Elva Lavers

As in previous years, publication of this Bulletin during the past academic year has frequently presented problems such as delayed manuscripts, special graphs and tables, and last-minute changes. It has been a real pleasure and privilege to be able to turn to Miss Elva Lavers and her staff with these problems with the certain knowledge that a solution would be forthcoming. Once again, the editor wishes to acknowledge gratefully the help and unlimited cooperation that Miss Lavers and her co-workers have given.

* * *

Progress Report

Looking out over what used to be the court of the hospital, one finds a fascinating and pleasant scene of constructional activity. Structural steel skeletons now reach to the top of the present hospital buildings in the areas that will constitute connecting wings between the Mayo Memorial Tower and the Todd, Eustis, and Elliot sections of the present hospital. The underground parking facilities and storage areas are rapidly taking shape. The next important step will be the erection of the

steel for the tower itself. As work on the structure progresses, we find ourselves looking forward more and more to its completion, scheduled for 1954.

* * *

Dr. Kennedy to Join Medicine Department Staff

On August 1, 1952, Dr. B. J. Kennedy will join the staff of the Department of Medicine as Assistant Professor of Medicine. Dr. Kennedy graduated from the University of Minnesota Medical School in 1945 and served his internship and fellowship at the Massachusetts General Hospital in Boston. He has been particularly interested in endocrinology and cancer biology. The staff joins in welcoming Dr. Kennedy's return to Minnesota.

* * *

Construction to Begin on Research Laboratory Building

Construction will start immediately on a new four-story medical research laboratory building on the Medical School campus. The new structure will face Washington Avenue and will occupy the area between Millard Hall and the Institute of Anatomy, connecting those two buildings. It will house departments which were originally intended to be in the Mayo Memorial building but which had to be eliminated when plans for the latter were scaled down. Among the departments in the new research building will be the cancer biology laboratory under the direction of Dr. John Bittner. The building will cost \$675,000, and it is expected to be completed during 1953.

* * *

Several Clinical Faculty Members to Retire

During the academic year about to be completed several members of our clinical faculty have reached retirement age and will attain Emeritus status on July 1. Each of these men has made a valuable contribution to the teaching of medicine. Faculty members, alumni, and friends of the Medical School join in saluting:

Dr. Ernest M. Hammes	Emeritus Professor of Neurology
Dr. James A. Johnson	Emeritus Professor of Surgery
Dr. Moses Barron	Emeritus Professor of Medicine
Dr. E. Mendelssohn Jones	Emeritus Professor of Surgery
Dr. A. T. Rasmussen	Emeritus Professor of Anatomy

* * *

Summer Best Wishes

As the 1951-52 academic year closes, publication of the "Bulletin of the University of Minnesota Hospitals and Minnesota Medical Foundation" ceases until next fall. In review, the series of papers presented during the past year has contained many presentations of outstanding interest and originality. We wish to thank the heads of the various departments and divisions and the authors who have contributed to the continuing improvement of the publication.

To students, faculty, and friends of the Medical School and to all members of the Minnesota Medical Foundation, we wish to extend best wishes for a most pleasant summer season: Whether vacation consists of time spent painting the house, fishing on Gull Lake, or bicycling through the British Isles, we know that it will permit much-needed relaxation and that it will perhaps allow time for the contemplation of next year's objectives, in an atmosphere free of the pressure of everyday duties.

III.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
WEEKLY CALENDAR OF EVENTS

Physicians Welcome

June 16 - 21, 1952

Monday, June 16

Medical School and University Hospitals

- 9:00 - 9:50 Roentgenology-Medicine Conference; L. G. Rigler, C. J. Watson and Staff; Todd Amphitheater, U. H.
- 9:00 - 10:50 Obstetrics and Gynecology Conference; J. L. McKelvey and Staff; W-612, U. H.
- 10:00 - 12:00 Neurology Rounds; A. B. Baker and Staff; Station 50, U. H.
- 11:30 - Tumor Conference; Doctors Kremen, Moore, and Stenstrom, Todd Amphitheater, U. H.
- 12:15 - Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.
- 1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen, A. B. Baker and Staff; U. H.
- 4:00 - Seminar on Fluid and Electrolyte Balance; Todd Amphitheater, U. H.
- 4:30 - Public Health Seminar; 15 Owre Hall.
- 5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss, and Staff; Eustis Amphitheater.

Minneapolis General Hospital

- 7:30 - Fracture Grand Rounds; Dr. Zierold; Sta. A.
- 10:30 - 12:00 Tuberculosis and Contagion Rounds; Thomas Lowry; Station M.
- 11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.
- 12:30 - Surgery Grand Rounds; Dr. Zierold; Sta. A.
- 1:00 - X-ray Conference; Classroom, 4th Floor.
- 1:30 - Pediatric Rounds; Robert Ulstrom; 4th Floor.

