PRIMARY INTRATHORACIC GROWTHS.

(A CLINICAL & PATHOLOGICAL STUDY OF CASES OCCURRING IN THE VICTORIA INFIRMARY, GLASGOW.)

by

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This paper is based on a series of cases which were examined by me, clinically and pathologically, while acting as outdoor house physician at the Victoria Infirmary, and during the tenure of a Muirhead Scholarship in the Clinical Laboratory of that Institution.

The post mortem and clinical records, together with specimens and microscopical slides, were put at my disposal for the purposes of this study. With the exception of one case, all the tumours considered developed as primary growths of lung, bronchus, or mediastinum.

INTRODUCTION.

A study of the literature on malignant intrathoracic growths reveals a distinct change in the conception of this form of cancer in the last thirty years. Perhaps the most striking feature, to the modern reader of not only textbook articles but also monographs on this subject written at the beginning of this century, is the amount of emphasis placed upon the mediastinum as a source of tumour growth, and the comparatively small amount of attention paid to those tumours which arise in the lung.

F. T. Roberts/

F. T. Roberts in "Clifford Allbutt's System of Medicine" (1900) regards primary lung tumours as extremely rare and though he gives, for that period, a fairly full account of those growths, yet his symptomatology shows that, as far as he is concerned, the term "intrathoracic new growths" practically means "mediastinal new growths". De Haviland Hall, also, in the Encyclopaedia Medica (1901) groups his mediastinal and lung tumours under the heading "Mediastinal and Other Intrathoracic Growths". Sir R. Douglas Powell also stresses the mediastinal growths in his "Diseases of the Lungs and Pleura". Lindsay Steven (1891) confines his attention entirely to the mediastinum in his monograph, and the same occurs in many other works.

Turning to the writings of the present day, one finds a complete reversal of this order. Tumours of lung are now considered in far more detail, and mediastinal growths, though still given prominence clinically, are being regarded, in many instances, as pathologically correlated with those of the bronchi. This reversal of importance, though perhaps of gradual onset, seems to date from 1912 when Adler published his "Primary Malignant Growths of the Lungs and Bronchi".

With the interval of the War Years, an ever increasing amount of literature has been written on this subject. This is particularly true in America, where more attention seems to have been given to these tumours than in this country. Playfair and Wakeley in 1922 state that they could trace records of only three/

three cases reported in British Journals, while thirty had been recorded in America since 1918.

Concomitant with this change there is a great alteration in the histological grouping of cases. Taking again, as examples, the papers of about thirty years ago, it is found that sarcoma, and particularly lympho sarcoma, was held to be the most common tumour of the mediastinum. F. T. Roberts, in discussing this point in relation to Hare's view that carcinoma was more common, says "many growths formerly described as cancerous would now be removed from that category". Lindsay Steven also holds this view and other authorities seem to agree. To-day the tendency is more in favour of describing many mediastinal tumours as carcinomatous and probably arising in bronchial epithelium. These tumours were formerly described as sarcomata, the view that they are of epithelial origin being first promulgated by Barnard in 1926, although Adler and others have mentioned the possibility of this conception. Since Barnard's paper, several other writers, including Shennan and Duguid, have supported this view.

It would appear from most recent writers, that the general opinion is that intrathoracic growths, particularly those of lung, are more common than they were. Adler, in 1913, was of the opinion that primary lung tumours seemed to show a decided increase. Shennan and Duguid also show some increase in intrathoracic growths as a whole, in recent years, and Playfair and Wakeley/

Wakeley, in the article already quoted, find that the years 1920/1922 yielded more cases than the previous seven years of the decade 1913/1922. How far this is a true increase it is difficult to say, as many factors might be cited to account for the frequent incidence. From the clinical aspect, better diagnosis with the help of X-rays, might account, in some measure, for the increase. It has been suggested, particularly with reference to primary lung tumours, the symptoms of which so often resemble phthisis, that a diagnosis of tubercle may have been given in the earlier days in many cases which now would be diagnosed as pulmonary cancer. On the pathological side, also, it might be suggested that the increase is due to more frequent post mortem examination, especially in doubtful lung cases, and the more complete investigation and placing on record of the autopsy findings in such cases.

Allowing for both those explanations, it is still apparent that the increased percentage is considerable, and, if a further explanation of this is required, modern conditions of life must be examined to ascertain if they present any etiological solution.

ETIOLOGY.

In the older books the causation of intrathoracic growths is seldom very fully discussed. On consideration, this is not unnatural, since tumours of lung were supposed to be extremely rare and when they did occur were grouped etiologically with carcinoma elsewhere/

elsewhere in the body. Another point, which has already been raised, is that sarcoma and particularly lympho-sarcoma of the mediastinum was then regarded as the most common of intrathoracic growths. Since lympho-sarcoma attacks other groups of glands besides those of the mediastinum, the factors of its causation are not solely confined to any intrathoracic condition and are, therefore, not dealt with in articles on that region. The same may be said of a lymphadenomatous enlargement of the mediastinal glands.

Hereditary proclivity, trauma, and, in a small group of cases, occupation, are vaguely referred to, the occupational group being the familiar cancer of Schneeberg miners, which is stated to have been lympho-sarcomatous in nature. Beyond this, no definite relationship between cause and effect has been established.

With the modern tendency to group many mediastinal tumours under carcinoma of bronchus, the etiological correlation with tumours arising in the lung is evident, since the epithelium of bronchus is subjected to much the same conditions as the epithelium lining the lung alveoli. Theories regarding the causation of these tumours for the most paft indicate that chronic irritation of the respiratory tract is now considered an important factor, and differ only in the predominant agents causing this irritation, which vary according to the opinion and findings of the writer.

Old-standing respiratory disease such as bronchitis or interstitial/

interstitial pneumonia has been found, by many writers, to precede tumour formation. Tuberculosis is stated by Ewing to be the chief etiological factor, and he further substantiates this by quoting cases in which tumour formation has been found in tuberculous cavities. In recent years influenza has been particularly stressed, the epidemic of 1918 being regarded, chiefly in America, as considerably affecting the increase.

It is considered significant by some writers that the increase in lung tumours should roughly correspond with the increase in motor traffic. These investigators suggest that the irritating gases which escape from the exhausts of petrol-driven motors have a deleterious effect on the respiratory epithelium. The modern extensive tarring of the roads is also given as a contributary factor since tar has been used experimentally to cause epithelioma. Dusty occupations, with the consequent inhalation of small particles, and pneumokoniosis are also instanced. In this connection it has been found in Geneva that wood-dust may play an important part.

CLINICAL CONSIDERATIONS.

INCIDENCE. From the post-mortem records of the Victoria Infirmary I have been able to collect 61 cases of primary intrathoracic growths (until the end of 1928). Of these 10 occurred in the decade 1899-1908, 13 during 1909-1918, and 38 during 1919-1928. The following table shows their relation to the post-mortem/

post-mortem examinations held during those years:-

Years.	Post-mortems.	Cases.	Cases as % of post-mortems.
1899-1908	1967	10	0.51
1909-1918	789	13	1.64
1919-1928	1303	38	2.91

The fall in the number of post-mortem examinations during 1909-1918 is, in part, due to the under-staffing of the Pathology Department during the war period, and, also, to the fact that part of the hospital was used for military cases, of which a very small proportion came to post-mortem examination. To base any statistics on the percentage of cases found at autopsy is, of course, quite inaccurate, since routine examination of every case dying in this Infirmary is not practised. On one side, it is clear that if this were the rule, the percentage of intrathoracic tumours would be considerably lowered; on the other hand it might be argued that latent tumours which are occasionally found at present, would be brought to light, and thus would swell the total. Another point, which may have a slight effect, is the fact that in cases clinically simulating intrathoracic growth permission for post-mortem examination may not be obtained.

The great increase from 0.5% in 1899-1908 to 1.6% in 1909-1918 is entirely due to the fall in the number of autopsies performed during the later decade and is a good example of the inaccuracy/

inaccuracy of this basis. When we come to 1919-1928 however, with 38 cases as against 23 in the past twenty years, allowing for the difference in the post-mortem rate, there is, obviously, a distinct increase. As a matter of fact, taking the first two decades together, there are 2756 autopsies, which is a little more than double the number during 1919-1928.

An analysis of the years 1919-1928 shows a more or less steady increase, 1 case occurred in 1919, 3 in 1920, 2 in 1921, 3 in 1922, 4 in 1923, 3 in 1924, 5 in 1925, 3 in 1926, 5 in 1927 and 9 in 1928, giving 25 cases in the latter half, as compared with thirteen in the first half of the decade. As there has been no increase in the number of medical wards during the last ten years the number of medical cases treated yearly will be roughly the same.

SEX. Of the ten cases during 1899-1908 5 were males and 5 females. In the decade 1909-1918 out of 13 cases 10 were males and 3 females. Lastly during 1919-1928 of 38 cases, 18 were males and 20 females. That is out of 61 cases, 33 were males and 28 females. A point upon which all writers are agreed is the more frequent incidence of this disease in males. Shennan gives 24 males and 4 females, M. W. Marsman records 15 primary lung cases in which only 1 was a female, and out of 175 cases Duguid finds 151 males and 24 females. Adler gives a proportion of 71.9 to 24.8. The figures quoted above show only a slight male preponderance, and it is remarkable to note that the/

the greater part of the increase during 1919-1928 is due to the marked rise in the incidence among females.

AGE. In one case the age was omitted.

From	1 - 10 years	- -	0 Cases.
"	11 - 20 "	- -	3 "
"	21 - 30 "	- -	4 "
"	31 - 40 "	- -	9 "
"	41 - 50 "	- -	11 "
"	51 - 60 "	- -	17 "
"	61 - 70 "	- -	15 "
"	71 - 80 "	- -	1 "
			60 "

This agrees for the most part with the findings of other writers, the majority being over 40 years of age. Since specimens of all the tumours were not available the relation between the age and the type of tumour cannot be definitely given, but from the post-mortem reports of the three cases under 20 years they would appear to have been genuine lymphosarcomata. Of the microscopical specimens examined it would appear that while the oldest case of sarcoma was 39, cases of carcinomata varied from 26 to 72 years of age.

OCCUPATION. Among the males this showed considerable variation. Of the 33 men there were 5 engineers, 3 labourers, 3 clerks, and one of each of the following,- tramwayman, sugar confectioner, plasterer, tilelayer, miner, motor driver, joiner, car/

car cleaner, warehouseman, boiler inspector, carter, head porter, ship rigger, grocer, bricklayer, sawyer, draper, machineman, storekeeper, and traveller. No occupation was given in two cases. Of the 28 women there were 22 housewives, 2 schoolgirls, 2 dressmakers, 1 retired nurse, 1 typist.

There would not appear to be any marked occupational incidence except that the number of engineers is fairly high (16% of the males), but the total number of cases is too few to place any stress upon this. The engineers, machineman, motor driver, however, might be grouped together as working under similar conditions, and the plasterer, tilelayer, miner, joiner, car cleaner, carter, bricklayer, boiler inspector, sawyer and tramwayman as carrying on their work in air more or less dust laden, the dust being either of mineral or vegetable origin. The term labourer is rather indefinite, but it is recorded in one of these cases that the man worked in an atmosphere of sal ammoniac for more than 10 years. This would certainly suggest a chronic irritation of the respiratory tract. As regards the women, that they are nearly all housewives is of no significance since the majority of middle-aged women of their class have become housewives.

DURATION. The shortest history given in this series was a case in which the time elapsing between the onset of the first symptom and death was 3 weeks. The longest history was in Case 36 (see Appendix) where the lung involvement apparently began 5 years before death.

These are both unusual figures, the average in the 61 cases working out at a little over 6 months. Cases have been recorded in which the duration has apparently been 4 or 5 years, but these are exceptional and point to an extremely slowly growing tumour. In the case recorded above the growth was a spindle celled sarcoma secondary to a tumour of thigh.

GROUP TYPES. In considering the clinical symptoms and signs in these cases it is found that each falls more or less into one of the four groups. The FIRST GROUP consists of these cases in which the effects of pressure are the most marked features of the history. In the SECOND GROUP are collected the cases in which pneumonic and bronchitic symptoms predominate. In the THIRD GROUP are those cases in which signs of cerebral metastases have to some extent masked the primary lesion, and lastly, a FOURTH GROUP of cases where an unsuspected intrathoracic tumour was found during a routine post-mortem examination.

GROUP 1. The history given in a typical case in this group is probably that some months before admission the patient began to have a feeling of tightness in the chest, with some breathlessness. This increased, and, in addition, attacks of breathlessness came on at irregular intervals, lasting for about ten minutes or so, and then passing off; later becoming more frequent. These attacks are often described as "asthma". Pain in the arms, shoulders, back, and lumbar region may accompany, precede, or follow this dyspnoea, but is usually an early symptom. The

pain/

pain may become extremely severe, particularly at night. Another symptom is an irritating cough which is of a harsh and spasmodic character with, usually, little sputum. Complaint of tingling and a feeling of coldness in one or other limb may be made. The patient frequently appears fairly well nourished although he may admit recent loss of weight. This loss is very often best seen in the legs, being masked in the upper part of the body by the oedema which gives the face, neck and chest a full, bloated look. Oedema is usually marked in the lumbar cushion and the veins of the chest are prominent. The veins in the neck also stand out and the complexion varies from bluish red to almost black during the paroxysms. Vasomotor disturbances are very common, flushing of one side while the other is normal. Inequality of the pupils due to interference with the sympathetic is sometimes found, and also, occasionally, inequality of the pulses.

As the tumour progresses the breathlessness becomes constant, rather than paroxysmal, and extremely distressing, cyanosis and oedema increase and the patient dies fighting for breath.

Case 35 might be taken as an example of this type. Of the 61 cases collected 28 might clinically be placed in this category, i.e., roughly 46%

GROUP 2. Under this heading are grouped those cases of tumour in which the clinical histories resemble a chronic bronchitis or pneumonia. The patient's story is commonly that of an attack of influenza, bronchitis, or pneumonia which did not clear up but left/

left a troublesome cough and fairly abundant spit. In two cases which I investigated the patients dated all their chest trouble from anaesthetics some months before. Breathlessness is also a feature, but unlike that of the cases in Group 1 this breathlessness is continuous and resembles that of cardiac disease.

