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NEW GROWTHS OF THE MEDIASTINUM

From a Study of

60 cases.



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Intra-thoracic New Growths may be divided into:-

(1) Mediastinal New Growths.

(2) Pulmonary " " .

(3) Pleural " " .

By far the commonest seat of origin within the thorax is the mediastinum and from there the disease may spread to involve both lungs and pleurae.

In the present series only Mediastinal New Growths will be considered and those rare cases in which the disease occurs primarily in the lungs or pleura will be omitted altogether.

In a few cases even after post mortem examination it is very difficult, if not quite impossible, to say definitely whether the growth started in the mediastinum and spread outwards to the lungs and pleurae or whether the converse were the case.

In the present series when there was any great doubt one has taken it, perhaps erroneously in some cases to mean that the primary site was the mediastinum and the lung or pleura was secondarily affected.

At present we have no certain knowledge as to the etiology of this disease in general. Various isolated facts bearing on their causation have been collected, but no definite conclusion as to the etiology can be drawn from these facts. It is, however, generally admitted that the disease is caused by a specific virus, and that the virus is transmitted by contact with the infected animal.

The disease is a very common one, and is found in all parts of the world. It is caused by a specific virus, and is transmitted by contact with the infected animal. The disease is characterized by a high fever, and by a general prostration of the animal.

ETIOLOGY

- (1) The Infective Properties of the Virus
- (2) The Age of the Animal
- (3) The Influence of the Environment
- (4) The Influence of the Virus
- (5) The Influence of the Virus
- (6) The Influence of the Virus

ETIOLOGY

The etiology of this disease is a very complex one, and is not yet fully understood. It is caused by a specific virus, and is transmitted by contact with the infected animal. The disease is characterized by a high fever, and by a general prostration of the animal.

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ETIOLOGY

At present we have no certain knowledge as to the etiology of tumours in general. Various isolated facts bearing on their causation have from time to time been established and these necessarily play an important part in the formation of any theory as to their true etiology

When one has a large number of cases under consideration of such a relatively rare condition as New Growth in the Mediastinum statistical data must naturally be of some importance and one will begin by pointing out:-

- (1) The Relative Frequency of the Condition.
- (2) The Age of Onset.
- (3) The Influence of Occupation & Locality
- (4) The Influence of Sex.
- (5) The Influence of heredity

{	a. Malignant.
{	b. Tuberculosis.
- (6) The Influence of personal tuberculosis.

I. Relative Frequency.

A Mediastinal Growth is usually considered to be an exceedingly rare disease.

Between 1900 and 1913 (both inclusive) 20,743

cases were admitted to the Brompton Hospital and of these 80[†] were unquestionable cases of Mediastinal New Growth.

This means that 1 in every 259 admissions was a mediastinal tumour.

This large number really gives one rather a false impression as to the relative frequency of the condition because:-

- (a) Brompton is exclusively a chest hospital.
- (b) Obscure cases naturally gravitate into hospital.

Dr. F. de Havilland Hall making statistics in a similar way at the Westminster Hospital (i.e. a general hospital) found that 1 in 360 was the proportion of intra-thoracic new growths to medical admissions.
(1)

The mediastinum is far from being the commonest situation of new growths in the body. Herrich in 1,121 post mortem examinations found 68 cases of malignant disease but in only 6 was it present within the thorax.
(2)

Wiczowski has recently pointed out that mediastinal tumours, like cancer in general, are apparently

†

Though there were 80 cases between 1900-1913 one is only writing from 60 as in the remaining 20 no post mortem examination was available.

(3)

increasing in frequency.

One is to only a certain extent able to corroborate this statement from the present series:-

In 1900 there were 3 mediastinal tumours

"	1901	"	"	3	"	"
"	1902	"	"	4	"	"
"	1903	"	"	3	"	"
"	1904	"	"	6	"	"
"	1905	"	"	4	"	"
"	1906	"	"	4	"	"
"	1907	"	"	3	"	"
"	1908	"	"	9	"	"
"	1909	"	"	3	"	"
"	1910	"	"	12	"	"
"	1911	"	"	6	"	"
"	1912	"	"	8	"	"
"	1913	"	"	12	"	"

II. Age of Onset.

No age is exempt from the disease. Dr. Angel Money records a case of a malignant mediastinal growth in an infant aet. 18 months ⁽⁴⁾ and Hare in a child aet. 5 years. ⁽⁵⁾

In the present series one finds:-

Under 20 years there were 2 cases

" 21 to 30 " " 7 "

" 31 " 40 " " 14 "

" 41 " 50 " " 28 "

Over 51 years " " 9 "

From that one sees that between the ages of 31 and 50 years there were 42 cases (i.e. 70%) and that 85% of cases occurred over the age of 30 years.

The minimum age one found to be 18 years

" maximum " " " " 70 "

Conclusions

- (1) The commonest age is between 41 and 50 years.
- (2) It is very uncommon to find the condition under 20 years, but it may occur.
- (3) It is not often met with over 50 years of age.

III. Occupation and Locality.

Hesse records that 75% of miners at Schneeberg die
(6)
of cancer of the lungs.

The present series consists entirely of the so-called hospital class and from it one could find no particular occupation or locality was predominant. Even after carefully going into the question of indoor and outdoor occupations no conclusions could be drawn.

IV. Sex.

(7)

Though Walshe in a series of 102 cases found that males and females were affected practically equally it is generally found that the number of males predominate e.g.

(8.)	Vincent Harris	3 men	1 woman
(5.)	Hare	2 "	1 "
(1.)	Westminster Hospital Statistics	2.5 "	1 "
(9.)	Riegel	2.4 "	1 "
(10.)	Kohler	5 "	1 "

In the present series one found

41 men

19 women

i.e. 2.15 men : 1 woman

In looking at the influence of sex as a determining factor as to the variety of tumour found the following results were got:-

<u>MALES</u>	{	Carcinoma	4	}	<u>Carcinoma = 1 in 10</u>
		Sarcoma	33		
		Endothelioma	1		
		Unclassified	3		
<u>FEMALES</u>	{	Carcinoma	6	}	<u>Carcinoma = 1 in 3</u>
		Sarcoma	11		
		Unclassified	2		

Conclusions.

- (1) The disease is relatively twice as common in males as in females.
- (2) In both sexes sarcoma is the commonest form.
- (3) In females carcinoma is relatively three times as frequent as in males.

V. Heredity.

Hospital records as a rule yield little direct information on problems of heredity. As so large a proportion of cases admitted to the Brompton Hospital are tuberculous in nature it has always been the custom to enquire very carefully into the health of father, mother, sisters and brothers and in the present series enquiries were always made especially as to:-

- (a) Any tuberculous family history
- (b) " Malignant " "

So one may divide the series into 4 classes:-

- (1) Those with a direct hereditary taint of tuberculosis.
- (2) " " " " " " " malignant disease.
- (3) " " " " " " " both
- (4) " " " " " " " neither

CLASS I. Roger Williams taking malignant disease anywhere in the body found it was much commoner to find

(10)

a tuberculous than a malignant family history. Here one found 19 cases i.e. 31.6% with a definite tuberculous history.

CLASS II. In 14 out of the 60 cases examined one found a malignant family history i.e. in 23.3%. In addition one may point out that both Walshe and Coccle have recorded instances of two brothers being affected with malignant disease of the mediastinum.

(7)

CLASS III. Here one only found 4 cases i.e. 6.6%.

CLASS IV. In 31 out of 60 cases neither malignant nor tuberculous family history was present i.e. 51.6%.

Conclusions.

(1) It is rather more common to find a tuberculous than a malignant family history.

(2) In more than half the cases met with one finds neither.

VI. Personal Pulmonary Tuberculosis.

Kurt Wolf in 31 cases of Malignant Disease of the body in general found evidence of pulmonary tuberculosis in 13 cases i.e. in 42%.

(11)

(12)

Fowler on the other hand only found such a combination in 2 cases out of 30 i.e. 6.6%.

In the present series in only 2 cases was the tubercle bacillus found in the sputum and in only 1 was it found in the accompanying pleural effusion.

On the other hand however on post mortem examination definite evidence of pulmonary tuberculosis was found in 25 cases i.e. 41.6 %.

Conclusions.

(1) Taking the finding of Tubercle Bacilli in the sputum as a criterion of pulmonary tuberculosis there is little or no relation between it and malignant disease of the mediastinum.

(2) In a case suggesting pulmonary tuberculosis in which no Tubercle Bacilli can be demonstrated in the sputum after repeated examinations one should always consider the possibility of new growth.

(3) Post-mortem evidence shows there is some relation between pulmonary tuberculosis and malignant disease.

PATHOLOGY

PATHOLOGY

Under this heading one will include:-

- (1) Situation of the growth
- (2) Varieties of tumours found
- (3) Secondary affection of the lung tissue
- (4) Situation of secondary extra thoracic growths.

I. Situation of the Growth.

In practically every case the seat of origin is in the mediastinal lymphatic glands. Though in one case in the series it arose in the remains of the thymus gland.

(5)	(13)	(14)	(15)
Hare,	Pepper,	Strengel,	Rolleston
(16)			

and Harris all found that the common situation was the anterior mediastinum.

In the present series one found that in 41 cases (i.e. 68%) the anterior glands were affected though in 21 of these cases deposits were also found in the posterior (including bronchial) glands as well.

From the glands the disease rapidly spreads to surrounding parts especially involving the pericardium and root of the lung. From here it usually radiates in a series of finger like processes into the pulmonary

tissue along the course of the bronchi. This is well seen in the accompanying photographs.

Conclusion.

(1) The ant. mediastinum is the common situation of origin.

(2) From here it may spread to both the middle and posterior mediastina.

II. Varieties of Tumour.

The vast majority of tumours of the mediastinum are malignant in character.

In the present series there were 60 malignant growths and not a single example of an innocent one.

(5)

Hare in a study of 520 cases of mediastinal diseases found:-

134	Cancer
98	Sarcoma
21	Lymphoma
7	Fibrossa
11	Dermoid Cyst
8	Hydatid Cyst
3	Lepoma
	Gumma
3	Eccondroma

In most of these the mediastinal origin was somewhat doubtful.

He pointed out that Carcinoma is much commoner than Sarcoma but the value of his observations are greatly lessened by the fact that only 47 were microscopically examined.

Another cause of error is that Hare's series is based merely upon a collection of isolated cases which were published from time to time. Obviously rare cases are more likely to find their way into print than cases which, though somewhat uncommon, cannot be said to be rare.

The present is a continuous series containing every case of mediastinal new growth which occurred in one hospital during fourteen consecutive years and practically every case was examined microscopically.

The results show a marked difference to those recorded by Hare:-

Sarcoma	=	44 (32 were lymphosarcoma)
Carcinoma	=	10
Endothelioma	=	1 (possibly originated in the pleura)
Unclassified	=	5

Sarcoma: Carcinoma = 4.4 : 1.

Conclusions.

(1) Innocent tumours of the mediastinum are exceedingly rare.

(2) Sarcoma is the commonest form of malignant disease of the mediastinum and it usually takes the form of lymphosarcoma.

III. Spread to the Lung Tissue.

Malignant disease of the mediastinum usually spreads via the root of the lung to the lung tissue.

(12)

Fowler in a series of 30 cases found:-

Right Lung involved in 20 cases

Left	"	"	"	5	"
------	---	---	---	---	---

Both Lungs	"	"	"	5	"
------------	---	---	---	---	---

Neither Lung	"	"	"	0	"
--------------	---	---	---	---	---

i.e. He found the right lung was involved 4 times as often as the left.

In the present series one found:-

Right lung involved in 29 cases

Left	"	"	"	13	"
------	---	---	---	----	---

Both	"	"	"	14	"
------	---	---	---	----	---

Neither	"	"	"	4	"
---------	---	---	---	---	---

(to any naked eye extent)

i.e. Right Lung: Left Lung = 2.2: 1.

In 93.3% of cases one found the disease spread outwards to involve the lung tissue and in 71.6% the right lung was affected.

Conclusions.

(1) The right lung is the commoner of the lungs to be affected.

(2) Both lungs are more often affected than the left lung alone.

(3) It is exceedingly rare for neither lung to be implicated.

IV. Extra-Thoracic Metastasis.

These frequently occur and are very diagnostic of the condition.

The commonest combination is an affection of Liver, Pancreas, and Suprarenals.

In the last case one had under observation in which all these organs were implicated the condition was very typical.

The liver was hugely enlarged and nodular (p.m. it weighed $10\frac{1}{2}$ lbs.) The man had a curious bronzing of the skin which one failed to interpret during life (p.m. both suprarenals were replaced by masses of new growth). He occasionally had indigestion and his stools contained traces of only partly digested food but there was no sugar in the urine as one possibly might expect.

In the present series one found:-

No evidence of Secondary Growths in 16 cases

Liver affected	"	21	"
Pancreas	"	14	"
Suprarenals	"	10	"
Kidney	"	9	"
Spleen	"	7	"
Thyroid	"	1	"
Brain	"	1	"
Ovary	"	1	"

Conclusions.

(1) In 73.3% of cases extra thoracic metastasis
are present.

(2) Palpation of the abdomen is of the greatest
diagnostic value and should never be omitted.

S Y M P T O M S

SYMPTOMS

It is quite impossible to portray a clinical picture which will hold good in every case of mediastinal growth. The mode of onset, severity and duration of practically every symptom differs in nearly every case. So one is forced to merely mention the main symptoms which may occur, laying especially stress on those most commonly met with and pointing out their pathological and diagnostic significance.

A small mediastinal tumour so situated as not to give rise to pressure symptoms is often quite unrecognisable except on the post mortem table. On the other hand a tumour of similar size may by its situation give rise to very grave symptoms and yet nothing be found after careful clinical examination of the chest.

The symptoms may be roughly divided into 3 main groups:-

- (1) General symptoms
- (2) Pressure Symptoms
- (3) Pulmonary symptoms

I. General Symptoms.

These are often very similar to those met with in Pulmonary Tuberculosis. The patient complains of a

feeling of general malaise and inability to perform his ordinary work. He is unable to sleep at night and often sweats profusely. He has loss of appetite and suffers from dyspepsia and diarrhoea.

Loss of weight is as a rule to the very end conspicuous by its absence. In the present series one is unable to give the exact loss in weight as the weight after death was not ascertained, but in no case one has seen here was there any marked emaciation and in the others the usual report was "the body shows no extensive emaciation".

In one case however which one had the opportunity of examining some years ago emaciation was very marked indeed, but as far as one could see, it was mainly due to the growth obstructing the oesophagus and so preventing food from reaching the stomach.

On the whole one may say that a patient with malignant disease of the mediastinum as a rule loses little more weight than any person would who had been confined to bed for a similar time.

The typical cachexia one associates with malignant disease elsewhere in the body is quite absent except in those rare cases where the disease has a very rapid and fatal course.

Pyrexia is a feature which is usually absent. From an examination of 60 charts of mediastinal growths one found that in no case was the temperature above 101° unless some complication supervened. The common cause of a continued high temperature one found in nearly every case to be due to Bronchiectasis or Septic Broncho-Pneumonia. In most cases the tendency was to find long periods of persistently subnormal temperature with an occasional sudden rise and fall.

II. Pressure Symptoms.

Are very characteristic and diagnostic of the disease.

(1) Pain is usually present at some period of the disease. It is generally dull and aching in character but sometimes comes on in exceeding severe paroxysms very similar to those of angina pectoris. The causes of this pain so commonly found in cases of mediastinal growth are numerous e.g.

(a) In one case one had under observation the patient complained of a persistent dull pain in the left side of the chest. This quite disappeared after aspirating 3 pints of fluid from the left pleural sac.

(b) If the disease spreads through the lung and involves the pleura a typical pleuritic pain is present.

