Observations

ON

INTRATHORACIC NEW GROWTHS AND
THE VALUE OF BRONCHOSCOPY IN
DIAGNOSIS AND TREATMENT*

BY

MAURICE DAVIDSON, M.A., M.D. OXON.,

F.R.C.P. LOND.

PHYSICIAN TO THE BROMPTON HOSPITAL FOR CONSUMPTION AND DISEASES
OF THE CHEST, AND TO THE MILLER GENERAL HOSPITAL; CONSULTING
PHYSICIAN TO ST. LUKE'S HOSPITAL, CHELSEA

(With Special Plate)

The diagnosis of intrathoracic new growths has become a very much more complicated affair than was ever anticipated at the beginning of this century, and the value to-day of clinical history and physical examination in diseases of the chest can only be duly appraised when regarded in relation to various other methods of investigation which have made remarkable progress in the last decade. Foremost among these is the employment of Roentgen rays and of the bronchoscope.

I shall endeavour to indicate the importance of these from the standpoint of the physician, and to give a brief practical outline of what I conceive to be the proper mode of procedure in the investigation of cases of suspected intrathoracic tumours, with special reference to those malignant growths of which the incidence has increased so remarkably in the post-war period, and upon the early diagnosis of which depends entirely any hope we may entertain of successful treatment in the future.

For our purpose at this meeting I shall assume that the appropriate team consists of physician, radiologist, and bronchoscopist. While thoracotomy may be, and occasionally must be, resorted to for diagnosis, it is usually in connexion with treatment that the surgeon's aid is sought. I have therefore omitted from my paper the purely surgical aspects of the question as being, strictly speaking, outside the scope of this particular discussion.

INCIDENCE, MORBID ANATOMY, AND AETIOLOGY

Under the general term "intrathoracic tumours" must be included a number of morbid conditions differing widely in origin, in frequency, and in pathological significance. For purposes of classification the most important practical point is the broad division of these into two main groups—malignant and non-malignant. The non-malignant tumours are undoubtedly more rare, but their importance is for this reason none the less, since from a clinical standpoint the evidence of their presence may be very similar to that observed in the case of malignant tumours, and from a therapeutic standpoint the possibilities in regard to treatment are infinitely greater. Among the benign tumours may be mentioned chondromata, fibromata, teratomata, and dermoids. Lipomata also occur in the literature of the subject. The above varieties have been mentioned in order to simplify our classification, but it must be remembered that many, if not most, of these benign growths are found on histological examination to be complicated in structure, though macroscopically they may appear to be homogeneous. They may be found within the substance of the lung, but are not infrequently extra-pulmonary and growing between the two layers of the pleura. They may arise in the mediastinum. Hydatid disease must also be

mentioned. Though rare in this country, it is comparatively common in Australasia; the cysts are usually in the substance of the lung, but are sometimes found within the pleural cavity. Innocent growths within the lumen of the trachea or bronchi come strictly under the heading of intrathoracic tumours, and one must not omit to consider substernal thyroid growth. Oesophageal tumours, though they may be intrathoracic, are hardly within the ordinary province of the laryngologist.

Increased Frequency of Lung Cancer

It is when we turn to the subject of malignant intrathoracic new growths that we find, in comparison with the benign tumours, such a striking increase in frequency at the present day. The following tables and graphs

TABLE I.—Incidence of Pulmonary Cancer (after Huguenin⁶).

Number of Necropsies	Number of Cases of Pulmonary Cancer	Authors and Dates
11,400	40	Wolff
21,000	17	Fuchs (1854 to 1896)
7,006	6	Norwiski (Lemberg) (1886 to 1903)
16,047	61	Lavrinovic (Petrograd) (1905 to 1914)

Compare with the above figures those given by Berblinger (Jena) in regard to 8,056 necropsies performed between 1910 and 1924. Of these 5,773 were on persons over 20-years of age; of the latter 987 (that is, 17.1 per cent.) had died of cancer. Of these cancers 41 were primary growths of the lung (that is, 4.2 per cent. of all the cancers were primary lung cancers).

