The pathology of mediastinal tumours with special reference to diagnosis / by John Lindsay Steven.

MEDIASTINAL TUMOURS

J. L. STEVEN, M.D.

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To Dr Colcott Fox
With the author's Compliments
January 1892

MEDIASTINAL TUMOURS.

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THE PATHOLOGY

OF

MEDIASTINAL TUMOURS

WITH

SPECIAL REFERENCE TO DIAGNOSIS

BY

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PREFACE.

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THE contents of this volume formed the subject-matter of a short course of lectures delivered by the author during the second session of the post-graduate course, held at Glasgow, in the month of October, 1890. After the lectures had been delivered the notes were extended and published as a series of articles in the *Glasgow Medical Journal* in 1891. With a few necessary alterations and additions these papers have been reprinted, and are now published in their present form. The colloquial style of the lecture-room has been departed from, partly because the author desired to be as concise as possible, and partly because he felt, in view of the detailed description necessary for the accurate record of his cases, that the plan now adopted was the best. The specimens from most of the cases recorded have been preserved in the Pathological Museum of the Glasgow Royal Infirmary, after having been carefully dissected and examined by the author.

The author desires gratefully to acknowledge the valuable assistance and advice received from his colleague, Dr. Charles Workman, during the progress of his researches; and to express his thanks to colleagues in the Royal Infirmary, and to other medical friends, for kindly supplying him with clinical notes of the cases.

PATHOLOGICAL LABORATORY,
GLASGOW ROYAL INFIRMARY,
December, 1891.

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THE

PATHOLOGY OF MEDIASTINAL TUMOURS.

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I.

INTRODUCTORY—HISTORICAL AND LITERARY.

It is somewhat difficult to know how best to proceed in discussing the subject of tumours of the mediastinum, mainly for the reason that, as yet, we have arrived at no fixed or definite principles of classification, such as we find so useful in the study of the tumour-formations of other organs and regions of the body, and, therefore, in the present investigation, we must, as far as possible, endeavour to map out a plan of classification for ourselves. It was in the hope that the cases to be related in these pages, and the reflections to which they give rise, might be of some little service in enabling us to establish nosological and diagnostic principles, that I decided to bring them under the notice of the Gentlemen who attended the Post-graduate Course, held in Glasgow in the autumn of 1890. It has been a matter of no little difficulty with me how to proceed in recording the cases to be demonstrated—whether to consign them to an appendix, or to embody them in the text of this essay. The former plan would be the easier, but the latter, I think, would be

the more serviceable, and shall therefore be adopted. With regard to the general arrangement of the subject matter, I propose, in the first place, to give a brief historical and literary sketch, after which the pathology, etiology, and diagnosis of mediastinal tumours will be discussed in detail.

At this point, also, it may be well to remember that the essay deals only with those tumours of the mediastinum which are to be regarded as new-growths or neoplasms, including under this category such solid new-formations as may be syphilitic, tubercular, or glandular in origin. Simple inflammatory conditions of the mediastinum (*e.g.*, abscess), aneurism, and hydatid and dermoid cysts are not included within the range of our present subject, except in so far as they may be incidentally considered under the heading of diagnosis. I may also add that I accept the old anatomical division of the mediastinal space into anterior, middle, and posterior in preference to any more complicated topography, and this description of the mediastinum, with the contents of each of its regions, is so well known to all that I need not further allude to it.

In the preparation of my cases for publication, one of the first works to attract my attention was the excellent monograph on affections of the mediastinum, by Dr. Hobart Amory Hare of the University of Pennsylvania,* a work involving an enormous amount of labour, and including a much wider range of diseases than those with which we have at present to deal. The reader feels somewhat amazed at the persevering labour which has sought out from medical literature the clinical histories of 520 cases of mediastinal disease, but, at the same time, he begins to wonder whether the absolute or intrinsic value of some of the results arrived at are commensurate with the enormous labour involved. I am afraid not. An enormous series of cases like this, from all sources, and extending over a long period of years, would require the

* *The Pathology, Clinical History, and Diagnosis of Affections of the Mediastinum, other than those of the Heart and Aorta, with Tables of 520 Cases* (Philadelphia, 1889).

most careful scrutiny and assortment before anything like certainty of conclusion could be arrived at with regard to many of the points at issue. For example, we might quite legitimately raise the question whether cancer *is* the most frequent form of tumour occurring primarily in the mediastinum, and we do not think that the collection of cases given by the author at all necessarily proves it to be so. Twenty or thirty years ago many morbid growths were called cancer which now would be classed in a quite different category, and, bearing this in mind, we rapidly glanced through the table of 134 cases of cancer to see how many had been recorded in 1870 or before it. To our surprise, we found that no less than 67, or half the total number, had been recorded at or before this date. If we were to investigate the dates of those cases to which reference is made by giving the number of a series of volumes of transactions, without stating the year, this number might possibly be increased. Looking through the cases of sarcoma, we find that out of 98 cases tabulated only 7 are recorded as having occurred in 1870 or before it. The contrast is certainly suggestive, and proves, we think, the necessity of eliminating this source of error before attempting to make any definite statement as to the relative frequency of cancer and sarcoma in the mediastinum. Then, again, it is also absolutely necessary, in arriving at a conclusion as to the frequency of different neoplasms in the mediastinum, to distinguish between primary and secondary formations. But how is this possible in a series of 134 cases of cancer, where at least 56 of the whole give no information whatever as to the primary seat of the tumour? Secondary tumours of the mediastinum are of no more importance in a scientific study of the primary growths of that region than is a secondary nodule in the liver in the investigation of the nature and cause of malignant tumours of the gastro-intestinal tract. While, therefore, I cannot agree with many of the conclusions at which Hare has arrived, I must add that from a bibliographical point of view his book is one of the most important on this subject that has as yet appeared.

Another most valuable, though much older book, from a

historical and bibliographical point of view, is that of Dr. John Cockle, which was published in 1865.* This book constitutes a most interesting and readable epitome of the literature of the subject previous to the date at which it appeared, but it deals with mediastinal tumours more in their relationships to the lungs than to the mediastinum *per se*.

With regard to the historical aspect of our knowledge of mediastinal new-growths, there is not a great deal to be said. All the older medical writers have described cases of new-growths filling the cavity of the chest, but have referred to them rather as pathological curiosities than as diseases falling within the scope of our diagnostic powers. Cases are to be found in the writings of Bonetus, Morgagni, and others, and it may perhaps not be out of place here to refer briefly to a most interesting case recorded by an English physician of the seventeenth century—Dr. Thomas Willis.† This was the case of the Rev. Dr. Berwick who, for fifteen years in all, now better and now worse, had suffered from cough, hæmoptysis, and very "stinking" breath. When the body of this divine came to a *post-mortem* examination, the circumstance that caused Dr. Willis great surprise and difficulty was that "there was no collection of any filth or stinking and putrid matter, nor any cavity in the lungs made by an ulcer or wound," to account for the "grievous breath, stinking like hell, . . . but only one lobe of this bowel, or rather the whole left side, was so hardened from a scirrhous tumour," &c. Dr. Willis then goes on to show that the sulphureous particles in the blood mixing with the fixed salts in the diseased part must have given rise to the stinking odour of the breath; and, by way of analogy, quotes chemical experiments in support of his opinion. This account strikes me as being one of the best of the earlier English descriptions of a case of cancer of the lung.

Till the time of Bayle and Laennec, however, the possibility of diagnosing primary growths of the mediastinum during life was not seriously entertained, and even long after

* *On Intra-thoracic Cancer* (London, 1865).

† *Pharmaceutice Rationalis, &c.* (London, 1679), part ii, p. 58.

Laennec we find Stokes* admitting that nothing had been done to establish diagnosis of cancer of the lung, although Laennec had stated that "the stethoscope ought to detect its existence." In Voigtel's† work on pathological anatomy, published in 1804, we find that the characters of tumours of the lung and chest are well described, and that numerous references to recorded cases are given. In the book of this early German writer on pathology there occurs a sentence on malignant disease of the lung which is well worthy of being quoted to-day when the early period at which it was written is taken into consideration. "The scirrhous nodules (*scirrhen*)," he writes, "were mostly (if one really found them in the lung, and was not deceived) not, indeed, a degeneration of the lung itself, *but rather of the glands of the lung and the branches of the bronchi.*" I have placed what I consider to be the important and suggestive words of this sentence in italics. The work of Bayle‡ is important because, in his classification of phthisis, he recognises a "cancerous phthisis," of which, however, only three cases were observed in 900 *post-mortems* on cases of phthisis. Of course we do not now recognise "cancerous phthisis" as a variety of pulmonary consumption in the modern conception of this disease, but one or two of Bayle's remarks on cancer of the lung are worth quoting from a historical standpoint. He says—"Such phthisical persons are always more than thirty years of age, and most of them have cancerous tumours not only in the lungs, but also at the surface of the body, or in the liver, or the stomach. . . . In these cases it is evident that the cancerous phthisis is really no more than the effect of the general cancerous diathesis." The obvious bearing of these remarks of the great French physician upon the pathology and life-history of pulmonary cancer is quite apparent.

* *A Treatise on the Diagnosis and Treatment of Diseases of the Chest*, Part I: Diseases of the Lung and Windpipe (Dublin, 1837), p. 370.

† *Handbuch der Pathologischen Anatomie* (Halle, 1804), vol. ii, sect. ix, pp. 269-272.

‡ *Researches on Pulmonary Phthisis*, from the French of G. L. Bayle, by William Barrow, M.D. (Liverpool, 1815), p. 36.

Since the time of Lænnec, John Sims,* and Stokes the diagnosis of mediastinal new-growths during life has gradually been placed on a more secure footing, so that now it is quite possible to arrive at a tolerably accurate knowledge of these affections before death takes place. It is to be noted, however, that the value of physical signs in the determination of the diagnosis does not hold nearly so important a place as in the other more common affections of the chest—in fact, the physical signs of mediastinal tumour taken by themselves are often obscure and misleading to a degree, as one of the cases I shall very shortly have to relate proves. Indeed, it is only by taking into account the entire pathology and symptomatology of the disease, as well as its physical signs, that we can finally arrive at a definite and reliable conclusion. Here it is, then, that pathology has played such an important part in strengthening the hands of the physician in the practice of his art; and in perhaps no department of medicine has the value of the accurate pathological and clinical observations of the last twenty-five years been more apparent than in the great advance we have made during that period in our powers of diagnosis in cases of mediastinal disease.

* *Medico-Chirurgical Transactions* (London), vol. xvii, part i, p. 280.

II.

CLASSIFICATION.

In discussing their pathology and etiology, it is first of all necessary to formulate a classification of the different new-growths which may be met with in the mediastinum, and this, owing to the confusion that has hitherto prevailed in reference to some of the varieties of intra-thoracic neoplasms, is by no means an easy thing to do. The question at once arises, are there any forms of tumour which may be regarded as more or less special to the mediastinum? I believe that the variety of tumour, which we have been accustomed to designate lympho-sarcoma, is the one which is most likely to occur in the mediastinum. But when such a statement has been made we are brought face to face with a very serious difficulty—a difficulty in which has originated much of the confusion that still obscures our knowledge of the intimate pathology of the class of tumours which we are now studying. I would not be presumptuous enough to say that I can remove this difficulty, but during my recent observations and studies it seems to me that I have been able to arrive at clearer views, which I shall endeavour to unfold for general consideration and criticism. The difficulty to which I have referred is the relationship which lympho-sarcoma of the mediastinum bears to lymphadenoma, or, as I would very much prefer to call it, Hodgkin's disease. I cannot help thinking that much of the confusion with regard to this subject is really to be traced to Virchow who, in

his celebrated book on tumours,* has treated of these two affections as if they were really one and the same. The influence of the great pathologist's authority is traceable, I think, in most of the subsequent writings on mediastinal tumour, and even in the writings of Hilton Fagge† the impress of the "*krankhaften Geschwülste*" is plainly visible. I shall, however, immediately return to the discussion of this question, and in the meantime I wish to formulate the classification to be followed in the present essay.

Tumours of the mediastinum may be classed under one or other of the following groups:—

I. **Sarcoma and Lympho-sarcoma of the Mediastinum.** Under this heading I shall discuss the relationship of primary intra-thoracic sarcomatous tumours to Hodgkin's disease.

II. **Cancer of the Mediastinum.**

III. **Fibroma of the Mediastinum.** Under this head I shall discuss the relationship of this form of mediastinal tumour to the rheumatic diathesis.

IV. **Tubercular and other Specific New-growths of the Mediastinum.**

V. **Miscellaneous Tumours of the Mediastinum.**

* *Die krankhaften Geschwülste* (Berlin 1864-65), vol. ii, p. 733, *et seq.*

† *The Principles and Practice of Medicine*, second edition, vol i, p. 998.

III.

SARCOMA OF THE MEDIASTINUM.