(c) Involvement of the intercostal nerves may give

rise to severe pain.

(d) If the disease erodes the vertebrae or sternum one finds the typical boring pain of bone disease.

Pain is by no means always confined to the thorax. One had two cases in which it radiated down the arm to the finger tips. In both of these on post mortem examination the brachial plexus was found to be pressed on

(2) Dyspnoea is sometimes the first symptom complained of. It usually develops very insidiously but generally sooner or later become a very prominent symptom.

Dyspnoea out of proportion to the physical signs found is very diagnostic of the condition.

Its causes are:-

(a) Pressure of a pleural effusion - in a case of malignant mediastinal disease complicated by a pleural effusion the patient as one would expect lies on the affected side.

(b) Pressure on the trachea or main bronchus - if there is only a slight effusion present and the patient is suffering from continuous dyspnoea it is as a rule due to pressure on the trachea or main bronchus. In such a case the patient takes up a position in which there is least pressure on the trachea or bronchus.

(c) Vagal irritation - if paroxysms of dyspnoea suddenly occur in a patient who has not previously been

short of breath it is usually due to the growth pressing on and irritating the vagus nerve. A curious point which one has often noticed in the post mortem room is that the nerve is nearly always only pressed upon by and rarely infiltrated with the disease. In most cases one can quite easily dissect the nerve out of the surrounding new growth.

(d) If a paroxysm of dyspnoea suddenly comes on in a case which had previously continuous dyspnoea it is generally due to a plug of mucus blocking the already narrowed lumen.

(3) Hoarseness is a very common feature and a laryngoscopic examination is of great diagnostic assistance.

It is as a rule due to pressure on either the recurrent laryngeal or vagus nerve and gives rise to a paralysis of the abductor muscle of the corresponding side.

A case at all suggestive of mediastinal disease should always be examined with the laryngoscope as often a slight abductor paralysis is found before any change in the voice can be detected.

(4) Dysphagia - is often met with but is rarely so severe as to require a gastrostomy.

It is due to the neoplasm encircling and pressing on

the oesophagus. Rarely is the oesophagus itself infiltrated by the disease.

If the pressure be only exerted on one side the oesophagus being such a mobile organ does not become occluded. It is only in those cases where the neoplasm encircles the whole circumference of the oesophagus that the patient is apt to die of starvation.

(5) Vomiting - due to vagal irritation may occur.

(6) Hiccough - in one case which one saw this was a very distressing and quite uncontrollable symptom. It is due to pressure on the phrenic nerve.

(7) Eye changes - the sympathetic nerve occasionally becomes pressed upon and as a result one would expect to get first dilatation and later contraction of the pupil of the affected side. Clinically however dilation is rarely seen. When there are eye changes present there is practically always a contraction of the pupil from the beginning. In one case which one had under observation the transition was very well seen and in addition one found ptosis of the corresponding eyelid and retraction of the eyeball.

In another case one noticed the curious fact that the pupil of the affected side dilated instead of contracted to light.

(8) Pressure on Veins - sudden oedema of the face, neck

and arms is sometimes met with and may be the first symptom which appears. If present it is of the greatest diagnostic significance.

In a case one recently had under one's care there was a sudden oedema of the face, neck, arms and thorax. On post mortem examination the lumen of the superior vena cava was quite occluded by the surrounding new growth but the coats of the vessel were not infiltrated.

In many cases the superficial veins of the neck and upper part of the thorax became dilated, tortuous and varicose. This is a very striking feature and very diagnostic of the condition.

A point of note is that, while pressure on the superior vena cava is relatively common, in none of the present series was there any evidence of pressure on the inferior vena cava either ante- or post-mortem.

In addition a noteworthy fact is that while the thin walled veins are easily pressed upon the thick elastic arteries escape compression. This is important in differentiating the condition from a thoracic aneurysm in which arteries are more commonly pressed upon than veins. Hence, while in aneurysm the radial pulses are usually unequal, in mediastinal growth they are as a rule both equal and synchronous.

One has now given the main pressure effects which may occur in a case of mediastinal tumour. From a

consideration of the anatomy of the part it is easy to see that when a tumour is situated in the anterior mediastinum it will compress the large venous trunks and when in the posterior mediastinum it will press on the trachea, oesophagus, vagus and sympathetic nerves. Hence a consideration of the pressure symptoms helps one in diagnosing the situation of the neoplasm.

In some cases none of the above pressure effects are present whilst in others they all are.

The following table gives the pressure symptoms and their causal factors as found post-mortem in a case which was recently under one's charge at the Brompton Hospital.

SYMPTOM	CAUSE
Dull continuous pain in chest.	Effusion (relieved by aspiration).
Continuous Dyspnoea	Trachea encircled by growth.
Hoarseness	Vagus " " growth.
Dysphagia	Oesophagus " " growth
Pain radiating down arm	Pressure on Brachial Plexus.
Oedema of arm	Pressure on Subclavian vein.
Ptosis & contraction of pupil.	Pressure on Sympathetic

III. Pulmonary Symptoms.

(1) Cough is a common and early symptom and usually becomes more and more irritating as the disease advances.

In the later stages it has a typical "brassy" note greatly resembling what Professor Wyllie calls the "gander" cough of aneurysm.

(2) Haemoptyses is seldom severe but in 3 of the present series it was the actual cause of death.

What one usually finds is small quantities of blood intimately mixed with the sputum giving it a "prune juice" or "red current jelly" appearance. In the present series in 38 cases (i.e. 63%) blood was definitely present in the sputum and in all these 38 cases as one would expect the disease had spread to the lung tissue.

(3) Expectoration - the sputum is usually thick, sticky, mucoid and difficult to get up, though it becomes purulent and foetid in cases where bronchiectasis or gangrene of the lung supervene.

It is not typical though it rarely has the nummular appearance of that of pulmonary tuberculosis.

It is quite the exception to be able to recognise its malignant nature microscopically though there are 9 cases on record in which malignant cells were found and a correct diagnosis made.

PHYSICAL SIGNS

PHYSICAL SIGNS

These of course vary greatly according to the situation and extent of the disease.

If the growth be small and lies deeply there may be either no symptoms and no physical signs, or else symptoms quite out of proportion to the physical signs found. Again if the growth be large there may be both marked symptoms and marked physical signs.

If a growth be in the posterior mediastinum it usually gives rise to pressure symptoms before marked physical signs develop while if in the anterior mediastinum physical signs are generally more marked than pressure symptoms.

I. Inspection.

The patient is usually a man. The first hint in an early case as to the diagnosis may be a faint stridor in his breathing. In an advanced case his face wears a haggard and anxious appearance as if he fully realized the gravity of his condition.

Any or all of the pressure symptoms before mentioned may be noticed e.g. quickened respirations, ocular changes, hoarse voice, oedema of the head and neck, etc.

Any dilatation of the superficial thoracic veins is looked for and if found one usually notices that the blood flows in a downward direction. This indicates

blockage of the superior vena cava and an attempt being made to set up a collateral circulation with the inferior vena cava. According to the situation of the tumor the cardiac impulse is displaced and it is usually somewhat diffuse in nature.

Any perforation or deformity of the chest wall is noted. If the whole of one lung be consolidated a striking unilateral enlargement may be seen accompanied by a bulging of the intercostal spaces. Any local prominence or bulging of the chest wall is very characteristic. It is usually best seen in front and is nearly always due to a growth in the anterior mediastinum.

If the disease has spread to implicate the whole of one lung and is accompanied by a pleural effusion what strikes one most is the marked immobility of one side of the chest over its whole extent. The contrast between this and the other side, which has to carry on the whole function of respiration is often very remarkable.

II. Palpation.

Many of the facts found on inspection can be confirmed by palpation.

If the patient be a woman the breast is carefully palpated as an intra-thoracic tumor may follow, accompany or lead to, malignant disease of the breast.

The cervical, axillary and clavicular regions are

palpated for enlarged glands. It is not very common to find these but in the last two cases one had under observation they were a very marked feature.

The intercostal spaces are carefully felt and in some cases secondary nodules in the pleura may be found. If the disease has spread to the surface there is a very typical wooden like resistance to the touch.

A unilateral deficiency of expansion in respiration is very characteristic.

If the main bronchus be pressed on or the lung extensively infiltrated vocal fremitus is diminished or absent altogether. If there be however only a moderate degree of infiltration it is increased.

The cardiac impulse is if palpable very diffuse. If the heart be covered with a mass of growth it is absent altogether.

Displacement of the apex beat is very common due to the mass of growth or the accompanying effusion pushing the heart to one side.

III. Percussion.

Percussion is of the very greatest importance in making an early diagnosis. The manubrium sterni should be very carefully percussed for dullness crossing the middle line. This is exceedingly typical of a mediastinal neoplasm.

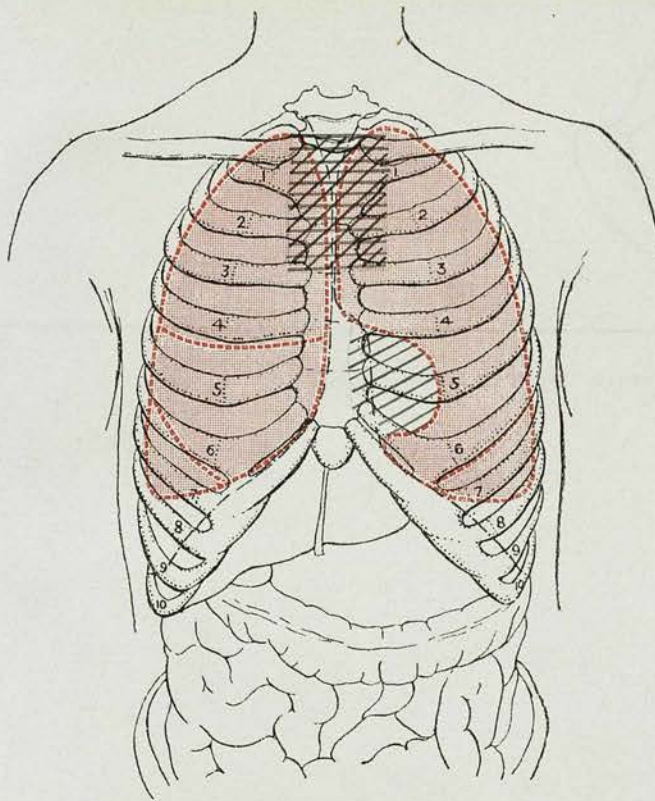


Diagram illustrating percussive dullness in an early case of Mediastinal New Growth.

The area of dullness varies greatly in size. In an early case its common situation is over the upper part of the sternum and extending rather more to one side than to the other. As the disease advances and involves the lung the dullness increases in size and is typically "stony" in character - much more so than an effusion or a pneumonia. This absolute dullness and sense of resistance to the finger is of the very greatest diagnostic value.

Careful percussion can usually bring out isolated irregular patches of dullness which are exceedingly typical of the condition.

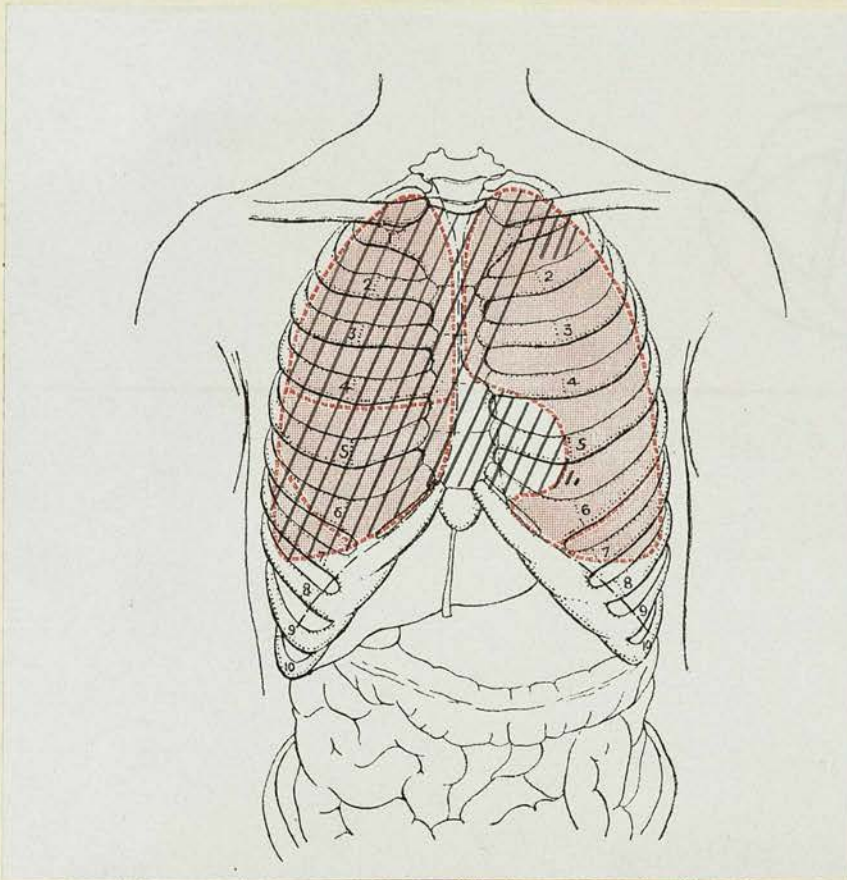


Diagram illustrating percussion dullness in an extensive case where the lung is secondarily involved.

If the pericardium becomes involved or if there be a pericardial effusion the area of dullness is of course increased.

The opposite lung if not involved in the growth is often hyper-resonant on percussion.

IV. Auscultation.

Breath Sounds - vary greatly in different cases.

If the tumor be of small size they are usually bronchial in nature. If the disease is extensive and involves

the greater part of one lung or presses on the main bronchus they are absent or else very weak. If there be an accompanying pleural effusion they are of course usually absent.

Accompaniments - are usually absent but may appear if the tumor begins to break down. Again, if pulmonary tuberculosis be present as well, accompaniments are of course usually present. In some cases pleural friction can be heard.

Vocal Resonance may be greatly increased in cases of moderate consolidation of the lung and in some cases whispering pectoriloquy may be very evident. If there be great consolidation, pleural thickening or a pleural effusion the vocal resonance is either absent or greatly diminished.

DIAGNOSIS

DIAGNOSIS

The diagnosis of a mediastinal new growth is sometimes easy, often difficult and occasionally impossible.

The presence of dullness crossing the middle line is very suggestive and should always lead one to making a very careful examination for other signs and symptoms indicative of new growth. When the disease has spread to the lung, irregular patches of wooden resistant dullness are very typical.

The presence of history of malignant disease elsewhere in the body in a case with obscure pulmonary symptoms should always arouse one's suspicions. The low temperature, the age and sex of the patient are important axilliary factors in making a diagnosis. Any of the symptoms of pressure or irritation before mentioned are very diagnostic.

Distension of the superficial veins of the neck and thorax is exceedingly characteristic but as a rule is a fairly late manifestation of the disease.

Enlarged glands in the neck or axilla though not often found are very typical if present.

In any case at all suggesting a mediastinal neoplasm one should always make a very careful abdominal examination for secondary growths. As mentioned before these are most commonly found in the liver, pancreas,

spleen and suprarenals and are often very palpable.

Having made a provisional diagnosis of mediastinal new growth various special methods of examination should be followed.

I. Exploration.

If a pleural effusion is present, or if one thinks it be present an exploratory puncture should be made. By putting in a needle it may be found that what was taken to be fluid was in reality a mass of new growth and on withdrawing the needle a fragment of growth may be found adherent to it and examined microscopically.

In the present series one found:-

No effusion	31 cases
Effusion present but contained no blood to the naked eye	14 "
Effusion Haemorrhagic	15 "
Cancer Cells present	3 "
T.B. present	1 "

Conclusions.