Ancker Hospital

- 8:30 - 10:00 Chest Disease Conference.
- 1:00 - 2:00 Medical Grand Rounds.

Monday, June 16 (Cont.)

Veterans Administration Hospital

- 8:00 - 9:00 Neuroradiology Conference; B. J. O'Loughlin, R. C. Gray; 2nd Floor Annex.
- 9:00 - G.I. Rounds; R. V. Ebert, J. A. Wilson, Norman Shrifter; Bldg. I.
- 11:30 - X-ray Conference; B. J. O'Loughlin; Conference Room, Bldg. I.
- 2:00 - Psychosomatic Rounds; Bldg. 5.
- 3:30 - Psychosomatic Rounds; C. K. Aldrich; Bldg. I.

Tuesday, June 17

Medical School and University Hospitals

- 8:30 - Conference on Diet Endocrines and Cancer; M. B. Visscher; 116 Millard Hall.
- 9:00 - 9:50 Roentgenology-Pediatric Conference; L. G. Rigler, I. McQuarrie and Staff; Eustis Amphitheater, U. H.
- 9:00 - 12:00 Cardiovascular Rounds; Station 30, U. H.
- 12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 102 I. A.
- 4:00 - 5:00 Pediatric Rounds on Wards; I. McQuarrie and Staff; U. H.
- 4:30 - 5:30 Clinical-Medical-Pathological Conference; Todd Amphitheater, U. H.

Ancker Hospital

- 8:30 - 9:30 Medical-Roentgenology Conference; Auditorium.
- 1:00 - 2:30 X-ray - Surgery Conference; Auditorium.

Minneapolis General Hospital

- 8:00 - Pediatric Rounds; Spencer F. Brown; 5th Floor.
- 10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station F.
- 11:00 - Pediatric Rounds; Erling S. Platou; 7th Floor.
- 12:30 - Neuroroentgenology Conference; O. Lipschultz, J. C. Michael, and Staff.
- 12:30 - EKG Conference; Boyd Thomes and Staff; 302 Harrington Hall.
- 1:00 - Neurology Grand Rounds; J. C. Michael and Staff.

Tuesday, June 17 (Cont.)

Veterans Administration Hospital

- 7:30 - Anesthesiology Conference; Conference Room, Bldg. I.
- 8:30 - Infectious Disease Rounds; Dr. Hall.
- 8:45 - Surgery Journal Club; Conference Room, Bldg. I.
- 9:00 - Liver Rounds; Drs. Nesbitt and MacDonald.
- 9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.
- 10:30 - Surgery Tumor Conference; L. J. Hay, B. J. O'Loughlin; Conference Room, Bldg. I.
- 1:00 - Surgery Chest Conference; T. Kinsella and Wm. Tucker; Conference Room, Bldg. I.
- 2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III.
- 3:30 - 4:20 Clinical Pathological Conference; Conference Room, Bldg. I.

Wednesday, June 18

Medical School and University Hospitals

- 8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-109, U. H.
- 8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Norman Jacob and L. G. Rigler; Todd Amphitheater, U. H.
- 11:00 - 12:00 Pathology-Medicine-Surgery Conference; Medicine Case; O. H. Wangensteen, C. J. Watson and Staff; Todd Amphitheater, U. H.
- 12:30 - 1:30 Permeability and Metabolism Seminar; Nathan Lifson; 129 Millard Hall.
- 1:30 - Conference on Circulatory and Renal System Problems; M. B. Visscher; 116 Millard Hall.
- 5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis Amphitheater, U. H.
- 8:00 - 10:00 Dermatological-Pathology Conference; Review of Histopathology Section; R. Goltz; Todd Amphitheater, U. H.

Ancker Hospital

- 8:30 - 9:30 Clinico-Pathological Conference; Auditorium.
- 2:00 - 4:00 Medical Ward Rounds;
- 3:30 - 4:30 Journal Club; Surgery Office.

Wednesday, June 18 (Cont.)

Minneapolis General Hospital

- 8:00 - Pediatric Allergy Rounds; Lloyd Nelson; 4th Floor.
- 10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.
- 11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.
- 12:00 - Surgery-Physiology Conference; Dr. Zierold, Dr. E. B. Brown; Classroom
- 1:30 - Pediatric Rounds; E. J. Huenekens and Robert Ulstrom; 4th Floor.
- 2:00 - 4:00 Infectious Disease Rounds; 8th Floor.
- 4:00 - 5:00 Infectious Disease Conference; Classroom, 8th Floor.