In appearance the patient usually presents a marked contrast to a typical case in Group 1. By the time he reaches hospital there has been considerable loss of weight and is markedly cachetic. This, together with the cough and spit, are sufficient to lead to a diagnosis of tubercle even if other signs are absent. Another very frequent pro-tuberculosis sign is night sweating which occurs in a large number of cases. Fluctuations of temperature are also present, particularly latterly when breaking down processes are going on, and the patient gradually becomes more cachetic and dies of exhaustion (see Case 32).

Into this group also might be placed as a subdivision those cases of lung tumour in which the first sign of any mischief is pleurisy with effusion. Sent into hospital as cases of pleurisy these cases apparently recover after tapping and are discharged well. A few weeks later the patient is readmitted with a recurrence of the effusion. On aspiration the fluid is frequently blood-stained and this is said by some to be strong evidence for the case being one of tumour, although it can also occur in tuberculosis. Tapping may partially relieve the breathlessness, but seldom does so entirely. An example of this is found in Case 26. There/

There are 25 cases in this group, i.e., roughly 41%

GROUP 3. The cases in this group are those in which cerebral symptoms due to metastasis predominate so that the primary lung tumour is often entirely overlooked. These form only a small proportion of the actual cases, 5 of the 61, roughly about 8% of the total. The symptoms are the usual ones of brain tumour, i.e., headache and giddiness, vomiting, optic neuritis, gradually giving place to unconsciousness. Case 27 is a good example of this type.

GROUP 4. Into this group are placed those cases which are undiagnosed throughout life, and the existence of a tumour not suspected until revealed at post-mortem examination. These patients, 3 of the 61 cases or roughly 5%, during life showed no signs of respiratory distress nor any other symptom such as cough and spit which would lead one to a correct solution. Case 33 shows this difficulty of coming to a correct conclusion.

This classification is of course clinical and as such is imperfect, as many of the cases do not fit entirely into any one group, and in some instances the clinical notes are not very full and most of the older cases were only traced with great difficulty. The percentages are not therefore exact.

The more important symptoms, cough, sputum, pain, changes in the voice, cachexia, require some further comment. These symptoms vary with the particular point of origin of the tumour.

COUGH. As has been said before this is an important and usually/

usually very early symptom in the type clinically resembling phthisis. It is in no way characteristic of malignant disease and suggest a bronchitis with copious exudate. It is usually worst in the morning and then the muco-purulent sputum is abundant. It is not a distressing cough even when the sputum is fairly scanty which is often the case in the early stages. In many instances the patient when closely questioned admits that he had had a slight cough for months which he considered too insignificant to worry about. This type of cough is found where there is a tumour beginning in the alveolar tissue or smaller bronchioles and spreading outwards into the lung, with at first consolidation and later necrosis with corresponding increase of sputum. The tumour which begins at the bifurcation or just below it in either bronchus is responsible for the other main type of cough which is so easily mistaken for that of aneurysm. The tumour enlarges, forming a large mass in the posterior mediastinum and thus pressing on the trachea and bronchi, producing an irritating, dry, spasmodic cough. Later, the tumour having involved the arch of the aorta and consequently the left recurrent laryngeal, the cough has stridor superadded and is very characteristic. Among my own cases examples of those two types will be found in Case 28 and Case 35.

SPUTUM. In spite of the fact that the so-called "prune juice" sputum is supposed to be characteristic of lung tumours, there is no record of it in any of the 61 cases examined. Two are/

are stated to have coughed up bright red blood and many others have had slightly blood stained sputum, as in Case 35. Adler states that "bloody expectoration is associated with most cases of lung tumours at some period of their development". Unfortunately I cannot give any percentage as in many of the reports it is not mentioned. The most frequent description of the sputum is muco-purulent, without any particular characteristic. An unusual case in which repeated haemoptysis was the only symptom is reported by Davidson, at post-mortem a small purely local spheroidal-celled carcinoma being found in the lumen of the bronchus. In one of the cases collected by Adler grass green sputum was found; a dark green very foetid sputum was present in Case 28 of my series.

I have examined the sputa of my own cases where possible, but although clumps of epithelial cells were found in most instances they were not characteristic of malignant disease, and might be found in chronic bronchitis. In a case having symptoms suggestive of a possible lung tumour which I examined clinically, the sputum was abundantly muco-purulent and consisted microscopically of very definite fragments of epithelium which stained better and were evidently less degenerated than in other cases examined. The cells were of the squamous type and were so much more abundant than in other cases that it would have been interesting to find out whether this was a case of carcinoma or not. Unfortunately permission for post-mortem examination was not obtained and so the/

the significance was lost.

CHANGES IN THE VOICE. These occur naturally more often where the bulk of the tumour is mediastinal as they are due to pressure effects on the recurrent laryngeal. This is as would be expected a late symptom and the change is usually a sudden one, the patient stating that he woke up one morning to find that he was hoarse and thought he must have caught cold. One of my own cases (Case 36) "lost his voice" as he put it, suddenly and completely, but it returned in some measure, at first only a whisper but later it became much stronger although still very husky. When examined by Dr. Brown Kelly at a late stage of the disease, the left cord showed complete paralysis. The partial recovery of the voice is an interesting example of the compensatin action of the unaffected cord which on phonation is found to cross the middle line and so lessens the aperture and consequently the hoarseness.

Another case complained of hoarseness of voice at night for six months before admission. At first this was eased by a hot drink although later the hoarseness was continuously present, but there is no history of improvement of voice as in the case described above. This is the only case in which involvement of the vocal cords was the earliest symptom noted by the patient, and is also the more unusual since hoarseness only develops when complete paralysis of the cord sets in, the paralysis of the abductor not interfering with phonation. In this case the tumour was only/

only the size of a hen's egg, and growing out from the left main bronchus into the mediastinum had early involved the left recurrent laryngeal as it hooked round under the arch of the aorta; the metastases were widespread; that in the brain causing convulsions which marked the terminal phase. Although abductor paralysis with consequent abduction of the cord is generally acknowledged to be the first sign of interference with the recurrent laryngeal, some laryngologists are inclined to believe that a still earlier stage exists in which the cord assumes the so-called position of deep inspiration when the cords are hyper-abducted. This, presumably, they ascribe to irritation of the abductor portion of the nerve before the onset of paralysis. Dr. Brown Kelly has informed me that he has had no personal experience of this position. As hospital cases have usually reached a much later stage than this before admission it is impossible to verify this position.

CACHEXIA. Although this is usually regarded as a prominent feature of malignant disease, the reverse is sometimes the case in thoracic tumours. Of the non-cachectic among my cases many were well nourished and one was described as "very obese". A case in Adler's collection is stated to have gained weight during the illness. As a general rule the cachexia occurs in cases where the tumour originates in lung alveoli or smaller bronchioles, and these have been already classified in Group 2. In many of the cases which at no stage of the disease could be termed

cachectic/

cachectic, there was loss of weight sufficient to be noted by the patients themselves, but, as stated previously it may be masked by the oedema and cyanosis of the upper part of the body, which together might suggest at first glance hyperpiesia, a diagnosis not borne out by the sphygmomanometer. The loss of flesh is usually seen in the lower part of the body, the legs being much wasted and very much out of keeping with the trunk and face.

PAIN. This is very frequently the first symptom complained of by the patient. About 30% of the series examined stated that their illness began with pain. In some circumstances this meant more a feeling of discomfort in the chest, while in others it was a definite gnawing pain in the back. One woman complained of pain which she said was all over the right side from the back of the ear to the sole of the foot. Another had been treated for some time for "neuritis" in the right arm and shoulder, whilst several cases had suffered from "lumbago", and in two instances "sciatica" was the diagnosis on which the patients were admitted. This pain is due to pressure on the spinal cord or upon the nerves themselves. For the most part it is mediastinal tumours originating in the bronchus or glands which are responsible for the foregoing symptoms. Those arising in lung are usually fairly well advanced before pain is felt. Notwithstanding this, however, in some cases the patient will state definitely that he felt perfectly well except for a slight cough until suddenly seized with a sharp pain in the side followed by pleurisy./

pleurisy. This, of course, does not occur until the tumour has reached and involved the pleura. It is remarkable how extensively the lung can be involved before the pain calls the patient's attention to the fact that something is wrong.

PHYSICAL SIGNS. These vary so widely with each case and even from week to week, almost, it might be said, from day to day, in the same case, that no rules can be laid down as to diagnosis from the usual methods of examination of the chest. In one case I examined, the rapidity with which the signs changed was remarkable, the growth advancing so quickly that the areas of impaired resonance altered daily, and signs demonstrable one day were replaced the next by new ones.

Restricted movement of one side of the chest, impaired resonance, dulness, diminished R.M., tubular breathing, whispered pectoriloquy are found. Displacement of the heart is frequent, and often its borders cannot be defined if the growth be extensive. In tumours of mediastinum, broadening of the mediastinal dulness is found with very much increased vocal resonance and fremitus. Where there is an effusion these, of course, are much dulled.

DIAGNOSIS. The diagnosis of a lung tumour is seldom made until the disease is fairly well advanced and usually beyond radical cure. One reason for this is that the symptoms may be so slight that the patient does not realise that there is anything serious and so does not consult a doctor till the more definite symptoms appear. Again, the patient may complain of a slight cough/

cough without spit and some breathlessness, and on examination very little will be found. Taking tumours of lung alone, symptoms such as cough and spit following as they frequently do upon an attack of influenza or pneumonia, suggest that old tuberculosis has been lit up by the superadded infection. Percussion and auscultation in many cases bear out this view, and the patient's general condition becomes steadily worse. The fact that on repeated examination of the sputum no tubercle bacilli are found is generally given as a point in favour of tumour. In some cases, however, the two diseases may co-exist. It would be interesting to know the number of lung tumours found in sanatorium cases.

Examination of the sputum for tumour cells may yield some positive information, but where the cells are most abundant they are so degenerated that the differentiation from degenerated bronchial epithelium is often impossible. Where pleurisy is present with effusion bloodstained pleural fluid is in favour of tumour but by no means constantly present. A small fragment of tumour tissue may be found in the exploratory needle, and this would be definitely diagnostic. Where necrosis of lung is proceeding rapidly a diagnosis of gangrene might be made. Steadily increasing dulness on one side of the chest is frequently found, and in some instances this occurs very rapidly apart from effusion. Recurring pleurisy is a frequent sequel to a tumour of lung, and is very apt to confuse the diagnosis since it masks the changes

in the lung.

A mediastinal tumour might at first be confused with aneurysm of the arch of the aorta, but the character of the pulse and auscultation over the area should help to clear up the difficulty. An X-ray film of the chest would help by showing that the growth was non-pulsatile, although a tumour which was firmly fixed to the arch of the aorta might give the impression of a pulsating aneurysm.

In the cases which I examined clinically the X-ray films of the chest were always taken after the diagnosis of tumour had been made by Dr. Douglas Russell, so that it is difficult to estimate the exact value of X-rays as a means of diagnosis. In cases, however, where the diagnosis is doubtful X-ray examination should prove of great assistance.

Where the tumour is situated in the bronchus with ulceration, bronchoscopic examination would establish the diagnosis. The chief points, however, upon which diagnosis must rest will be the history, the physical signs, the examination of the sputum and pleural effusion if present.

TREATMENT. The treatment in the cases under discussion has been almost solely of a symptomatic nature, except in a few cases where radium was tried. Deep X-ray therapy has been found to be of considerable help by many observers, and in future will be more extensively used. The cases so far treated had reached too late a stage for much benefit to be derived from it. Surgical interference/

ference has also so far failed for the same reason. It would appear however that with the earlier diagnosis consequent upon increased knowledge of the disease, surgical interference in conjunction with deep X-ray therapy and radium should have a better chance of proving their use.

PATHOLOGY.

The comparatively recent change in the views on the pathology of intra-thoracic tumours, particularly those of the mediastinum, has already been alluded to in the introduction. In this series of cases it has been found that many of the older microscopical specimens have had to be re-classified in view of the recent work. It is unfortunate, in this connection, that in a considerable number of cases no microscopic specimens can be found, only 39 out of 61 being available, as this makes final comparison impossible. Detailed descriptions of all the types met with, however, are given and it has been found that the large majority can be classified as carcinomata. In many cases it was only after considerable searching that the definite evidence for such a diagnosis was found.

MACROSCOPIC APPEARANCES. The post-mortem appearances of these tumours might be divided into groups according to the site of the main mass of the tumour:-

1. Where the tumour is peribronchial and there is a large mass in the mediastinum. 32.

2. Where the main tumour is at the root of the lung (rather than mediastinum)/

mediastinum). This would include lymphosarcoma and lymphadenoma. 15.

3. Where the tumour has originated in the lung and is practically confined to the lung tissue. 12.

4. Where the tumour has over-run the whole lung and mediastinum and is one solid mass which has pressed on the other lung and caused partial collapse. 2.

In the majority of cases the main tumour mass was found in the mediastinum. On opening the chest a mass of tumour was found encircling the bifurcation of the trachea, the arch of the aorta and one or both bronchi for a considerable distance. Embedded in this mass were the various structures passing through the mediastinum. In my cases I found that the blood vessels though flattened considerably were not usually invaded by tumour growth. In two cases the superior vena cava was invaded but never the arteries. Nerves were so flattened that they appeared like ribbons and sections of them showed no fibres but merely fibrous tissue. The oesophagus was also flattened but not invaded in any of my cases. In one case the mediastinal tumour had caused narrowing of the oesophagus at one point and food was found in a dilatation immediately above. The pericardium and sometimes the heart itself were involved in the spread downwards, the pericardium being very much increased in thickness. There was usually no involvement of the heart muscle but rather an extension over the visceral pericardium encasing the heart in a shell/

shell of tumour tissue. In one of these cases it was seen to follow definitely the lines of the blood vessels. In dissecting these cases I have been able to identify and separate from their casing of tumour growth all the structures of the mediastinum with the exception of the left recurrent laryngeal. It was frequently identified as it came off the vagus and then lost entirely under the arch of the aorta where the tumour was dense. The growth along the bronchus extended to the hilum and thence throughout more or less of the lung itself, invariably spreading along the bronchial wall. One lung was usually involved particularly, of the 52% the right was involved in 31%, and the left in 21%. Transverse section of the bronchus showed it to be much increased in thickness, the cartilage standing out clearly from the dense greyish white tumour tissue. In many cases there was no ulceration, the epithelial surface being smooth, although in places the tumour growth might bulge into the lumen, but giving a smooth irregularity to the wall. In one case the bulging caused a ball-valve obstruction with a dilatation beyond it which was filled with pus.

The tumour tissue itself in these cases was always firm in consistence and in none of them was there any tendency to break down. Metastases in these cases were usually wide-spread and will be dealt with later.