TABLE II.—Proportion of Lung Cancer to Total Cancer (Huguenin, loc. cit.), Showing Increase in Recent Years

Statistics	Period	Pulmonary Cancers Per cent.	Total Cancers
Jena	1910 to 1914	2.2	363
	1915 to 1919	2.9	337
	1920 to 1924	8.3	287
Basel (Staehelin) ...	Before 1906	1.76	—
	1906 to 1914	2.9	—
	1914 to 1924	5.0	—
Berlin (Wahl)	1917 to 1922	6.0	—
	1922 to 1927	13.0	—
Zürich (Probst)	1906 to 1910	1.13	—
	1911 to 1915	3.34	—
	1916 to 1920	6.12	—
	1921 to 1925	7.17	—
	1926	7.56	—
			—

illustrate the remarkable rise in the incidence of primary cancer of the lung within the last fifteen years, and I would emphasize the important fact that the statistics on which I have relied for my conviction as to the reality of this increase are taken, not from clinical observations, but from actual post-mortem examinations.

Pathology

With the morbid anatomy we need not concern ourselves to any great extent, but a brief outline may be given of the main pathological features of these growths. According to the most reliable authorities, sarcomata are less common among primary intrathoracic growths than was formerly supposed to be the case. Many of the so-called lymphosarcomata of the mediastinum have been shown by Barnard¹ and others to belong, in all probability, to the group of carcinomata, and are examples of the "oat-celled" tumours which are associated especially with Barnard's name. Of the obvious carcinomata almost every histological variety may be found—squamous, columnar, encephaloid, or medullary cancers, and so forth. It may be mentioned that the occurrence of metaplasia in these growths is a common phenomenon, and may well account for the differences in histological appearance in tumours, most of which probably have a

* Read in opening a discussion in the Section of Oto-Laryngology at the Annual Meeting of the British Medical Association, London, 1932.

common origin from the bronchial mucosa. Of the malignant growths other than the carcinomata, mention must be made of primary endotheliomata of the pleura, which give rise to metastatic deposits in the lung tissue; sarcoma of the thymus may appear in children, and is a rapidly growing and fatal form of intrathoracic growth.

Of much more concern than the histological appearances is the anatomical site of these tumours. In most cases of primary bronchial cancer the growth originates a short distance below the bifurcation of the main bronchus. From this point it may spread outwards from

CHART 1.—Incidence of lung cancer at the Eppendorf Hospital, Hamburg, 1889-1923 (W. Kikuth).*

A=Absolute figures for cancer of the lung.
B=Percentage based on total cancer.
C=Percentage based on total post-mortems.

CHART 2.—Incidence of lung cancer at the Charité Hospital, Berlin, 1903-25.

the root until it has involved a large portion of the lung itself, the main bronchus being encircled and compressed. Occasionally the spread is in a backward direction, involving the posterior mediastinum. Although such spread inevitably occurs sooner or later, there are cases in which the growth remains more or less localized within the bronchus for a considerable time, and it is in such instances that bronchoscopic examination may reveal the true state of affairs, long before the appearance of physical signs or skiagraphic abnormalities of such a character as to give evidence which is sufficiently definite for a correct diagnosis.

A vast amount of speculative literature has appeared in connexion with the aetiology of lung cancer, but little has been discovered that throws any real light upon its causation. Occupational factors are of interest in so far as they may account for chronic irritation of the respiratory tract. The various irritants which have been

discussed include tar, petrol, gas, tobacco, and so forth, but so far it cannot be said that we have any conclusive evidence upon which it is possible to base a definite opinion in regard to aetiology.