I. **Sarcoma and Lympho-sarcoma of the Mediastinum.**—Are all tumours of the mediastinum, presenting a lympho-sarcomatous structure, to be regarded as examples, or at least modifications, of Hodgkin's disease? I think not; and this opinion is chiefly based upon my understanding of what Hodgkin * himself wrote in his original paper on the subject, and also on the independent communication of Dr. Samuel Wilks,† dealing with the same morbid process. We may have lympho-sarcomatous tumours occurring in the chest which are in no way related to Hodgkin's disease; and all such names as pseudo-leukæmia, adenia, malignant lymphadenoma, &c., when employed with special reference to primary intra-thoracic tumours, are apt to be highly misleading, and are based upon erroneous notions as to the pathology both of Hodgkin's disease on the one hand, and sarcomatous formations in the mediastinum on the other. I do not mean to say that Hodgkin's disease may not begin in the mediastinal glands, just as it may begin in any other glands—*e. g.*, those of the neck, groins, or axillæ. When this is so, however, we are not dealing with a primary new-growth, in the first instance, strictly localised in the mediastinum, but with a general morbid state of the lymphatic glands, whose origin in those of the chest must be

* *Medico-Chirurgical Transactions* (London, 1832), vol. xvii, p. 68, *et seq.*

† *Guy's Hospital Reports*, Third Series, vol. ii, p. 128, *et seq.*

looked upon as more or less accidental. There has of recent years been too great a tendency to search for some relationship between mediastinal tumours and Hodgkin's disease, when in reality there was no need to do so, and when the effort to demonstrate a connection simply led to the formation of erroneous views. The fact that very many, though not all, of the sarcomatous tumours, and especially those which are well designated lympho-sarcoma, occurring within the thorax originate in connection with the mediastinal glands, has led many to relate them in some way or other to Hodgkin's disease; but, unless we can demonstrate in an unmistakable way the presence of the other typical features of the latter affection, I hold that it is erroneous to do so. The chief phenomena of the disease of the lymphatic glands, which Hodgkin described, are great anæmia and dropsy, enlargement of all the lymphatic glands of the body, and in many, though not in all, a peculiar deposit in the spleen. Perhaps, in order to make this plain, I cannot do better than quote a few sentences from his paper. All his "cases agree in the remarkable enlargement of the absorbent glands accompanying the larger arteries; mainly the glandulæ concatenatæ in the neck, the axillary and inguinal glands, and those accompanying the aorta in the thorax and abdomen." The "enlargement of glands appeared to be a primitive affection of these bodies rather than the result of an irritation propagated to them." Any scrofulus condition is regarded as an "accidental concomitant to the idiopathic interstitial enlargement of the absorbent glandular structure throughout the body;" and the affection is not to be looked upon as inflammatory in the usual acceptation of that term. The spleen in his cases was "thickly pervaded with defined bodies of various sizes, in structure resembling that of the diseased glands." The deposits in the spleen he regards as "a posterior effect, and on this account may not always have been produced." Here, then, we have a perfectly well defined general morbid state, which is in no way specially related to primary tumour formations of the mediastinum, to those at least which throughout remain confined

to this region of the body. All subsequent descriptions of the affection are based on Hodgkin's original statements, and in proof of this view I would refer to the definition of the disease as given in Gower's excellent article in Reynolds' Medicine.* Even in this article, however, scientific and comprehensive as it undoubtedly is in every sense, we meet with evidence of the nosological difficulty, which most physicians have experienced. His division of the varieties of the disease into (1) local, (2) local enlargement preponderating, and (3) general uniform enlargement, is scarcely logical, especially when we consider that in his definition the term "lymphadenosis," on his own showing, implies a general disease. This view of his division of the varieties of Hodgkin's disease is also supported by the circumstance that in his section on differential diagnosis he finds it necessary to distinguish between lymphadenosis and "local gland lymphoma." All this goes, I think, to prove that anything in the nature of a mediastinal tumour which can be regarded as essentially a local manifestation, whether liable to metastasis or not, can have no relationship to Hodgkin's disease.

Hare† is certainly to be credited with an endeavour to arrive at a true nosological classification of mediastinal growths, when he places the lympho-sarcomata of that region in his tabular list of sarcomata; but I am decidedly of opinion that a number of his cases of lymphoma and lymphadenomata might also with perfect accuracy have been relegated to the same table. I cannot help thinking, however, that his attempt to distinguish between lymphadenoma and lymphoma as separate growths is somewhat confusing.

In concluding this part of our argument, I would like also to remark that the fact of certain other lymphatic glands being affected in a case of mediastinal lympho-sarcoma need not at all be regarded as pointing to any relationship to Hodgkin's disease. With an enormous mass in the mediastinum pressing more or less upon the main lymphatic

* *A System of Medicine* (London, 1879), vol. v, p. 306.

† *Loc. cit.*, p. 71, 72.

channels, at or near the points where they pass into the venous system, we need not wonder if a number of the lymphatic glands become enlarged. But this, indeed, is a very different thing from a general morbid process affecting all the lymphatic glands of the body altogether independently of any secondary pressure effects.

It will now be proper that I should describe the specimens from, and relate the clinical histories of two cases of lympho-sarcoma of the mediastinum which I have myself dissected, and with reference to one of which the patient was also under my professional observation during life in consultation with two medical friends. Having done this, I propose in the next place to relate the clinical history of what I consider to have been a typical case of Hodgkin's disease, which was under my care in the wards of the Royal Infirmary two or three years ago, and which terminated fatally, although, unfortunately, no *post-mortem* examination was possible.

Case 1. *Lympho-sarcoma of the Mediastinum involving the Left Bronchus and Lung, with severe Pericarditis and Secondary Nodules in the Spleen, Kidneys, and Abdominal Lymphatic Glands.*—Mrs. C. was admitted to Ward VIII of the Glasgow Royal Infirmary, under the care of Dr. Wallace Anderson, on the 12th July, 1889, and the *post-mortem* was performed on the 20th September, 1889.

Summary of Clinical History.—The patient, a housewife, aged 55, complained of pains disseminated over the whole body, but specially severe in the epigastrium and right shoulder, of about three weeks' duration. The pain first commenced in her back, and her urine became "like blood;" she also suffered from headache and vomiting; the abdominal pain was liable to be brought on by taking food, being relieved when vomiting took place, and on one occasion she vomited a considerable quantity of blood. Before her admission to hospital her symptoms were attributed to "inflammation of the kidneys." The liver was tender on pressure, but was not obviously enlarged, the dulness in the nipple line measuring 4½ inches. There was general abdominal

tenderness. Over the whole of the left lung anteriorly and posteriorly there was complete dulness, with diminished movement and increased vocal fremitus and vocal resonance. The dulness was most marked in front, and the breathing was highly tubular. The heart sounds were normal. The urine contained no albumen, but abundant lithates. During residence in hospital a glandular swelling appeared above the left clavicle, and also at the right angle of the lower jaw. For several days before death the patient was comatose.

Post-mortem Examination.—There is slight jaundice of the skin and conjunctivæ; the body is well nourished, and there is much subcutaneous fat.

Chest.—A firm irregularly shaped tumour occupies the mediastinum, reaching to a little above the episternal notch in the middle line, and extending downwards to about the middle of the pericardium, to which and to the great vessels emerging from it it is firmly adherent. An offshoot from the growth extends beneath the left clavicle to within two inches of the tip of the left shoulder, and the glands on each side of the neck in front of the sterno-mastoids are enlarged. The tumour is firm to the touch, irregularly lobulated, and covered by a dense fibrous tissue; its cut surface is rather friable, and of a yellowish-white colour; and minute hæmorrhages are scattered through its substance. The left pleural cavity contains a considerable quantity of blood and bile-stained serum, and the left lung has been much compressed by the fluid. The right lung is normal, and there are no adhesions on either side.

The entire tumour and the heart, with the pericardium unopened, are removed for more detailed examination and dissection.

Abdomen.—The peritoneal cavity contains between three and four pints of fluid, deeply stained with bile and blood. A mass of enlarged glands is found in the neighbourhood of the duodenum and the portal fissure, causing some matting of the organs in this region. The mucous surfaces of the stomach and duodenum are quite healthy. The gall-bladder is distended, and on slitting up the duct from the hepatic

papilla in the duodenum, it is found to be somewhat constricted near its middle point by the pressure of one of the enlarged glands. The gall-bladder contains about 2 oz. of a dark viscid fluid. The liver is bile-stained and slightly hyperæmic, but is not otherwise abnormal.

The spleen is the seat of several hard round nodules, which can be easily felt, and a small growth is also present in the pelvis of the left kidney. The kidneys and spleen are reserved for more minute examination.

Dissection of the Tumour.—During winter session 1889-90 I undertook the dissection and examination of the tumour, which now forms one of the preparations contained in our museum.* The pericardium is found to be the seat of a most intense generalised pericarditis, with very abundant blood-stained fibrinous exudation on both surfaces. The exudation is most abundant over the left ventricle, and especially in the neighbourhood of the auriculo-ventricular grove. On cutting into the organ the muscular tissue is seen to present a normal appearance, and the valvular structures are found to be healthy. It is to be noted, however, that the surface fat is very greatly exaggerated.

The whole of the upper portion of the anterior, middle, and posterior mediastinum is the seat of a bulky lobulated mass, which apparently is composed of agglomerated glands. In addition to the mass occupying the mediastinum, there is also a smaller lobulated tumour which has been situated in the root of the neck to the left side of the trachea, and which reaches to about the level of the lower margin of the larynx. In consistence the tissue of the neoplasm is exceedingly soft, the term encephaloid describing its naked eye characters well. On dissecting the preparation, so as to make out its relationships to neighbouring parts, the following facts are discovered:—The gullet is firmly adherent to the posterior surface of the growth, but is not otherwise involved. The trachea occupies a deep groove in its posterior wall, but can be dissected away from it in its whole extent, as far as the entrance of the left bronchus into the lung. At this point the wall of the bronchus

* Glasgow Royal Infirmary Museum, Series X, 234A.

is very seriously encroached on by the tumour tissue which is extending inwards upon the lung. The left pneumogastric nerve can be dissected easily from the posterior surface, and has evidently not suffered much, but the right is buried in the substance of the growth. The aorta and arteries at the root of the neck tunnel their way through the tumour, but for the most part are capable of being dissected from its tissue. The left innominate vein passes obliquely across the front of the mass, and its wall is very closely incorporated with the new tissue, although for the most part capable by careful dissection of separation from it.

Microscopic examination of sections from the tumour show it to be composed of tissue very similar to that of a lymphatic gland—viz., a delicate connective-tissue stroma containing large numbers of small round and oval-shaped cells. The characters are typically those of a lympho-sarcoma, and this opinion is borne out by examination of microscopic sections of the involved bronchus, which shows the gradual replacement of normal structures by the lymphatic new tissue.

Microscopic examination of sections of the heart wall show that the pericardial tissue is infiltrated with leucocytes and epithelioid cells. On the free surface of the pericardium there are large masses of coarsely reticulated fibrin, which is being replaced by the cells of the granulation tissue beneath.

A careful naked eye examination of the spleen and kidneys confirms the description given above, and there is no doubt that the nodular tumours in these organs are metastatic in origin, an opinion confirmed by microscopic examination.

Case 2. *Lympho-sarcoma of Mediastinum involving the Apex and Root of the Left Lung, in which several attempts were made to find fluid in the pleura during life.**—The patient, R. G., was a butcher, about 30 years of age, married, and of temperate, steady habits. On the evening of the 25th October, 1889, I was asked by my friend, Dr. George M. Connor, to see the patient in consultation with him, and I

* The specimens from this case were also shown at the Glasgow Pathological and Clinical Society, 10th December, 1888.

then discovered that this was not the first occasion on which I had come into contact with the man, for although I have no recollection of it, it seems that some months before I had officially passed him from the receiving room of the Royal Infirmary into the wards, it being one of the rules of that institution that no patient is to be rejected as unsuitable for admission by the resident physician of the day until he has been seen and examined by one of the assistant physicians to the house, with whom the final decision lies. The patient remained in the Infirmary during the greater part of August 1888, and the symptoms and signs of his case were regarded as pointing to pleurisy of the left side. After leaving the Infirmary, the man had been seen on several occasions by Dr. Connor, who thought that the phenomena pointed mainly to phthisis pulmonalis, complicated with rheumatism, and sent him to the country, and he was apparently for a time benefited by the change. He soon, however, became very much worse, and, on the morning of the day on which I saw him, Dr. Headrick of Dennistoun examined him in consultation with his own attendant. It was then thought possible that the symptoms pointed to pleuritic effusion, and with an exploring needle two punctures were made in the lateral and postero-lateral regions of the left side of the chest. One puncture gave no result, the other resulted in bubbles of air passing into the syringe, but no fluid was obtained.