(1) In 29 cases of effusion blood was recognisable to the naked eye in 15 i.e. 51%.

(2) Microscopic examination of the effusion is rarely diagnostic.

If an effusion be haemorrhagic one always suspects the possibility of an underlying new growth.

Though rarely diagnostic the effusion should

always be centrifugalized and examined microscopically.

This should be done as soon as possible after exploration as the malignant cells quickly disintegrate. The points to be looked for are:-

- (1) Presence of large "signet ring" cells of irregular shape and dropsical appearance.
- (2) Presence of blood.
- (3) Absence of puscells.
- (4) Absence of tubercle bacilli.

As a rule an examination of the pleural fluid is of little diagnostic importance. Formerly a haemorrhagic effusion was considered pathognomonic of malignancy but a tuberculous effusion may also contain blood - often due to puncture of a small vessel during the operation.

Tubercle bacilli are rarely found in a tuberculous effusion and in one of the present series they were actually found in a malignant effusion so the presence or absence of tubercle bacilli is of little importance.

A high percentage of small lymphocytes in the fluid is quite as characteristic of new growth as of tubercle.

In a case of mediastinal lymphosarcoma one had under one's care lately 96% of the cells in the accompanying effusion were small lymphocytes.

A point of great diagnostic importance is if an effusion develops insidiously with few symptoms and no pyrrhexia it is probably due to a malignant growth.

II. Laryngoscopic Examination.

One would look for any paralyses of the vocal cords and also for the presence of local malignant disease. Abductor paralyses of the vocal cords can often be seen before any change in the voice can be detected.

III. Bronchoscopic Examination.

This may be of great assistance in finding evidence of tracheal stenosis.

IV. Sputum - Is rarely typical but it should always be carefully examined. The repeated absence of tubercle bacilli should always arouse one's suspicions.

V. X-rays. - X rays are of great use in the hands of a skilled operator. A bismuth bougie may also be passed to see if there be any signs of pressure on the oesophagus.

In one case which one had under observation this was very well illustrated. The patient was a woman who for some time past had been suffering from increasing dysphagia. The passage of a bismuth emulsion was watched. A marked delay was seen at the level of the aortic arch and later the bismuth was seen to pass in a thin line through a very obviously obstructed posterior mediastinal space. Lymphosarcoma of the posterior mediastinum was diagnosed and this was later confirmed by post-mortem examination.

The typical X-ray appearance (Fig. 102nd) of a mediastinal tumor is well seen in the accompanying three lantern slides which are unretouched reductions from cases one had recently under observation.

A point of importance is that it is of little diagnostic value to radiograph a suspected mediastinal growth which is complicated by a pleural effusion as fluid also gives a dense shadow. One of the cases illustrated had no such effusion whilst the other two were radiographed after the effusion had been aspirated.

There are many conditions which could cause
and you are already aware of a number of
them.

On the other hand, the above conditions may
be caused by a number of other conditions. The
possibility of a few other conditions, the condition
which may be considered as a possible cause
of the condition which is being considered.

DIFFERENTIAL DIAGNOSIS

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DIFFERENTIAL DIAGNOSIS.

There are numerous conditions whose clinical signs and symptoms closely resemble those of a mediastinal growth:—

Chronic Bronchitis - In a middle aged person with obscure signs of bronchitis and excessive dyspnoea the possibility of a new growth underlying the condition should always be considered and corroborative signs and symptoms carefully looked for - especially those indicative of pressure on a main bronchus.

Chronic Pulmonary Tuberculosis. - In both the general symptoms may be very similar and it must be remembered that both often occur together. Dullness going across the middle line, a low temperature and the absence of tubercle bacilli in the sputum after repeated examinations strongly point to new growth.

Haemoptyses occurs commonly in both and is of no diagnostic importance but frequently recurring haemoptyses with only slight emaciation and little pyrrhoxia is very suggestive of malignancy.

Syphilitic stricture of a main bronchus gives rise to symptoms very similar to new growth but in a stricture one gets symptoms of pressure on the trachea alone

while in new growth there is usually evidence of pressure on other structures as well. Bronchoscopic examination may be of great value. A positive Wasserman reaction would point to the syphilitic nature of the disease.

Chronic Pleural Effusion - is often found in a case of mediastinal growth and it may be very difficult to recognise the underlying cause. Repeated haemoptyses, low temperature and absence of tubercle bacilli in the sputum all point to the malignancy of the condition.

Examination of the fluid is rarely of value but if haemorrhagic and attended with no pyrrhexia should be looked upon with suspicion. A persistence of dullness after aspiration of the fluid points to new growth. The rapid reaccumulation after the operation is of no value as it may occur in either condition.

Abscess of the mediastinum - may give rise to pressure symptoms similar to those found in a case of neoplasm but in abscess one gets all the symptoms of an inflammatory process.

Hydatid Disease of the Mediastinum - is so rare in this country that it need only be considered in the case of a patient coming from the Shetland Islands. In hydatid disease one can usually find cysts in other parts of the body.

Dermoid Cyst of the Mediastinum - as there are only 35 cases of this condition on record it may be neglected.

Aortic Aneurysm - is the condition which presents most serious difficulty in diagnosis and this can usually be cleared up by X ray examination when an aneurysm shows a typical expansile pulsating shadow in contrast to a new growth where there is only a shadow with irregular edges and no pulsation. In a man with a history of syphilis and degenerated arteries one would naturally think of aneurysm while in a case with widespread pressure symptoms new growth is the more probable diagnosis.

PROGNOSIS

PROGNOSIS

The disease usually runs a more or less chronic progressive course and with rare exceptions is always fatal.

The early signs and symptoms are in so many cases very vague that it is somewhat difficult to judge the usual duration of the illness.

In the present series dating the duration as accurately as possible from the first symptom complained of one found:-

The Minimum Duration was 9 weeks

" Maximum " " 88 "

" Average " " 32 "

Jaccord¹⁷ however records a case which died in 9 days and Hertz¹⁸ one which lived for 7 years.

One could trace no direct relationship between the duration of the disease and the age of the patient though the general impression one got was that the younger the patient the more rapid is the course of the illness.

In giving an opinion as to the probable duration of the disease one has to judge every case on its own merits and even then complications may at any time unexpectedly arise and greatly hasten death.

MODE OF DEATH

The usual termination of a case of mediastinal growth is death by gradual exhaustion. Less frequently it is due to asphyxia. Occasionally oesophageal obstruction may hasten death by starvation.

Sometimes the patient dies suddenly of haemoptyses; sometimes implication of the vagus or a spread of the disease to the pericardium and heart leads to cardiac failure; sometimes a cerebral tumour may be the fatal termination.

In the present series one found:-

Death from	<u>Exhaustion</u>	43	cases
"	" <u>Asphyxia</u>	11	"
"	" <u>Haemoptyses</u>	3	"
"	" <u>Cardiac Failure</u>	2	"
"	" <u>Cerebral Tumor</u>	1	"

T R E A T M E N T

TREATMENT

This may be divided into 2 main classes:-

- I. Medical
- II. Surgical $\left\{ \begin{array}{l} \text{Palliative} \\ \text{Radical} \end{array} \right.$

I. Medical Treatment.

The medical treatment of new growth in the mediastinum is at present entirely palliative.

It may be divided into:-

- (a) General Treatment.
- (b) Symptomatic Treatment
- (c) X-ray Treatment
- (d) Radium Treatment.

A. General Treatment.

The patient's spirits should be kept up and the brooding fits of depression into which he is so apt to fall should be alleviated by cheerful surroundings and congenial companions. If he is accustomed to or needs stimulants they should not be withheld and, if he wishes to get out of bed for a few hours a day, it cheers him up and does no harm.

In every case Potassium Iodide should be given a fair trial. The diagnosis between malignant disease

and gumma of the mediastinum is often quite impossible. If the patient improves with iodides the possibility is it is a syphilitic manifestation and neo-salvarsan and mercurial innunctions should be added to the treatment. If one does find a slight improvement with iodides it is not wise to be too optimistic as the drug has a beneficial effect in all cases.

A noteworthy point in prescribing iodide is that certain patients who are intolerant to small doses can comfortably take large doses.

Arsenic in large doses may give some relief if it is pushed until very definite poisonous symptoms are manifested.

B. Symptomatic Treatment.

This is always called for sooner or later - the main symptoms one has to treat being, pain, cough and dyspnoea.

Pain in many cases is relieved by poultices, small blisters, leeches or painting with Lirimentum Iodi. Considering the hopelessness of the case it would be more than cruel to withhold morphia. If necessary this should be given freely either by the mouth or hypodermically.

Cough in many cases responds to simple remedies e.g. ammonia and ipecacuhana or inhalations of tinctura benzoini composita. In two cases one got great relief by ordering a continuous respirator impregnated with a solution of cinnamon and creosote. If these remedies are of no use Heroin (grs. 1/12 P.R.N.), Morphia, or Codein (grs. I. P.R.N.) may be tried.

Dyspnoea. Spasmodic attacks of dyspnoea as mentioned before are often due to a plug of mucus blocking an already narrowed trachea. Such a case may be very successfully treated by judiciously giving expectorants to loosen the viscid mass. Amyll Nitrite, m V , or inhalations of oxygen are useful to tide a patient over a crisis. In some cases a very valuable remedy is that suggested by Powell and Hartley¹⁹

R. + Sod: Iodid: grs. V.

Chloral grs. X.

Sig: 4 to 6 times in the 24 hours.

Temporary relief to venous obstruction, until a collateral circulation is set up, can be procured by venesection or the application of leeches.

The great oedema which is sometimes present in the arms is alleviated by careful bandaging from the fingers upwards.

C. X-ray Treatment.

Dr. Zum Busch²⁰ records a case in which all the signs and symptoms quite disappeared under X-ray treatment and Dr. Frederick Roberts authenticates the case.

From time to time various papers have been written commenting on the remarkable curative effect of X-rays in cases diagnosed clinically as Lympho-sarcoma. The true explanation is probably that suggested by Dr. Cecil Wall²¹ who believes that such cases may possibly be due to some obscure inflammatory process and not be lympho-sarcomatous in nature at all. One does not expect to get any permanent improvement from the application of the X-rays.

D. Radium Treatment.

This has in all probability a great future before it. One knows of a case in which radium certainly temporarily arrested the progress of the disease and in time it will very likely be an exceedingly valuable remedy.

The treatment is at present too modern to justify one in saying whether the beneficial results, undoubtedly got temporarily in many cases, can be regarded as a permanent cure.

II. Surgical Treatment.

This is naturally divided into two main groups:-

(a) Palliative.

(b) Radical.

A. Palliative Surgical Treatment.

Aspiration should only be performed when the fluid by reason of its actual bulk causes symptoms e.g. dyspnoea, pain etc.

In no case should one make it a routine to draw off a malignant effusion. It not only usually re-accumulates in a very short time but is also a procedure which is by no means devoid of danger. One case in the present series was aspirated on account of urgent dyspnoea and the result was fatal from a sudden haemorrhage into the pleura. The fluid should be drawn off slowly and one should cease as soon as the patient gets at all distressed.

If the effusion becomes purulent, as it occasionally does, a portion of rib must be resected and the cavity drained.

Tracheotomy is sometimes necessary in urgent cases of dyspnoea. It is only indicated when the obstruction is in the larynx e.g. oedema of the larynx, laryngeal spasm due to nerve irritation etc. In cases due to pressure on the trachea or main bronchus it is obviously useless.

Artificial Pneumothorax is of use in those cases

which one would otherwise have to aspirate very frequently. The fluid is withdrawn and either air or preferably nitrogen is put in to replace it. This tends to prevent a re-accumulation of the effusion. Dr. Horton-Smith Hartley has introduced a modification of Sir James Barr's well known instrument which renders the procedure a very simple one.

Coley's Fluid (made from the *Bacillus Prodigiosus* and the *Streptococcus of Erysipelae*) has been tried but the results are very disappointing. As a rule the patient prefers death to the exquisite torture following the injection.

B. Radical Surgical Treatment.

Operative measures are undoubtedly of great use in hydated disease of the mediastinum, but are of little use in malignant disease in that situation. By the time our present methods have made the diagnosis absolute, complete removal is beyond the skill of the most heroic of surgeons.

Thoracic surgery has advanced to such an extent of late years that the mediastinum can be freely exposed with comparatively little danger. The future of the operative treatment of mediastinal neoplasm lies with the physician not the surgeon. When the physician is able to diagnose the condition in its earliest stages he will find the surgeon already prepared to completely remove the disease.

ILLUSTRATIVE CASES

ILLUSTRATIVE CASES

The following cases illustrate a few of the types met with.

Case I. Lympho-Sarcoma of the mediastinum presenting no difficulty in diagnosis.

Case II. Lympho-Sarcoma of the mediastinum which was unrecognisable during life.

Case III. Disease situated in the anterior mediastinum which in its early stages closely resembled pulmonary tuberculosis but which later rapidly increased in size and became quite unmistakable.

Case IV. Disease situated in the posterior mediastinum complicated by an effusion, the cytology of which would formerly have been considered typical of a tuberculous effusion.

1
A Case of Malignant Growth of the Mediastinum

Presenting no Difficulty in Diagnosis.

F.K.:- aet: 46 was admitted to the Brompton Hospital on Oct. 29th 1913 complaining of cough, continuous dyspnoea and substernal pain.

Family history - 1 brother died of pulmonary tuberculosis.

Personal history - no venereal history; when younger the patient was a heavy drinker. (Wasserman Reaction was negative).

History of Present Illness.

Onset - 10 months ago.

Expectoration - not abundant, comes up easily, typical red currant jelly appearance. Tubercle Bacilli were not found after repeated examinations. (Dr. Immans complement fixation test for tuberculosis was also negative).

Cough - somewhat brassy in nature.

Pain - dull aching substernal and abdominal pain.

Haemoptyses - never large but sputum always of a red currant jelly appearance.

Emaciation - not noticeable.

Night sweats - absent.

Dyspnoea - continuous $\bar{c}$. occasional short paroxysms

Dysphagia - slight.