Symptomatology and General Clinical Features

We have now to consider the main clinical features of intrathoracic new growths and to study the most important points in the symptomatology and physical signs. I have been accustomed for the sake of brevity and simplicity to divide cases of primary bronchial and pulmonary growths into the following broad clinical groups:

1. Those in which haemoptysis is the initial symptom.
2. Those in which the occurrence of a pleural effusion is the first manifestation of illness.
3. Those in which there is evidence of localized infection within the thorax, of which the presence of a breaking-down growth is the underlying cause.
4. Certain cases of unexplained bronchitis, usually associated with marked dyspnoea, especially in elderly people.
5. Obvious cases in which the presence of massive growth is at once suggested by symptoms and signs of pressure.

CHART 3.—Incidence of lung cancer at the London Hospital, 1907-25.

CHART 4.—Incidence of lung cancer at the Brompton Hospital, 1918-29.

Without giving a detailed account of the clinical aspects I would emphasize the following salient points:

Haemoptysis, occurring as an initial symptom in persons of middle age or over, should always raise the suspicion that malignant disease may be present in some portion of the respiratory tract, and in any case of haemoptysis of which the cause cannot be determined after adequate clinical and radiological examination the employment of the bronchoscope should be regarded as an obvious and necessary step in the procedure. Pleural effusion in older people should raise a similar suspicion, particularly if the effusion is found to be uniformly blood-stained. Localized infection within the chest must always demand an explanation. Even when the presence of pus has been determined by the exploring needle, it is still necessary to know the reason for its existence, and clinical experience has taught us that in many cases of unexplained intrathoracic suppuration, a breaking-down

carcinoma is really the origin of the trouble. It is all the more necessary to insist upon the importance of this, since the diagnosis in these cases has often been obscured by the history given. From the latter it may appear that one is dealing with a straightforward case of empyema or lung abscess following an attack of pneumonia. The precise clinical details of the preceding illness are not always available, and even when they are, may sometimes be misleading.

Bronchitis in elderly persons is a phenomenon of everyday experience, and its very frequency is liable to throw the physician entirely off the track in cases of lung cancer, unless he is aware of the insidious disguise which often masks the early clinical features of this grave disease. Pressure symptoms and signs are nearly always late phenomena, but it is a fact that patients with a large mass of growth in the chest may sometimes continue their ordinary occupation without being conscious of disability until the disease has reached this advanced stage, and that only then do they seek medical advice when the diagnosis is obvious at the first clinical examination.

Physical signs.—The actual physical signs found in the chest in cases of intrathoracic growths vary so much according to the size and situation of the tumour that no general description is possible. In very advanced cases one may get extensive dullness, due either to massive growth invading the lung itself or to the presence of a complicating pleural effusion. In earlier cases it is not uncommon to find dullness in one zone, especially that corresponding to the right upper lobe, which is, on the whole, the one most frequently involved. In these instances the dullness is due, not to the growth itself, but to atelectasis of the area of lung supplied by the bronchus or one of its branches, which has been obstructed by growth. The heart may be displaced towards the side of the lesion. There may be pleural involvement as indicated by the presence of dry pleural creaking on auscultation, and this may be accompanied by a certain amount of localized pain and by reflex cough. Quite often there are no physical signs in the chest of any great importance; the presence of slight bronchitic signs is common enough, and is of little or no diagnostic assistance.

RADIOLOGICAL ASPECTS

From what has already been said it will be obvious that a similar variation must exist in the radiological picture, which, after all, can only indicate fairly gross alterations in the anatomical structure or position of the thoracic contents, for the explanation of which we have to rely on a combination of all the various details of information available from different sources. In moderately advanced cases certain definite appearances are seen, and one or two well-recognized examples may be quoted. Where the bronchial obstruction has affected the air supply to one lobe, thus causing some degree of atelectasis or collapse, a well-marked opacity may be seen in the region of the affected lobe. The right upper lobe is the one most frequently involved, and in such cases the opacity is seen in the right upper zone with a sharply defined lower edge corresponding more or less exactly to the position of the interlobar septum. In other cases the lower lobe is affected, and one can thus distinguish broadly the so-called upper and lower lobe types of lung cancer. It might at first be thought that the opacity was due to the presence of growth itself which had spread out from the hilum into the substance of the lung, and indeed it is possible in the latter stages of disease to distinguish between the portion of the opacity due to the mass of growth and that due to the atelectatic lung. The opacity, however, which is due solely to collapsed lung, is extraordinarily dense, and it is hardly possible to deduce from the radiographic appearances alone the extent to which a primary bronchial growth has spread from its original site.