The condition in which I found the patient was as follows:—He was suffering from extreme dyspnœa, and lying upon the left or affected side; the face presented extreme pallor and lividity of the lips, with cold drops of perspiration in the forehead; there was much œdema of the ankles and body, but it was particularly noted that, as regards the head and upper extremities, the dropsy was chiefly limited to the left arm and left side of the neck and head. An enlarged gland could be felt above the left clavicle, and there was the history of a painful swelling over one of the scapulæ, which had been considerably reduced and relieved by blistering. On examining the chest, it was found that there was absolute

dulness over the whole of the upper lobe of the left lung in front; in this region, also, the respiratory murmur and the vocal fremitus were both quite gone; the dulness did not extend, so far as could be made out, across the middle line. In the left axillary region, and at the left base posteriorly, the percussion note was somewhat clearer, and in these regions some breath-sound could be quite distinctly made out. The heart's action was rapid and feeble, and the cardiac sounds were replaced by murmurs, the exact rhythm of which was not determined, but they seemed to me to be mainly mitral in origin. It was thought to be not improbable that some degree of valvular disease might have resulted from the rheumatism. As will be seen from the *post-mortem* report, the alteration in the heart-sounds was the result of pericarditis and not of endocarditis.

The opinion I expressed was that the case was one of mediastinal tumour, which had involved the bronchi of the left lung, especially those passing to its upper lobe. My chief reasons for arriving at this conclusion were the very absolute nature of the dulness, and its limitation to the upper lobe of the lung, the base being left comparatively free, and evidently receiving a fair supply of air; the presence of enlarged glands and painful swellings which might fairly enough be interpreted as secondary in origin; and the presence of the œdema on the left side of the neck and in the left arm. Under these circumstances only palliative measures could be suggested. At the very urgent request, however, of one of his physicians, who believed that fluid might possibly be found over the upper portion of the lung, and who was extremely desirous that no possible chance for the man should be thrown away, I consented to perform another exploratory puncture over the apex. This was carefully done, but the result was negative.

The patient died a day or two afterwards, and the following is the account of the *post-mortem* examination, which was performed by myself in the presence of Dr. Connor:—

Only the chest was particularly investigated, as the

examination was conducted in a small house late at night, and under very considerable difficulties.

On removing the sternum a large white nodulated mass, from which, on being cut into, a white creamy juice escaped, was found occupying the upper portion of the mediastinum. This mass was in close relationship with the upper lobe of the left lung and the upper extremity of the pericardium; and the left lung was found to be very firmly adherent over its whole extent. The right lung was quite non-adherent, and presented nothing remarkable. The liver was studded with numerous small white nodules, one of which was the size of a large hazel nut, and presented all the characters of a secondary tumour. The abdomen was not more particularly examined. As the pericardium was found to be adherent, the heart, tumour, and entire left lung were removed together for examination.

The mass * occupying the upper portion of the mediastinum was apparently for the most part composed of greatly enlarged lymphatic glands, which had only partially remained isolated from one another; and the whole mass was closely related to the great vessels and bronchi. The left innominate vein was discovered passing along in front of the anterior and upper portion of the tumour, and into the lumen of the vein opened numerous radicles, coming from the midst of the tumour tissue. Passing backwards the growth extended underneath the arch of the aorta, and at one point the tumour tissue was firmly incorporated with the arterial wall, so that a distinct depression and puckering of the internal coat had thereby been produced. Passing still further backwards the tumour tissue became firmly adherent to the left bronchus, immediately below the bifurcation, although neither the trachea itself nor the right bronchus seemed to be in the least involved.

Below the bifurcation of the trachea, for a distance of at least 2 inches, the entire wall of the left bronchus was found to have been converted into tumour tissue, so that the mucous membrane had disappeared, and the bronchus at this point was simply a channel through the growth. Below this the bronchi passing to the lower regions of the lung were found to be

* Glasgow Royal Infirmary Museum, Series X, 234 G.

comparatively free and patent, but the bronchus passing to the upper lobe, which was given off in the midst of the diseased portion, was almost entirely occluded, and during life very little air could possibly have entered it. At its left border the mass just described was firmly adherent to the anterior margin of the upper lobe of the left lung, so that it was impossible to separate them without tearing the tissue. Inferiorly the mass was similarly adherent to the upper portion of the pericardium, and numerous nodules were found in its tissue, and one or two in the wall of the heart. The mediastinal growth, whose relations have just been described, when viewed from the front was found to be somewhat triangular in shape, the apex of the triangle being superior. After hardening, the greatest vertical measurement was found to be 4 inches, the greatest transverse 2½ or 3 inches.

On cutting into the left lung, its tissue in the neighbourhood of the root, and for a considerable distance around this, was found to be converted into a white, soft, almost encephaloid structure. The margin of this morbid area was quite irregular and extended from the root of the organ chiefly towards the anterior and lateral regions, and not so much towards the base and posteriorly. From the main mass of the new pulmonary tissue the tumour showed a tendency to encroach upon the lung mainly by extending along the walls of the bronchial tubes, and to a much less degree along the vascular walls. The internal surface of the left lung was firmly adherent to the pericardium, through this aspect of which several nodules projected. A recent acute pericarditis, with fibrinous exudation and moderate adhesion, was found to involve the whole of the anterior and left regions of the pericardium, the source of irritation undoubtedly having been the advancing tumour. Several nodules of the tumour were found in the visceral pericardium on the surface of the heart, and almost the entire wall of the left auricle had been transformed into tumour tissue. The valvular structures of the heart were not abnormal.

Under the microscopes sections from the primary mediastinal mass and from the secondary nodule in the liver were shown at the meeting of the Glasgow Pathological

and Clinical Society, and these presented all the typical histological appearances of what is usually described as lympho-sarcoma. From the manner in which the mass invaded the pulmonary tissue, it was at first thought that the tumour might be cancerous, but the microscopic examination disproved this opinion. The *post-mortem* examination also proved that the cardiac murmurs noted during life were due to the pericarditis, and not to any valvular disease.

I shall now give a clinical account of what I believe to have been a typical case of Hodgkin's disease, in order that it may be compared with the cases of mediastinal tumour which have just been related, and that it may serve to illustrate the opinions I have already expressed as to the pathology of this very interesting and somewhat obscure affection.

Case 3. *Clinical Account of a Case of Hodgkin's Disease, with great enlargement of the Lymphatic Glands and Spleen, and fluctuating Pyrexia.*—Alice D., aged 17, unmarried, English, a mill-girl, was admitted into Ward II of the Glasgow Royal Infirmary on the 22nd August, 1887, and she came under my care in September of the same year, when I took duty for Dr. Wood Smith during his absence on holiday. The case clinically presented all the characteristic features of Hodgkin's Disease, and on the 17th September, 1887, and following dates, I made careful clinical notes of her history and physical condition.

17th September, 1887.—About seven months ago she first noticed a glandular swelling on the right side of the neck, which seemed to come and go for a time, but latterly became permanent, and was followed by similar swellings on the opposite side of the neck, along the sterno-mastoids, in both axillæ, and in the groins. The glandular swellings have never suppurated, have never been painful, and are not tender on pressure. The enlarged glands have produced great deformity of the neck, especially below the ears and around the angles of the lower jaw, imparting a bovine character to the face and neck. The tumours vary much in size, and although

they form enormous masses, they apparently remain quite isolated from one another. The isolated swellings can be traced right down the sterno-mastoid muscles continuously into the axillæ, where some of them are nearly as large as hen's eggs. In the groins, also, there are numerous large masses, which are isolated, firm, and painless. The lymphatic gland, situated above the internal condyle of each elbow-joint, is considerably enlarged. The veins in front of the neck on both sides are slightly dilated, as are also those in front of the chest.

On palpating the left lumbar region a dense, firm, painful, sharp-edged tumour is made out filling it entirely—obviously an enlarged spleen. The splenic notch cannot be felt; the anterior edge of the spleen approaches to within $2\frac{1}{2}$ inches of the umbilicus; from the upper to the lower border of splenic dulness in the axillary line measures $5\frac{3}{4}$ inches; the lower border is situated about $2\frac{1}{2}$ inches above the level of the anterior superior, and $1\frac{1}{2}$ inch above that of the posterior superior spinous process of the ilium. The splenic tumour distinctly descends with a deep inspiration.

The abdomen, generally, is somewhat distended, but no enlargement of the mesenteric glands can be made out. On account of the distension of the abdomen it is difficult to determine precisely the limits of hepatic dulness, but the liver is not obviously enlarged, although there is slight tenderness over its left lobe.

The following facts of her personal and family history are also to be noted:—Two years ago she began to suffer from a cough, which has never entirely left her, and since then there has been a pretty abundant mucous expectoration, but never any undoubted hæmoptysis, although she has been much troubled with night-sweats. Her appetite has been fair, and her bowels slightly costive. The apartment in which she worked was airy and well ventilated, and her work was not too hard. Her mother is still alive, and has never complained much. Her father died of "decline" seven years ago. She has two sisters and two brothers, and, so far as she knows, they have always enjoyed good health.

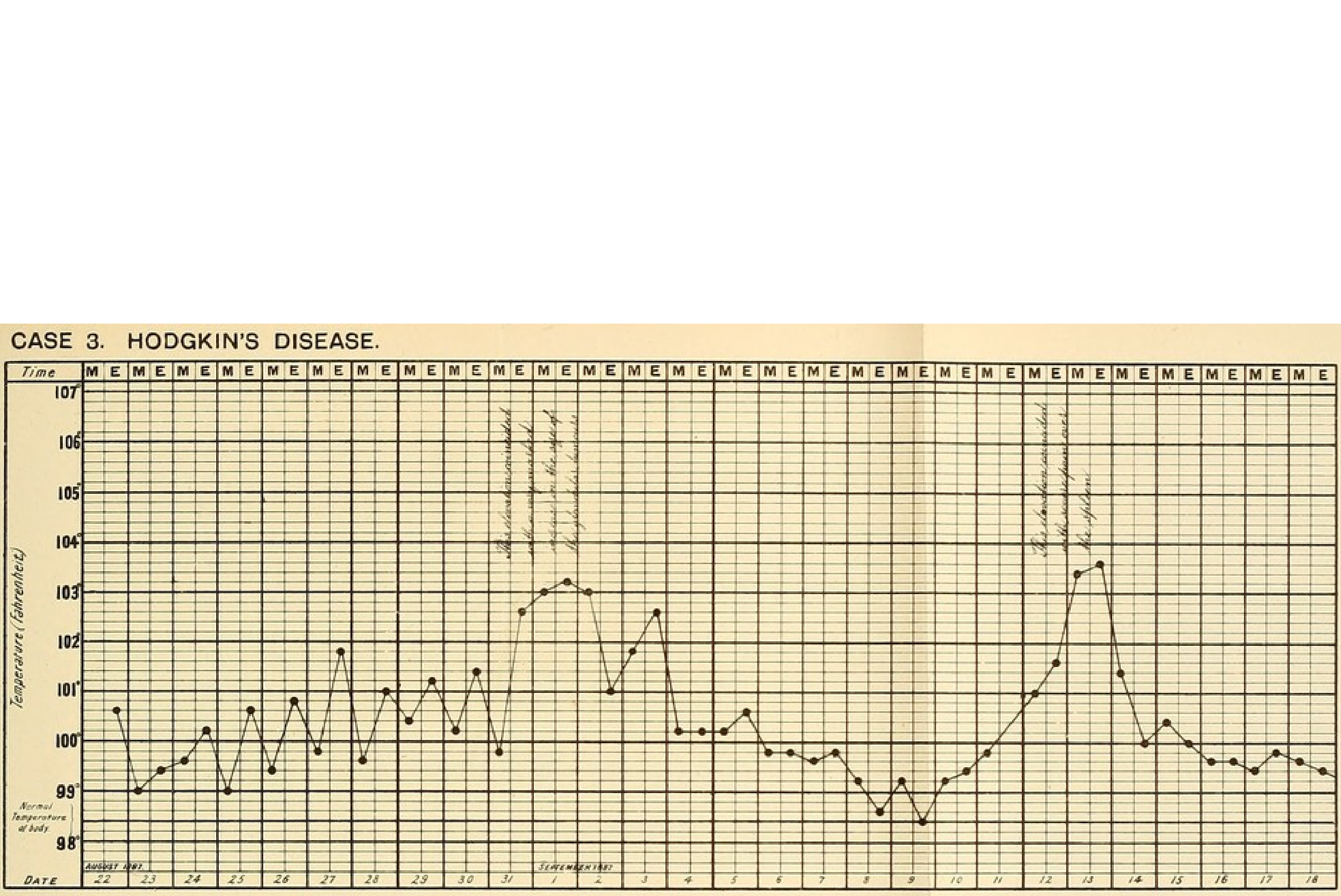
On physical examination, percussion and auscultation of the apices in front give normal results, but in the right mammary region slight impairment of resonance and abundant moist crackling râles on inspiration are detected. Posteriorly there is some dulness at the extreme bases, with harsh breathing. Since admission, the temperatures have been very distinctly febrile, only once reaching the normal, and almost always above 99° F., with occasional exacerbations to 102° or 103° F., lasting for a day or two. On the occasion of the first exacerbation of temperature the glands became more swollen; on the second severe pain was complained of over the region of the spleen (see Chart).