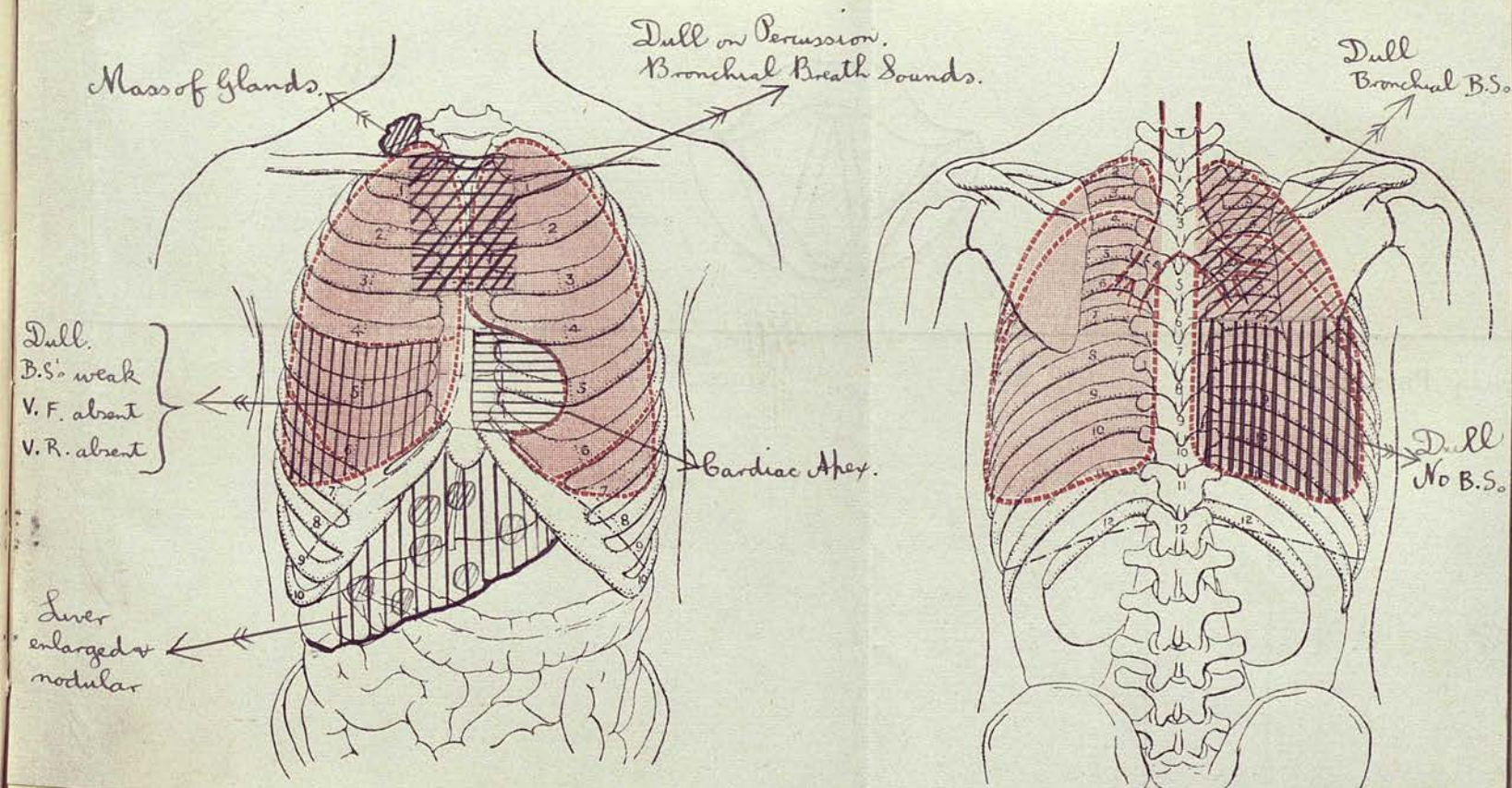
Voice - hoarse.

Physical Signs

Inspection - Face was pale and somewhat alcoholic. Pupils were equal. Chest was well covered. It bulged slightly on the right side and the interspaces were somewhat obliterated. On respiration, movement was practically absent on the right side and appeared excessive on the left side. Enlarged veins were especially seen at the root of the neck and over the upper part of the thorax.

Palpation - a large mass of coalesced glands was found above the right clavicle. V.F. was absent at the right base. The apex beat was in the 5th inter-space $\frac{1}{2}$ " internal to the mid clavicular line.

Percussion.)
Auscultation) vid. diagram



Abdomen - liver enlarged and slightly nodular.

Laryngoscopic Exam: Paralysis of Right Vocal Cord.

The right base was explored with a needle and some blood stained fluid got. Microscopical report ran as follows: "Films of deposit consist almost entirely of red blood corpuscles. One normoblast was seen and 400 white cells were counted.

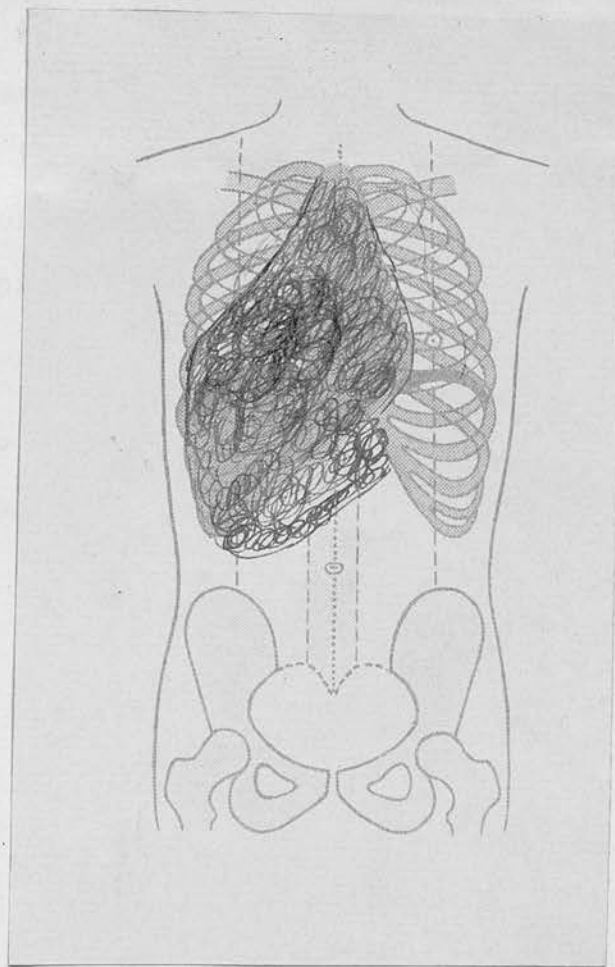
Polymorphonuclear leucocytes	53.2%
Small Mononuclears	39.7%
Large "	5 %
Mast Cells	1 %
Eosinophils	1 %

There are no masses of cells suggestive of growth and no T.B. found".

X.-ray Examination.

Showed a dense opaque mass in the chest but the fluid present prevented the possibility of marking out the extent of what was undoubtedly a neoplasm.

A thick emulsion of bismuth showed some delay in passing through an obviously narrowed oesophagus.



At this stage new growth was diagnosed. The main features pointing to it being -

Continuous Dyspnoea c. occasional paroxysms.

Substernal pain.

Absence of T.B. in sputum and complement fixation test negative.

Red currant jelly sputum and haemorrhagic pleural effusion.

Little emaciation.

Dullness on percussion crossing the middle line.

Enlargement of Liver.

Engorgement of superficial veins.

Glands in the neck.

X-ray examination.

Laryngoscopic examination.

Progress. The patient is still in hospital. His symptoms are all becoming more prominent and he is going down hill fairly rapidly.

Later Note

Jan. 3rd. Patient got steadily worse and died. Post Mortem Examination showed a large lympho. sarcoma originating in the posterior mediastinum & involving the right lung.

11
A Case of Lympho-sarcoma of the Mediastinum,
quite unsuspected during Life and complicated by Ex-
tensive Pulmonary Tuberculosis.

S.H.:- aet 54 was admitted to Brompton Hospital on Jan. 29th complaining of cough, dyspnoea, night sweats and slight emaciation.

Family History - Father died of pulmonary tuberculosis

Personal History - Patient had been delicate since childhood.

History of present illness.

Onset - 8 months ago.

Expectoration - occasionally streaked with blood
Tubercle bacilli were present in the sputum.

Cough - especially in the morning.

Night sweats - present.

Pressure symptoms - none.

Physical Signs - were typical of an ordinary case of pulmonary tuberculosis with excavation at one apex and infiltration of four lobes. There were no physical signs indicative of mediastinal growth.

Abdomen and larynx were apparently normal.

Progress - the case was diagnosed as Chronic Pulmonary Tuberculosis. The patient rapidly went down hill and died eight weeks after admission of extreme exhaustion.

Port Mortem Examination showed:-

(1) Mass of new growth situated in the anterior mediastinum. Both the superior vena cava and innominate veins were compressed. (N.B. there was no ante-mortem evidence of such pressure). The pericar-

dium and left bronchus were invaded and the trachea compressed (this was also unrecognisable during life)

(2) At the apex of the right lung was an old tuberculous cavity. The whole upper lobe was fibrosed and the lower lobe showed some recent caseating tuberculous disease.

(3) The left lung also showed extensive tuberculous disease.

Case illustrating:-

- (1) Disease in the Anterior Mediastinum.
- (2) The occasional similarity of early malignant disease in the mediastinum to pulmonary tuberculosis.
- (3) The rapid increase in physical signs which may occur.

T.G. aet: 46 was admitted to Brompton Hospital on April 14th 1913 complaining of cough, coloured sputum and pain in the chest.

Family History - Mother died of Carcinoma of the stomach.

Personal History - Nil.

History of present illness.

Onset - 6 months ago.

Sputum - was occasionally streaked with blood.

It was examined three times for tubercle bacilli with negative results. It was again negative on treating a large quantity with Antiformin. No streptothrix Actinomyces were present.

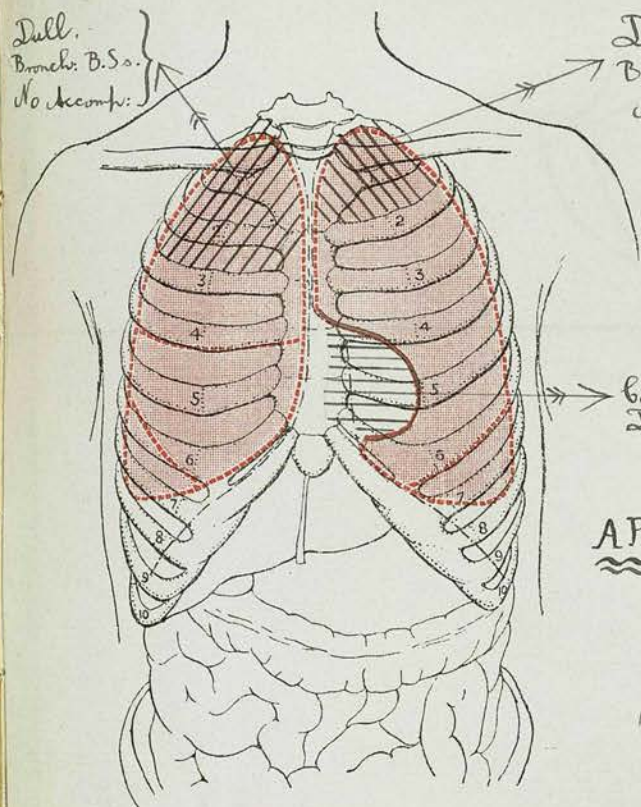
Cough - especially in the morning.

Physical Signs - are shown in diagrams.

- (1) On admission
- (2) Two months later.

It will be seen that on admission he had all the signs of Pulmonary Tuberculosis. The repeated absence of tubercle bacilli in the sputum suggested the possibility of new growth. Gradually the physical signs increased and became quite unmistakable.

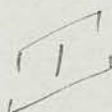
Dull.
Bronch: B.S.o.
No accomp:



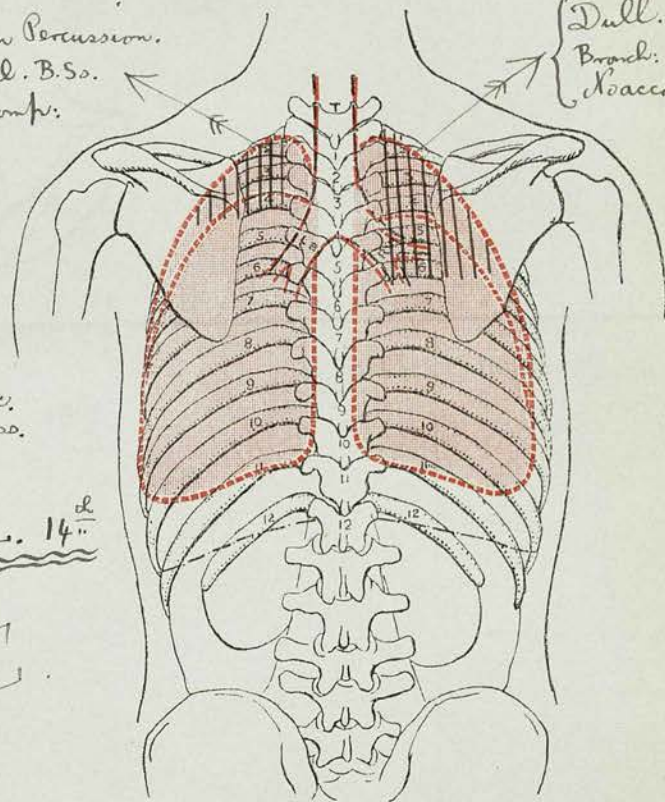
Dull on Percussion.
Bronchial B.S.o.
No accomp:

Cardiac
Dullness.

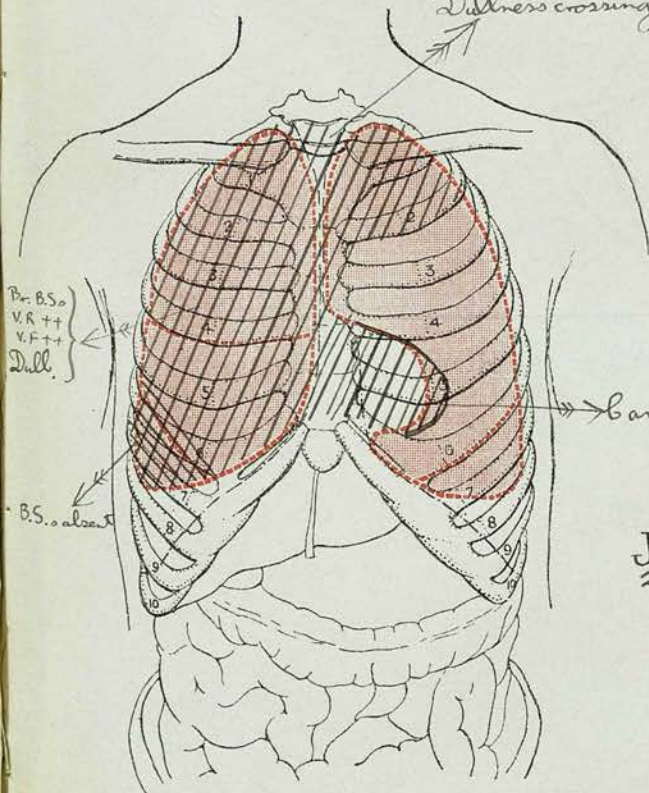
APRIL 14th



Dull.
Bronch: B.S.o.
No accomp:

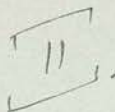


Dullness crossing Mid. Line.

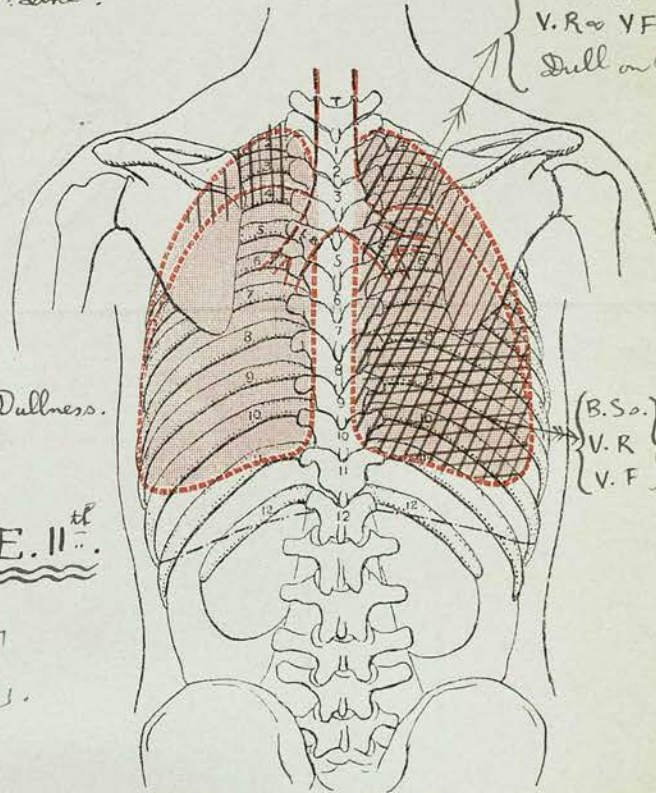


Cardiac Dullness.