Occasionally, though much less frequently, the main mass of growth is situated in the actual lung parenchyma, the bronchus being clear. In these circumstances a somewhat different type of opacity will be seen, usually not quite so dense as the former and with an edge which, though by no means sharp in the case of malignant growths, is sufficiently clearly defined to differentiate the tumour from the surrounding lung tissue. In benign tumours, such as fibromata or hydatid cysts, the edge is much more sharply defined, and this feature is of some importance in endeavouring to distinguish radiologically between the malignant and the non-malignant varieties of growth.

Use of Lipiodol

In quite a number of instances no such obvious abnormalities are shown by an ordinary skiagram, but the introduction of about 15 to 20 c.cm. of opaque oil into the bronchi by one of the recognized methods may enable the radiologist to demonstrate bronchial obstruction, and though the nature of the obstruction is not necessarily proved by this means, yet the typical picture of "blocked bronchus" seen so frequently in the x -ray department of a chest hospital is, for all practical intents and purposes, diagnostic of a primary carcinoma. It must, however, be remembered that the absence of this typical picture after injection of lipiodol does not by any means exclude the presence of a growth. In one of my cases, already published,⁴ lipiodol examination revealed a condition of localized bronchiectasis at the base of one lung without the slightest appearance of obstruction. This condition was shown later on post-mortem examination to be secondary to a carcinomatous deposit in the main bronchus involving the mucous membrane extensively for a distance of about two inches below the bifurcation of the trachea and, to a lesser degree, right down to the smaller bronchi. No blocking of the lumen had occurred, and it is impossible to conceive that a diagnosis could have been established before death except by bronchoscopic examination, which in this instance was, I regret to say, not carried out.

USE OF BRONCHOSCOPY

The diagnostic value of the bronchoscope is seen chiefly in those instances in which a really definite picture has not been obtained by x -ray examination, even with the aid of lipiodol. It is best illustrated in cases of haemoptysis arising from bronchial carcinoma where there is no gross obstruction, as in the example I have just quoted. Further, it is sometimes possible by means of this instrument to remove a portion of tissue for microscopical examination. Its value in both diagnosis and treatment would appear to be restricted mainly to the class of case in which the growth is definitely within the lumen of the bronchus. In cases of growths of parenchymatous type the information afforded by bronchoscopy is more likely to be negative, and the decision as to whether it is necessary to subject the patient to this further examination must be made after due consultation between physician and radiologist. In this connexion I should welcome the views of my colleagues in the laryngological section as to the possible contraindications in regard to bronchoscopy. I am fully aware that in expert hands the operation can be carried out with a minimum of discomfort or risk, and yet from the standpoint of the physician I feel bound to make some reference to the inevitable distress to the patient which must occasionally occur, even in the experience of the most practised bronchoscopist, from the passage of the instrument, and to the natural desire that one feels to spare the patient, so far as is consistent with adequate investigation, the multiplication of highly technical methods of examination. The possibility of idiosyncrasy to cocaine is a detail to which I think insufficient attention has been paid, and since I have occasionally seen distressing and

even alarming symptoms occur from the use of the cocaine spray during the course of bronchoscopic examination, I feel that this is essentially an occasion on which I may invite criticism and information on the point.