Cases where the bulk of the tumour was situated at the hilum of the lung embraced all tumours of glands such as lymphadenoma and lymphosarcoma. At post-mortem examination chains of enlarged glands/

glands were found running up towards the neck and the lung was invaded. Peribronchial tumours, also, where the greatest growth has been found near the lung fell into this group.

The tumours originating in the lung itself varied very much in appearance. The whole lung might be involved, though this was unusual, except in the case of sarcoma. The growth might be confined to one lobe (Case 27) or several nodules might be found in each lobe. I have not had a case of primary miliary carcinomatous nodules in my series, but examples are found in Adler's list as well as in other collections. Unlike the mediastinal growths the consistence of these varied tremendously. Some were firm, yellowish white masses, as in case 27, others showed gelatinous material in the centre, while others again showed cavity formation as in Case 28, which although diagnosed clinically as a lung tumour at post-mortem resembled so closely a gangrene of the lung that only sections revealed its true nature. Another of the cases had a large cyst filled with black malodorous fluid, and a similar one was present in the brain. Metastases were usually found in the brain, supra-renals, liver, kidneys as in the peribronchial tumours.

The other main type of tumour represented in this series was one involving the whole of one lung and mediastinum, displacing the heart considerably, and causing partial collapse of the other lung. Two cases of this type are recorded further on (Cases 26 & 36), both sarcomata, one being secondary to a sarcoma of thigh./

thigh. These tumours presented the same appearances, dark reddish in colour from numerous haemorrhages, and extremely friable. It was found impossible to dissect out the various structures, the tissue falling away when the attempt was made to remove the tumour en masse. The pleura on the affected side was involved in both, pleurisy with effusion being the diagnosis on which one patient was admitted. Metastases were absent in both cases. These descriptions cover the types met in the 61 cases.

METASTASES. Wide metastases seem to be a feature of intrathoracic growths. Both mediastinal and lung tumours show this tendency. In my cases only twelve showed no metastases. Among the others the metastases were usually multiple, the abdominal organs being most frequently attacked.

In order of frequency secondaries were found in:-

Suprarenals	15 cases	Kidneys	9 cases.
Liver	14 "	Ovaries	7 "
Mesenteric glands	13 "	Bones	7 "
Pancreas	12 "	Spleen	2 "
Brain	11 "	Muscle	1 "

The suprarenals were frequently both involved, the one growth being larger than the other. In some cases these reached a considerable size being as large as a tangerine, no normal suprarenal tissue being recognisable. In other cases very small almost un-noticeable tumours were found, causing little enlargement of the gland. In all these cases the tumour was found originating/

originating in the adrenal medulla with the cortex more or less involved. In spite of the total destruction of the suprarenal tissue in many cases, in none was Addisonian pigmentation noted, although low blood pressures were found.

The liver was in my series seldom extensively invaded. Mesenteric glands were quite often involved apart from the abdominal organs, particularly those round the stomach and pancreas. It would seem that this occurs through lymphatic spread from the thorax to the abdomen, possibly by way of the descending trunks from posterior intercostal glands, or, as in one of my cases, via the pre-aortic glands. Baden-Evans reports a case in which there was direct lymphatic spread along the thoracic duct to the stomach. The body of the pancreas was a more frequent site for the secondaries than the head or tail. In the brain, the frontal, temporal and occipital lobes, the dura, the pituitary, the medulla and the pons were invaded in the various cases. It is remarkable, as demonstrated in Case 38, that large areas of the brain tissue may be destroyed without any symptoms. The kidneys were involved at their upper poles, usually although not always, in conjunction with the suprarenals. The ovaries occasionally reached a large size when the seat of secondary growths. The bones involved were ribs, sternum, clavicle, vertebrae and the humerus. The comparative rarity of splenetic involvement was peculiar. It has been said that when it is involved the tumour may be considered a lympho-sarcome, but this did not hold good in Case 34, which

was/

was a carcinoma. The only deposit in muscle was one in the erector spinae.

In his paper on oat-seed tumours Barnard points out that these growths have similar metastases to those of bronchial carcinomata and considers this added evidence for placing these tumours in the same category. It might also be argued that tumours arising in mediastinal lymph glands, e.g., lymphosarcoma, could have precisely the same metastases and hence could only be distinguished by microscopical findings. Ewing gives lymphosarcoma as the exception to the rule for sarcoma metastases by the blood stream. It is usual not to find metastases in the case of spindle-celled sarcomata. One case where no metastases were found was histologically a spindle-celled sarcoma (Case 26), but Case 23 which had metastases in suprarenals and ovaries was also a definite spindle-celled sarcoma. It was very interesting to find how frequently the real nature of the tumour was apparent in the metastases.

This has been well recognised by other writers. Cases in which the primary growths were in all points alike presented a difference when their metastatic growths were considered; and the metastasis as a rule gave a true indication of the exact type to which the tumour belonged.

HISTOLOGICAL CLASSIFICATION. Among the 39 available cases many preparations were found to have faded considerably and had to be restained in order to bring out their characters. In some/

some cases, too, only one or two slides could be found, so that it was difficult to decide the precise nature of the tumour if it belonged to the peribronchial borderline group. Fortunately, however, the cases which occurred during my own investigation have been so varied that almost every type has been included among them alone.

Of the 39 cases available for histological classification I have found 5 to be sarcomatous and 32 carcinomatous in nature. 1 was a tumour of thymus and 1 was lymphadenomatous. In a great number the diagnosis was only made after studying many microscopical specimens, particularly the metastatic nodules, for presence of the epithelial arrangement which has been described in so many cases by other observers. In the older cases where only a few slides were extant I had difficulty in deciding into which category the tumour should be placed. In the full histological description of each of these the amount of available material was mentioned and taken into consideration in the decision.

SARCOMA. These included 4 spindle-celled sarcomata (one a secondary) and 1 mixed cell sarcoma. Three originated apparently in lung and the other two from some mediastinal structure. Two showed metastases, those of Case 23 proving the mesoblastic origin of the tumour.

CARCINOMA. In the bronchus the growth may arise from the lining epithelium or from the glands; in the lung tissue from the alveolar epithelium. The obvious carcinomata numbered 16 of my/

my cases. These included 4 squamous celled tumours of bronchus, 9 columnar celled tumours of bronchus, and 3 polygonal celled tumours of alveoli. In some of these the actual origin seemed doubtful, the alveolar carcinomata showing some columnar cells and the columnar type having areas of polygonal cells resembling those of alveoli. In 16 cases the diagnosis was not at first obvious. These tumours belonged to the small celled peribronchial type of growth which were formerly considered sarcomata and which are now classified by Barnard, Shennan and others as carcinomata.

It was with the idea of finding out whether the cases which had occurred in the Victoria Infirmary corroborated this view that this work was undertaken. In deciding whether a tumour was a sarcoma or a carcinoma I found great help in close study of the metastatic nodules. Where the primary peribronchial mass showed on microscopical examination the small oat-seed cells more or less closely packed together and varied here and there with small round cells, the metastases frequently revealed marked polymorphism. Large round squamous-like cells, small cubical cells arranged round alveoli, as well as the oval and small round cells of the parent growth were seen. This polymorphism is considered by most an important factor and this, combined with absence of even the finest network between the cells, has been the basis of my diagnosis. Polymorphism was not however confined to carcinomata, some of the sarcomata, notably Case 23, showed small round, large round/

round and spindle cells. In the sarcomata that I have studied, however, the polymorphism was more restricted than in the carcinomata, the whole of one nodule being round-celled while another spindle-celled, or an area of one showing round, while another area showed spindles, but seldom spindle and round cells mixed in a haphazard fashion (except, of course, in the true mixed-celled sarcoma where there was no doubt as to diagnosis). This uniformity had some influence in my decision.

The so-called oat-seed type of cell also differed from the spindle-cell of the sarcomata. It was smaller, and when seen lying free lacked the fibrillary appearance of the larger cell caused by the elongation of both ends into fibrils. In doubtful cases, I have found Professor Shennan's advice as to staining methods of great help. I have not found eosinophil cells in any of my cases stained with Leishman's stain, except in the one which was quite clearly of thymic origin.

In the small-celled tumours in my series the resemblance to basal cell epithelioma alluded to by Shennan and Duguid was well-marked. The desmoplastic reaction was found in a few cases, in one a thick band of fibrous tissue had been formed between the loose ends of a ring of cartilage and had been successful, at the point from which the section was taken, in barring the progress of the tumour.

SPINDLE-CELLED SARCOMATA. (Cases 16, 23, 26, 36.)

1. Case 16. The left lung was adherent to the chest wall by tumour/

tumour growth. A large tumour mass at the root of the left lung had displaced the oesophagus, aorta, trachea, and heart to the right. The mass at the root was glandular involvement and was closely connected with the thickened pleura (1½"). There were metastases in vertebrae with pressure on the cord, left erector spinae of hen's egg size and involvement of the left ribs.

Microscopically:- The only section available was that of thickened pleura containing masses of spindle cells. This would appear to be a spindle-celled sarcoma probably originating in pleura.

2. Case 23. A fibro-gelatinous tumour was found in anterior mediastinum extending to the right and inseparable from a large mass at the root of the right lung. Milky fluid could be expressed. The entire middle and lower lobes of the lung were replaced by tumour tissue which was fleshy but in areas showed caseous change. Tumour tissue in bronchial walls. Metastases:- Left kidney, left suprarenal, ovaries, and a mass was found between diaphragm and liver.

Microscopically:- In the lung the tumour was composed of small round cells lying in acini made by strong bands of connective tissue and strongly resembling a small-celled carcinoma. In the metastases, however, there was an abundance of spindle cells, embryonic vessels and young fibrous tissue which removed any doubt as to the true nature of the tumour. This was a definite sarcoma probably spindle-celled sarcoma, and it afforded an/

an excellent contrast to the small-celled carcinomata.

3. Case 26. (See appendix of cases.) The tumour occupied the whole of the mediastinum. It was reddish-brown in colour, necrosed in parts and generally soft and friable in consistence. Microscopically the cells were closely packed, spindle-shaped for the most part, but in places round; the fibrous tissue being closely associated and apparently being formed from the tumour itself. Areas of necrosis, haemorrhage, and numerous embryonic vessels were also present.

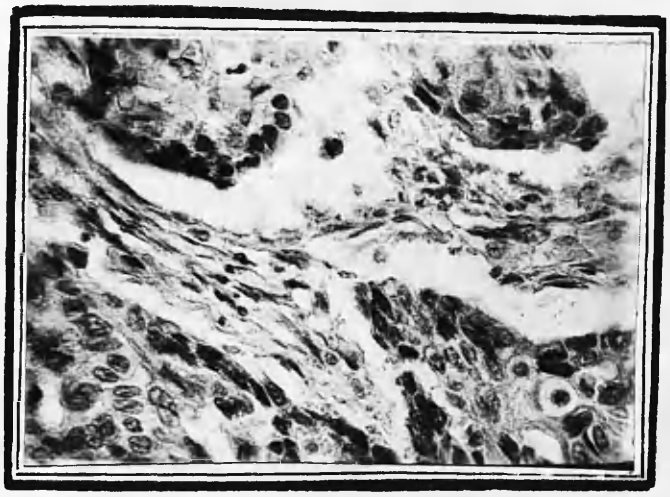
4. Case 36. (See appendix of cases.) This was a secondary growth to a sarcoma occurring years before in the thigh. The tumour was similar to that previously described. Microscopically it consisted of spindle cells lying in fasciculi and approaching fibrous tissue cells more nearly than the former tumour. The whole appearance was one of a fairly slow growing tumour unlike the other which was obviously of more rapid growth.

MIXED-CELLED SARCOMA.

Case 2. The tumour was large occupying most of the mediastinum round the bifurcation and at the roots of both lungs. It was pale and fleshy in appearance and milky fluid was expressed from it and there were no metastases. Microscopical examination showed the usual features of a mixed-cell growth, spindle cells, with large and small round cells between the strands of spindles; the large cells standing out clearly with convoluted nuclei.

SQUAMOUS-CELLED CARCINOMATA OF BRONCHUS. (Cases 1, 7, 17, 21.)

1. Case 1. The tumour mass was situated in the anterior mediastinum/



Case 2I.

Section of squamous celled carcinoma of bronchus (H.P.) showing masses of typical polygonal cells filling the alveoli. The cells immediately lining the alveolar walls tend to be of the columnar type.

mediastinum attached to the right lung, sternum, ribs, spreading over the aorta and heart with metastases in both suprarenals, acute pleurisy and pericarditis. Microscopically it was a squamous celled tumour.

2. Case 7. This case showed marked polymorphism. In the bronchus from which it arose and which it completely filled, the tumour showed the polymorphous character of such growths. The cells were largely of the squamous variety, but areas of polygonal, small and spindle cells were also found.

3. Case 17. (Specimen taken from a private post-mortem examination.) The alveoli of the lung were filled with masses of squamous cells. In some cases there was considerable flattening and elongation almost to spindle shape as a result of narrowing of the lumen.

4. Case 21. A fairly soft tumour was found at the root of the left lung involving the bronchus and glands, and also the apex of the lung with metastases in liver and glands around the pancreas. Microscopically clumps of squamous cells were seen filling the alveoli and bronchioles with degeneration of the central parts.

COLUMNAR-CELLED CARCINOMATA. (Cases 5,6,14,24,25,27,28,38,39.)

1. Case 5. The left lung was consolidated with tumour tissue and adherent to the pleura. A nodule projected into the left main bronchus and there were metastases in the mediastinal, cervical, and pancreatic glands, and nodules in the left kidney. Microscopically the cells were polygonal for the most part, but the/

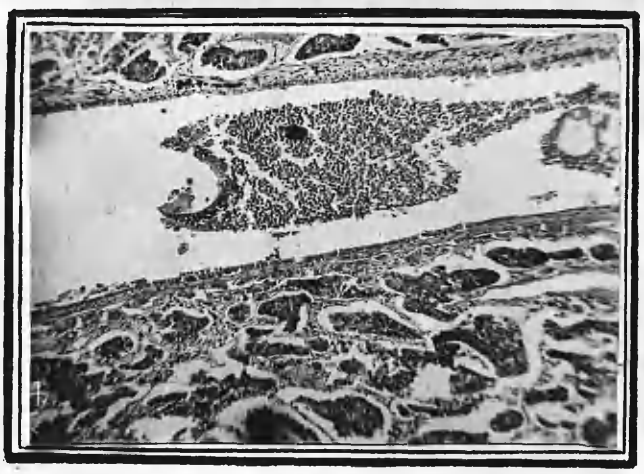
the papillary growth in the bronchioles warranted its insertion into the carcinomata of the bronchus.