JUNE 11th



Bronchial B.S.o
V.R. VF ++.
Dull on Percussion



{B.S.o.
V.R } absent
{V.F }

June 3rd. - signs of fluid at the right base. Temperature normal.

June 9th. - head, neck and arms are suddenly very swollen. Superficial veins of chest are very dilated.

X-ray examination showed a dense opacity over the whole right lung. Report - "no apparent obstruction in posterior mediastinum."

30 3 of blood stained fluid were aspirated -
Report:-

Small Lymphocytes	48.0%
Large "	.5%
Polymorpl: Leucocytes	39.75%
Endothelial cells	11.75%
No T.B. seen	

Wasserman Reaction was found to be negative.

Diagnosis of a lymphosarcoma originating in the anterior mediastinum was now made.

Patient never had any pressure signs except on the superior vena cava and died of exhaustion on Aug. 26th.

Port Mortem Examination showed involvement of the pericardium. Superior vena cava and right innominate veins were completely blocked by the surrounding growth. Oesophagus was pushed to one side but its lumen was not narrowed.

The right pleura was thickened and adherent to

the lung and contained 4 $\bar{3}$ of haemorrhagic fluid.

Right lung showed a mass of solid white growth springing from the anterior mediastinum and radiating out to and involving the pleura.

At both apices of the lungs were signs of old caseous tuberculosis.

IV

Case illustrating:-

- (1) Disease in the Posterior Mediastinum.
- (2) The importance of Abdominal Palpation.
- (3) The changes which often occur in the pleural fluid from time to time.
- (4) Even 96% of small lymphocytes is not diagnostic of a tubercular effusion.

A.H. aet 40, was admitted on June 23rd 1913 to Brompton Hospital complaining of pain in the left side, continuous dyspnoea with occasional severe paroxysms, cough and a husky voice.

Duration of illness 10 months.

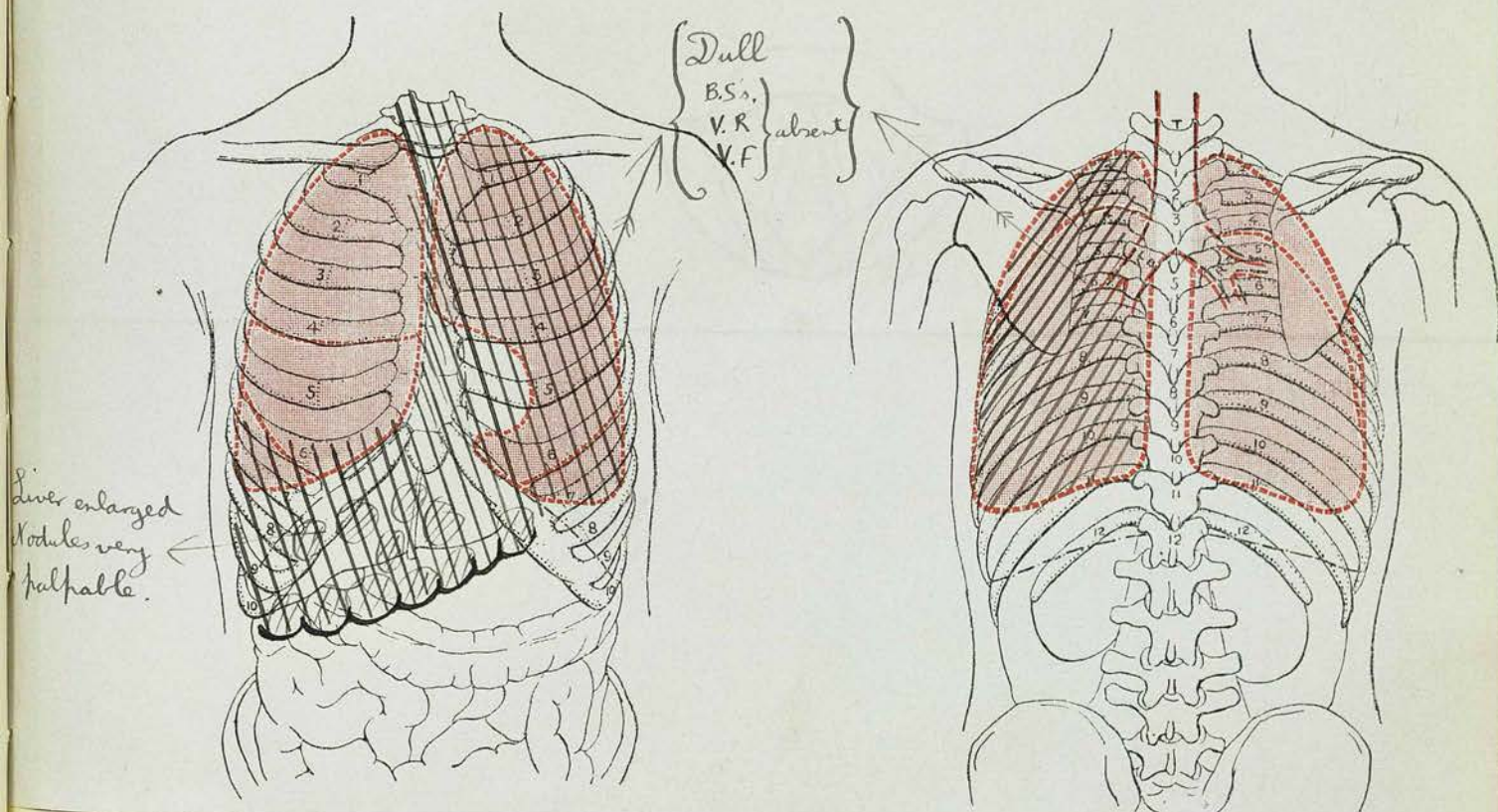
Patient had both a malignant and tuberculous family history. Wasserman Reaction was negative. Sputum was examined four times for tubercle bacilli, with negative results. It never contained any blood visible to the naked eye.

Larynx - showed complete paralyses of the left cord.

Eyes - left pupil was contracted and did not react to light.

Symptoms after admission - dyspnoea was always present and there were sometimes acute paroxysms of breathlessness. Slight dysphagia developed later and also a continuous dull aching pain in the chest and over the liver. There was no dilatation of the superficial veins of the chest and no oedema of face or arms. Temperature was always either normal or subnormal.

Physical Signs as diagram.



Pleural Effusion was haemorrhagic and contained

Endothelial Cells	50.6%
Small lymphocytes	49.0%
Large lymphocytes	00.4%

The endothelial cells were in places massed together and this, together with their appearance, though not typical were suggestive of malignancy.

Abdominal Examination - liver was enormously enlarged and had typical umbilicated nodules easily palpable upon its surface.

A diagnosis of lymphosarcoma of the posterior

mediastinum was made.

Three months later the pleural fluid was again examined and had completely changed. It now contained:

Small Lymphocytes	96%
Large "	2%
Polymorphonuclear Neutrophils	2%

The patient finally died of exhaustion.

Port Mortem Examination showed a large mass of growth arising from the posterior mediastinum and radiating from the hilum into the left lung.

Liver was enormously enlarged (3170) and nodular.

Pericardium, spleen, diaphragm, pleura, kidneys and suprarenals showed extensive deposits of new growth.

The left vocal cord was curved and atrophied. Trachea, oesophagus, sympathetic and vagus were all involved in the mass.

PHOTOGRAPHS, DIAGRAMS &c.

Side view of a case of mixed celled sarcoma of the mediastinum showing marked bulging of the anterior chest wall. The tumour was large and pulsating and the overlying skin was thin and reddened. The right clavicle is seen to be eroded and was pulpy on palpation. Large masses of coalesced glands are seen in the neck and axilla.

From a man aet 21 who suffered from haemoptyses, continuous dyspnoea, and post sternal pain for six months before death. He had a marked family history of pulmonary tuberculosis. The pleural effusion was at first haemorrhagic in nature and later purulent. Temperature varied from 97° to 103°.

During life he had symptoms of pressure on the axillary vein, sympathetic nerve, trachea and superior vena cava. Wasserman Reaction was positive. T.B. were not found in the sputum.

Post Mortem - there was evidence of acute degeneration in the lower lobe of left lung and the upper lobe of the right lung. The apex of the right lung was covered by a mass of new growth in the pleura which extended upwards into the neck and outwards into the axilla. The axillary structures were surrounded by growth, the vein being almost obliterated. The clavicle and the 1st, 2nd, and 3rd ribs were eroded and pulpy. The growth extended down the whole of the anterior chest wall both within and without.

Gummata were present in the liver and spleen.



Front view of the same case showing the thin
reddened skin overlying the tumour.



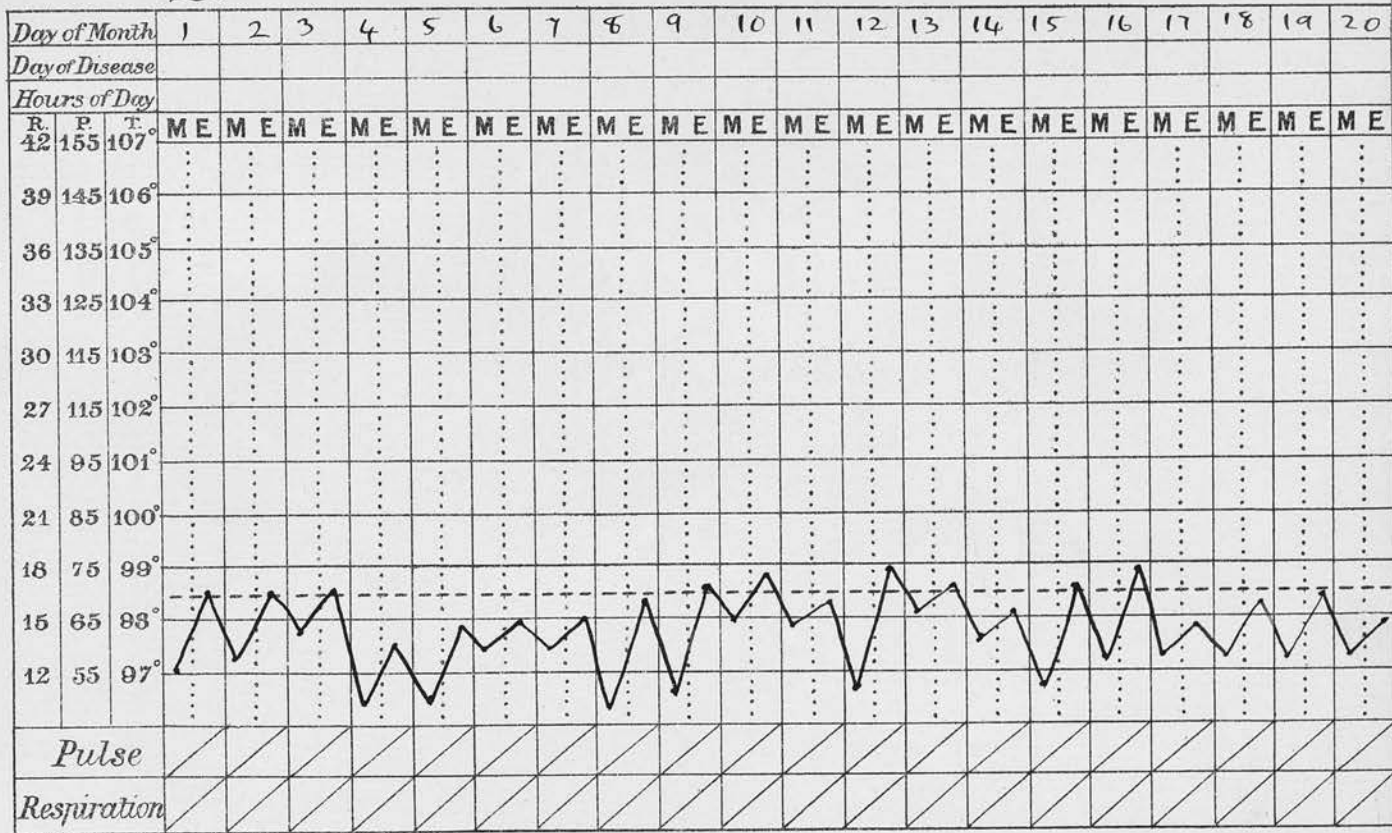
Same case as seen from the left side.



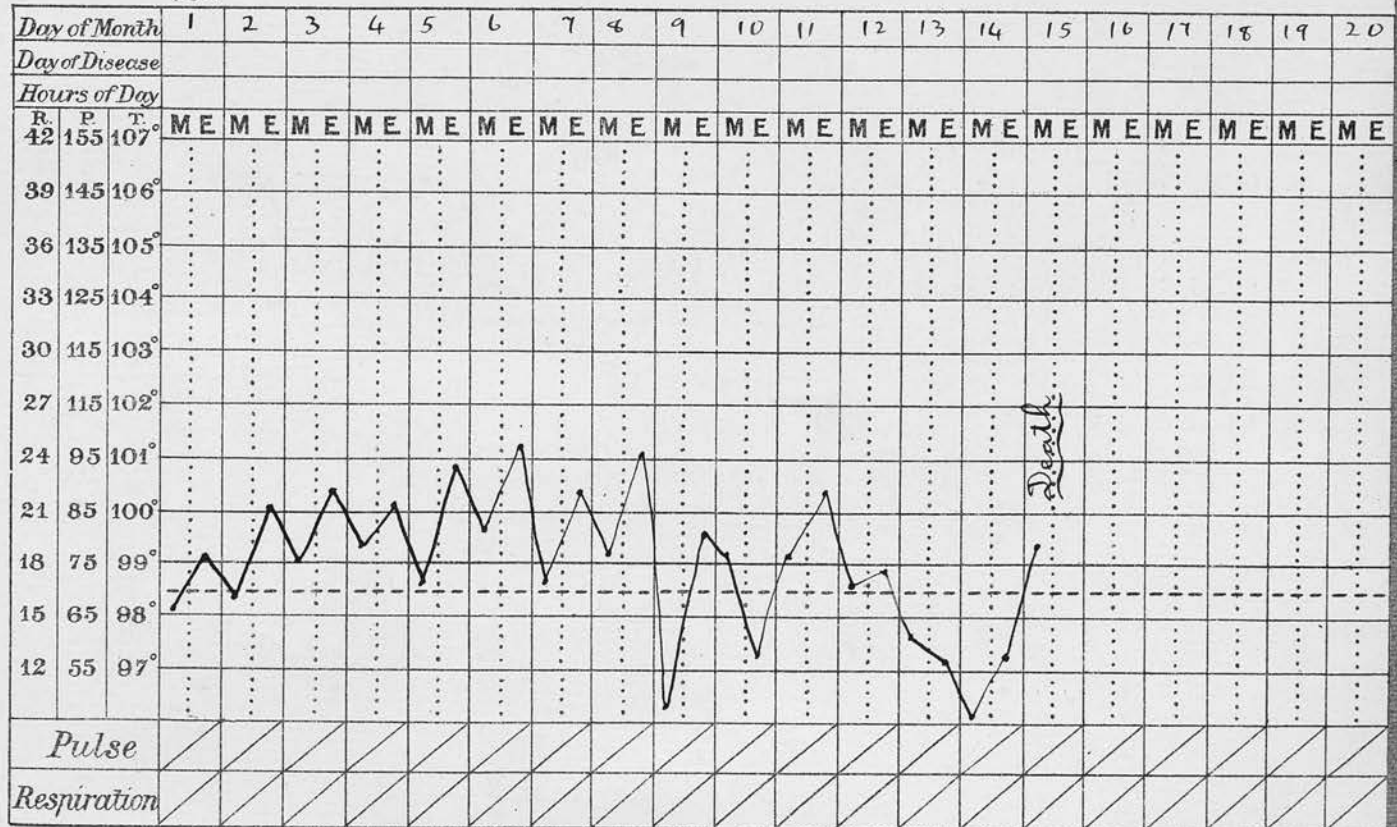
I. Temperature from a case of Mediastinal Lympho-
sarcoma with no complications.