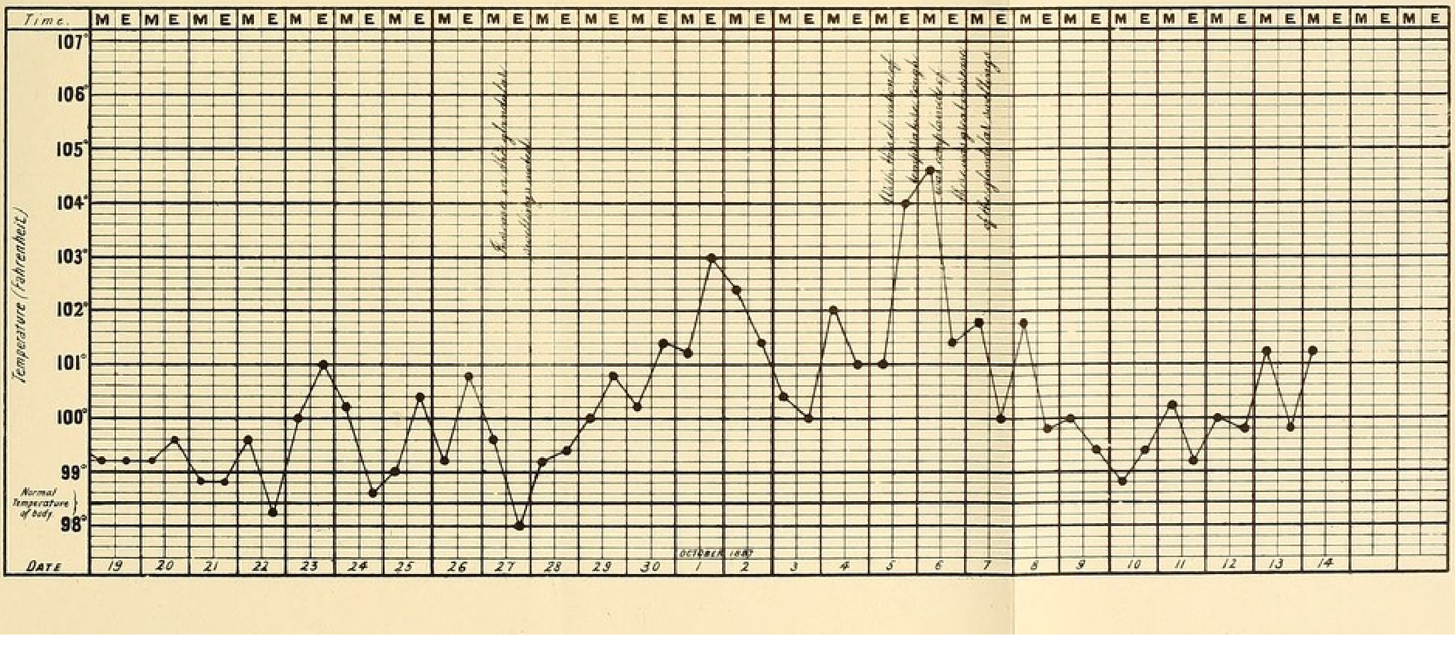
21st September.—It is thought to-day that the tumours are somewhat less in size, and the patient feels exceedingly well. A careful microscopic examination of blood drawn from the finger is undertaken. The naked eye characters of the blood present nothing remarkable, and with the microscope nothing abnormal is detected, there being no excess of white blood corpuscles, and the red corpuscles being of uniform size and well formed. A careful examination with Zeiss' hæmacytometer gives 3,500,000 per cubic millimeter, a by no means extreme degree of anæmia.

27th September.—Since the 23rd inst. the temperatures in this case have again been somewhat higher than during the previous seven days, the evening rise predominating. She has been feeling fairly well, but this morning the glandular swellings are very distinctly larger. Iodide of potash, of which she has been taking 10 grains thrice daily since the 17th, is to-day increased to 15 grains.

3rd October.—Since the last note was made there has been a progressive rise of temperature, the evening rise being always the higher, but the morning remission never coming so low as on the previous day. The rise reached its acme on the evening of the 1st inst., when 103° F. was touched, since which there has been a gradual fall, and this morning the temperature is 101·4° F. Coincident with this rise in temperature there has been no marked constitutional disturbance, the only complaint having been of cramps or colicy pains in

CASE 3. HODGKIN'S DISEASE.





the abdomen on the 1st inst. She has all along been subject to such attacks, but on that day they were worse than usual. There can be no doubt about the presence of considerable increase of enlargement in the glandular swellings, especially in the left axilla, and she states that several new swellings have appeared in the neck. A physical examination of the chest reveals nothing but a few musical and moist râles diffused over both sides, but specially abundant in the right. The cough is slight, and expectoration simply mucous.

14th October.—The patient was dismissed to-day *in statu quo*, at her own request. I afterwards learned that she had been readmitted a few months later to a different ward, and had died; but unfortunately no *post-mortem* examination could be obtained.

It seems to me that in the case just recorded we have a tolerably accurate picture of the disease which Hodgkin described, and to which his name has been given. It is quite conceivable that a large mediastinal tumour might form as one of the incidents in the development of this disease, but in such a case the mediastinal lesion would manifestly be nothing more than a part, and probably an insignificant part, of the whole affection. Under such circumstances the mediastinal tumour could have no real or intimate relationship to such lesions as are exemplified in the two cases of lympho-sarcoma already related, and in the two whose histories are immediately to follow.

The following case of lympho-sarcoma of the mediastinum occurred shortly after the termination of the course of post-graduate lectures, at which the previous cases were demonstrated and described. The patient was under the care of Dr. Samson Gemmell in the Glasgow Royal Infirmary, and as regards the clinical history and diagnosis I shall quote the account given by that gentleman in bringing the case before the Glasgow Pathological and Clinical Society,* on which occasion I was associated with him in the demonstration and description of the anatomical details.

* *Glasgow Medical Journal*, vol. xxxv (February, 1891), p. 154; also Glasgow Royal Infirmary Museum, Series X, 234 E.

CASE 4. *Limited Lympho-sarcoma of the Mediastinum involving the Vena Cava Superior, with characteristic localised Œdema and Venous Engorgement, and Secondary Nodules in the Lung.*—"A. F., aged 60, a labourer, was admitted to Glasgow Royal Infirmary on 23rd September, 1890, complaining of cough and spit, shortness of breath, and a choking sensation in the throat. The cough has been present more or less for many years, but the more urgent symptoms were only of six weeks' duration. He could assign no special cause for them, but thought they might be due to exposure, as for a week prior to their onset he had been engaged cleaning and painting one of the river steamers, and had on sundry occasions got himself very wet. He always considered himself a healthy man, and was temperate in his habits. He is described on admission as 'presenting a flushed and bloated appearance, with considerable œdema about the lower eyelids.' The temperature was normal; the pulse 82, regular and of good quality; the respirations 18, noisy and wheezing. No œdema was present in the legs or feet, and there was no ascites. Examination of his chest revealed a prolonged and somewhat feeble R.M., and in the lower part of the chest expiration is noted as being accompanied by snoring râles, which at the extreme base were associated with mucous râles. The abdominal organs were healthy, and the urine non-albuminous.

"The patient was admitted while I was on holiday, and on my return to duty was introduced to me as a case of chronic bronchitis. It was quite evident, however, that another construction was to be put upon it, and on the 10th October I embodied my view of the case in the following note:—The whole progress of this case since admission has been strongly suggestive of intra-thoracic tumour, of what nature is as yet undetermined, although the occurrence of a circumscribed area of dulness in the region of the *manubrium sterni*, with a highly musical and deep-toned quality of the second sound in this situation, and a difference in the force and rhythm of the radial pulses, the left being much weaker than the right and somewhat delayed, are strongly suggestive of aneurism, although there is no pulsation perceptible over the

dull area. The face, neck, upper part of the chest, and arms are markedly œdematous; while the abdomen and lower extremities, although he has been in the sitting posture all night, present almost no trace of œdema. The urine is non-albuminous, and the temperature strictly normal. The veins in the neck are greatly distended, but so far as palpation can be pursued, no enlarged glands are found above the clavicle, such as might be present in malignant disease within the thorax; and the trachea, which is strictly in the middle line, is normal in position, and there is no pulsation of the jugular fossa. The face is much congested, the mucous membrane of the lips livid, and respiration, though it cannot be said to be very difficult, is accompanied by distinct stertor, both expiratory and inspiratory. The voice is somewhat hoarse, but the cough has no brassy character. Examination of the larynx reveals the fact that the mucous membrane of the pharynx and larynx participates in the œdema. The entrance to the glottis is narrowed by lateral compression of the epiglottis, due to the surrounding œdema; but the epiglottis itself is not very œdematous. Beyond the narrow chink the cords are plainly visible. Their movements are perfectly normal; and, except for a slight linear injection, their general appearance is healthy. Several of the rings of the trachea are seen beyond the cords, and there appears to be no compression in that region.

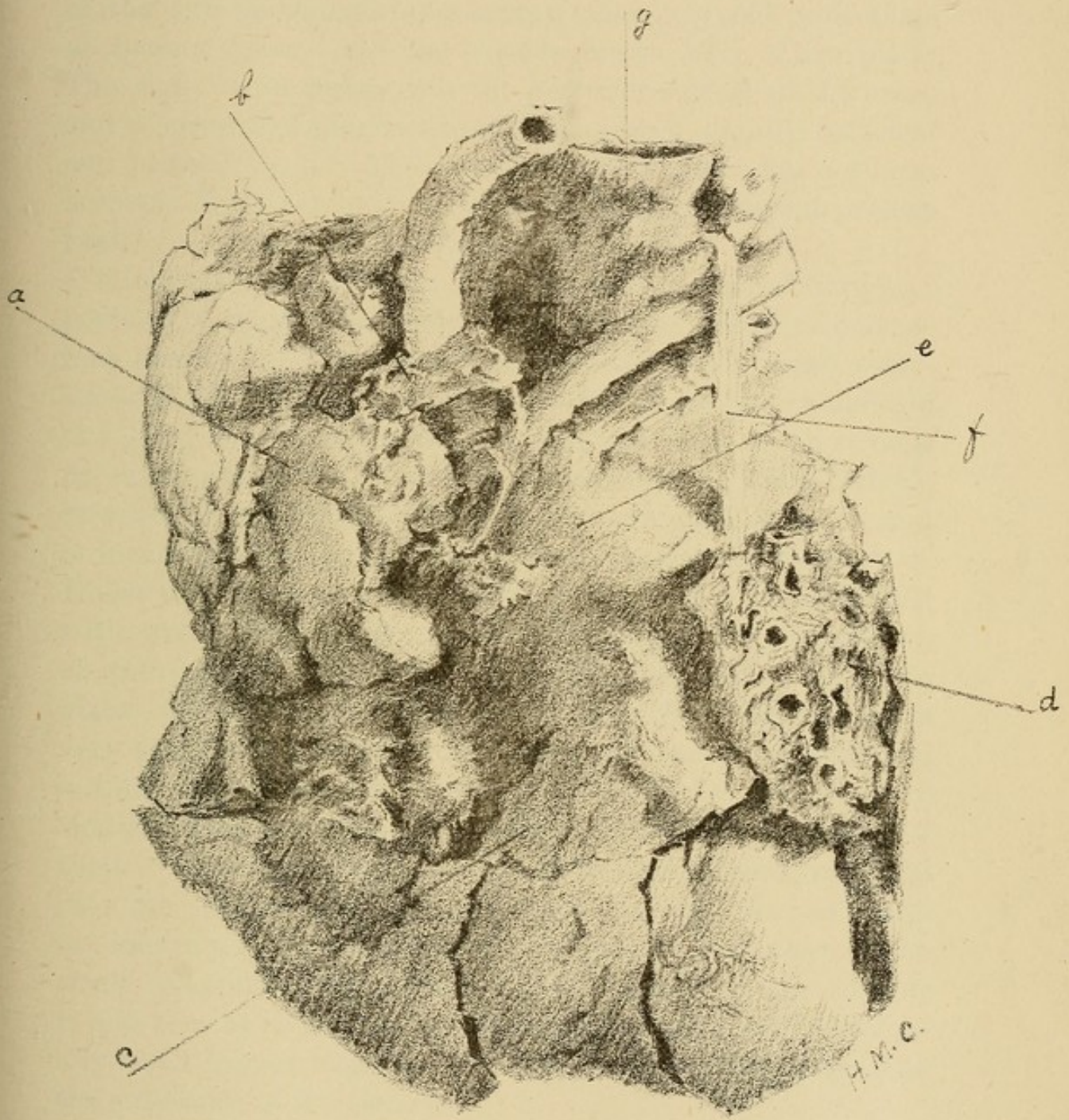
"There is no complaint of pain, and, indeed, there has been none during the course of the illness; nor have there been any disordered sensations such as might be attributable to pressure on nerves.