2. Case 6. The lower lobe of the right lung was solid with tumour tissue and nodules had spread to the pleura. Mediastinal glands were enlarged. No metastases were found except in the left suprarenal and both ovaries. The microscopical appearances were those of a columnar celled tumour. The cells were mostly of the short columnar type but some polymorphism was present; oat-seed, round, and polygonal cells being found. There was considerable fibrosis and necrosis of lung. The ovaries showed marked desmoplastic reaction to the secondaries.

3. Case 14. A polymorphous carcinoma of bronchus with columnar, polygonal and small round cells, the polygonal being the most frequent.

4. Case 24. The tumour was situated in the lower lobe of the left lung. The right lung was collapsed and fluid was present in the chest. The tumour was obviously of bronchial origin and was found encircling the root of the left bronchus pressing on the right carotid and trachea. Nodules were present on the diaphragm and in the right parietal pleura and the left suprarenal. Microscopically the cells were columnar as in the last case but here the polymorphism was more marked; polygonal cells being predominant in the metastases.

5. Case 25. Here the upper lobe of the right lung was completely consolidated, the right pleura thickened and a mass of hen's egg size in the posterior mediastinum. Metastases were present in the right/

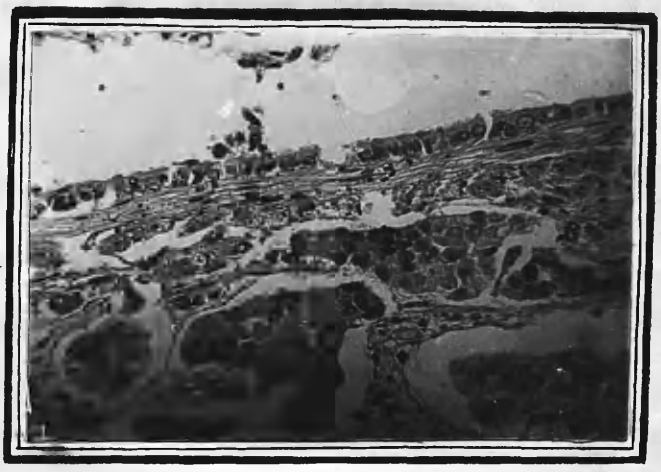


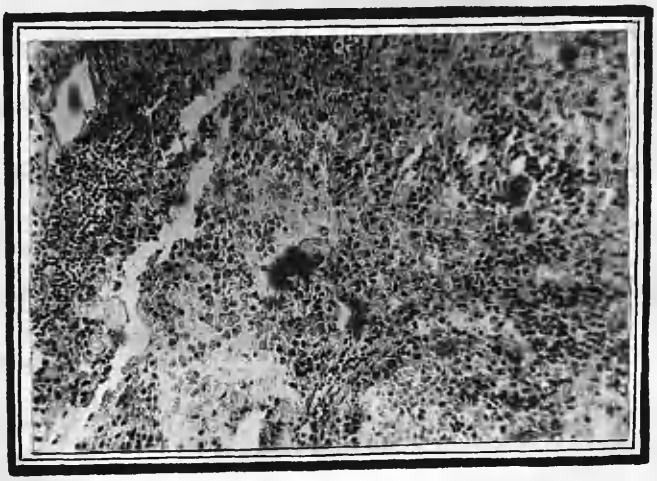
Case 27.

Section of original tumour, (L.P.), showing wall of bronchiole and alveoli filled with masses of tumour cells.

Case 27.

High power view of above. The tumour cells in the alveoli have a squamous arrangement but resemble closely the slightly flattened epithelium of the bronchiole. Other parts of the tumour show definite columnar arrangement.





Case 27.

Low power view of metastatic nodule in suprarenal. The cells are of the small columnar type and resemble the oat-seed type. They are closely packed without any definite arrangement.

right suprarenal of cystic character, and in brain: the right frontal lobe and left optic thalamus were cystic. Microscopically columnar cells of the short variety and well-marked polymorphism chiefly polygonal cells, but also small round and spindle cells, were found.

6. Case 27. (See appendix of cases.) The main tumour was in the right lung, a small nodule in the left, and metastases in the brain and suprarenals. Microscopically the cells were both columnar and polygonal, and there was a great tendency to acinus formation, the cells ranging round the alveoli with a space in the centre which in some instances was filled with debris from broken down cells (see photograph). Pneumonic consolidation was found round the nodule in the left lung. The metastases showed the same features.

7. Case 28. (See appendix of cases.) This case suggested at post-mortem examination a gangrene of lung, the lung being much disintegrated with cavity formation. Microscopically the lung tissue was found entirely infiltrated by tumour tissue arising from alveolar epithelium showing some polymorphism, polygonal, round, and short columnar cells being present. It was difficult to say whether the origin was from the alveoli or from the end of a minute bronchicle, but probably the latter.

8. Case 38. (See appendix of cases.) The tumour was in the right lung with metastases in suprarenal and brain. Microscopically the cells were long columnar, lining the alveoli with a space in the centre, or polygonal where the alveoli were filled.

There/

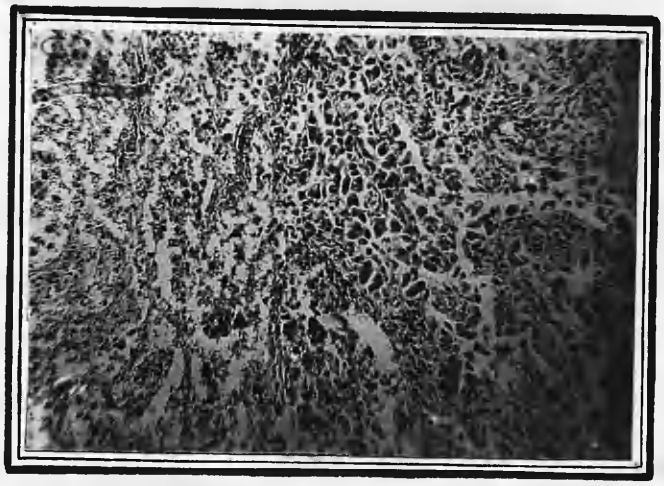
There was cystic formation in the metastases with mucoid material in the centre of the acini. This might suggest origin from the mucus-secreting glands of bronchus.

9. Case 39. (See appendix of cases.) The main mass was mediastinal but stretched upwards involving the left clavicle and first rib and outwards along left bronchus into the lung. No ulceration of bronchus was found. Metastases were present in both suprarenals. Microscopically the characteristic cells already described in the other cases were found, but there was a marked tendency to form papillary projections into the bronchioles. In these projections the cells were smaller and resembled the cells found in the cases of small-celled carcinomata to be discussed later. There was no doubt however in this case as to the type of tumour, as columnar and polygonal cells were in abundance. Where the cellular overgrowth was greatest large numbers of small round cells and some spindle cells were found.

ALVEOLAR CARCINOMATA. (Cases 13, 22, 32.)

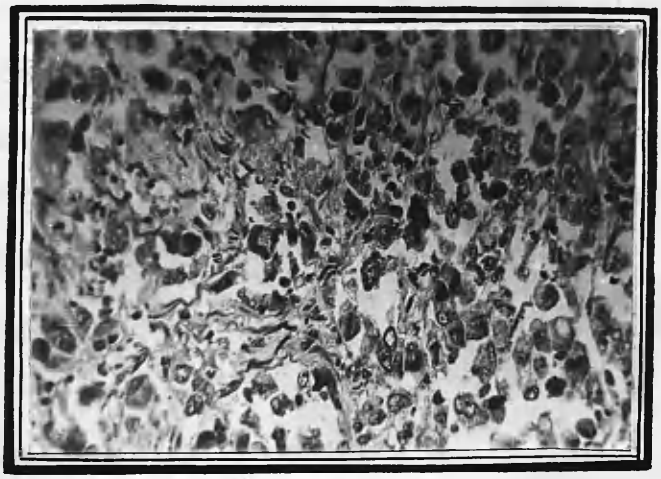
1. Case 13. The apex of the right lung was destroyed by the neoplasm, and bronchi were involved commencing at the bifurcation, with metastases in right suprarenal and brain. It was stated to have been a carcinoma of alveoli.

2. Case 22. The right pleural cavity was full of blood-stained fluid, the lung was collapsed, the lower lobe being completely replaced by tumour tissue involving the pleura. There was no involvement of the bronchus. The glands at the root were involved and the spread could be traced down the glands around the descending/



Case 32.

Section of lung (L.P.), showing growing edge of alveolar carcinoma. The cells are of the polygonal and short columnar variety.



Case 32.

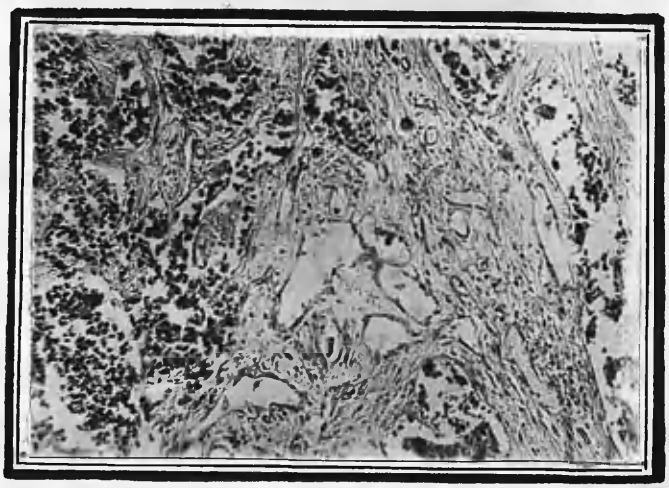
Metastases in lymph-gland (H.P.) from case of alveolar carcinoma. This shows well the large type of cell with clear nuclei and well-marked nucleoli with a few smaller cells interspersed.

descending aorta to those of the stomach and pàncreas. Microscopically the cells were fairly large, some round, some polygonal with big clear nuclei resembling alveolar cells. Here and there oat-seed cells could be seen. There was a fair amount of necrosis of the lung tissue. In some areas the cells reproduced alveoli with a central space empty and here the cells were flatter; but in most cases there was just a solid mass of tissue. Pigment was seen round the nuclei of some of the cells similar to that found in normal alveolar cells. This was the best example of alveolar carcinoma in my series.

3. Case 32. (See appendix of cases.) The tumour growth encircled the left bronchus, extending into the lung in all directions following the course of the bronchioles. There was no metastasis. Microscopically the original tumour showed cells of the polygonal and round type, but the majority of the cells were longer and resembled columnar cells. The alveolar arrangement was reproduced in the wall of bronchus. In the metastases the true polygonal cell with its large nucleus was seen and the polymorphism of the original growth was much less marked. This case was probably alveolar in origin.

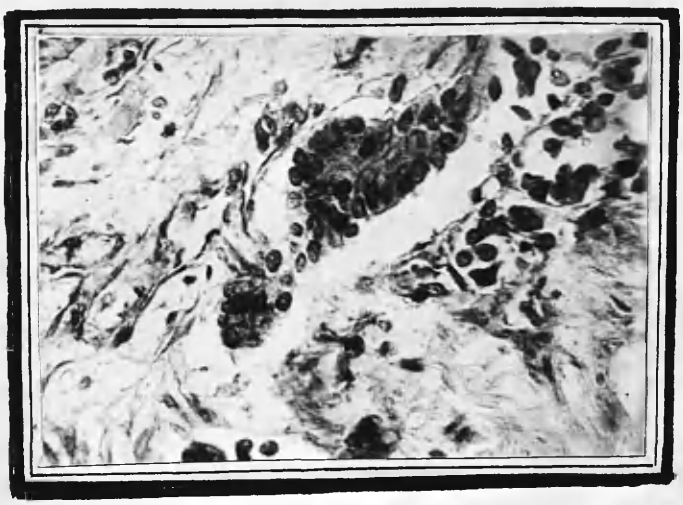
SMALL-CELLED CARCINOMATA of BRONCHUS. (Cases 3, 4, 8, 9, 10, 11, 12, 15, 18, 19, 30, 31, 33, 34, 35, 37.)

1. Case 3. The left bronchus was surrounded by tumour tissue for 1½", a mass of hen's egg size being found in the mediastinum. The left lung was adherent to the growth and to the chest wall; the right lung was uninvolved. The bronchial epithelium was intact/



Case 3.

Section of lung (L.P.) showing small round cells filling alveoli and increase of interstitial fibrous tissue. Near the bottom right hand corner of photograph is seen a mass of cells lying in an alveolus which resembles squamous formation.



Case 3.

Same section as above under high power showing the mass of cells referred to.

intact. Metastases were found in both suprarenals, and in the left frontal lobe of the brain a cystic mass of the same size as the mediastinal tumour. Microscopically the tumour consisted of masses of small cells arranged in alveolar manner, the walls of the alveoli composed of fibrous tissue. In some places the cells were short and square, lining the artificial alveoli, but for the most part they were small and round, although here and there larger round cells could be seen, and cells of oat-seed type. The photograph of this tumour shows the well-marked polymorphism.

2. Case 4. Here the main tumour growth surrounded the right bronchus at the root of the right lung and extended into the lung for 2" forming a mass of tangerine size. There were metastases in the liver. Microscopically the arrangement resembled the last case, but the fibrous bands were thicker and the cells were more closely packed. They varied from small round to oat-seed, but the majority were small and round. This case offered a good contrast to Case 3, as the arrangement of the cells resembled that of a squamous epithelioma and under high power could be seen fitting into each other like polygonal cells.

3. Case 8. The only tumour in this case was one of golf-ball size surrounding the bifurcation. Microscopically the tumour resembled a scirrhous carcinoma, fibrous tissue predominating, but acini containing columnar, oval, round, and polygonal cells of epithelial origin were present. The two sections were both rather thick, but from the situation as well as from the microscopical structure, this would appear to have originated at the bifurcation, the/

the marked fibrous reaction preventing further spread.

4. Case 9. The main mass of the tumour was in the glands at the root of the left lung and spread into the lung involving the greater part of it. A mass was found in the posterior mediastinum of duck's egg size. There was no involvement of the main bronchi. Metastases:- in suprarenal. Microscopically, the cells of the main tumour varied from round to spindle-shape. They lay in a stroma of fibrous tissue. In the metastases there was more variation in the shape of the cell, columnar, oval and round being present, and the arrangement was definitely of the alveolar type. The appearance was suggestive of a polymorphic columnar celled tumour.