II. Temperature from a case of Mediastinal Lympho-
sarcoma complicated by Septic Broncho-Pneumonia.

Dec



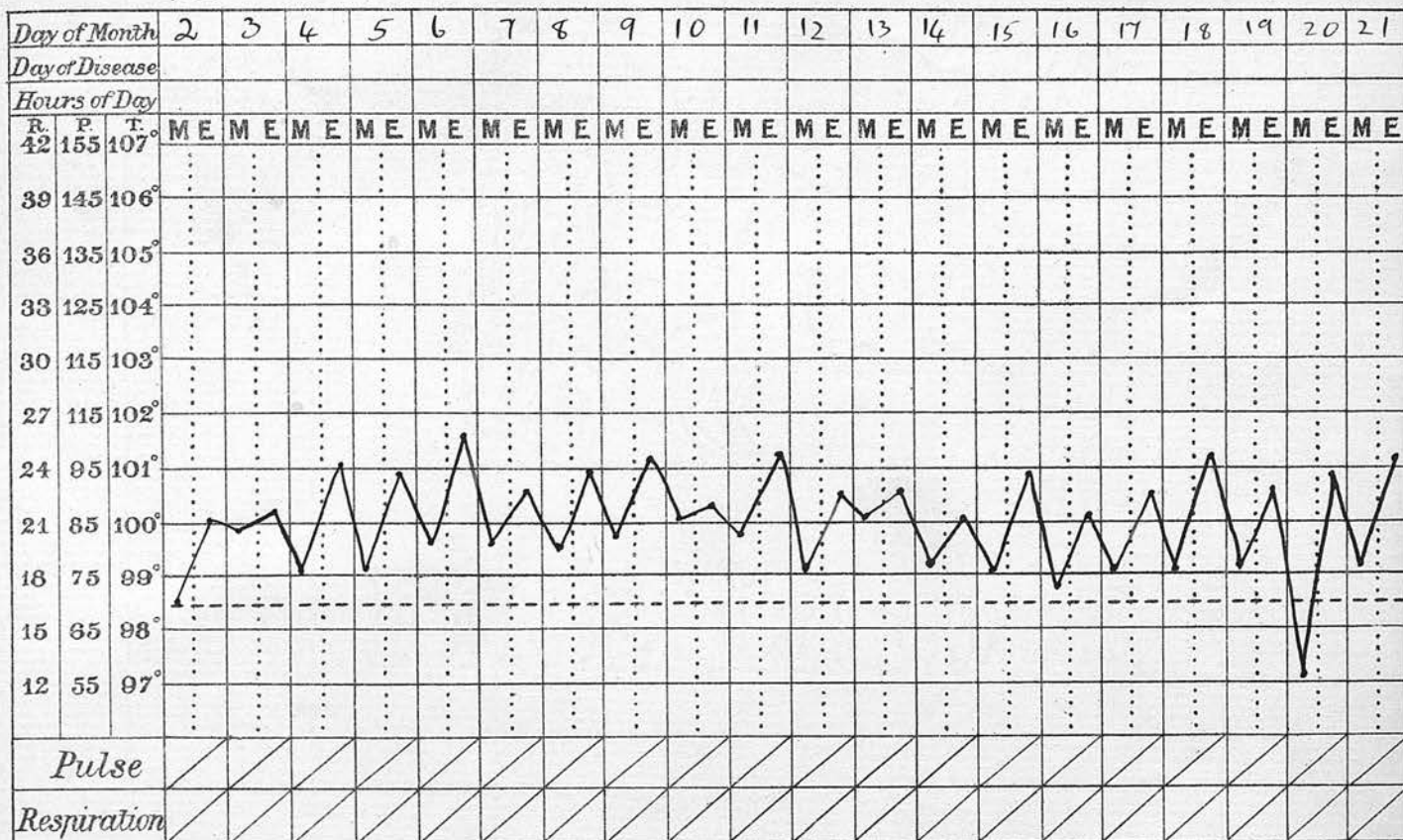
let



III. Temperature from a case of Mediastinal Lympho-
sarcoma complicated by Secondary Bronchiectasis.

IV. Temperature from a case of Mediastinal Lympho-
sarcoma complicated by Disintegration of the
Lung.

Nor



Seh

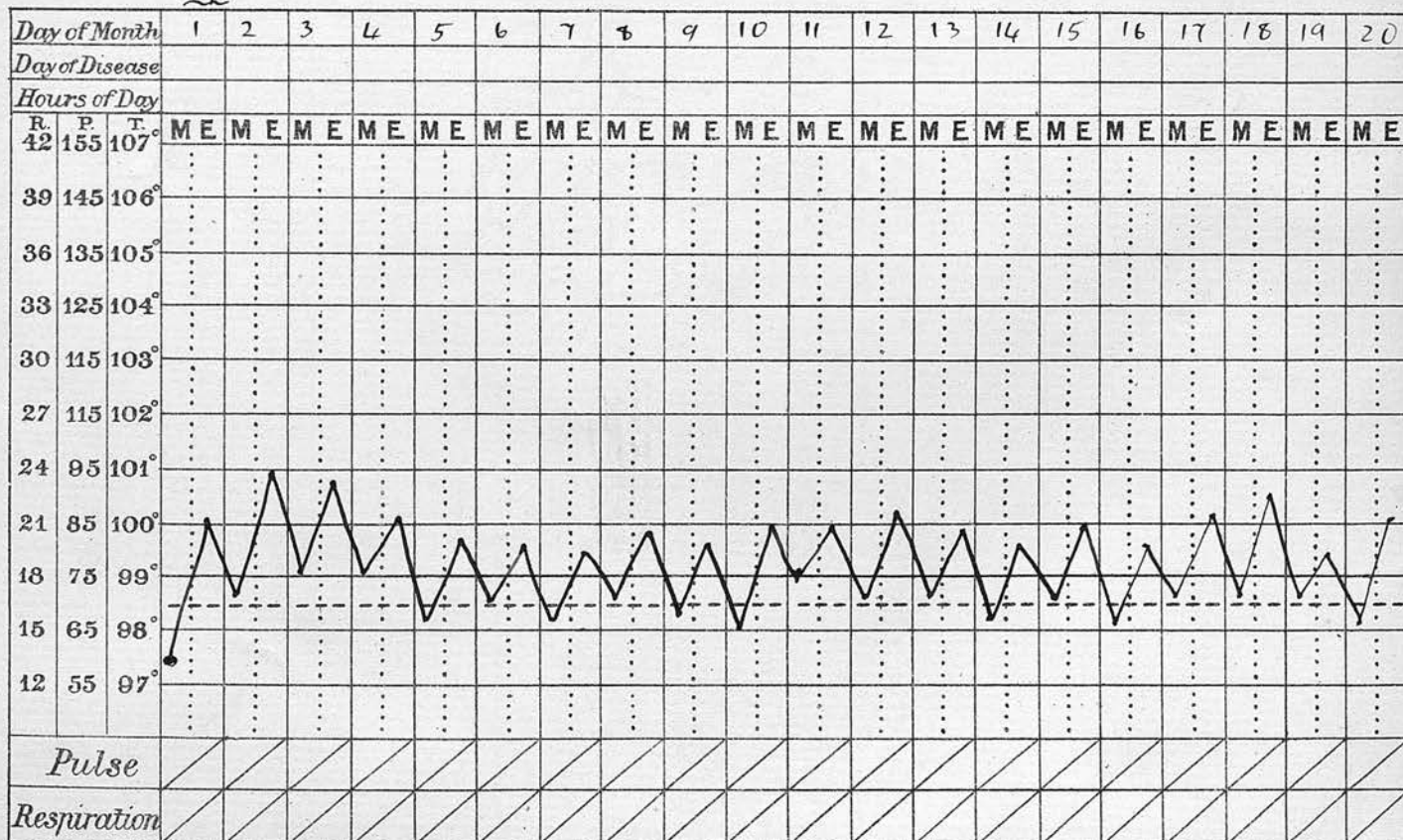
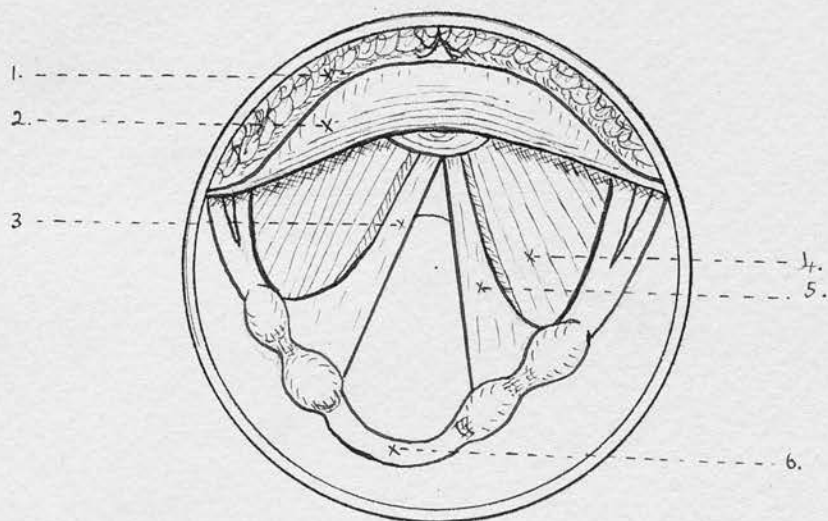


Diagram of larynx drawn from a case of mediastinal tumor during respiration showing paralysis of the left abductor muscle due to pressure on the vagus.

- (1) Base of tongue
- (2) Epiglottis.
- (3) Vocal Cord
- (4) Ventricular Band
- (5) Vocal Cord
- (6) Interaryteroid space.



A Lymphosarcoma arising from the bronchial glands is seen invading the right lung in both upper and lower lobes. The right bronchus is invaded and destroyed. The trachea at its bifurcation and the left bronchus are also infiltrated.

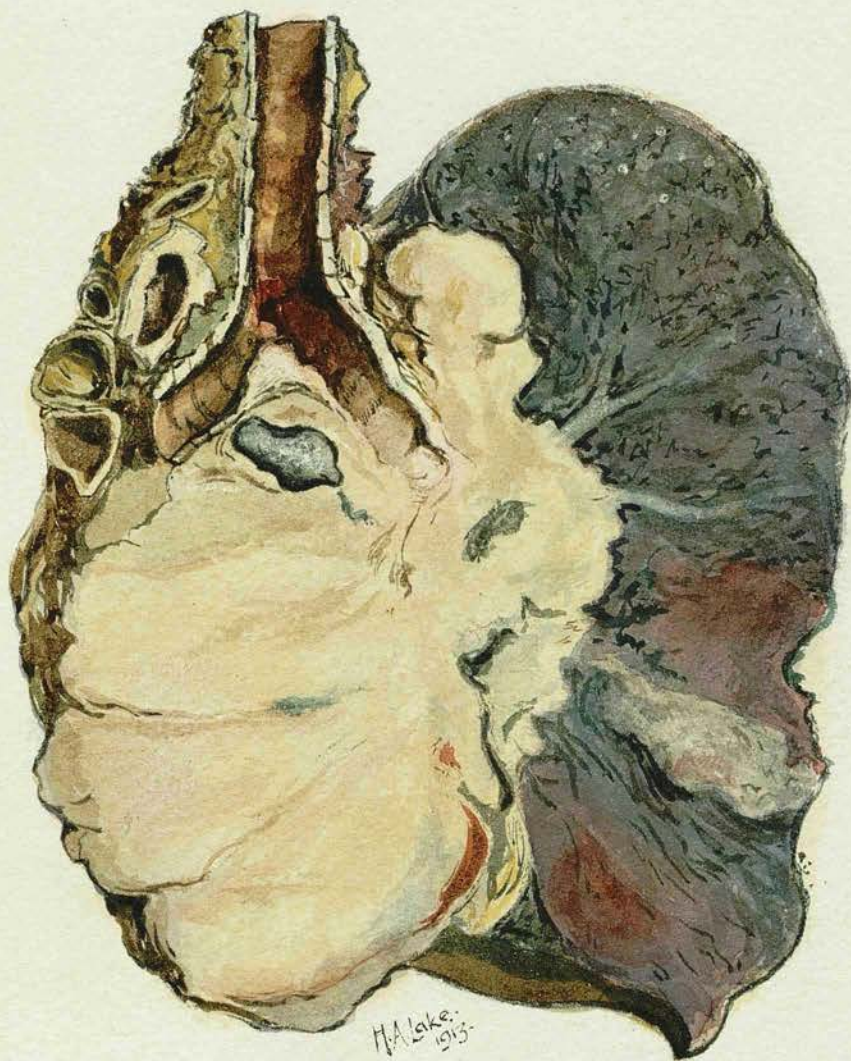
The upper lobe shows evidence of recent tuberculosis (confirmed by microscopical examination).

The lower lobe shows a patch of recent broncho pneumonia.

History: From a woman aet: 42 admitted with signs of pleural effusion at the right base. On three occasions when she was aspirated haemorrhagic fluid was withdrawn. Death was due to suffocation.

Post Mortem: left lung was normal.

The growth invaded both pericardium and right auricle. Secondary growths were found in the suprarenals.

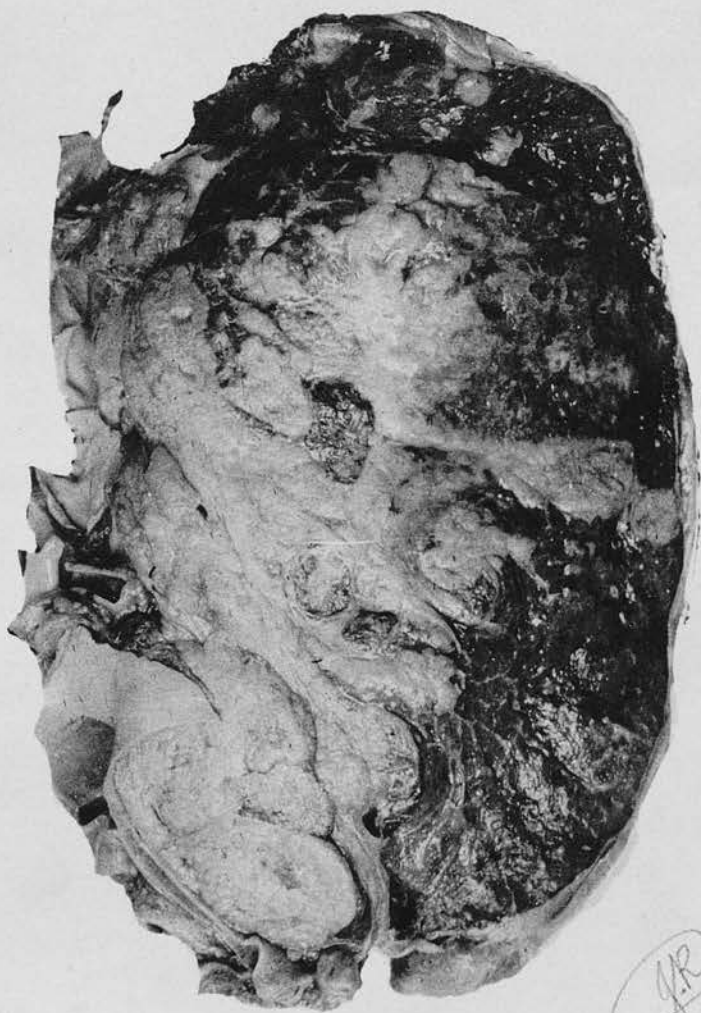


A lymphosarcoma is seen arising from the mediastinum and spreading outwards from the hilum of the right lung, in finger like processes, to reach the pleura about the middle of the lung. The pleura is thickened. The extreme apex and base of the lung were collapsed. At the hilum of the lung were several small pigmented caseous tuberculous glands.