"He grew rapidly worse, the obstruction to the venous circulation soon giving rise to serious cerebral disturbance. He became first delirious and then comatose, and died on 14th October, 1890."

Post-mortem Examination.—16th October, 1890.—To-day I made an examination of the body, and wrote the following report:—The body is that of a well developed man, apparently between 60 and 70 years of age, of fair complexion. The head, chest, and upper limbs are very œdematous. The costal

cartilages are calcified, and on raising the sternum a lobulated tumour is found in the mediastinum, above the pericardium and a little to the right side. The left lung is adherent to the chest wall by fibrous bands, due to old pleurisy; the right lung is also slightly adherent towards its apex. The thoracic organs, including the tumour, are removed *en masse* for more detailed examination. On cutting into the lungs, a few secondary nodules resembling the primary tumour tissue are found in the right lung, but otherwise these organs appear to be normal. The liver is of ordinary size, and its tissue presents normal characters; the spleen is of normal appearance, but has a thickened white patch of circular shape at one part of its capsule; the kidneys are congested, the cortex and pyramids are not sharply defined, and the capsule strips off with ease. The tumour, with the heart, trachea, and blood-vessels, is placed in spirit for dissection.

23rd October.—The dissection of this tumour is completed to-day, and it may be described as a remarkably isolated lobular mass, measuring fully 4½ inches in long diameter, and nearly 3 inches from before backwards. The cross measurement of its anterior surface is 2½ inches. The tumour occupies the right side of the upper portion of the anterior, middle, and posterior mediastina. It also projects upwards into the right side of the neck for a considerable distance, reaching as high as the fourth tracheal ring. Its internal margin corresponds very closely to the outer edge of the first portion of right carotid artery, and the lower part of the tumour overlaps the pericardium, from which, however, it is quite separable; the overlapping portion of the growth lies in front of the first part of the aortic arch. The tumour has the following relations to venous and nervous structures:—The left innominate vein passes right through the growth, entering it about the middle of its internal margin. The vena azygos also passes into the mass at the lower portion of its posterior surface. The right innominate vein and the vena cava superior pass vertically through the substance of the tumour. The superior vena cava is laid open by an incision along its right border, when it is seen to be closely



CASE 4. LYMPHO-SARCOMA OF MEDIASTINUM.

a. Tumour.
b. Left Innominate Vein.
c. Heart, with a portion of Pericardium.
d. Root of Left Lung.
e. Arch of Aorta and Great Vessels.
f. Left Pneumogastric Nerve.
g. Trachea.

encircled by the tumour, and between the points of entrance of the left innominate and azygos veins polypoid projections of tumour tissue into the venous lumen have taken place. The right vagus passes over the posterior surface of the mass, and is somewhat adherent to it, having been slightly flattened and pressed upon. The right recurrent nerve has not been involved in the tumour. The left vagus and recurrent present healthy characters. There is no pericarditis.

Microscopic examination of fresh scrapings and of hardened portions of the tumour show a characteristic lympho-sarcomatous structure. The tissue is composed of small round, sometimes slightly oval cells, with here and there a very delicate and irregular fibrous stroma; sometimes there is no stroma. At many places the tumour is possessed of a capsule, which, however, is intimately related to the subcapsular tissue, and is incapable of being stripped from the surface of the growth. Under the microscope this capsule is observed to be infiltrated with round cells similar to those composing the groundwork of the growth, and to be exceedingly vascular. At some places the infiltration of lymphoid cells into the capsule is very dense, and in stained specimens the leucocytes contained within the distended capsular blood-vessels present very similar appearances to the stained cell-elements outside of them. At certain points the capsule is seen to send trabeculæ into the substance of the growth in the same way as would be seen in a lymphatic gland or a section of the spleen. The small lymphoid-celled tissue of the interior of the tumour is also seen to be very vascular at certain parts, and occasionally small hæmorrhages are observed to have taken place into the substance of the tumour.

Case 5. *Lympho-sarcoma of the Mediastinum, involving the Left Lung and Bronchus; Aphonia due to Paralyis of Left Vocal Cord; Acute Pericarditis.*—Rose Ann M'C., aged 45, a hawker, was admitted on the 6th December, 1888, to Ward X of the Glasgow Royal Infirmary, under the care of Dr. Samson Gemmell, who diagnosed a tumour of the left lung or its vicinity. The following epitome of the clinical history

was supplied by Dr. Gemmell to the Pathologist. On admission, the patient complained of cough, pain in the left side, and pain in the stomach. There was a history of chronic bronchitis of ten years' duration. She had been a hawker, and was therefore much exposed to cold and damp. About ten weeks before her admission she began to suffer from pain between the shoulders and in the stomach, with much flatulence; and these symptoms persisted throughout the case. Eight weeks before she came into hospital the cough became much worse, and aphonia for the first time showed itself. The latter symptom began as a hoarseness, and, when the patient was admitted, she spoke in a husky whisper. On physical examination, flattening and diminished movement of the left side of the chest were discovered, with absolutely dull percussion over the left anterior aspect of the thorax, where no respiratory murmur could be made out. It was also noted that immediately above the clavicle on the left side there was a decided sense of fulness, dipping down behind that bone. Posteriorly over the left lung the percussion was dull as far as the middle of the interscapular space, and the breathing, though diminished, was tubular. There was absolute paralysis of the left vocal cord, but the larynx was otherwise normal. On the 9th February, 1889, extensive pericarditis occurred, and lasted for nearly four weeks. After this, bulging of the left chest wall, with localised œdema, took place, to be soon followed by general œdema. The urine was non-albuminous on admission, albuminous during the period of pericarditis, and again non-albuminous before death. The liver was enlarged and painful, but not nodular; the stomach was dilated, and there was a sense of fulness in the left lumbar region behind. Death took place on the 18th March, 1889, and an autopsy was held on the 21st March.

*Description of the Tumour.**—This case occurred in the time of my predecessor, and I find that no record of the *post-mortem* examination has been preserved either in the Ward Journal or in the *Post-mortem* Report Book. The specimen was found in a semi-dissected state in the prepara-

* Glasgow Royal Infirmary Museum, Series X, 234 D.

tion room of the Infirmary; I have completed the dissection of the tumour, and have mounted it for the Museum. The case was a typical one of lympho-sarcoma, involving mainly the anterior and middle mediastina, and closely surrounding the arch of the aorta and the bifurcation of the trachea. The tumour had also encroached upon the upper portion of the anterior layer of the pericardial sac, and a distinct pericardial fibrinous exudation was present. The left main bronchus was very seriously involved in the tumour tissue; at one point, just where it entered the lung, the whole bronchial wall was replaced by the tissue of the growth, and the lumen of the tube was very seriously diminished as a result. The growth was a bulky lobulated mass which had scarcely at all involved the posterior mediastinum. The only venous trunk which was found to be seriously interfered with by the tumour was the left innominate, which passed over the upper portion of the growth, to which it was very firmly adherent. The superior vena cava was remarkably free from the tumour; it was in contact with it at its left margin, but no deleterious pressure seemed to have been exercised. The relations to nervous structures were of some interest. The right pneumogastric and recurrent were found to be normal and in no way related to the tumour, a fact which may still be seen in the specimen preserved in the Museum. The left pneumogastric was very seriously involved at the point where the recurrent hooks off beneath the arch of the aorta. Here the nerve trunk had been very severely crushed between the tumour on the one hand, and the arch of the aorta and the left bronchus on the other. It was impossible to follow out the trunk of the nerve at the seat of pressure, but beyond this it was quite possible to trace up the recurrent towards the larynx. The condition as regards the left pneumogastric and recurrent in this case was exactly that which is so often found in cases of aneurism of the arch of the aorta, and is of interest accordingly. The pulmonary tissue had been wonderfully little encroached on, although at the root of the lung it was obvious that the growth was extending along the walls of the main bronchi; and at the extreme base, where the lung came into contact

with the greatly infiltrated pericardium, a nodule of tumour tissue the size of a walnut was found.

Portions of the tumour related to the aorta, to the pericardium, and to the lung, were cut into sections and carefully examined under the microscope. The tumour was found to be composed of small, round, lymphoid cells, embedded in a pretty abundant, but quite loose and irregular stroma. No distinct alveolar arrangement of the stroma was anywhere apparent, but here and there, in some of the sections examined, a state of matters was seen to which some might have been inclined to apply the term endothelioma or alveolar sarcoma; but the lymphoid character of the cells, and the quite irregular arrangement of the fibrous stroma, left no doubt in my mind that the tumour was an ordinary lympho-sarcoma of the mediastinum. Under the microscope it was seen that, although intimately related to the tumour, the substance of the aortic wall had not been encroached upon.

Varieties of Sarcoma of the Mediastinum.

Hitherto we have been mainly occupied with the consideration of that form of mediastinal sarcoma which originates in connection with the lymphatic structures within the thorax. From what has already been written, and from a consideration of the cases which have been recorded, it will have been gathered that I hold the term lympho-sarcoma to indicate *that variety of sarcoma which, both by its naked eye appearances and its histological characters, is to be looked upon as originating in connection with the lymphatic glands—i. e., a sarcoma of the lymphatic glands.* In this sense a lympho-sarcoma is to be regarded as a variety of sarcoma in the same way as a cylinder-celled epithelioma is to be looked upon as a variety of epithelioma originating in connection with the cylinder-celled structures of the intestinal mucous membrane. Thus, a lympho-sarcoma may originate in one gland, or in a part of one gland, and in its growth may surround and involve neighbouring glands, which may be quite recognisable in the midst of the tumour tissue. I have seen this in specimens of

mediastinal lympho-sarcoma, and it is a circumstance quite in keeping with what we know to take place as regards the relationship of cancerous tissue to the healthy tissue around it, whose type the carcinomatous tumour follows. Thus, in some of the specimens of mediastinal sarcoma in the Glasgow Royal Infirmary Museum, isolated, rounded, pigmented bronchial glands are to be seen embedded in, and completely surrounded by, the new tissue.

It must not be forgotten, however, that sarcomatous tumours may originate within the chest in connection with other tissues, although, no doubt, less frequently. Sarcomata may take origin in the subpleural tissue, and grow into the mediastinum. In illustration of this, I may refer to a case shown by Dr. R. S. Thomson at the Glasgow Pathological and Clinical Society.* The case need not be quoted in detail, but it may be indicated that the mass weighed 3 lb. 5 oz., and was situated in the anterior mediastinum of a child aged 10. It occupied pretty much the position of the heart, and the left lung was much collapsed. The diagnosis was glandular tumour of the mediastinum. The microscope showed the specimen to be composed of "small spindle-celled sarcomatous tissue, combined with a large amount of very fibrous connective-tissue." The tumour was entirely covered with pleura, and Dr. Joseph Coats regarded it as of subpleural origin. Such mediastinal tumours seem to be not uncommon in very young children, and a very remarkable case of this kind has recently been reported by Dr. Angel Money.† From the brief account we have seen of this case we think it not at all impossible that it may have had a subpleural origin.

Virchow‡ also holds, and the statement will be found repeated in most of the text-books, that sarcomata may also originate in connection with the thymus gland, but of such tumours I have had no personal experience.

* *Glasgow Medical Journal*, vol. xxx (July to December, 1888), p. 483.

† *British Medical Journal*, 10th November, 1888, p. 1,046.

‡ *Loc. cit.*

Relationships of Mediastinal Sarcoma.

It is now necessary to refer to the relationships which mediastinal sarcomata may come to form with *neighbouring and distant parts.* These may vary a good deal according to the form of sarcomatous tumour which is present. Thus, a subpleural sarcoma, such as that reported by Dr. R. S. Thomson, may simply cause pressure effects, crushing the organs aside without involving them to any very great extent. With regard to lympho-sarcomata, which I believe constitute by far the largest proportion of mediastinal sarcomas, the case is somewhat different. This form of sarcoma presents very typical local malignancy, which plays an important part in determining the relationships of the tumour. Of these relationships we could have no better illustration than the cases which I have related in full, and the specimens contained in the Glasgow Royal Infirmary Museum, which I have carefully studied and re-examined with a view to this essay. In the entire series of cases there is a most remarkable uniformity as regards their mode of behaviour to surrounding parts and their histological structure. We may consider, then, *first the local relationships of mediastinal sarcomata.*

Origin in Lymphatic Glands.—It has been well remarked by Fagge and others that at the time of the *post-mortem* it is often difficult to say precisely where the tumour has originated. But although, oftentimes, we have a large nodulated mass, the general appearance of the tumour, as well as its histological structure and its anatomical situation, is strongly suggestive of origin in the glands. I think it not unlikely that the majority of nodulated conglomerate mediastinal sarcomata are glandular in origin, while the simple, rounded, firm tumours occasionally met with, especially in children, spring from the subpleural connective-tissue.