5. Case 10. A large tumour mass was found at the root of the left lung. Nodules were found throughout the lung and on the pleura. The main mass projected into the left bronchus. Metastases were found in pancreas, mesenteric and cervical glands, liver, left suprarenal, right kidney, ovaries, left ribs, vertebrae, dura mater, and pituitary. Microscopically:- Masses of polygonal cells lying in fibrous stroma. The cells were so arranged in parts that the section had a feathery appearance. The cells arranged along the stroma were in type short columnar. The majority, however, tended to be polygonal. The tumour had a definite squamous appearance.

6. Case 11. A mass was found in the mediastinum encircling the bifurcation and arch of aorta. It was about the size of an orange and showed hyaline and mucoid degeneration. Microscopi-

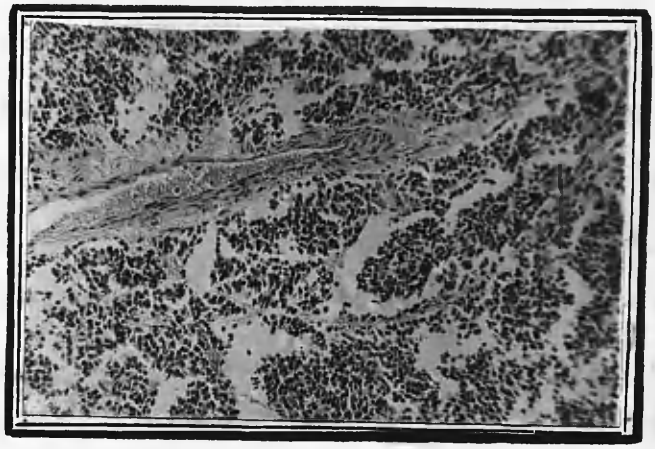
cally/

cally the tumour showed cells a little larger than the usual small cell of these cases. Columnar, oval and oat-seed cells were found lying in groups fairly loosely packed. The stroma was abundant round the groups but of a delicate character. Columnar cells predominated.

7. Case 12. The post-mortem report of this case was not available. Microscopically the cells were of oval, columnar and polygonal shape. This would appear to be a columnar celled tumour showing marked polymorphism.

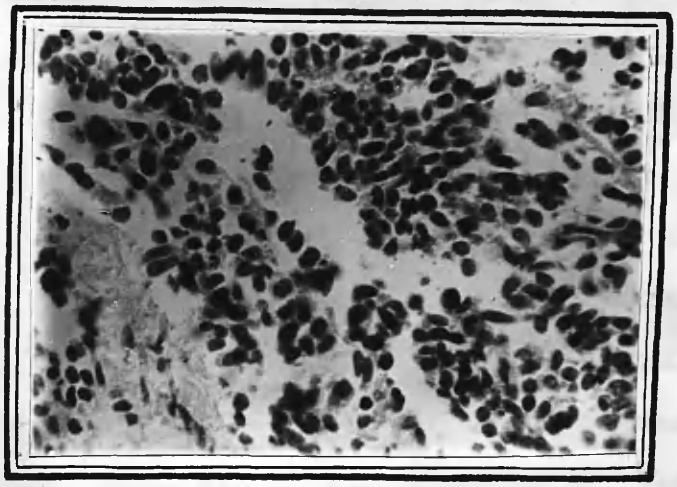
8. Case 15. The lower lobe of the right lung and pleura were studded with tumour nodules. Tumour growth was also found in the right bronchus and metastases in liver, both suprarenals, and pancreas. Microscopically, the cells were packed closely together and were of the round and spindle type. The vessels were very thin-walled and numerous in the tumour tissue, but alveolar arrangement was definite and there was distinct resemblance to a papilloma in some areas. Metastasis in a gland revealed definite squamous formation.

9. Case 18. A tumour mass was found at the root of the left lung about the size of a child's head. The bronchus was uninvolved but was pressed upon by the mass and the left lung was gangrenous. The pleura was thickened. Metastases:- enlarged gland at the upper pole of right kidney. Microscopically the cells were round and oval and some were short columnar in type. Here and there a tendency to alveolar arrangement of cells was seen./



Case I8.

Section of lung (L.P.) showing typical oat-seed cells lying in masses in the alveoli with here and there cells of short columnar type arranged in palisade fashion.



Case I8.

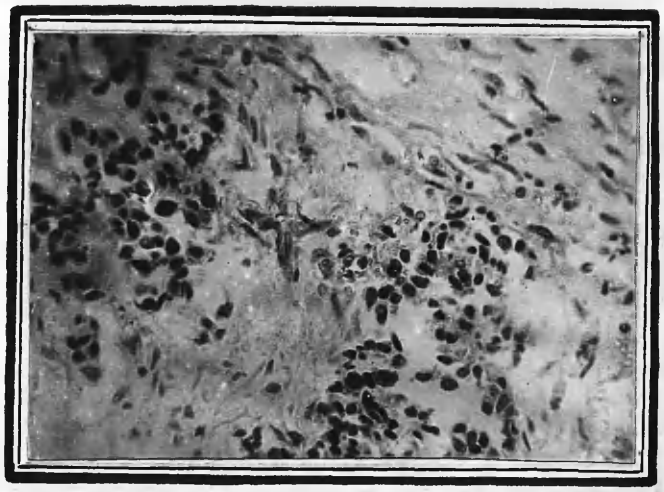
The same section under high power showing the various cells in detail.

seen. There was no intercellular tissue which would suggest mesoblastic origin.

10. Case 19. A tumour about the size of an orange at the root of the left lung extending into the lung for some distance. Lung adherent to much thickened pleura and studded with tumour nodules. Metastases:- Pancreas. Microscopically columnar, round, and spindle cells with large nuclei filling most of the cell but with distinct cytoplasm were seen. The appearance was that of a basal-cell epithelioma. The columnar cells were predominant.

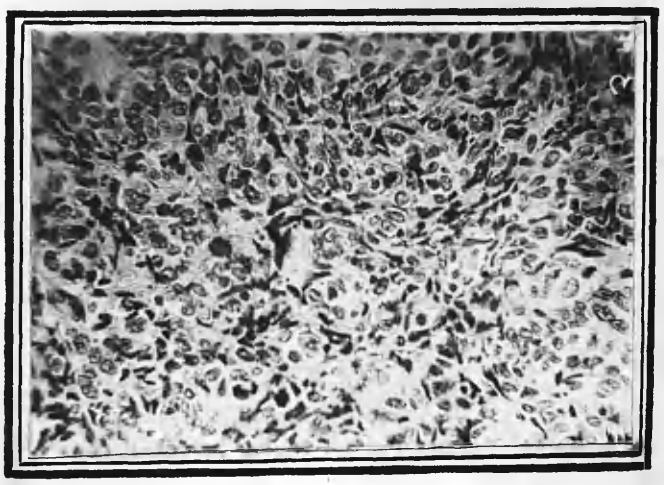
11. Case 30. (See appendix of cases.) A mass was found encircling right bronchus and extending into the lung. Metastases were found in the lumbar vertebrae and left humerus. Microscopically the peribronchial tumour showed the cells lying in clumps between well-marked bands of fibrous tissue. They varied in size and shape; small round, large round, and oat-seed, with, here and there, a large squamous cell and some short columnar cells were present. The latter were arranged sometimes palisade fashion, sometimes enclosing a small space. The epithelial nature of the tumour was well seen in the metastases where large polygonal cells with fairly clear nuclei were in abundance. Oat-seed cells were also fairly plentiful. This was a definite small-celled carcinoma of bronchus with marked polymorphism.

12. Case 31. (See appendix of cases.) A mediastinal mass was found of large size surrounding and displacing trachea and oesophagus and continuing round both bronchi and involving right lung. Metastases/



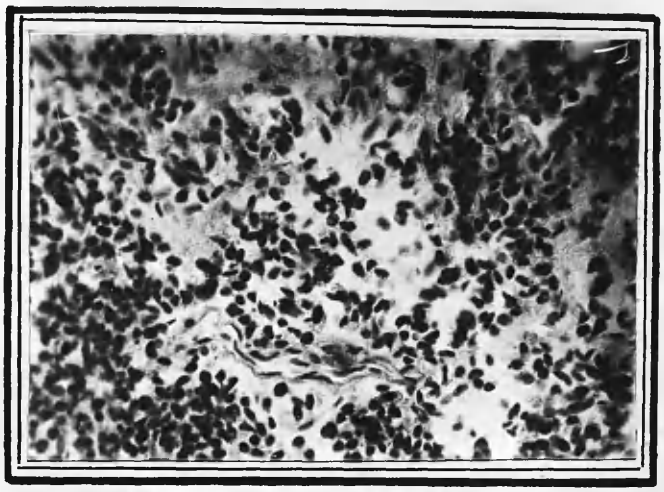
Case 30.

Tumour in bronchus (H.P.), showing large and small round cells and some of oat-seed shape. These are arranged in clumps surrounded by an excess of fibrous tissue.



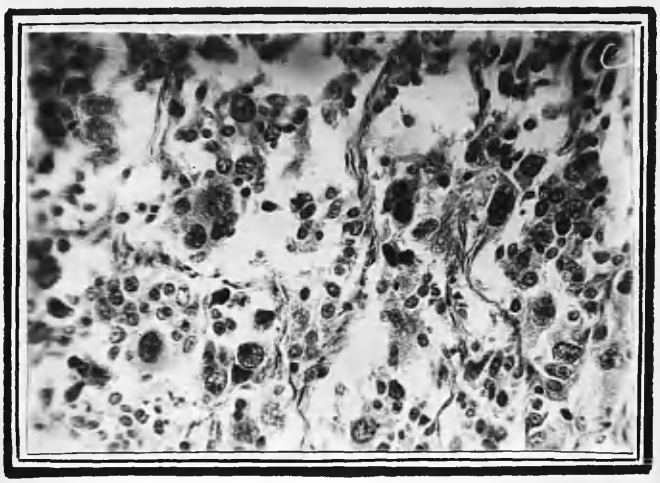
Case 30.

Metastatic nodule in periosteum (H.P.), showing cells of squamous type interspersed with of the oat-seed variety.



Case 3I.

High power view of tumour in right bronchus. The cells are oval or round in shape with no definite arrangement and in parts of the section closely packed. This photograph represents a typical oat-seed tumour.



Case 3I.

High power view of metastases in liver. The difference in both arrangement and shape of cells is marked. There is a tendency to alveolar formation, the cells being of the squamous type varying in size. The majority are small, but large cells are seen with clear nuclei and well-marked nucleoli.

Metastases were present in right suprarenal, liver, ribs, and intercostal muscles. Microscopically the primary tumour showed small oval and round cells packed closely together between septae of fibrous tissue. Here and there at the edge of the growth an attempt at acinus formation was seen, but definite epithelial arrangement of squamous type was found in the metastases with what looked like cell nests and numerous large epithelial cells. (See photograph.)

13. Case 33. (See appendix of cases.) A mass was found at the root of the right lung with tumour growth along both main bronchi. Metastases were found in both suprarenals and in the body of the pancreas. Microscopically, the tumour consisted of round, columnar, and spindle cells with the large nuclei described in other cases. The cells were in some places arranged in palisade fashion, but for the most part were indiscriminately mixed. Polymorphism was a marked feature of this tumour.

14. Case 34. (See appendix of cases.) A large mass was found in the mediastinum spreading into the left lung. Metastases:- Pancreas, spleen, left suprarenal, and intervertebral discs. Microscopically the primary tumour was composed of small oval and round cells closely packed and arranged in masses surrounded by fibrous tissue. The cells had deeply-staining nuclei and definite but little cytoplasm. The nature of the tumour was revealed in the axillary metastases and the lung extension, where the cells were arranged in a squamous manner; and short columnar

cells/

cells were seen lining the alveoli, and round or polygonal cells forming a solid core. In some places the centre of the alveolus was empty and the epithelial character very evident. Although small round and oval cells formed the greater part of the tumour, here and there larger cells with big, deeply-staining nuclei were found. Where the cells were sparse the lack of intercellular fibrils, characteristic of sarcomata, was seen.

15. Case 35. (See appendix of cases.) The large mediastinal mass invaded both lungs and deposits were found in both suprarenals. Microscopically the cells were for the most part oat-seed. They lay closely packed in the wall of a bronchus, clumps being divided by septae of fibrous tissue. In the metastases where the cells were looser, the oat-seed in some places had become more columnar and occasionally showed a palisade arrangement. The same cell lined the alveoli formed by fibrous tissue. In one or two places larger cells were found but these were comparatively infrequent. There was, however, ample evidence for considering this a small-celled carcinoma of bronchus.

16. Case 37. (See appendix of cases.) The post-mortem examination showed a mass about the size of an orange encircling trachea and the bifurcation, and spreading down both bronchi. The mass was continuous through glandular involvement with a mass in the neck. Metastases were found in liver, left suprarenal, pancreas, and ovaries. Microscopically this was found to consist of small oval, round, and columnar cells. In the suprarenal alveolar arrangement/

arrangement proved this to be of epithelial origin.

TUMOUR OF THYMUS.

Case 29. (See appendix of cases.) At post-mortem a greatly enlarged thymus was found in conjunction with a lymphatic leukaemia. Section of the thymus showed microscopically the characters of a normal thymus infiltrated with lymphocytes.

LYMPHADENOMA.

Case 20. There was a large fleshy glandular mass in the posterior mediastinum surrounding left bronchus and pressing on oesophagus and superior vena cava. The entire left lung was infiltrated by tumour tissue with bronchiectatic dilatations and gangrenous softening in parts. Microscopically this was definitely a case of Hodgkin's disease. It was typical of a late stage in the disease with great overgrowth of stroma and very few large lymphadenoma cells.

Since a final decision regarding the nature of these tumours is frequently reached only after study of numerous sections, it is impossible to be dogmatic where only a few slides are available. A thick section, also, may be very misleading, giving the appearance of intercellular tissue where none exists. After consideration the foregoing classification has appeared as accurate as the material well allow.

SUMMARY.

In the present series no striking causative factor has been found/

found. Previous respiratory disease was noted in about 50% of the cases. Chronic bronchitis, pneumonia and pleurisy were most frequent. Tuberculous nodules in the lungs were found in only 3 cases. These were old healed lesions. In no case was active tubercle discovered.