TREATMENT AND CONCLUSIONS

In regard to the treatment of intrathoracic growths I would say this. While all the members of our team are vitally concerned, the physician and radiologist in respect of the task of early diagnosis, and the radiologist in respect of the valuable palliative treatment which, as I believe, he is able in not a few cases to give, it is to the surgeon and to the bronchoscopist that we must look for the actual technique of any radical therapy that may be attempted. Whether a growth is to be approached through the chest wall or through the respiratory tract will depend, of course, on its exact situation. It is now generally admitted that the great majority of lung cancers originate in the bronchial mucous membrane, and in sufficiently early cases it is possible to introduce, by means of the bronchoscope, a small tube containing radon seeds, which is then left in position in the narrowed bronchial tube for a sufficient period, even up to a fortnight. Although we cannot at present hold out any extravagant hopes of the value of radium as a curative agent—and, in fact, it would appear that the results up to date have been extremely disappointing—it does still seem to me to be a remedy which we should reasonably continue to exploit as an alternative to the policy of masterly inactivity. A few cases have been recorded in which, after treatment of bronchial growths by endoscopic removal or the application of radium, or by both combined, the after-history of the patient has been such as to suggest very strongly that improvement has resulted. The remarkable case reported by Chevalier Jackson⁷ in 1917, and the removal by Orton¹⁰ of a pedunculated bronchial carcinoma, are two classical examples which, together with numerous other attempts that have been attended with a certain measure of success, should encourage the belief among the more determined investigators that the bronchoscope as a medium of treatment is still awaiting further trial.

In summing up the observations made above I would say that for complete investigation of a case in which the presence of intrathoracic new growth is suspected we should rely on the following methods of examination in this order: first, a carefully taken clinical history; secondly, physical examination of the patient; thirdly, radiological examination, which should include screening and the taking of skiagrams in the lateral as well as in the antero-posterior plane; fourthly, the use of lipiodol to assist the radiologist in the interpretation of the ordinary skiagrams; fifthly, examination by the bronchoscope. In this scheme of examination it is important that physician, radiologist, and bronchoscopist should be in close touch with each other, and should, so far as possible, work together.

In this country, although much is spoken in praise of team work, we are still far from the attainment in practice of the ideal co-operation and understanding. Experts in one department spend too little time in the departments of their colleagues, where they should attain such a measure of intelligent understanding of other men's specialties as would help them enormously with their own. I am myself conscious of the immense value of the many hours that I have sojourned in the x-ray rooms of various hospitals, and of the lessons that I have learnt therein, but of the bronchoscopist I fear I have as yet been but a sluggish pupil. I must therefore confess that in connexion with the earlier diagnosis of bronchial carcinoma it is to my friends of the laryngological section that I look more especially to fill those gaps in knowledge of which my radiological colleagues and I alike are con-

scious, and, by further research into the significance of the different appearances which may be revealed by the bronchoscope, to improve and perfect our diagnostic machinery to such an extent that we may see prospects of radical treatment which at present lie beyond our vision.

DETAILS OF ILLUSTRATIVE CASES

The following skiagrams (Figs. 1 to 4 on Plate) have been selected from a very large number available in order to illustrate some of the more characteristic appearances in known cases of primary carcinoma of the lung or bronchus.

Fig. 1 shows the upper lobe type already referred to; the opacity in the right upper zone has a sharp lower edge corresponding to the interlobar septum, and represents the atelectatic right upper lobe, which in this case was associated with obstruction of the right bronchus by a surrounding mass of growth.

The full details of this case have been published elsewhere,² but the outline of the case may be given as follows. The patient, a man of 32, had enjoyed good health until the winter of 1927, when he had an attack of pleurisy [*sic*] on the right side. Since this attack he had complained of pain in the chest and dyspnoea, with slight cough and expectoration. When admitted to hospital in July, 1928, he was found to have dullness over the upper part of the right lung in front and behind, with diminished air entry and absence of vocal fremitus. There was moderate pyrexia. In the course of time he developed a pleural effusion on the right side, and ultimately there appeared oedema of the right arm and other signs of pressure. He died about six months after admission. Post-mortem examination revealed a smooth, hard mass of growth surrounding the right bronchus, which was completely obliterated. The growth had spread downwards and outwards into the middle lobe. Throughout both lungs there were also areas of old tuberculous disease.