Relationship to the Pulmonary Tissue.—A very striking feature of the tumours is the readiness with which they spread

in upon and work up the pulmonary tissue. This tendency was so striking, and the extension took place in such an irregular, and one might say crab-like manner, that in investigating my earlier cases I could scarcely believe that I was not dealing with a cancerous tumour, till I looked at sections under the microscope. Very frequently the encroachment on the lung-tissue takes place along the bronchial tube, but sometimes, as in one of the cases related, the tumour moulds itself directly to the edge of the lung and begins to work it up. I have also, in one of the old museum specimens, observed appearances which are suggestive of the tumour growing into pulmonary cavities, much in the same way as intra-cystic growth occurs in mammary adenomata.

Relationships to Trachea, Œsophagus, and Blood-vessels.—Perhaps, however, the most characteristic feature of mediastinal lympho-sarcomata is the manner in which they mould themselves round the great tubular and vascular structures of the upper portion of the thoracic cavity. All the specimens demonstrated illustrate this point more or less fully. The structures most liable to be involved in this manner are the great vessels, and the trachea and bronchi. You find the aorta and large arteries springing from it often completely buried in the midst of tumour tissue; but, as a general rule, by careful dissection the morbid tissue can be pretty completely separated from the arterial wall. The veins suffer from the encroachment of the tumour much more severely than the arteries, and in some of the specimens well marked intravenous growths of the morbid tissue may be seen. This is an anatomical point of the very greatest importance in connection with the diagnosis and extension of intra-thoracic tumours. Dr. Maguire* has expressed his opinion, founded on his experience, that lympho-sarcomata have little, if any, tendency to destroy the endothelium lining the vessels which they invade, whereas ordinary sarcomata ulcerate into the vessels and cause hæmorrhages. I am not inclined to agree with Dr. Maguire in this view; but then it is not unlikely that

* *British Medical Journal*, 1888, vol. ii, p. 1,047.

what Dr. Maguire would call an ordinary sarcoma of the mediastinum I would call a lympho-sarcoma. The bronchi very frequently suffer severely from the local malignancy of lympho-sarcomatous mediastinal tumours. The whole normal histological structure of the bronchial wall may entirely disappear, nothing being left but a channel, more or less narrowed, through the tumour tissue. Some of the microscopic specimens, which I have prepared, show the gradual destruction of the bronchial tissue exceedingly well. It is not at all unlikely that in many cases the bronchial tubes may be very considerably dilated, the bronchiectasis being partly due to the local action of the tumour on the bronchial wall, and partly due to paralytic conditions induced by pressure on nerves or plexuses, to be more particularly adverted to immediately.

Relationship to Nervous Structures.—The nerve trunks of the thorax are often found to pass into and become buried in the midst of the tumour. Sarcomata of the mediastinum seem to behave differently to aneurism as regards their mode of involving the nerves. Aneurism, as is well known, crushes the nerve trunk aside and destroys it by pressure. Sarcoma, on the other hand, appears to surround it much in the same way as it does a bronchus or an artery. Whether it destroys the nervous continuity by so doing my observations do not allow me to say, but in one case of lympho-sarcoma of the neck, where the common carotid, jugular vein, and pneumogastric were deeply buried in tumour tissue, and where the vein was plugged by an ingrowth, I have still been able to find and dissect out the nerve trunk. In our ordinary clinical experience, irritative and paralytic nervous symptoms are perhaps not so frequently associated with solid as with aneurismal tumours within the chest. While this may be so, however, there can, I think, be little doubt that a number of the symptoms met with in the course of a case of mediastinal tumour (and probably some which, at first sight, are not obviously nervous in origin) may be due to interference with the nerve trunks and plexuses within the thorax, an opinion

which may be verified by a reference to the cases I have already recorded. In this regard an important paper by the late Sir William Gull is deserving of notice.* He shows that destructive changes in the lungs, after experimental division of the pneumogastric nerves, only take place when both nerves have been cut. When only one nerve has been divided, the free anastomosis in the pulmonary plexus is sufficient to maintain the nutrition of the lungs. Under pathological conditions, however, the lung is apt to suffer even if only one nerve is involved, because when the mediastinum is the seat of disease the pulmonary plexus is likely also to be injuriously affected. He supports this conclusion by citing a series of cases, including one of fibrous, probably malignant, thickening of the mediastinum. He attributed the injurious effects on the lungs to paralysis of the bronchial tubes. In 1879 Dr. James Goodhart† published a very valuable paper calling attention to the part which enlarged mediastinal glands play in the production of spasmodic asthma in children, by interfering with the mediastinal nerves, and giving rise to peripheral irritation. In the case of an adult he was inclined to regard coma as having been induced in a similar way. He thinks that spasm so induced is not glottic, but rather a spasm of the whole lung —spasmodic asthma. A number of references to spasmodic asthma caused by mediastinal gland enlargement will also be found in this paper. These circumstances, then, should lead us to pay particular attention to any nervous phenomena which may develop in the progress of cases of mediastinal tumour. Dr. Hilton Fagge also calls attention to interesting vaso-motor and pupillary phenomena due to the pressure of mediastinal new-growths upon the sympathetic trunk within the chest.‡ It is not improbable also that the vomiting which is sometimes present in cases of mediastinal sarcoma, and which was very troublesome in Case 1, as well as the gastralgia and

* "On Destructive Changes in the Lung from Disease in the Mediastinum invading or compressing the Pneumogastric Nerves and Pulmonary Plexus" (*Guy's Hospital Reports*, New Series, vol. v.)

† *British Medical Journal*, 1879, vol. i, pp. 542-580.

‡ *Practice of Medicine*, second edition, vol. i, p. 1,002.

flatulence so often met with, may be nervous in origin. In corroboration of Goodhart's observations, it is also worthy of note that at least two of the cases of lympho-sarcoma, which I have related, became comatose before death. In connection with cancer of the mediastinum, originating in the wall of the œsophagus, I shall also have to call attention to the circumstance that gangrene of the lung, a not uncommon mode of termination, is frequently to be related to nerve trunks being involved in the malignant mass. In Case 5 we have an example of absolute paralysis of the left vocal cord, from pressure exerted by the sarcomatous mass on the trunk of the left pneumogastric, where it gives off the recurrent, the nerve being flattened between the tumour and the artery; and in the case of sarcoma of the neck (referred to at the beginning of this section), in the midst of which I found the trunk of the pneumogastric buried, the dyspnœa leading up to death was so severe that tracheotomy was performed. The dyspnœa, however, was largely due to spasmodic contraction of the bronchi from irritation, and so the opening of the windpipe did little good, although it may have relieved that part of the respiratory distress which was due to spasmodic closure of the vocal cords, a condition which generally accompanied the bronchial spasm. For information with regard to this very interesting case, in which the tumour originated in the right posterior triangle of the neck about 9 weeks before death, I am indebted to my friend, Dr. John Macintyre, who performed tracheotomy in the hope, at least, of relieving that part of the spasm which took place within the larynx. The first attack of dyspnœa occurred about 3 weeks after the growth was first noticed. The operation was not accompanied by relief of the spasms, and in the midst of a very prolonged attack the patient died. Dr. Macintyre has also given me the opportunity of examining another case of sarcoma of the posterior triangle of the neck, accompanied by precisely similar laryngeal and bronchial spasms, due to pressure on the pneumogastric trunk.

Pericarditis and Pleurisy excited by Mediastinal Sarcoma. — Another very important feature of mediastinal sarcomata and other malignant tumours of this region is the great tendency, which they have, to excite inflammatory action—generally of a very acute kind—in the serous membranes with which they come immediately in contact. Acute pleurisy and pericarditis are among the most common complications of malignant disease of the mediastinum, and this phenomenon is very well illustrated in three of the cases (1, 2, and 5) that have already been related; and in Case 5 it was recognised for a few weeks before the fatal issue. The occurrence, therefore, of an acute inflammation of the pleura or pericardium in the course of a case whose signs and symptoms point in the direction of mediastinal tumour, is a circumstance of very great importance in the establishment of diagnosis. A train of clinical phenomena, which for a long time may have been obscure and perplexing, will often be explained by the sudden and unlooked for development of an acute pericarditis or pleurisy, although the explanation may not come till pretty late in the case. While this is so, however, care must be taken, on the other hand, not to confuse the secondary with the primary affection. As has already been seen in connection with one at least of the cases (Case 2) now recorded, it is very easy to mistake the physical signs of a mediastinal neoplasm for those of a simple pleurisy with effusion. There are, however, in connection with the signs of mediastinal tumour which resemble those of pleurisy or pericarditis, two circumstances which should prevent such an error of diagnosis from being made. First, if an exploring needle be used and no fluid be obtained, as happened after repeated trials in Case 2, the presumption is that we are dealing with a solid tumour, whose dulness to percussion may be so absolute and intense as to resemble that of fluid pleural effusion. And second, even if fluid should be discovered, as the result of an exploratory puncture, its character is generally such as at once to suggest that the serous inflammation is secondary to tumour formation. In the great majority of secondary

serous inflammations the inflammatory process is of a hæmorrhagic type, and the fluid withdrawn by the aspirator is in consequence sanguinolent. Whenever we obtain hæmorrhagic fluid as the result of *paracentesis thoracis*, the presumption generally is greatly in favour of a pleurisy or pericarditis secondary to malignant disease, either sarcomatous or cancerous, within the chest. In this regard, then, the pathological anatomy of mediastinal tumours becomes of the very greatest importance to the clinical physician in his efforts at diagnosis, and affords another proof of what I have already alluded to, that the mere accurate determination of physical signs is insufficient by itself to establish the diagnosis of primary new-growths within the chest. In the fourth case recorded in this essay, the lympho-sarcomatous tumour had not produced a pericarditis, although the lower part of the growth lay immediately in contact with the upper and anterior layer of the pericardium. But this simply shows that it is only after the serous membrane has been intimately involved in the growth of the neoplasm that inflammatory reaction occurs.

In none of the cases that I have examined did purulent inflammation result from the growth of the tumour. The serous inflammation set up by the extension of malignant growths is an exceedingly intense and acute one as a rule, a circumstance which is fully proved by the sanguinolent nature of the fluid effusion, and by the very abundant fibrinous exudation usually met with, but the inflammation seldom or never results in pus. This circumstance is probably to be related to the fact, now fully established by numerous researches and observations, that purulent inflammations are caused by the action of special varieties of micro-organisms. In the growth of malignant tumours we possess as yet no evidence that specific bacteria play any part, and therefore the inflammatory action which they excite in neighbouring parts, although very acute, is a simple inflammation—simple in the sense that it is due merely to the influence of a simple, aseptic irritation.

Tendency to increase in direction of least resistance.—It is also a character peculiar to the growth and extension of lympho-sarcomatous tumours of the mediastinum that they tend to grow in the direction of least resistance. The manner in which sarcomata of this region insinuate themselves in and out between the different structures in their neighbourhood is a feature which must have frequently struck all, who have investigated the pathological anatomy of mediastinal new-growths. Bulky and lobulated as most lympho-sarcomata of the interior of the thorax are, they do not simply crush the organs aside, as many other varieties of tumour would do. You find processes of the growth peeping out beneath the arch of the aorta, pushing their way upwards beneath the clavicles into the triangles of the neck, insinuating themselves between, and applying themselves around, the great blood-vessels of the root of the neck and the bronchial stems; and all this without there necessarily being any actual incorporation of the surrounded structures and tissues into the substance of the tumour itself, at least in the first instance. In this way the growth of a thoracic sarcoma differs in the most marked manner from that of a primary cancer within the chest. The cancer, as a rule, never becomes so bulky as a sarcoma; and in its growth it steadily infiltrates, and causes ulceration of everything coming into contact with it, in this way even ulcerating through the wall of the thoracic aorta itself, and leading to fatal hæmorrhage. And in the case of cancer this may occur with a minimum of growth of the tumour as regards its bulk. Sarcomata of the chest, in my experience, never cause erosion of bone, or exercise the very striking pressure effects sometimes witnessed in cases of aneurism, for instance. The variety of sarcoma most likely to give rise to pressure effects pure and simple is that which I have described as of subpleural origin, and as being most commonly observed in the case of children. Here the tumour is liable to present itself as a single rounded mass, with a very considerable fibrous basis, and hence simple pressure effects are more likely to occur.

In the second place, it is necessary to consider briefly the *relationships between sarcomata of the mediastinum and distant parts.* In thinking of this subject, it is essential to remember the division of sarcomata of the mediastinum into primary and secondary. The changes induced secondarily in distant organs by primary sarcoma of the mediastinum are of metastatic origin; and, of all the primary sarcomata of the mediastinum, there can be no doubt that the variety which has been denominated lympho-sarcoma is the most prone to metastasis. This is a circumstance not to be wondered at in connection with this variety of mediastinal sarcoma, when we think of the very intimate manner in which the veins are involved in, and worked up by, the tumour tissue. Metastatic nodules, having all the characters of the primary thoracic mass, may be found in the lungs, the liver, the spleen, and the kidneys; and, if the cases recorded in this essay be consulted with reference to this point, ample evidence of it will be found.