Trauma was the apparent cause in 2 cases. One man had been shot through the chest during the war. He also had a history of pleurisy previous to being wounded. His symptoms dated from his second period in hospital. One woman was knocked down by a tram-car about a year before she was admitted with a lung tumour. She had sustained a severe blow over the lower dorsal vertebrae.

Anthracosis was present in the lungs in two cases, but silicosis was not found in any. Interstitial pneumonia, however, was frequently seen in sections of lung free from tumour growth. This might be a reaction of the lung to the tumour, rather than a pre-existing lesion.

Occupation as a factor has already been considered. The hypothesis that outdoor workers are more prone to these tumours does not hold good in the cases under discussion. Taking the women into consideration as well as the men, it was found that only 28% were outdoor workers. The one point in common was that all the cases were city-dwellers and hence more liable to chronic irritation of the respiratory tract by smoke and fog. The climate of Glasgow has made chronic bronchitis an almost regular finding at post-mortem, and is by no means confined to outdoor/

outdoor workers. It would be absurd, however, to regard it as more than a contributory factor in the causation of lung tumours, since their incidence, in spite of recent apparent increase, is still low.

In many of these cases proliferation of the basal cells of the bronchial epithelium has been found quite apart from the tumour growth, and the resemblance between these cells and those of a small celled carcinoma noted. In none of the latter type of tumour could the actual site of origin from the bronchial epithelium be established.

Barnard's hypothesis has been borne out by microscopical study of these cases, the large majority being carcinomata. The size and shape of the cells in the oat-seed variety would appear to be the result of pressure on a fairly rapidly growing tumour. The mediastinum does not allow much alteration in the size of its contents, but in the metastatic nodules the same close packing is not usually so necessary, hence the true character of the growth is more clearly shown.

In none of the cases was a diagnosis of lymphosarcoma made. In view of what has been said in the introduction in relation to the older books on intrathoracic growths, it would seem strange if the character of the tumours should have changed in so short a time. I have been able to compare my cases with the microscopical specimens of two cases occurring at the end of last century in which a diagnosis of sarcoma was made. Both appear to be definite/

definite sarcomata and, although small-celled, do not resemble the oat-seed type at all. This would show that all the older small-celled tumours situated at the bifurcation of the bronchi are not to be regarded as carcinomata unless epithelial characters are definitely present. There is no doubt, however, that the modern view of the epithelial origin of the majority of intrathoracic growths has been well supported by the findings of recent observers. It is to be hoped that earlier diagnosis in future will allow deep X-ray therapy to prove its undoubted value in such cases.

CONCLUSIONS.

1. That there is an increase within recent years in the incidence of intrathoracic growths shown in the post-mortem reports of the Victoria Infirmary.
2. That this increase is not alone due to better diagnosis.
3. That the large proportion of females in this series differs from the observations of other workers.
4. That outdoor workers do not appear to be more prone to these tumours than indoor workers, but that chronic irritation from various sources would appear to play some part in the etiology.
5. That pain is a very frequent and misleading early symptom of intrathoracic tumours.
6. That the majority of the tumours are carcinomatous in nature and originate chiefly in the bronchi and in a few instances in the alveolar epithelium.

My acknowledgements and thanks are due to the Muirhead Trustees and to the Governors of the Victoria Infirmary for the grant of a Scholarship and for access to the clinical and pathological records of the Infirmary: also to Dr. John Anderson and Dr. Douglas Russell for their valuable advice, and for the interest which they have taken in the work.

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APPENDIX.

Clinical and Post-mortem Findings in Cases 26 - 39.

Case 26. J.B., male, age 39.

Admitted 19.6.28. Discharged 28.7.28 (much improved). Re-admitted 3.8.28. Died 11.10.28.

Complaint - Pain in the chest and shortness of breath with a cough for 14 days.

Past History - Operation for double hernia 2 years before. In the army from 1917-1919, not wounded, no history of gassing.

History of Present Illness - Short troublesome cough for some weeks. 14 days ago, 5.6.28, pain in right chest, worse on breathing deeply. On June 10th pain much worse, particularly in the back, and on stretching out right arm. Breathless even lying in bed.

General Condition - Cyanosed, capillary distension on both sides of the chest over the lower ribs. No marked loss of flesh.

Respiratory System - Deficient movement on right side of chest. An area of extreme tympanicity was found in front stretching downwards from the lower border of the 2nd costal cartilage to the lower border of the 5th, and across the mediastinum from the left border of sternum for $4\frac{1}{4}$" to the right. It was practically square in shape. The remainder of the right lung was dull to percussion. Posteriorly dulness was found from the 5th rib downwards. R.M. tubular at right apex, below this diminished, absent towards base. V.R. increased at right apex, diminished

at/

at right base. Occasional dry rales left side, otherwise normal. Other systems normal, except heart displaced slightly to the left.

26.6.28 - Chest aspirated, 3 pints of blood-stained fluid withdrawn (no organisms or pus cells found). Patient much easier, but physical signs not much altered.

On readmission tympanitic area replaced by complete dulness over right side anteriorly and posteriorly. A narrow Grocco's Triangle was present at the base of the left lung. R.M. was harsh at right apex, absent over the rest of the lung. V.R. was much diminished over right side and V.F. absent.

4.8.28 - Chest aspirated, 72 ozs. blood-stained fluid withdrawn, contained no organisms but epithelial cells.

8.8.28 - Capillary varix more marked. External jugulars distended.

5.9.28 - Radium applied.

26.9.28 - Right face, neck, chest much swollen. Venous distension much worse.

Post-mortem Findings - Thorax. Heart displaced to the left. Tumour tissue at root of pulmonary vessels. Muscle soft with slight fatty excess. Otherwise normal.

Left lung congested, oedematous, scarred at apex. Right lung much collapsed. A large soft haemorrhagic mass occupied the right side of the chest. The pleura was thickened and adherent to chest wall.

Abdomen. Normal, no metastases.

Microscopical examination showed this to be a spindle cell sarcoma, closely/

closely packed with spindle-shaped cells for the most part, but round cells were found also. The fibrous tissue was closely associated with the spindles, being apparently formed from them. There were numerous embryonic blood vessels.

Case 27. A.C., male, age 48. Machineman.
Admitted 19.9.28. Died 9.10.28.
Complaint - Headache and vomiting for 3 months, with attacks of unconsciousness of a fortnight's duration.
Family History of tuberculosis.
Past Health - good.
History of present illness - In June he began to have attacks of vomiting. He had no abdominal pain and no headache then. Severe headaches began and then dizziness and a staggering gait, collapsing in the street about 4 weeks before admission. He had several fits of unconsciousness and latterly has had hallucinations.
Present Condition - Dazed, impossible to obtain a history from him.
Nervous System - Reflexes all present except left knee jerk, but all are feeble. No clonus, no loss of power. Eyes - fundi showed marked papilloedema. Lateral nystagmus noted.
Respiratory System - Impaired resonance at right base posteriorly from 8th vertebra downwards. R.M. diminished. V.R. and V.F. diminished.
9.10.28 - Became gradually comatose and died.
Post-mortem Examination - Thorax. Left lung showed small tumour nodule in the lower lobe. Some old tuberculous scars at the apex./

apex. Right lung showed a large tumour mass about the size of an orange in the lower lobe.

Metastases - 2 masses at the upper pole of right kidney, 1" and ½" in diameter.

Right suprarenal enlarged, 4" x 3" x 2", whole gland replaced by tumour growth, areas of mucoid degeneration and haemorrhage. Left suprarenal, 1¼" x 1⅛", nearly all replaced by tumour.

Brain showed flattened convolutions, oedema, distended ventricles, a tumour of walnut size in left lobe of cerebellum, soft and gliomatous in character, small nodule in right lobe, another small tumour (bean size) above the corpus callosum in the posterior parietal region.

Microscopically this was found to be a columnar celled carcinoma with marked variation in size and shape of the cells. See photograph.

Case 28. M.D., male, aged 64. Store-keeper.

Admitted 30.10.26. Died 7.5.27.

Complaint - A tight feeling in the right side of the chest for 11 months.

Past History - healthy.

History of present illness - The patient began to have a tight feeling in the chest about 11 months ago. His description of the feeling was of a "string in the chest being pulled". Later he had a burning pain at the angle of the right scapula and about a month afterwards it had extended into the right axilla

and/

and down the ulnar margin of the arm to the little finger. Poulticing aggravated the pain. He has had a bad cough and has to sleep propped up or he wakens choking.

General Condition. A small firm nodule was found under the skin at the inferior angle of the right scapula. Pressure on this caused a pain to shoot down the back. The right arm and hand were colder than the left, particularly the right little finger. There was no apparent wasting. The voice was hoarse.

Respiratory System - Impairment to percussion was found over the right side of the chest anteriorly and posteriorly varying in degree, being less impaired at the apex anteriorly and at the base posteriorly. R.M. was definitely tubular on the right side and diminished on the right side at the base.

Examination of the larynx and bronchi was negative. Blood-stained sputum was present most of the time latterly, becoming dark green in colour. Abundant pneumococci were found. The patient gradually became weaker and died.

Post-mortem Examination - Thorax. The left lung was free. On section there was seen oedema and chronic bronchitis and congestion, but no consolidation nor tumour. The right lung was firmly adherent by old adhesions anteriorly in the axillary region and at the base. At the position of the 4th rib there was distinct bulging of the chest wall. In the middle lobe a large gangrenous cavity was found which was almost as big as the closed fist. This cavity was in contact with the chest wall at the region of the 4th rib. The entire lung presented a chronic induration/

induration and purulent infiltration and chronic bronchitis. Microscopical examination showed a consolidated lung with areas of the nature of a catarrhal pneumonia - other areas showed a very cellular character and the alveoli were filled with epithelial cells of bronchial rather than lung type. Areas of epithelial cells were present in the fibrous septae outside the lung alveoli and having the arrangement of a growth of cancerous type. This was classified as a carcinoma of bronchus.

Case 29. M.G., male, age 22.

Admitted 22.12.28. Died 6.1.29.

Complaint - Cough and haemoptosis of 3 days duration.

Family History - Mother died of asthma.

Previous Health - Troubled with cough since childhood. Pneumonia at 6 years.

Present Illness - Pain and stiffness in the arms for a fortnight, paralysis of the right side of the face 10 days before admission. Cold began 3 days before admission with cough, shivering, pain behind the sternum. Coughed up ½oz. blood, and thereafter the sputum was blood stained.

Present Condition - Moderately well nourished, paralysis of right side of face, enlarged glands in the posterior triangles of both sides of the neck, also in the axillae and groins.

Respiratory System - No striking abnormality. No increased mediastinal dulness.

Blood/

Blood Count - Red corpuscles 3,570,000
White " 481,000
Haemoglobin 50%
Colour index .71

X-ray showed broadening of the mediastinal shadow.

29.12.28 - Diminished resonance over right side of chest. Has had slight epistaxis.

2.1.29 - Retinal haemorrhages. Differential count gives great excess of lymphocytes. Definite lymphatic leukaemia.

Post-mortem Examination - Thorax. Heart dilated and enlarged. Muscle flabby. Haemorrhages in the wall of left ventricle. Lungs normal except for a few haemorrhages. The thymus was considerably enlarged forming a tumour mass.

[illegible] - Right frontal lobe of brain, $2\frac{1}{4}$" in diameter, showing cyst like degeneration. A second cyst was present lateral to the first. Numerous haemorrhages were present of small size and one large one $2\frac{1}{4}$" in diameter in the right occipital lobe.

Microscopical examination showed the thymic enlargement to be of the nature of a simple enlargement due to infiltration by lymphocytes.

Case 30. Mrs. H., age 66.

Admitted 15.2.28. Died 25.2.28.

Complaint - Breathlessness, cough and spit. Pain in the left arm and loss of power in the right leg.

Past History - Chronic bronchitis since childhood with asthma.

History of Present Illness - The bronchitis has become worse and the/

the breathlessness has increased in the last few months. She has lost weight. About two months ago she suddenly lost power in her right leg, and a little later noted a painful swelling in her left arm. Her condition has become much worse in the last week.

Examination - Cyanosed, dyspnoeic. Dulness at right apex with absent R.M. and altered V.R. and V.F. R.M. feeble at right base.

Post-mortem Examination - Pericardium attached to right lung by tumour growth. Heart normal. Left lung uninvolved. Right lung showed a mass round the bronchus stretching into the lung for about 2". The mass at the root was about the size of a small orange, and firm. There was no ulceration of bronchial mucosa.

Metastases - 3rd and 4th lumbar vertebrae and left humerus.

Microscopically this was found to be a small celled carcinoma of bronchus, of the oat-seed variety, squamous-like cells being found in the metastases. See photograph.

Case 31. J.H., male, aged 42. Labourer.

Admitted 17.5.28. Died 14.6.28.

Complaint - General weakness, pain in chest and breathlessness of 16 weeks duration; hoarseness of 7 weeks duration; and spitting of blood for 9 weeks.

Past Health - good.

History of Present Illness - Sixteen weeks ago he had an attack of/

of influenza which he could not get rid of. He complained of headachy nausea and vomiting and general weakness. He was rather breathless and he says he lost weight. He had pain and tightness in the chest at this time. He recovered a little and went back to work after six weeks. He however had the feeling that he had gone back too soon as he was still breathless and very easily tired. Nine weeks ago he had a fit of coughing and coughed up some dark red frothy blood, and this continued for about a week. He still has occasional spasms and some blood in his sputum. Seven weeks ago he lost his voice and he attributed this to a chill. Six weeks ago he had to give up work as he was getting weaker. The pain and tightness in his chest got worse and he could only move about slowly. He was seen by Dr. Howie who advised his admission to hospital.

Present Condition - He is thin but of good colour. His voice is very hoarse. Two enlarged glands are visible in his right supra clavicular region, just at the margin of the sterno-mastoid muscle. There are enlarged glands palpable in both axillas. He has no evident difficulty in breathing while lying quietly in bed, and has only an occasional cough and very little spit.

Nervous system - The left pupil is oval in shape and is smaller than the right. The pupils react to light and accommodation both directly and consensually. The eyes move freely in all directions.

Reflexes - A slight unsustained ankle clonus is present.