Post Mortem Examination - The left lung was not affected but showed at the apex a few nodules of old caseous tuberculosis.

The right bronchus and superior vena cava were completely blocked by the growth and the oesophagus was pushed to one side but its lumen was not encroached upon. Secondary deposits were present in pericardium liver and pancreas.

History - From a man aet: 46 admitted with signs of slight effusion at the right base, coloured sputum and no temperature. On exploration haemorrhagic fluid was found. Patient died of exhaustion.



J.R.

Vertical Section of the Anterior Portion of the
Right Lung from a case of Lympho-Sarcoma of the
Mediastinum.

A mass of new growth is seen arising from the anterior mediastinal glands and pressing on the trachea.

At the apex of the lung is a typical phthisical
cavity which was confirmed microscopically.

History:- From a man aged 52 who was admitted to hospital with tubercle bacilli in the sputum and all the symptoms of pulmonary tuberculosis.



J.R.

A Vertical Section of the Posterior Portion of
the Right Lung from a Case of Lympho-Sarcoma of the
Mediastinum.

A mass of new growth is seen arising from the anterior mediastinum. Below the bronchial glands are seen to be invaded. The superior vena cava is compressed and to a slight extent both innominate veins but during life there were no signs of pressure.

The pericardium & left bronchus are invaded and the trachea is compressed.

The apex of the lung shows an old cavity with thickened walls while the remainder of the upper lobe is fibrosed.

The lower lobe shows some recent tuberculosis beginning to caseate.

The left lung also showed extensive tuberculous disease - both old and recent.

History:- from a man aet: 54 who suffered for some time from chronic pulmonary tuberculosis. The new growth was never suspected during life. Tubercle bacilli were present in the sputum and both they and typical giant cells were found microscopically in those portions of the lungs affected with tuberculous disease.



GR

Vertical Section of the Posterior Portion of the
Right Lung from a case of Lympho-Sarcoma of the
Mediastinum.

The growth is seen arising from the bronchial glands and radiating along the course of the bronchi into the lower lobe of the lung. .

Post Mortem:- the left lung and all the glands except the bronchial were normal. The pericardium and right auricle were invaded and secondary growths were found in both supra-renals and the left ovary.

The right bronchus was obliterated and the left bronchus and trachea were invaded by the growth.

The upper lobe of the right lung showed evidence
of recent tuberculosis which was confirmed by micro-
scopic examination.

History:- From a woman aet: 42 who was admitted two months before death with a right sided pleural effusion. Haemorrhagic fluid was aspirated on three occasions from the right pleural sac. She finally died with great dyspnoea.



J.R.

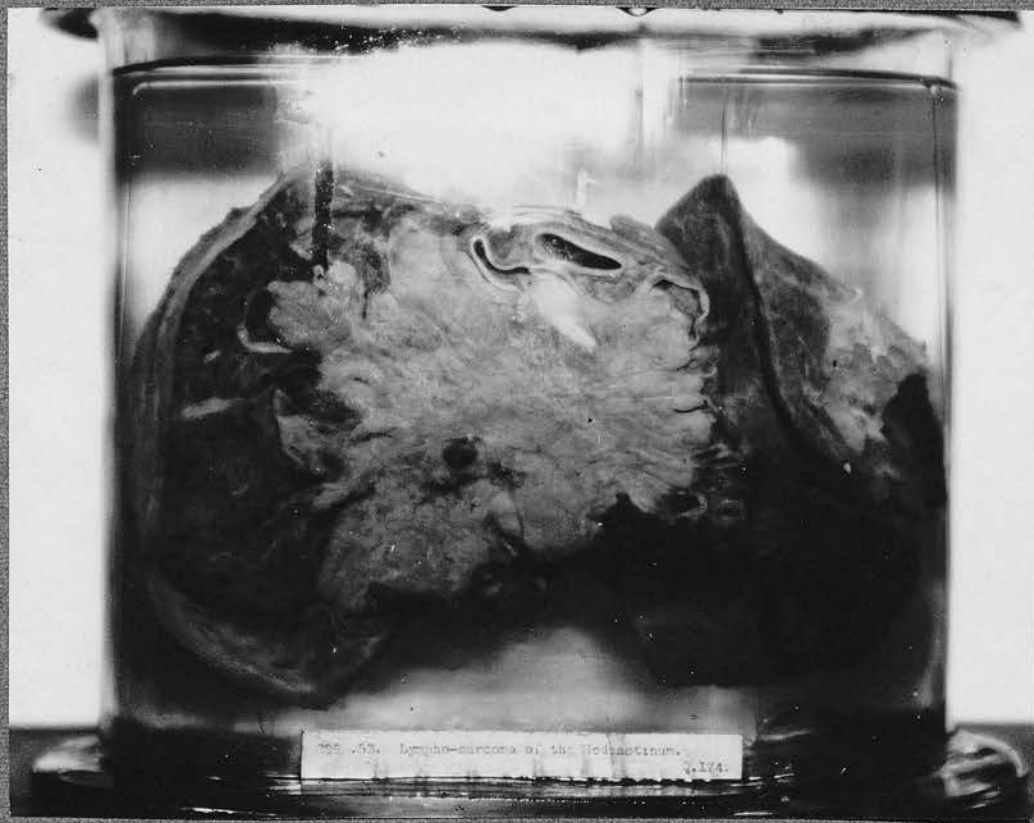
Lympho-sarcoma of the Mediastinum

The photograph shows a horizontal section of the thorax as seen from above.

The mediastinum is the seat of a new growth which is seen invading the pulmonary tissue. The left lung is consolidated and the bronchi contained pus. The pleura is greatly thickened. In the upper part of the photograph the aorta is seen on section with the pulmonary artery lying just below it.

The left pleural cavity was quite obliterated by adhesions. The right contained 303 of blood stained fluid and the right lung was collapsed. Acute pericarditis was also present - the pericardium being invaded by masses of new growth.

History. Specimen was from a man aet: 38. Duration of illness was one year. His symptoms on admission were cough and haemoptyses. He had a swinging temperature due to abscess formation in the left lung.



J.R.

Horizontal Section of a Lympho-Sarcoma of the
Mediastinum.

The photograph is of the upper aspect of the section and shows the arch of the aorta laid open. To the left two white spots are seen indicating the oesophagus which is entirely occluded.

Post-mortem examination showed the growth invading the pericardium and pushing the trachea to the right side. The left lung was collapsed and the left pleural cavity contained blood stained fluid.



JKP

The Lower Aspect of a Horizontal Section of the Thorax. From a case of Lympho-Sarcoma of the Mediastinum

Photograph shows a mass of new growth occupying the whole anterior mediastinum. In the upper part of the photograph it is seen infiltrating the sternum.

The cavities of the heart are seen on section - the walls of both auricles being invaded and almost wholly replaced by the growth.

History:- From a woman aet 33 in whom the growth made its way through the intercostal spaces in the front of the thorax.

Secondary deposits were found in the liver, kidney, and mesenteric glands.

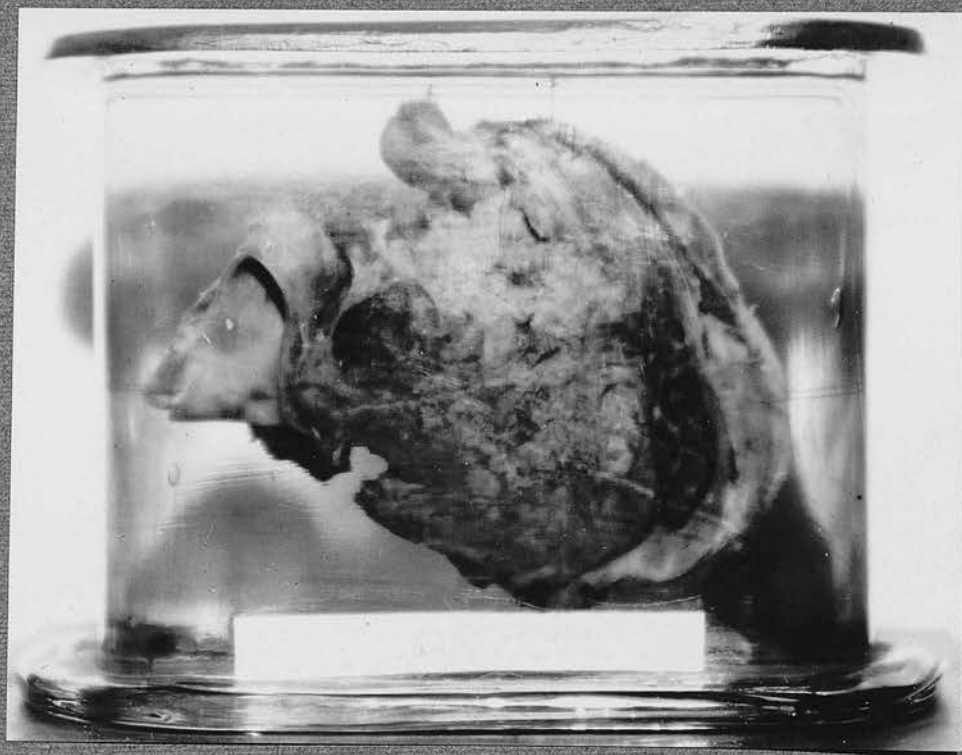


GR

Horiztonal Section of a Lympho-Sarcoma of the Mediastinum.

Photograph shows a friable new growth situated in the mediastinum. On the left the arch of the aorta is seen. A bronchial gland is present showing deposits of new growth. The pleura is greatly thickened.

Post-mortem examination showed the growth surrounding the pericardium, pressing on the superior vena cava and invading the right lung. The right lung was the seat of purulent bronchiectasis which accounted for the high temperature during life. Both pleural cavities contained haemorrhagic fluid.



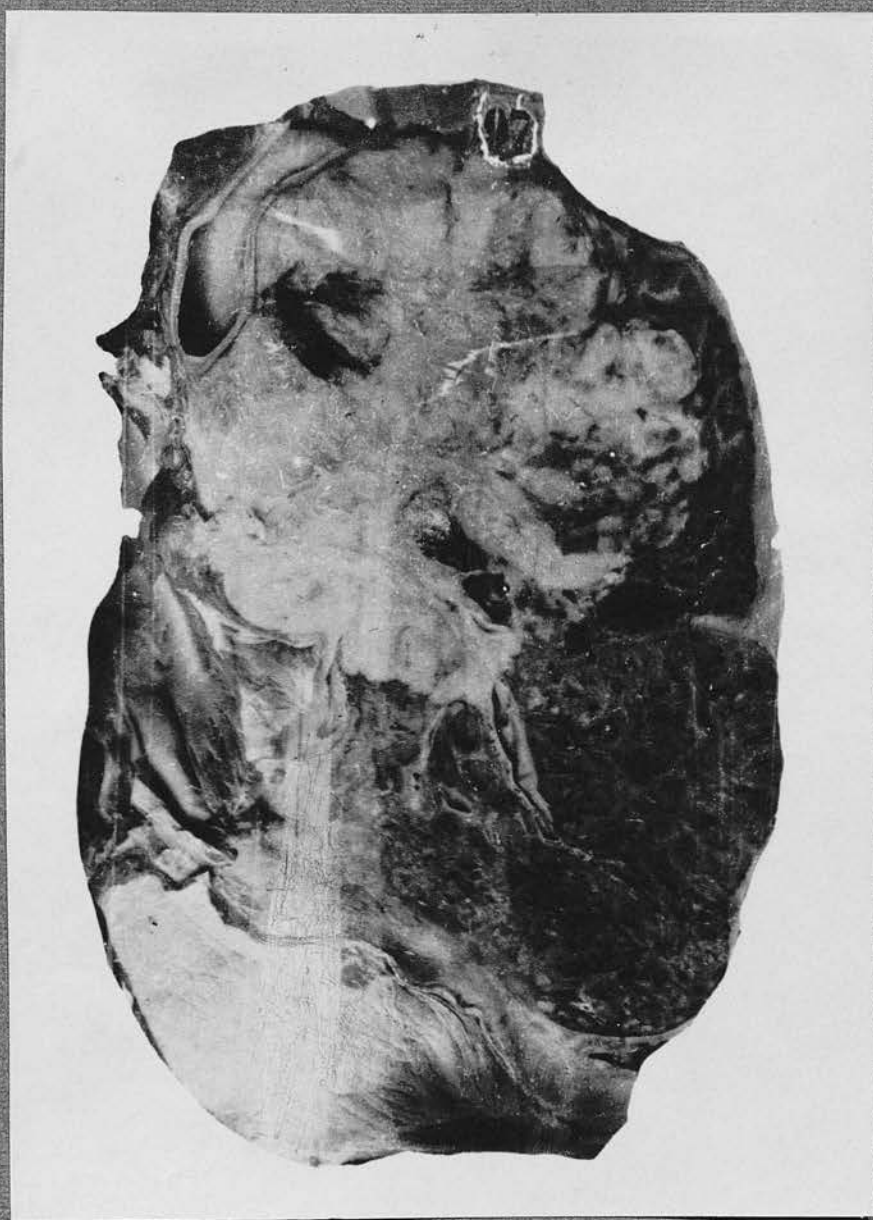
J.R.

Lympho-Sarcoma of the Mediastinum Invading the
Lung.

Photograph shows a section through the anterior part of the right lung. The upper lobe is almost entirely replaced by new growth. The middle lobe and upper portion of the lower lobe are seen slightly invaded by the growth.

History:- From a man aet: 47. One year before death he caught cold and had to leave off work. Four months later cough and dyspnoea commenced.

Port Mortem examination:- showed growth originated in the bronchial glands and secondary deposits were found in the right kidney.



J.R.

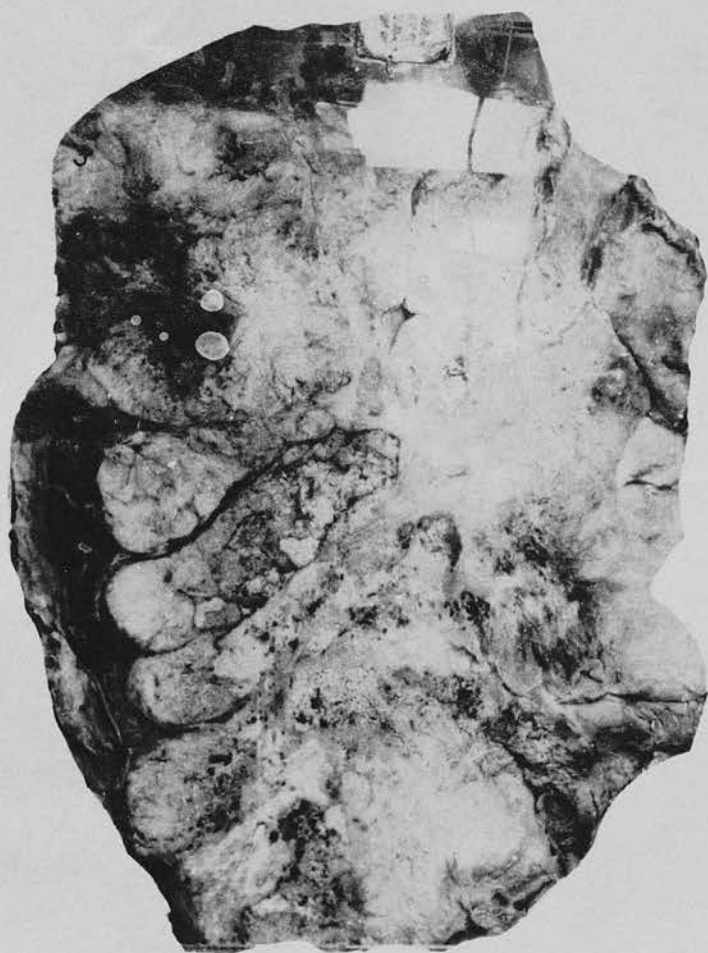
Lympho-Sarcoma of the Mediastinum invading
the left lung.