As I have already pointed out, secondary sarcomata of the mediastinum are comparatively unimportant from our present point of view, and therefore it is unnecessary that they should be discussed at any length. For obvious anatomical reasons, it is very probable that secondary sarcomata of the mediastinum are less frequent than similar tumours in the lungs; and it is also not unlikely, when a secondary mass does fill up the mediastinum, that it may have spread from the lung. Of all malignant tumours, the sarcomata are those which are most likely to be soon complicated by the development of secondary tumours within the chest, and it will be sufficient for the present purpose if I give a short account of two cases, which have quite recently come under my own observation.

Case 6. *Sarcoma within the Chest Secondary to Primary Tumour of the Testicle, causing Death about a year after Primary Tumour was first observed.*—The patient, a gentleman 35 years of age, was seen by me upon several occasions during his last illness in consultation with his medical attendant. He had been the subject of a congenital inguinal hernia, for which he underwent an operation about 8 years before his

death, when it was discovered that the testicle was small and undeveloped. About a year before death the testicle began to enlarge, the enlargement being regarded as probably of an inflammatory nature. When I was asked to see the patient, about 2 months before his death, the primary tumour was the size of an infant's head, and my advice was sought concerning his general state, which was one of very moderate pyrexia, the temperature highest in the evenings, and accompanied by slight feelings of *malaise*. At my first visit nothing could be detected in the lungs, but in the course of a few days slight dulness and a very faint crackling râle were detected at the right pulmonary base posteriorly. About this time he had an attack of pain in this region, which passed off in the course of a few days. As the surgical treatment of the case depended upon the state of the lungs, the physical signs in the chest were carefully investigated from time to time. The dulness soon became quite distinct, and the râles more numerous. A constant, irritating cough, *without expectoration*, set in, the breathing became much embarrassed, and in the course of about six weeks he died with all the signs and symptoms of a secondary intra-thoracic tumour. In this case the cough, though not brassy or incomplete, was quite obviously reflex, and was always referred by the patient himself to a tickling sensation in his larynx. The absence of expectoration almost throughout was a notable feature in the case; and several severe attacks of spasmodic dyspnœa occurred before the fatal termination. From a medical point of view, the case was of the very greatest interest, as showing the length of time that is likely to elapse between the earliest symptoms that could be regarded as indicative of thoracic recurrence and the fatal issue, and also as demonstrating the exceedingly insidious and almost imperceptible manner in which the chest becomes involved.

Case 7. *Secondary Sarcoma of the Posterior Mediastinum and Pleura, causing death 18 months after completely successful Removal of the Primary Tumour of the Femur by Amputation through the Hip-joint.*—The patient was a girl,

aged 9 years, who died in Dr. Wood Smith's wards of the Glasgow Royal Infirmary on the 22nd December, 1890. The left leg had been amputated through the hip-joint by Mr. H. E. Clark in June, 1889, for sarcoma of the femur. The patient was readmitted under the care of Dr. A. Wood Smith on 25th November, 1890, suffering from cough and dyspnœa. There was no expectoration, or, at most, a scanty amount of pearly mucus. The respiratory movements over the left base were restricted, and the vocal fremitus in the same region was diminished. Over the base of the left lung the percussion was dull, and the dulness extended as high as the spine of the scapula behind, and above the nipple in front. Over the left apex the percussion note was slightly tympanitic in quality. The respiratory murmur was very much diminished over the whole left lung, and bronchial râles were generalised throughout the chest. The cardiac impulse was situated in the sixth right intercostal space, and was slightly internal to a line let fall from the right nipple. The signs suggested pleuritic effusion, and on the 27th November paracentesis of the left side of the thorax was performed without any fluid being found. The dyspnœa and lividity became more and more severe, and for a week before death the patient could only rest in her cot in the genu-pectoral position. She died on 22nd December, 1890, about 18 months after the primary tumour had been removed.

I conducted a *post-mortem* examination of the body on 23rd December, 1890. The body was that of a well nourished child, whose left leg had been amputated at the hip-joint. The cicatrix was perfectly normal, without any sign of malignant growth. On being cut into, the tissues around it were seen to be perfectly healthy, and the acetabulum was found to be covered with a dense layer of white fibrous tissue. On opening the chest, the whole of the left pleural cavity was found to be filled up by a large lobulated tumour, which came well to the front, and overlapped the anterior surface of the heart. The mass was firmly adherent to the chest wall on the left side, and had apparently commenced to work up the intercostal muscular tissue. On removing the lungs and tumour, it was found that a few secondary nodules were also present

in the right pleura. The other organs and regions of the body presented practically healthy characters, and there was no involvement of the abdominal lymphatic glands.

On making a more detailed examination of the intra-thoracic growth, the tumour * was found to have originated in the lower portion of the posterior mediastinum and left pleural cavity; from this it had extended forwards, gradually completely enclosing the whole of the lower lobe of the left lung and replacing its tissue. On laying the mass open, the remains of the lung were found completely surrounded, in most of its extent, by tumour tissue. In the substance of the lung a mass having all the characters of spongy bone was discovered. In the right lung a similar mass of bone was discovered in its middle lobe. The gullet and thoracic aorta were adherent to the posterior surface of the tumour, but had not been much pressed upon. No pericarditis had been excited, and the heart showed healthy characters.

Under the microscope the tumour was found to be composed mainly of spindle cells, the hard nodules in the lungs containing distinct bony trabeculæ.

Histology and Etiology.

In concluding what has been written on the subject of the lympho-sarcomata of the mediastinum, it is only necessary to make a very few remarks upon their histological structure and etiology. Including the specimens contained in the Museum of the Glasgow Royal Infirmary with those cases fully recorded in the present essay, I have now made microscopical examinations of a considerable number of these tumours, and in all of them I have found a wonderful uniformity in minute structure. Their histology is very simple, and requires but little description. In every part of them are found closely aggregated masses of small, round, or sometimes slightly oval-shaped cells, which have been usually denominated lymphoid cells, from their similarity to the cells found in the tissue of lymphatic glands. The cells are held

* Glasgow Royal Infirmary Museum, Series X, 234 F.

together by intersecting fibrous bands, and by a capsule, which is intimately related to the cellular tissue beneath it, so that it cannot be stripped from the surface of the tumour, and which seems to grow with the increasing growth of the neoplasm. In a number of cases between the individual cell elements, or small groups of cells, a delicate reticulum can often be made out, similar to that of a lymphatic gland, but in a great many cases the heaping together of the lymphoid corpuscles is so great that no reticulum can be distinguished. Tissue of such a structure is likely to possess but little cohesive power, and when cut into many of the tumours give exit to a creamy juice, and present a soft encephaloid appearance. Thin-walled blood-vessels are frequently found in the midst of the tumour tissue, and often the capsular tissue is seen to be well supplied with capillaries, around which considerable cellular exudation has taken place, a circumstance which may possibly have something to do with the extension of the tumour and the growth of its capsule. In one or two instances I have met with microscopic exudations of red blood corpuscles in the substance of the tumour, evidently the result of hæmorrhage from ruptured capillaries. In examining structures, which are in process of being replaced by the lympho-sarcomatous tissue, the elements proper to the structure are seen to be separated from one another, and surrounded, by the small round-celled growth, and undergoing gradual atrophy and ultimate destruction. This is very well seen in the case of the bronchial tube, where the cartilage may be seen surrounded and broken in upon, the muscular elements separated from one another, and the submucous tissue entirely infiltrated, by the advancing and all-powerful lymphoid corpuscles. In the same way venous walls may be incorporated, and polypoid projections into the lumen of the vein formed. The tissue of the secondary nodules, which are liable to be formed in various organs in the progress of the disease, present a structure in all respects similar to that of the primary growth.

In fact, from the histological structure alone, such tumours might quite well be called round-celled sarcomata, from which

indeed there is little in their microscopic appearance to distinguish them. The tumours are really round-celled sarcomata, but they are sarcomata of the lymphatic glands of the chest, and hence I prefer to call them lympho-sarcomata —a name not founded on histological structure alone. The days are now gone when it was customary to classify tumours, at least in their clinical and prognostic relations, according to the microscopic structure alone, or the alleged specific character of a cell. The whole pathology of the growth must be taken into account in classifying a tumour, and in this histology merely plays a part, though no doubt an important part. In examining a large number of sections from different parts of lympho-sarcomatous tumours, the question of endothelioma occasionally presents itself for consideration. As endotheliomata, however, are tumours which in their minute structure present a close similarity to cancer, I shall defer the discussion of such neoplasms till the consideration of cancer of the mediastinum is taken up.

With regard to the etiology of lympho-sarcomata of the mediastinum, there is indeed very little to be said. The subject is a most difficult one, and as yet it is impossible to come to any very definite conclusions on the matter. By some these tumours have been compared to and included among the specific new formations or infective tumours, thereby indicating an opinion that their primary cause is likely to be similar to that giving rise to this class of affections.* I do not think, however, that we have sufficient evidence to enable us to formulate definitely such a view as to the origin of the lympho-sarcomata. Perhaps the most convenient disease with which to compare and contrast mediastinal lympho-sarcoma, in discussing this aspect of its etiology, is tuberculosis. In the tubercular new formation we have the most characteristic specific and infective process—a typical virus disease, both in its histological and etiological aspects. In tuberculosis the presence of a particulate virus, the effect it produces on the elements of the tissue in which the poison settles, and the changes that occur in the affected areas in

* Coats, *A Manual of Pathology*, second edition (London, 1889), p. 217.

the course of the disease, are all perfectly and accurately known. It is not so with regard to the causation of mediastinal sarcomata, and it seems to me, from my study of such tumours, that there is little in their life-history to suggest an etiology at all comparable, at least in its ultimate details, to that of tuberculosis or any other specific tumour. In tuberculosis we have to deal with an activity in the elements of the affected tissue—a morbid activity, no doubt—caused by the stimulus exerted upon them by the particulate virus. This activity is not one confined to a particular element or a particular tissue, but takes place in all tissues that are subjected to the influence of the virus, and leads to the same result in all. In the growth of a lympho-sarcoma we have nothing at all comparable to this. We have here nothing to suggest the influence of a poisonous agent on the nutrition of the tissues in which it is present, but we have to deal with the growth (and as regards the tumour itself, it may be said, a normal growth) of a new tissue, which exerts upon neighbouring tissues no nutritional influence at all, but simply causes them to disappear. So long as a portion of the tissue invaded by the new growth remains, it presents its normal characters, can be recognised by these characters, and shows no trace of unhealthy nutritional processes going on in it. This, then, is something very different from the effect of a specific virus on a tissue—it is, in fact, the effect and growth of an absolutely independent neoplasm.

From these remarks it will be seen that, in my opinion, the cause of lympho-sarcoma of the mediastinum is likely to be precisely similar to that which gives rise to other forms of simple or malignant tumours. Many observers have worked, and are working, at this obscure but most important subject; but, until something definite results from their labours, we must be content to wait for an explanation of the starting-point of these tumours of the mediastinum, which have at some length occupied our attention. A discussion on the

etiology of tumours in general would manifestly be quite out of place in an essay like this. With regard to the other aspects of the etiology of mediastinal sarcoma, as I have already in some detail expressed my views as to its relationship to Hodgkin's disease, it is unnecessary to say anything more.

IV.

MEDIASTINAL CARCINOMA.

II. **Cancer of the Mediastinum.**—As I have already indicated, I do not believe that primary cancer is anything like so frequently met with in the mediastinum as sarcoma, and especially as lympho-sarcoma. I hold to this belief in spite of the statistics advanced by Hare, for the reasons which I have already urged. Cancer is a disease which can only originate, except in very rare and exceptional circumstances indeed, in connection with epithelial tissues, and more particularly in those epithelial tissues which are specially prone to injury or irritation, such as those covering the lip, the pylorus, the os uteri, &c. For this reason the most likely place for a primary carcinoma to develop within the chest is the posterior mediastinum, where we have the epithelial structures of the trachea, bronchi, and œsophagus to afford a starting-point for the disease. To say with Hare that "undoubtedly the lymph glands at the base of the neck, or those which accompany the trachea and bronchi, are frequent seats for its beginning" is, in my opinion, undoubtedly erroneous; and I imagine that few, who accept the teachings of modern pathological anatomy, will accept the following statements as to the place of origin of mediastinal carcinoma:—"The lymph tissues at the root of the lungs, the pericardium and subpericardial connective tissue, the periosteum of the sternum, the fat and connective tissue of the mediastinum; and, last of all, the adventitia of the blood-vessels may give rise to the

growth." * A sentence like this simply amounts to saying that cancer may originate in any of the numerous tissues which go to make up the entire organism, and that it follows no special type of tissue-structure, epithelial or other.

Endothelioma.