Respiratory/

Respiratory System - The left side of the chest moves much more freely than the right. V.F. is not elicited owing to the patient having lost his voice. There is indrawing of the 6th, 7th and 8th spaces in the right side. The note on percussion is hyper-resonant on the left side. At the right apex in front the resonance is impaired. From the 1st to the 4th space the note is boxy and below that dull. At the back the impairment at the apex is not so marked and the note becomes dull at the level of the spinous process of the 6th thoracic vertebra. R.M. is present all over the left side and has a hollow quality back and front. R.M. is greatly diminished on the right side in front and is absent below the level of the 4th rib. At the back R.M. is absent below the level of the spinous process of the 6th thoracic vertebra.

The liver is palpable about ½" above the level of the umbilicus.

30.5.28. Patient complains of having great difficulty in micturating. It is difficult to start the stream and the stream is very small when it does come. There is some pain after the act and some nocturnal frequency. Rectal examination shows the prostate gland to be rather large and soft.

31.5.28 - Sputum examined. No T.B. No definite tumour cells found.

2.6.28. - Wassermann reaction negative.

8.6.28 - Patient very restless last night. Dyspnoea much more marked./

marked.

12.6.28 - Patient has been quiet today and not so breathless, but tonight he had a sudden spasm of severe dyspnoea. Given 1 cc opoidine.

Larynx examined previous to admission and paralysis of the right vocal cord found.

Post-mortem Examination - A large mass, size of an orange, was found behind sterno-clavicular junction more to the right side. Pericardium involved in tumour growth over 1½" area. Superior vena cava surrounded by a continuation of this.

Left lung involved. Right lung adherent all over. A large tumour mass was present above and to the right of the aorta in front of trachea and displacing it. It measured 4" in diameter. Mucosa was uninvolved. This was continued down the left bronchus without ulceration. The right bronchus was narrowed by tumour growth from ¾" below bifurcation, and tumour tissue continued into the lung for a distance of 5", involving middle and lower lobes. Cavitation with mucopus found. Vagus was uninvolved, but displaced.

Metastases - Liver, 2 or 3 small and one large nodule.
Right suprarenal much enlarged by tumour tissue.
Enlarged glands at pancreas, 3rd and 4th left ribs, also nodules in intercostal muscles.

Microscopical examination showed this to be a small celled carcinoma of bronchus, the secondaries showing the polymorphic character/

character of the growth. (See photograph)

Case 32. Mrs. McD., aged 63.

Admitted 21.1.28. Died 12.2.28.

Clinical History - Jany. 21. Admitted as an urgent case of heart failure, with complaint of weakness, cough, breathlessness and palpitation. These symptoms have troubled her since her dismissal from the Infirmary on 24th May, 1927. She had then been treated as a cardiac case.

History of Present Illness - Since dismissal she has never been well, and in bed practically all the time with cough and spit, breathlessness and palpitation. The spit she states has been blood stained. The legs have never been swollen, but recently weakness and breathlessness have become much worse.

Circulatory System - Her radial pulses are rapid, of good volume and high tension, regular rhythm. Vessel walls palpable. S.P. 180-90. Praecordium normal. Liver dulness begins at upper border of 5th rib, right border of heart at mid sternum, left border 5½" out from mid line. Upper border is indistinguishable from area of respiratory dulness at left apex.

Auscultation - at apex the heart sounds are poor in tone, regular with almost pendulum rhythm. A soft systolic murmur is heard, not well conducted but audible over the whole praecordium. The aortic sound is poor in tone, pulmonic a little accentuated with soft murmur noted.

Respiratory System - The thorax is emphysematous with curious

cut/

cut away sides which are flat. Respiratory excursion is absent, only a heave remaining. V.F. not tested because patient can only speak in a whisper. Percussion is hyper-resonant over the right lung and dull over the left apex, extending into the left axilla in a band over the pectoral muscle, and implicating thus the axillary upper third. Resonance begins again lower down at base. Resonance over all right lung. R.M. is harsh, prolonged on expiration over the right lung with adventitious moist and sibilant rales of many pitches. Over the left lung at base there is no respiratory murmur except that from the trachea. Lower down at the base a feeble R.M. is heard with no adventitious sounds. Whispered pectoriloquy marked over the dull area on left side. Behind there is the same dull area at the left apex which rapidly becomes resonant reaching hyper resonance in the scapular region and again becomes resonant at the base. The right lung is resonant with no impairment. R.M. is much diminished in volume and is tubular in quality at the left apex. R.M. is diminished over the whole left lung except over the scapular region. Moist adventitia heard over both lungs, markedly over the left lung where there is a clicking quality heard. Whispered pectoriloquy marked at left apex and nowhere else.

Alimentary System - Liver four finger breadths below costal margin and tender to the touch.

24.1.28 - No oedema. Hrash brassy cough to-day. No voice.

Colour/

Colour cyanosed and mind wandering a little. Very breathless.

30.1.28 - Loss of voice, very breathless and has to sit up at night.

1.2.28 - Mentally obscured. Cough severe. On 31st and to-day got out of bed. Sedative required.

8.2.28 - Mentally obscured. Cannot sleep without sedative. Dyspnoeic and coughs a lot.

Post-mortem Examination - Thorax. Pericardium - excess fluid present. Heart is enlarged. Left ventricle shows concentric hypertrophy. Right ventricle hypertrophied. Auricles normal. Mitral and tricuspid normal. Aortic valve incompetent to water test due to atheromatous dilatation of commencing aorta. Calcification of middle cusp of aortic valve. Calcareous plate in heart muscle. A considerable area of left ventricle wall shows marked fibrous change and apical part somewhat thinned.

Right lung shows no involvement by tumour, but gland at root shows involvement. Fluid in left pleural cavity (not considerable). Fibrinous exudate on surface. Examination of trachea shows a tumour involvement of wall. Examination of left bronchus shows bulging below bifurcation for ½". Section shows tumour tissue in contact with bronchus wall and tumour growth extends into the lung in all directions. Actual size of tumour tissue is about tangerine size. Upper left lobe shows consolidation (pneumonic) without evidence of tumour spread. The lower lobe is congested and oedematous. Bronchi filled with mucopus.

Glands/

Glands at left bronchus involved.

Abdomen. Liver congested, otherwise normal. Gall-bladder normal. Spleen - infarct present about walnut size, otherwise normal. Kidneys are of normal size, arterio sclerotic in type, capsules non-adherent, multiple cysts in one kidney. Supra-renals normal. Stomach shows P.M. congestion. The large bowel is intensely congested, slight diverticulitis. Pancreas normal. Mesenteric glands are enlarged. Bladder is normal. Uterus shows polypus (simple) at fundus. The ovaries are senile. Aorta is atheromatous. Arch of aorta adherent posteriorly to the malignant lung.

Microscopically this was found to be an alveolar carcinoma of lung (see photograph).

Case 33. Mrs. McV., age 52.

Admitted 22.10.28. Died 24.10.28.

Complaint - Pain in right shoulder of a month's duration, also pain in the lower abdomen and vomiting.

Present Illness - Two months ago was caught in the rain while out walking, and had a severe attack of vomiting on the way home. She then complained of severe pain in the right shoulder which continued for days, and nausea returned 10 days later with cramping pains in the lower abdomen and repeated retching. She had a feeling of fullness after fluids which were frequently vomited. Her appetite became poor. Four days before admission she became/

became confused mentally and tended to wander. She also complained of headache but had no fits. The abdominal pain cleared up, but the stools which had been dark remained greenish. She was not constipated. She had a fairly severe hacking cough but no spit. There is a history of mental derangement (puerperal insanity) but she had been otherwise healthy.

General Condition - Stuporous and restless, toxic look.

Respiratory System - Percussion resonant in front. V.R., V.F., and R.M. normal. Posteriorly less resonant note particularly at the left base where R.M. was puerile.

Blood pressure - 95/70.

Nervous System - Reflexes exaggerated, left patellar clonus, plantars flexor.

Beyond tenderness over the liver there was no other abnormality. She remained in a stupor but was very restless and sometimes noisy until her death in coma. Subcutaneous salines were administered and frequent enemata. The case was examined by me when I was asked to do her blood sugar curve, and she was incapable of replying to questions. The blood sugar curve was normal.

Post-mortem Examination - Thorax. Tumour tissue was found involving the parietal pericardium posteriorly, the right auricle and the interauricular septum.

The left lung was free, old healed tubercle at apex, tumour tissue involved wall of left bronchus.

Tumour/

Tumour tissue surrounded right bronchus for 1" below bifurcation, and a mass the size of an orange was present at the root of the lung adherent to pericardium and aorta. Oesophagus was pressed on but the wall was uninvolved. Trachea was also surrounded and the pleura involved. Posterior mediastinal glands were involved.

Abdomen. Tumour involvement of the medulla was present in both suprarenals, the right being larger than the left. A tumour necrosis of walnut size was found in the middle of the pancreas surrounded by an area of fat necrosis.

All the other organs were normal.

Microscopically this was found to be a small-celled carcinoma of bronchus.

Case 34. P.M., male, aged 55. Miner.

Admitted 29.10.27. Died 19.1.28.

Complaint. Breathlessness and a lump in his left axilla.

Duration - lump, four months and breathlessness over three months.

Past Health - Except for pneumonia 15 years ago has always been a healthy man. No exanthemata or other constitutional disease. He has had a cough with a spit which has been black but recently became white and frothy.

History of Present Illness - About four months ago he first noticed a small hard lump in his axilla. For about four weeks this gave him no trouble, but at the end of this time his breathing also began to be affected. He found latterly that jobs he could do/

do without effort before were leaving him gasping for breath and very weak. The lump in his axilla steadily increased in size, but apart from its size caused him no inconvenience.

About five weeks ago while returning from work he was seized with an attack of breathlessness and temporary blindness. He was in a car at the time so he sat still and by the time his destination was reached he had recovered his breath and eyesight and was able to get up and walk home. The duration of this attack was 10 minutes. He has had four attacks altogether since the first, all similar in character.

On 14th October he found that he could not carry on working, as working bent under a low roof increased his breathlessness. During all this the mass in his axilla was increasing in size, still with no pain. Until admission to Mr. Russell's wards he does not think that he has lost weight, and he has not noticed any other lumps. A few days before admission he had a sharp stinging pain in his left axilla momentary in duration.

General Condition - He lies in bed comfortable only when slightly propped up. His breathing is rapid and apparently with considerable effort mostly respiratory. His face is pale with a slight malar flush. The pale colour is of an earthy tint. His mucous membranes are fairly well coloured. There is evidence of loss of weight and his skin is inelastic and dry, but he does not complain of pain.

Respiratory System - The thorax is well formed with pale skin.

There/

There is a mass visible in the left axilla about the size of an apple, stoney hard in consistence, attached to skin, which puckers when the mass is moved as is easily done on the deeper structures to which it is also fixed. There is no tenderness on pressure. In the right axilla there is smaller hard mass commencing. Above the left clavicle no glands are felt, but there is one palpable above the right clavicle.

Respiratory excursion is fair but very evidently freer on the right side. Palpation confirms this. V.F. is much diminished over the left apex. Percussion reveals great impairment of the percussion note over the left apical region in front. The impairment extends from the apex across to the sternum, merges with the cardiac dulness and spreads into the axillary region in its upper two-thirds. At the base the note is resonant. The right lung is resonant with almost a hyperresonance at the right apex.

Auscultation reveals tubular R.M. at the very apex of the left lung, but as the third rib is approached and out into the axilla no R.M. is heard. At the apex R.M. is prolonged in expiration with adventitious rhonchi. Over the right lung R.M. is relatively of great intensity with expiration prolonged over the apex. V.R. is decreased at the left side with pectoriloquy well marked at the apex. Behind there is only slight impairment of percussion. V.F. is more marked on the right side. R.M. is distantly tubular over the left apex and expiration is prolonged over both lungs. R.M. marked over the right lung. V.R. decreased/

creased at the left apex with pectoriloquy. At the base of the left lung percussion is resonant with V.R. and V.F. almost the same in quality as the right side. Adventitious sounds are heard over both lungs, more marked on the right side.

Nothing of note in other systems, but there are glands in both groins. Pulse kept continually very rapid, ranging about 120 and reaching 140 at one time.

Nov. 1. - There is an area of impairment behind extending to the 6th rib, breaking abruptly into resonance over three finger breadths, then again into dulness at the base.

Nov. 2 - The area of resonance is raised about two finger breadths with dulness still at the base. Chest explored but no fluid obtained.

Nov. 11 - Glandular mass in axilla growing.

Nov. 27 - General condition is much the same. Mass growing. Physical signs still same. Colour little better and extreme breathlessness gone.

Dec. 1 - Improvement in general condition still present. Physical signs still the same. No R.M. at left apex except communicated sounds from trachea. Right lung clear.

Dec. 25 - Breathing much easier. Swelling in right groin enlarging. General condition deteriorating.

Jan. 2 - Patient much weaker.

Jan. 15 - Still very weak.

Jan. 18 - Coughing up pus. Mass bigger with ecchymosis over top.

Feels/

Feels harder than before. Left lung still as before. Visible mass between 2nd and 3rd ribs (left).

Jan. 19 - Patient died.

Post-mortem Examination.

External Examination - A well-developed, extremely emaciated man. A mass, the size of a large orange was present in the left axilla, very hard in consistence and attached to skin and underlying structures, which had the characters of the fleshy growth with caseous degeneration in parts. A smaller tumour was present in the right axilla.

Internal Examination - Thorax. Pericardium - completely adherent to and on left side and posteriorly continuous with tumour growth. Right lung was enlarged. It showed some congestion, deep pigmentation and chronic bronchitis. No evidence of tumour in the lung.

A large tumour mass was present in mediastinum occupying both anterior and posterior regions, more marked posteriorly. It was continuous with mass of enlarged glands around root of left lung and with tumour tissue which spread 3" or more into substance of left lung. Metastatic nodules were also distributed through lung and there was a marked tumour involvement of both visceral and parietal pleura. The tumour tissue in posterior mediastinum involved both visceral and parietal pericardial wall. Aorta, oesophagus and bronchi with lower part of trachea were displaced by tumour growth. On opening up bronchi, tumour growth was apparent/

apparent in left bronchus beyond bifurcation. Section through this area showed tumour tissue on mucosal surface and external to its wall continuous with main tumour growth. The area of tumour tissue involving mediastinum and root of lung was about 6" in diameter. There was marked breaking down and softening of the lung tissue.

Abdomen. A large glandular mass, about 4" in size, was situated at the head of the pancreas and lesser curvature of stomach. Stomach was adherent to it and also pancreas, but there was no tumour involvement of either organ. Stomach was normal. The intestines and mesenteric glands were normal. Tumour growth was present in head of pancreas. Spleen was enlarged and showed presence of tumour nodule of lemon size. A tumour mass was also present at ileocaecal junction. This mass was about the size of the pancreatic growth and was composed of enlarged glands. Kidneys apart from congestion were normal. Liver was congested; no evidence of tumour growth. The left suprarenal showed small secondary tumour in medulla. Bladder was normal.