Photograph shows a section through the upper lobe of the lung which is invaded and replaced by new growth originating in the bronchial glands. The change in shape and great enlargement of the lobe is well seen.

Post-Mortem Examination showed a mass three inches long, two and a half inches broad and half an inch thick in the pericardium. The left ventricle was also infiltrated.

The lower lobe showed many scattered patches of broncho-pneumonia but no sign of malignant disease. The right lung was natural.

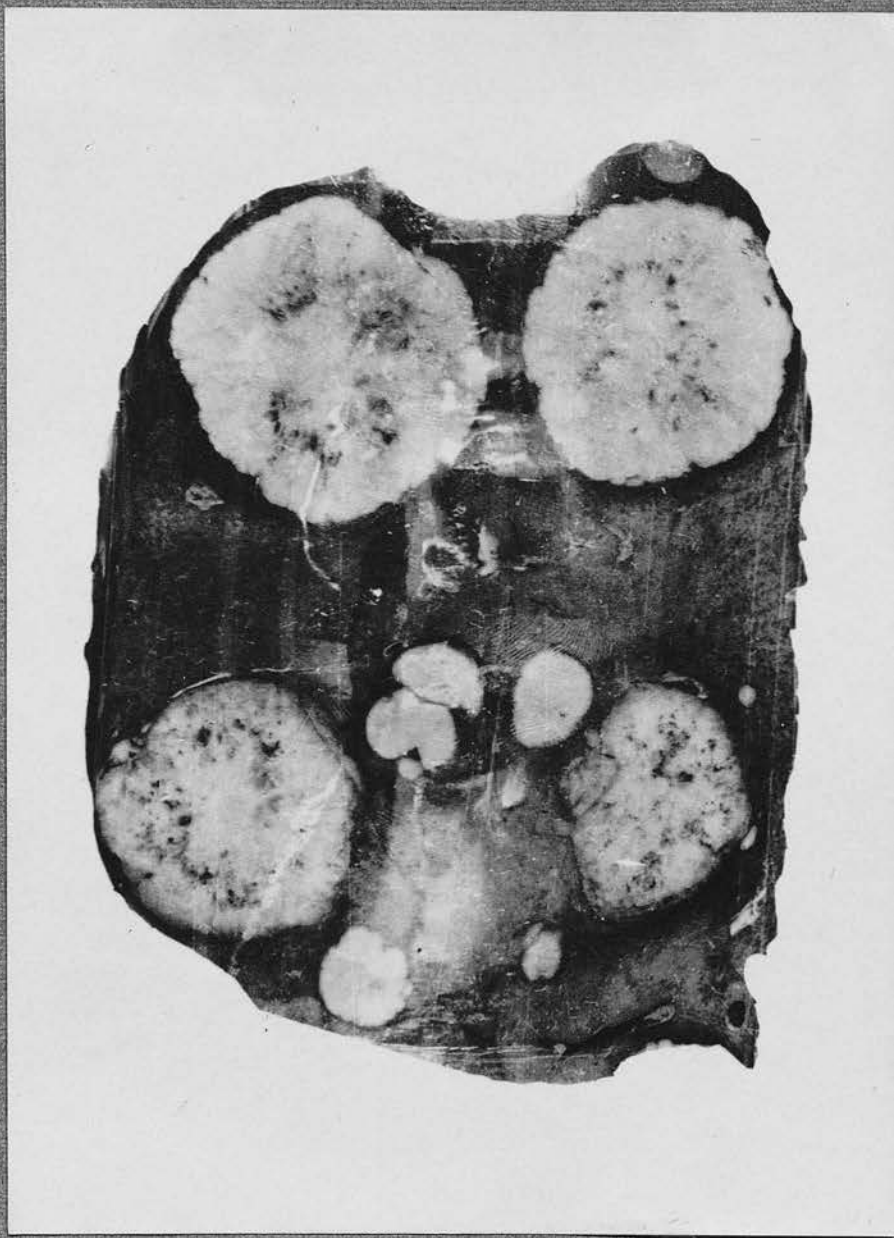
History - From a man aet: 48 who suffered from cough and continuous dyspnoea for six months before death.



GR

Section of Liver Showing Typical Malignant Nodules
which were very Palpable during life.

From a man aet: 38 who during life suffered from sarcoma of the mediastinum. There were also secondary growths in the brain, sternum, ribs, lungs, thyroid and supra-renals. The case illustrated the great value of abdominal palpation.



JK

Diagram Illustrating Lantern Slide I.

The slide is an unretouched reduction of an X-ray plate taken from a case of Lymphosarcoma of the Mediastinum.

The chest is seen occupied by a dense opaque mass which is very sharply defined.

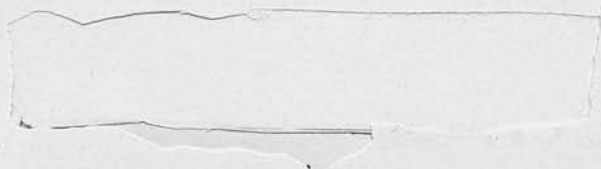


Diagram Illustrating Lantern Slide II.

The slide is one taken of the same patient as shown in slide I. but three weeks later. It illustrates the rapid changes which may occur in such cases.

The marked roundness of the shadow on the left side has altered. It is no longer sharply defined but is seen to gradually merge into the surrounding tissue.

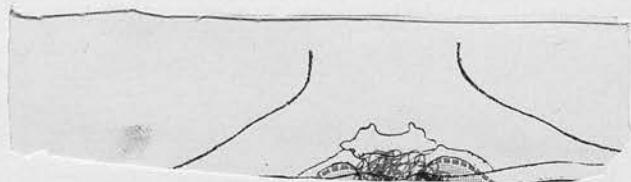
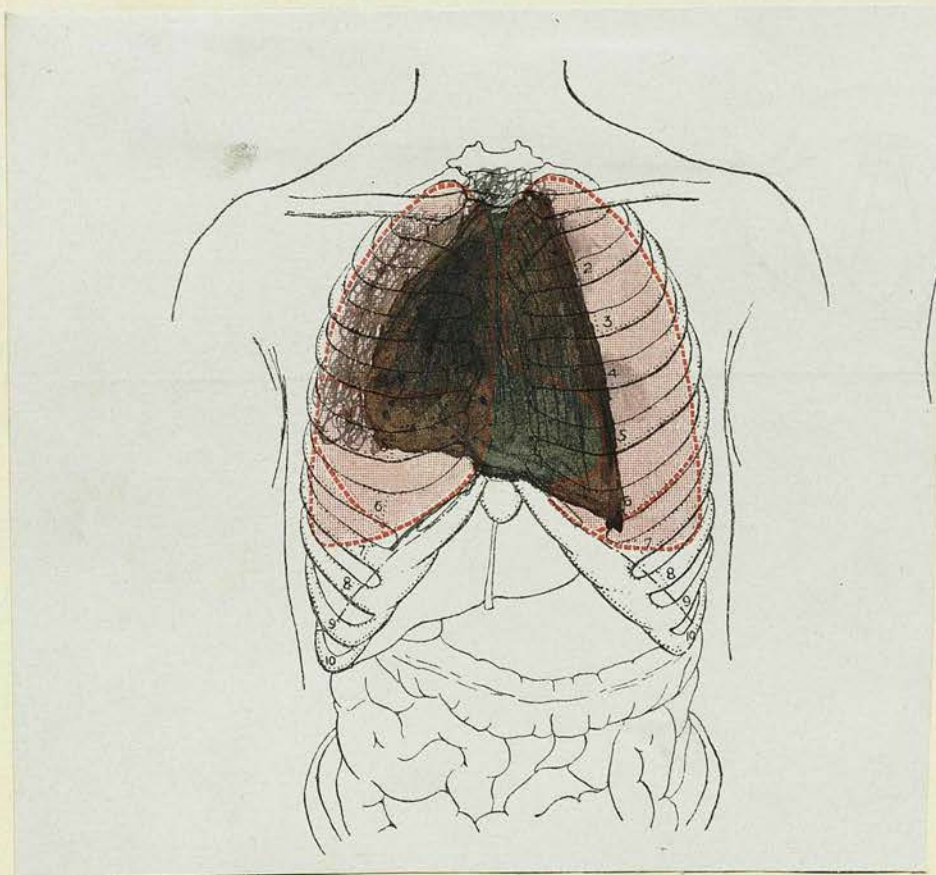


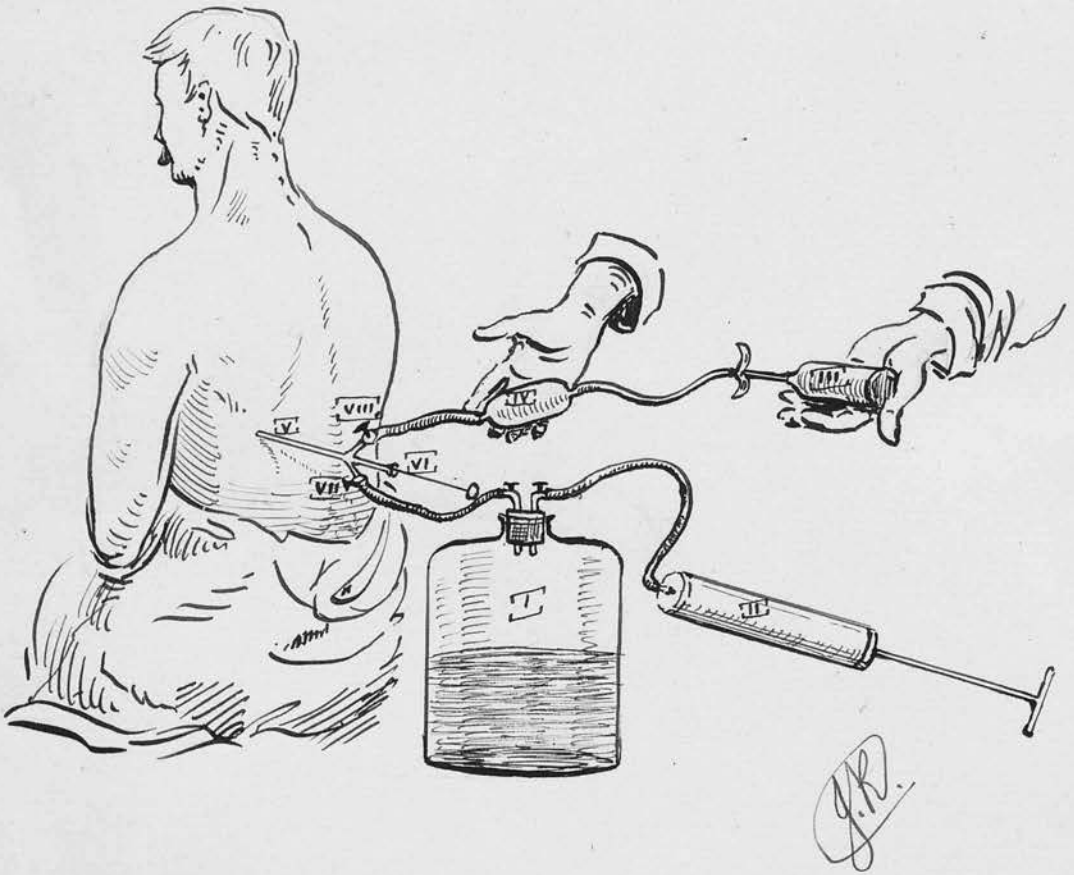
Diagram Illustrating Lantern Slide III.

The slide is an retouched reduction of an X-ray plate taken from a case of Lympho-sarcoma of the mediastinum.

A large dense opaque mass is seen occupying the mediastinum and spreading into the pulmonary tissue.







INSTRUMENT DESIGNED TO ASPIRATE THE PLEURAL EFFUSION
IN A CASE OF NEW GROWTH AND REPLACE IT WITH AIR.

- I. An ordinary aspirating bottle
 - II. A pump for exhausting the bottle.
 - III. A pump which expels of air at each
 depression.
 - IV. A chamber for sterilizing the air before it
 enters the chest.
 - V. A canula inserted into the pleural cavity.
 - VI. The needle of the trocar drawn out.
 - VII & VIII. Stopcocks.
-

Method of Procedure. Bottle I is exhausted and trocar and canula (V & VI) are inserted into the pleural cavity, stopcock VII is opened and the fluid is drawn off into I. VII is then shut and VIII opened. The requisite amount of air is then pumped in by III and after being sterilized in IV passes into the pleural cavity and prevents reaccumulation of the effusion.

CONCLUSIONS

CONCLUSIONS

(1) Malignant disease of the Mediastinum is not such a rare disease as is generally supposed but innocent tumours of the mediastinum are exceedingly rare in this country.

(2) It is essentially a disease of early middle age but it may occur at any age.

(3) It seems to be slightly increasing in frequency.

(4) The disease is twice as common in males as in females.

(5) A definite tuberculous history is very commonly found.

(6) A malignant family history is often present but not so commonly as a tuberculous.

(7) Though tubercle bacilli are usually not found in the sputum still there is probably some obscure relationship between pulmonary tuberculosis and new growth of the mediastinum.

(8) The anterior mediastinum is the common seat of origin.

(9) Sarcoma is the commonest form of malignant disease of the mediastinum in both sexes and it usually takes the form of Lymphosarcoma.

(10) Carcinoma of the mediastinum is relatively speaking much commoner in females than in males.

(11) The lungs are practically always affected sooner or later and pulmonary symptoms are usually present.

(12) The right lung is much more commonly affected than the left.

(13) Extra thoracic Metastases are very common and often very ^{palp}~~app~~able. In any case suggesting mediastinal new growth palpation of the abdomen is of the greatest diagnostic significance.

(14) A middle aged person with obscure pulmonary symptoms or with symptoms out of proportion to the physical signs should be submitted to a careful and thorough examination and not hastily diagnosed as neurosis.

(15) A diagnosis is quite within the limits of the ordinary practitioner and no scientific or difficult tests are necessary in making a diagnosis strongly pointing to the condition.

(16) If pyrrhexia is present it is due to some complication supervening upon, or caused by, the original condition.

(17) Microscopic examination of the sputum is rarely of great diagnostic value but the persistent absence of tubercle bacilli in the sputum of a case suggesting pulmonary tuberculosis is very significant.

(18) Haemoptyses is a moderately common symptom.

(19) Careful percussion is of the greatest importance.

(20) A pleural effusion is very often present and it is often haemorrhagic but a haemorrhagic effusion is not as pathognomonic of the condition as older observers believed.

(21) Microscopic examination of the pleural fluid should always be done but it is rarely of diagnostic importance.

(22) A large proportion of small lymphocytes in a pleural effusion is quite as characteristic of malignant disease as of pulmonary tuberculosis.

(23) Laryngoscopic examination is of the greatest importance in detecting early signs of pressure and may be of great value even before any vocal defect can be detected by the ear.

(24) X-rays and the bronchoscope are of great value in the hands of an expert in making an early diagnosis.

(25) The disease is usually fatal in less than a year and exhaustion is the common cause of death.

(26) At the present time treatment is practically entirely palliative. In all probability radium has a great future before it and provided an early diagnosis be made radical surgical measures may at any rate prolong the life of the patient.

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REFERENCES

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