Fig. 2 shows the lower lobe type of growth. This skiagram was taken from a man whom I saw on one occasion only in the out-patient department of the Brompton Hospital on May 28th, 1930. He was then complaining of cough of fifteen years' duration, with abundance of yellow sputum. There was a previous history of pleurisy. The cough had been getting steadily worse. Physical examination of the chest revealed little; there was general emphysema, but no definite evidence of infiltration of the lung tissue.

In the skiagram it will be noted that the right side of the diaphragm is invisible, and that the heart, mediastinum, and trachea are displaced towards the right side. To the right of the right border of the heart there is an area which is somewhat denser than the lung shadows in the periphery, and which is limited by an oblique line, which is distinctly visible. This area evidently represents a partly collapsed portion of the base of the right lung. My radiological colleagues reported that there was much pleural thickening, and suggested that a condition of basal bronchiectasis was probably present on the right side.

In the ordinary course this patient would have been re-examined after introduction of lipiodol, but he failed to attend again, and I heard nothing of him until I was informed of his death, fifteen months later, in another hospital. I was able to trace his history, and found that he had begun to lose weight and to suffer from increasing dysphagia. Dullness had appeared, which spread over the whole of the right side of the chest behind and over the upper lobe in front. X-ray examination after introduction of lipiodol showed that there was probably an obstruction of the right bronchus, since none of the oil could be seen to have entered the bronchial tree at the base of the right lung, though the actual "blocked bronchus" was not visible. Prior to death he had three severe attacks of haemoptysis. Post-mortem examination revealed a carcinoma of the right bronchus that had spread into the right lung, which was involved by a large mass of growth. The left lung was normal.

Fig. 3 is a skiagram taken from a man of 68, who was sent to me in the summer of 1929 suffering from distressing shortness of breath. Complete details of the case are on record,³ but the following brief summary may be given in connexion with the above skiagram. The patient had been complaining for some months of paroxysmal cough, with inter-

mittent signs of dry bronchitis, but the prominent symptom was dyspnoea, which had been increasing in severity. This x-ray illustrates the parenchymatous type of growth. Re-examination with lipiodol showed no evidence of bronchial obstruction, the opacity being surrounded by bronchial tubes of normal size and appearance into which the oil had entered without difficulty, though none was visible in the mass itself.

Treatment consisted in the introduction of radon seeds through the thoracotomy opening by one of my surgical colleagues. Considerable improvement resulted, and for about a year the patient lost his symptoms and was able to get about in comparative comfort. Later he developed other symptoms, which suggested the presence of metastatic deposits in the brain, and from the last account I received from his own doctor it was evident that he was going downhill.

Fig. 4 illustrates the typical appearances in a case of "blocked bronchus," demonstrated by injection of lipiodol into the trachea below the cricoid cartilage. The patient

Diagrammatic sketch explanatory of Fig. 4 (showing blocked bronchus).

from whom this skiagram was taken was a middle-aged man, who came under my observation on account of haemoptysis, the cause of which had not been determined. From the history, the presence of bronchial obstruction, and the occurrence of a small pleural effusion, the diagnosis of bronchial carcinoma appeared inevitable. Bronchoscopic examination showed a greyish-white glistening tumour projecting from the mucous membrane of the bronchus into the lumen. Two or three days after this examination the patient had a sudden fit of coughing, and expectorated about an ounce of blood, in which a small portion of solid tissue was discovered. This, on section, proved to be a carcinoma.