Veterans Administration Hospital

- 8:30 - 10:00 Orthopedic X-ray Conference; Conference Room, Bldg. I.
- 8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker
- 7:00 p.m. Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, June 19

Medical School and University Hospitals

- 8:00 - 9:00 Vascular Rounds; Davitt Felder and Staff Members from the Departments of Medicine, Surgery, Physical Medicine, and Dermatology; Heart Hospital Amphitheater.
- 9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 11:00 - 12:00 Cancer Clinic; K. Stenstrom and A. Kremen; Todd Amphitheater, U. H.
- 1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.
- 3:30 - Medicine-Pediatric Infectious Disease Conference; Heart Hospital Auditorium.
- 4:00 - 5:00 Physiology-Surgery Conference; Todd Amphitheater, U. H.
- 4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hansen and Staff; E-534, U. H.
- 7:30 - 9:30 Pediatric Cardiology Conference and Journal Club; Review of Current Literature 1st hour and Review of Patients 2nd hour; 206 Temporary West Hospital.

Ancker Hospital

- 4:00 - Medical Pathological Conference; Auditorium.

Thursday, June 19 (Cont.)

Minneapolis General Hospital

- 8:00 - Pediatric Rounds; Spencer F. Brown; 5th Floor.
- 8:30 - Neurology Rounds; William Heilig; 4th Floor.
- 10:00 - Psychiatry Grand Rounds; J. C. Michael and Staff; Sta. H.
- 11:00 - Pediatric Rounds; Erling S. Platou; 7th Floor.
- 1:00 - Fracture - X-ray Conference; Dr. Zierold; Classroom.

Veterans Administration Hospital

- 8:00 - Surgery Ward Rounds; Lyle Hay and Staff; Ward 11.
- 8:00 - Surgery Grand Rounds; Conference Room, Bldg. I.
- 11:00 - Surgery Roentgen Conference; B. J. O'Loughlin; Conference Room, Bldg. I.

Friday, June 20

Medical School and University Hospitals

- 8:30 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.
- 9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.
- 10:30 - 11:50 Medicine Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.
- 10:30 - 11:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.
- 1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.
- 3:00 - 4:00 Neuropathological Conference; F. Tichy; Todd Amphitheater, U. H.
- 5:00 - Urology Seminar and X-ray Conference; Eustis Amphitheater, U. H.

Ancker Hospital

- 1:00 - 3:00 Pathology-Surgery Conference; Auditorium.

Minneapolis General Hospital

- 11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.
- 11:00 - Pediatric-Surgery Conference; Dr. Wyatt, Forrest Adams; Classroom, Sta. I.
- 12:00 - Surgery-Pathology Conference; Dr. Zierold; Dr. Coe; Classroom.
- 1:00 - 3:00 Clinical Medical Conference; Thomas Lowry; Classroom, Station M.
- 1:30 - Pediatric Rounds; Robert Ulstrom; 4th Floor.

Friday, June 20 (Cont.)

Veterans Administration Hospital

- 10:30 - 11:20 Medicine Grand Rounds; Conference Room, Bldg. I.
1:00 - Microscopic-Pathology Conference; E. T. Bell; Conference Room, Bldg. I.
1:30 - Chest Conference; Wm. Tucker and J. A. Meyers; Ward 62, Day Room.
3:00 - Renal Pathology; E. T. Bell; Conference Room, Bldg. I.

Saturday, June 21

Medical School and University Hospitals

- 7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.
9:00 - 10:30 Pediatric Grand Rounds; I. McQuarrie and Staff; Eustis Amphitheater.
9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; Heart Hospital Amphitheater.
9:15 - 10:00 Surgery-Roentgenology Conference; L. G. Rigler, J. Friedman, Owen H. Wangenstein and Staff; Todd Amphitheater, U. H.
10:00 - 11:30 Surgery Conference; Todd Amphitheater, U. H.
10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.

Ancker Hospital

- 8:30 - 9:30 Surgery Conference; Auditorium.

Minneapolis General Hospital

- 8:00 - Pediatric Rounds; George Lund; 5th Floor.
11:00 - 12:00 Medical - X-ray Conference; O. Lipschultz, Thomas Lowry, and Staff; Main Classroom.
11:00 - Pediatric Clinic; C. D. May and Floyd Denny; Classroom, 4th Floor.

Veterans Administration Hospital

- 8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.
8:30 - 11:15 Hematology Rounds; Drs. Hagen, Goldish, and Aufderheide
11:15 - 12:00 Morphology Dr. Aufderheide

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