There was tumour involvement of intervertebral discs in upper lumbar region.

Neck. Larynx, trachea and oesophagus were normal. The thyroid gland was enlarged. Aorta - a few patches of early atheroma.

Microscopical examination showed this tumour to be a small celled carcinoma of bronchus with little polymorphism even in the secondaries.

Case/

Case 35. J.R., male, aged 64. Marine Engineer.

Admitted 11.10.27. Died 5.11.27.

Complaint - shortness of breath.

History of Present Illness - In January 1927 he had pleurisy and since then has had shortness of breath increased on exertion, and fits of coughing which left him very breathless. He has a tight feeling in the chest but no pain. He had pneumonia in June 1927, and was put off his boat at Port Said where he remained in hospital for three weeks and then returned to Glasgow. He had a frothy spit all the time which has been blood-stained for the last nine weeks. He lost flesh considerably, being 15 st. in January 1927 and 13 st. in July 1927. His sleeping has been disturbed by his slipping down in bed and waking up breathless.

Past History - Always healthy, no previous respiratory trouble.

General Condition - Heavily built, orthopnoeic, well-nourished, breathing rapid and noisy with slight inspiratory stridor. The skin is dry with a warty condition of hands and forearms. The voice is husky. Marked oedema of the chest wall, arms and lumbar cushion is present with dilated veins over the chest and neck. The legs are wasted and the feet cold.

Respiratory System - An area of dulness is found over the mediastinum increasing the normal impairment 4" to the right along the clavicle and 3" to the right at the level of the 3rd rib. To the left the dulness stretches 2½" at the level of the clavicle and 1½" at the 3rd rib. Posteriorly the right upper lobe is dull/

dull to percussion. R.M. is tubular over the dull area anteriorly and diminished over the right side posteriorly. There are rales and rhonchi at both bases. V.R. is increased over the dull area anteriorly and posteriorly, with whispered pertoriloquy. V.F. is much increased over dull area.

Circulatory System - borders of heart not definable.

Alimentary System - liver not palpable, abdomen full and flabby.

Nervous System - exaggerated reflexes - plantar flexor. Eyes normal.

Post-mortem Examination - Thorax - full of fluid. Pericardium full of fluid, adherent to heart at base posteriorly. Heart - right auricle and left auricle show tumour involvement of wall at insertion of superior vena cava. Both are dilated. Pulmonary artery in contact with tumour but not involved. Aorta adherent to tumour which surrounds all structures of the mediastinum. Mitral valve admits three fingers. Tricuspid, aortic and pulmonic normal.

Left lung - partial collapse, tumour tissue confined to root. Tumour tissue is peribronchial. Right lung - partial collapse, good deal of consolidation, fibrinous exudate. Peribronchial tumour tissue. Trachea involved in tumour, not mucosa. Anterior and posterior mediastinum involved. Oesophagus pressed on by gland at arch of aorta.

Abdomen - Liver displaced downwards. Slightly enlarged, congestion, no tumour tissue. Gall bladder has normal wall - one/

one gall stone. Spleen enlarged, semi-diffluent. Kidneys normal. Growths were present in both suprarenals - larger in left. Bladder normal. Prostate was enlarged, non-malignant in appearance. Stomach dilated, congested mucosa. Pancreas and intestines were normal.

Microscopically the tumour was found to be a small-celled carcinoma of bronchus with well marked polymorphism.

Case 36. R.S., male, aged 26. Motor-driver.

Admitted 19.5.28. Died 18.9.28.

Complaint - Loss of voice and shortness of breath on exertion. duration - one year.

Past Illnesses - Can only remember having whooping cough when a child, and since then has had a weak chest. In 1923 had skin disease of the face. He was treated for this for two years before it finally cleared up. He had a similar infection in the pubic region, which cleared up with treatment, but recurred six months ago.

History of Present Illness - In 1914 he fell between two planks and hurt his left leg, though at first all that was to be seen was a small pimple on the surface. A few days later he had an accident to his right leg while playing football and used his left one freely, when it also began to hurt him and to swell. Three months later he was admitted to the Western Infirmary for treatment of his left leg. He was advised to have his leg removed/

moved then, but his parents refused permission; and the "lump" was removed. Six years later (1921) this lump reappeared in the same place and was again removed. A soft swelling was removed from the right side of his neck at the same time. In 1923 when his skin disease started his chest began to trouble him also, and he had a bad cough. After his skin disease had been cured he was moderately well until 1927 when in America he had trouble with his chest which was diagnosed as "double pneumonia", but the symptoms cleared up in four days and tuberculosis was considered, and he was advised to be X rayed. As a result he was advised to stay in Hospital and have deep radium treatment, but he returned home. His voice disappeared suddenly one day and on his return he was admitted to the Western Infirmary, where his voice partly returned but he has never been able to speak above a whisper. He noticed then that the right pupil was always larger than the left. He was discharged from the Western after two months' treatment, and has since been at home, his condition unchanged until admission.

Present Condition - Patient lies comfortably in bed in any position, he complains of pain in his right shoulder. He is slightly pale, his right pupil is dilated, and his left semi-contracted; both react to light and on accommodation. There is a soft diffuse swelling on the right side of his neck behind the sterno-mastoid muscle, in the region where the swelling was removed in 1921./

1921. There is atrophy of his left sterno-mastoid muscle. The left side of his chest is bulging and the surface veins are markedly dilated. There is an area of dulness to percussion in the right hypochondrium but the liver is not palpated as the rectus muscle is very tense. The left thigh shows a linear operation scar.

May 21. Respiratory System - The right side of the chest is bulging and there are dilated veins all over. There is pulsation in the epigastrium and also in the 5th and 6th interspaces on the left side. There is a small hard swelling palpable over the right pectoral muscles. It is freely moveable, discrete and not attached to skin or underlying muscle, about the size of a bean. The left side of the chest does not move, but on the right side respiratory excursion is good. V.F. is absent on left, increased on right; over an area of $\frac{1}{2}$ sq. inch under the left clavicle there is whispered pectoriloquy. Auscultation - no breath sounds are heard over the upper part of the left lung. On the right side the R.M. is increased in volume, and vesicular in quality. The V.R. is absent on the left side except at the base, and on the right is amphoric in quality. Behind, the percussion is dull over the upper two thirds of the left lung, and there is increased resonance at both bases and in the axillae. V.F. absent on the left side, very intense on right side, especially at the base. V.R. is amphoric in quality. There are no adventitious sounds.

Circulatory/

Circulatory System - The radial pulses are synchronous, but unequal in volume, the right being greater than the left. They are regular in rate and rhythm. Right pulse is of good volume and moderate tension, left is of small volume and of low tension. Heart borders - liver dulness begins 7th interspace. Right border is 4½" to the right of the mid sternum, upper is in the 4th interspace. On the left side the superficial cardiac dulness is continuous with the dulness over the lung. Apex beat is visible, diffuse and forcible in the 5th interspace 4" from mid sternum. At the apex the sounds are pure and of good tone, 2nd sound is thudding in quality. Sounds are also pure at the base but slightly muffled. 2nd sound is accentuated at pulmonic area. There are no adventitious sounds.

Nervous System - Pupils are circular but unequal. Both react to light and on accommodation. Ocular movements normal. Reflexes in arms present and also in legs equal on both sides. Plantar reflexes flexor. Liver is displaced downwards.

July 16 - Breath sounds absent over the area of dulness in front. Behind are faintly heard and very distant. Large lump on right side in lumbar region, fluctuant and tense. Also small one in left posterior axillary line.

July 14 - Larynx examined by Dr. Brown Kelly. Paralysis of left vocal cord.

July 31 - Complains of having cold in his head. Confined to bed.

August 25 - Lump in lumbar region much bigger. Complains of pain in/

in the right subscapular region, worse on breathing and coughing. No change in physical signs. Sputum still slightly bloodstained, perhaps every fourth spit being tinged with blood.

Sept. 5 - Radium applied 83.6 m.g. for 8, 8 and 10 hours over different parts of the chest.

Post-mortem Examination - Thorax. Heart and pericardium displaced to the right side. Fluid present at base of right lung which was collapsed and congested, but otherwise normal. The whole of the left side was occupied by a tumour mass of the size of a small football and remnants of the left lung. The mass was composed of breaking down tissue and blood clot. At the base of the left lung was a cavity containing blood stained fluid. All the structures of the mediastinum were buried in the growth but uninvolved by it. The nerves were much flattened and ribbon like, particularly the vagus.

Abdomen. Organs were found to be normal except for the liver which was nutmeg in type. There were no metastases. Microscopically this was found to be a spindle-celled sarcoma.

Case 37. I.S., female, age 32.

Admitted 26.9.28. Died 27.9.29.

Complaint - Breathlessness.

Present Illness - First noticed a lump on right side of neck in July 1928. Piece removed for examination. Has been breathless for some time. This became urgent 5 days before admission, and she could/

could not swallow. Fed rectally.

General Condition - Cyanosed, dyspnoea extreme, unequal pupils, soft swelling in right supraclavicular region. Glands in groin. Sept. 26 - Low tracheotomy performed, breathing easier but became weaker and died 27th September.

Post-mortem Examination - A mass was found encircling trachea and bifurcation stretching 3" along the bronchi, and about the size of an orange. The tumour bulged into the wall of trachea but did not involve mucosa. This mass was continuous with a mass in the upper part of the right chest and the mass above right clavicle. Metastases - Liver - 12 nodules varying from a pea to a walnut in size. Left Seprarenal - medulla showed tumour involvement. Pancreas - malignant involvement of body and tail. Ovaries - numerous small nodules under the capsule in both. Involvement of periosteum of right rib.

Microscopically this was found to be a small-celled carcinoma of bronchus.

Case 38. Mrs. W. age 37.

Admitted 13.12.27. Died 21.6.28.

Complaint - Breathlessness, pain in the chest, cough and spit since August 1927.

Past Health - Slow recovery from influenza in 1918. Operation for gall-stones 2 years ago.

Present Illness - During the last fortnight of August 1927 she developed a cold with bronchitis, the cough and spit remaining after/

after she got up. She then developed a sharp stabbing pain in the chest and occasionally in the right arm with sudden attacks of breathlessness which made her feel as if she were choking. No other symptoms were complained of apart from these.

General Condition - Dyspnoeic, cyanosed, difficulty in inspiration. No apparent loss of flesh.

Respiratory System - Cough of spasmodic type, sputum frothy but not blood-stained. Movement of right side of chest much limited, percussion note impaired from apex to base. Upper limit of liver dulness indefinable. R.M. harsh on the left side, numerous rales; absent on the right side except for a small area in the axilla where it is bronchial but much diminished in volume, crepitations at right apex. Posteriorly R.M. is much diminished over the right side. V.R. and V.F. diminished over right lung with whispered pectoriloquy in places.

Nervous System - Abdominal reflexes absent but knee jerks active, otherwise no abnormality.

Dec. 25 - Breathless spasms not so severe or frequent. Pain severe round right breast. Adrenalin tried for spasms but caused them to be more severe. Atropine gr. 1/150 given night and morning.

Dec. 30 - Enlarged glands along right pectoral muscle. Right hand sweating more than left.

Jan. 17 - Mass palpable 2" below right axilla.

Jan. 27 - Physical signs still the same.

Jan./

Jan. 30 - Much more breathless, pain severe, generally weaker, cyanotic, sweating a great deal, cough spasmodic, blood-stained sputum.

Continued in this state till March 1st, when had headache and vomiting twice. Remained thus for some time and gradually became worse. No recurrence of vomiting. Gradually weakened with stertorous breathing.

Post-mortem Examination - Thorax. Right lung adherent to chest wall. Consolidated pleura much thickened. On section black gangrenous material oozed out of lung tissue. The lung was composed of areas of consolidation due to tumour tissue, areas of necrosis and areas of discrete colloid-like tumour tissue. Left lung was free but contained a few nodules of tumour growth.

Abdomen. Secondary deposits were found in liver (a few small nodules) and in both suprarenals (medulla). The other organs were uninvolved.

Head. Brain showed numerous discrete glioma-like tumours, one in the left occipital lobe, one in left cerebellar lobe, and one in the right crusta.

Microscopically this was a columnar celled carcinoma of bronchus.

Case 39. J.W., female, age 65.

Admitted 30.10.28. Died 11.1.29.

Complaint - Pain in back and left shoulder and arm for 10 months.

Past Health - Subject to "colds in the chest" as a child.

Operation/

Operation for gall-stones 12 years ago.

Present Illness - This began two years ago with pain below left scapula, which has remained constant spreading occasionally to the left shoulder and arm. She has noted that the left arm was sometimes redder than the right and slightly tender and sometimes benumbed. She has lost weight steadily and has been breathless of late, sweating profusely at night.

General Condition - Right arm pale as compared with the left. Dilated veins on the left side of the chest, swelling in the left side of the neck. No discrete glands palpable.

Respiratory System - Impaired resonance under the left clavicle, broadening of mediastinal dulness, movement poor on left side. V.F. diminished over the left side. V.R. nasal over impaired areas. Dulness later extended to left axillary border with whispering pectoriloquy at the left apex posteriorly. Hyperaesthesia of the left side of the chest.

Nov. 23 - Radium applied.

Nov. 28 - Larynx shows abductor paralysis of left cord. Pain more severe.

Dec. 11 - Haemoptysis - bright red blood.

Dec. 22 - Left sided paralysis of face to-day.

Jan. 9 - Severe dyspnoeic attacks, right side of face flushing, left remaining pale.

Post-mortem Examination - Mediastinal tumour found stretching into the neck on the left side involving left clavicle and first rib.

A/

A nodule of tumour growth was found in the 3rd left rib. The main tumour mass encircled trachea, bulging into it and surrounding it about 1¾" above the bifurcation. No ulceration of the wall. It extended 1½" along the left bronchus narrowing it considerably. Mass extended into left lung 1½" and was denser there. The aorta curved over the growth. The veins were uninvolved by tumour, but the left carotid and subclavian were stenosed. The first three dorsal vertebrae were involved by tumour spread and there were small nodules over the left pleura.

Metastases in both suprarenals, and a softening in left side of the pons.

Microscopical examination showed this to be a columnar celled carcinoma of bronchus with marked polymorphism.