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ANTE-NATAL RADIOLOGY*

BY

R. E. ROBERTS, M.D., B.Sc., D.P.H., D.M.R.E.

LECTURER IN RADIOLOGY, UNIVERSITY OF LIVERPOOL; HONORARY RADIOLOGIST, LIVERPOOL ROYAL INFIRMARY, LIVERPOOL MATERNITY HOSPITAL, AND VICTORIA CENTRAL HOSPITAL, WALLASEY

(With Special Plate)

This paper, based on the author's experience in the investigation by means of x rays of six hundred selected cases of pregnancy, is put forward with the object of briefly indicating what information may be expected from this type of examination. The cases are designated "selected" in that the x-ray examination was not of the nature of a routine procedure, but was in each case undertaken at the request of an obstetrician, either to confirm some clinical suspicion of abnormality or to solve some problem which could not be clearly elucidated by the ordinary methods of examination. Among the reasons

* Read in the Section of Obstetrics and Gynaecology at the Centenary Meeting of the British Medical Association, London, 1932.

which resulted in the help of the radiologist being solicited the following may be regarded as the more important:

1. To make a differential diagnosis between pregnancy and tumour in the case of an obscure abdominal swelling.
2. To ascertain the age of the foetus when this was in doubt clinically.
3. To determine the position and presentation of the foetus in doubtful cases.
4. To assess, by radiological pelvimetry, the exact measurements of the pelvic brim or outlet in a case of suspected contracted pelvis.
5. To investigate any suspected disproportion between the foetal head and the maternal pelvis.
6. To decide whether more than one foetus was present.
7. To determine the presence or otherwise of extra-uterine pregnancy.
8. To investigate the cause of hydramnios, with special reference to the presence and nature of foetal abnormalities.
9. To help in the diagnosis of suspected intrauterine death.

Differential Diagnosis of Pregnancy from Hydatidiform Mole and Pelvic Tumours

Since the advent of the Zondek-Aschheim test the radiological diagnosis of early pregnancy is of less importance than previously. The positive diagnosis by direct radiography is sometimes possible at the twelfth or thirteenth week. As a rule, however, it is not safe to exclude pregnancy by this method till after the sixteenth week. Even then the absence of foetal shadows should not be taken as conclusive evidence on one film only. At least three radiographs should be taken to exclude the possibility of non-visualization of the foetal parts through movement.

The Age of the Foetus

Where, owing to disparity between the period of amenorrhoea and the size of the uterus, an element of doubt exists as to the period of gestation, useful information can usually be given by x rays. In addition to the radiographic size of the foetus and the stage of ossification of its bones, one must take into consideration its position relative to the maternal parts, the presence of hydramnios or multiple pregnancy, or any other factor which may bear on its relative distance from the film and the consequent enlargement of its shadow on the radiograph. In order to build up a standard of comparison of sizes of foetuses at different ages it is important that a standard distance between the x-ray tube and the film should be maintained by the radiologist. A useful working distance is 30 inches.

Position and Presentation

For a complete orientation of the foetus three radiographs are, as a rule, necessary—namely, postero-anterior, antero-posterior, and lateral. The radiographs will give not only a true picture of the presentation, but also clear information as to the relation of the foetal parts to each other and to the maternal pelvis and spine. This is of special importance with vertex presentations in assessing the degree of flexion or otherwise of the head, or with breech cases in demonstrating the degree of flexion or extension of the legs and the position of the hands in relation to the head (Fig. 1). Out of 100 breech cases occurring in this series seventy-six showed extension of the legs.

Maternal Pelvic Deformities

By placing the patient in such a position that the pelvic brim is parallel to the x-ray film and the tube directly over the centre of the brim, it is possible to obtain a symmetrically enlarged picture of the superior strait. By measuring the distance of the tube from the upper border of the symphysis pubis and from the film it is quite a simple matter to estimate the exact dimensions of the pelvic brim in all diameters.^{1 2 3} With the

MAURICE DAVIDSON: INTRATHORACIC NEW GROWTHS AND THE VALUE OF BRONCHOSCOPY IN
DIAGNOSIS AND TREATMENT

FIG. 1.—Upper lobe type.

FIG. 2.—Lower lobe type.

FIG. 3.—Parenchymatous type.

FIG. 4.—"Blocked bronchus."