It must be accepted, however, as a fact that occasionally tumours, having all the characters, macroscopic and microscopic, of typical cancer, seem to develop in connection with tissues which are not of the epithelial type. Such tumours have been described as occurring in the pleura and peritoneum, although they are admittedly rare, and to this class of neoplasm the term *endothelioma* has been applied. I think, too, that those tumours which have been described as *alveolar sarcoma* might also be placed in the same class. In these cases the histological structure of the growth is indistinguishable from that of cancer, and there would be little difficulty in calling the tumour cancer, were it not for the fact that it had originated in a non-epithelial tissue—*e.g.*, the pleura or peritoneum. In the course of my own practice I have not met with a case that could be regarded as coming under the category of the rare tumours just referred to, but in 1888 I saw Dr. Joseph Coats perform a *post-mortem* examination of a case of primary cancer of the pleura, which has since been fully recorded by that gentleman.† Such tumours of the pleura have been generally looked upon as originating from the endothelium of the lymphatic vessels of the part, but Dr. Coats regarded the tumours in his case as having arisen from the surface epithelium or endothelium, rather than from the lymphatics in the substance of the membrane. As one would naturally expect, from the character of the pleural membrane, primary cancerous tumours of this structure are likely to be multiple, and to be of moderate rather than of very great size. In the face of such facts, too, the possibility of cancer primarily originating in other than

* *Loc. cit.*, p. 39.

† *Glasgow Medical Journal*, July, 1889, p. 15.

the epithelial tissues of the mediastinal space must also be admitted, although this must be an occurrence of the rarest kind. In the course of my microscopic examination of the cases of mediastinal lympho-sarcoma preserved in the museum of the Glasgow Royal Infirmary, I came across one case which might possibly have been classed as endothelioma, or perhaps more accurately as alveolar sarcoma, or *sarcoma carcinomatosa* (Virchow).* In this tumour the alveolar arrangement of the connective-tissue stroma of the growth was very perfect, and presented a very striking resemblance to the alveolar stroma of carcinoma. The cells, however, which were contained in the alveoli were not characteristic epithelial cells, being smaller, and following more closely the connective tissue type. For this reason, and also because the macroscopic characters and the relationships of the growth to the neighbouring structures were precisely those observed in other cases of lympho-sarcoma, I preferred to class the tumour under this heading. Another reason which made me keep this tumour among the sarcomatous formations was that in some parts the structure was undoubtedly sarcomatous—of such a nature that the question of any cancerous element could not for a moment be considered. While at some parts the minute structure very closely resembled carcinoma, at others abundant small oval and spindle-shaped sarcomatous cells, without a trace of stroma, were characteristically present. This was the only case in which the question as between cancer and sarcoma came up for serious consideration; but occasionally in examining other cases a tendency to endotheliomatous structure may be observed, although not in such a way as, in my opinion, to cause any difficulty in classifying the growth. In concluding these remarks on the subject of endothelial tumours, I think the following sentence, contained in Dr. Coats' record of the case of primary cancer of the pleura, should be quoted, from the bearing it has upon the etiology of such neoplasms, although I do not know that I am prepared to admit the suggestion at least in the case of mediastinal growths. He

* Glasgow Royal Infirmary Museum, Series X, 230, 231.

says:—"There seems no good reason for separating this form from the proper cancers. In structure there is a complete correspondence. It may even be that, as Balfour asserts, the pleura and peritoneum may be derived from the primordial body cavity, and so may be hypoblastic in origin." * If the hint as to the primordial origin of pleural and peritoneal serous membranes contained in this sentence be at all accurate, then the exception, which endotheliomatous tumours seem to present to the rule that all cancers originate in connection with epithelial tissues, may be more apparent than real. Granting, however, that the pleura and peritoneum are in no sense to be regarded as of hypoblastic origin, then endotheliomatous tumours, such as those at present referred to, might be taken as affording proof of Cohnheim's theory of the origin of neoplasms—viz., that tumours originate from a piece of tissue left over in the process of development, and retaining all its embryonic powers of growth. Endothelial growths are also met with in the region of the umbilicus, and I have seen two or three specimens of this kind exhibited at the Glasgow Pathological and Clinical Society, where the question as to whether they were cancerous or sarcomatous was vigorously discussed. An interesting case of the kind has been placed on record by Mr. D. N. Knox, in which it was probable that the cells filling the alveoli of the tumour originated from the peritoneal endothelium.† I have thus discussed at some length the question of endothelioma of the mediastinum, in order to show that, while strongly of opinion that cancerous tumours of this region, in the great majority of cases, originate in epithelial tissues, I am still aware of the difficulties which apparently cancerous tumours, not so originating, raise. I think it not at all improbable that very often the appearance of a cancerous tumour in the mediastinum may be caused by a sarcoma forming a stroma for itself out of the loose connective tissue amongst which it has frequently to grow.

* *Loc. cit.*, p. 22.

† *Glasgow Medical Journal* (January to June, 1885), vol. xxiii, pp. 136 and 308.

Having thus explained my reasons for believing that primary cancerous tumours of the mediastinum are most likely to take origin in the posterior portion of this region, either from the epithelial tissues of the respiratory passages or the œsophagus, I shall in the next place relate a case in which the tumour commenced in the right bronchus, after which I shall give an account of one or two cases of œsophageal cancer that have recently come under my observation.

Case 8. *Primary Cancer of the Mediastinum originating in the Tissue of the Right Bronchus, with Secondary Subcutaneous Tumours, presenting the usual Physical Signs and Symptoms of Phthisis Pulmonalis.*—Robert D., aged 24, a vanman, was a patient in the Glasgow Royal Infirmary under the care of Dr. Samson Gemmell, and the following summary of the clinical history was sent to me at the time of the *post-mortem* examination, which I performed upon the 10th February, 1890. The symptoms from which the patient suffered, and the physical signs in his chest, led to a diagnosis of phthisis pulmonalis. He was admitted labouring under a cough and spit of about nine weeks' duration, and loss of flesh and weakness of four weeks' duration. Expectoration was profuse, night sweating very marked, and diarrhœa troublesome. A tumour the size of a small orange was situated on the front of the right shoulder, and another about the same size was found in the abdominal wall. Percussion over the right apex in front was quite dull, the respiratory murmur was tubular, and there were crepitant râles. The left lung seemed to be normal. Posteriorly, percussion was dull all over the right lung; the respiratory murmur was tubular at the apex, and there were muco-crepitant râles at the base. There had been no hæmoptysis till 15th January, and then it was only slight. The sputum was nummular, the urine was normal, and the temperature was markedly hectic.

The report of the *post-mortem* examination was in the following terms:—

External Appearances.—There is a marked deformity of the chest-wall. In the right lumbar region of the abdominal

wall is a firm rounded tumour; and a similar smaller, but harder, rounded mass, about the size of a small orange, is situated on the front of the right shoulder.

Chest.—The anterior margin of the right lung is firmly adherent to the sternum. On opening the pericardium one or two moderately recent adhesions are found between the surface of the right ventricle and its parietal layer. The heart is somewhat dilated, and all its chambers are filled with clot; the muscular tissue is somewhat pale and rather soft, but otherwise the organ presents nothing abnormal.

The right lung is firmly adherent over its whole surface, diaphragmatic as well as costal. It is solid from apex to base, the consolidation for the most part presenting somewhat the characters of grey hepatisation, with here and there distinct nodules presenting features somewhat similar to those of caseous or catarrhal pneumonia. Surrounding the right bronchus, where it runs into the lung, is a hard, pearly white mass, which encroaches upon the pulmonary tissue of the root of the lung. Where this mass involves the lung its tissue presents a caseous appearance, and was at first regarded as caseous bronchial glands. In the anterior aspect of the upper lobe a large ragged cavity is discovered, into which projects at one point the white tissue already described as involving the root of the lung. The apex of this lung is capped by a greatly thickened and somewhat œdematous pleura.

The left lung is somewhat œdematous in its lower lobe; its upper lobe is much shrivelled and contracted by old fibroid change; and at the extreme apex is an old cavity about the size of a hazel-nut, lined with a well defined membrane, and nearly full of pultaceous material of a greenish colour.

On removing the tumour from the shoulder and abdominal wall, the naked eye characters are found to be essentially similar to those of the mass of pearly white tissue at the root of the right lung. The primary and secondary tumours from this case have been preserved in the museum of the Glasgow Royal Infirmary.*

* Glasgow Royal Infirmary Museum, Series X, 172 A and 248 A.

Abdomen.—The kidneys are somewhat pale, but otherwise present nothing special. The capsule is perhaps slightly adherent in both organs. The liver shows the lobules with undue distinctness, and this is probably due to slight fatty or hyperæmic change. The spleen presents nothing unusual. The intestines are examined, but no ulcers are found. The mesenteric glands are not enlarged. The stomach and pancreas present healthy appearances.

On microscopic examination of sections of the primary tumour in this case, it is at once seen that the growth is a typical cancer, the tissue being composed of masses of epithelial cells embedded in a characteristic alveolar stroma. On examining a large number of sections in order to settle more definitely the precise nature and origin of the cancerous growth, it soon becomes apparent that the neoplasm has originated in connection with the acinated bronchial mucous glands. The appearances observed in some of the sections leave no doubt whatever on this point, because in them the irregular alveolar epithelial tissue of the tumour can at places be seen to be in direct continuity with a more or less normal-looking bronchial glandular tissue, as if the section had been taken just at the point where the normal cells were beginning to break bounds. Precisely the same relationship of normal epidermis to tumour elements is often seen in cases of epithelioma of the lip. This relationship of the definitely cancerous tissue to tissue more or less normal in character was often very striking, and led one to think that some hypertrophy, or at least nutritive activity, of the normal gland structure had taken place before it had finally broken away altogether into independent cancerous development. That the cancerous growth had nothing whatever to do with the bronchial epithelium was abundantly evident in many of the sections, where the whole thickness of the bronchial wall could be carefully studied. The columnar superficial epithelium, the basement membrane, the sub-mucosa, and the muscular layers could all be made out with ease; and it was evident that the tumour formation had no relationship whatever to them. Beyond the evidences of considerable bronchial catarrh,

shown by the proliferation of the surface epithelium, the thickening of the basement membrane, and a considerable infiltration of leucocytes in the sub-mucosa, these structures of the bronchial wall presented tolerably normal characters. Here and there the tumour tissue encroached upon the muscular and mucous layers of the bronchus, apparently even penetrating it at a few points; but, on the whole, these layers were little affected, the growth of the tumour seeming rather to have expended itself in an outward direction towards the peribronchial tissues. The primary tumour in this case, then, might be called a *glandular cancer of the bronchial wall.*

Microscopic examination of the subcutaneous tumours shows that they possess a typically cancerous structure, being composed of large processes of well formed nucleated epithelial cells. The processes, which have a distinctly epitheliomatous character, vary greatly in size and shape, and are separated from one another by a well formed stroma, containing numerous spindle-shaped nuclei. The secondary tumours are, as regards their minute structure, perfect reproductions of the fully formed tissue of the primary growth—that is to say, the tissue of the secondary tumours has followed the type of the structure of the primary tumour at the point where that structure has diverged most widely from the normal structure from which it started. Some parts of the primary tumour are almost identical in structure with that of the secondary growth; but those parts of the primary growth, which follow most closely the type of the normal bronchial gland, have no corresponding structure in the secondary tumours. Both in the primary and the secondary tumours, but especially in the secondary, numerous laminated capsules are present. In one of the sections examined a bronchial lymphatic gland was found to have been included. It showed signs of irritative proliferation of its elements, but careful examination failed to detect any cancer elements in its tissue.

The case just recorded must be regarded as a good example of a simple primary cancer of the posterior mediastinum,

originating in connection with the root of the right lung; and although, in the light of the completed record, the whole relationships of the different parts of the case are easily appreciated and understood, it must also be admitted that, both during life and at the time of the *post-mortem*, the features, upon which one had to depend for a diagnosis, were obscure and misleading. During life the symptoms and signs were regarded as those of phthisis pulmonalis, nor was there anything in the general condition of the patient that was not perfectly in keeping with such a view. No doubt the subcutaneous tumours, if their significance could possibly have been interpreted aright during life, might have led to an accurate opinion; but, in face of the fact that even at the time of the *post-mortem* I took a wrong view of the relationship of the subcutaneous tumours to the lesion within the chest, it would seem to be almost impossible that the true interpretation of such tumours could have been arrived at, except on the ground of comparison with a precisely similar case having already occurred in the experience of the physician. Hence the importance of the present record in view of future diagnosis. What tended still further to complicate the diagnosis in the present case was the fact that along with the cancerous disease there was also quite characteristic phthisical disease, of the left lung at least. It was evident, however, that the tubercular element was quiescent, and that the lesions in the left apex were in process of healing. Had it not been for the cancer the patient might have thrown off the phthisis.

It is also worthy of remark that the cancerous disease had excited a very intense inflammatory action in the pulmonary parenchyma, a point of interest in connection with the well known tendency of malignant tumours of the chest to excite pleurisy and pericarditis, already adverted to in these pages at some length. It would seem that the growth of a primary cancer at the root of the lung can set up a wide-spread grey hepatisation, as actually occurred in the case just recorded. Cancers of the posterior mediastinum, and particularly those originating in connection with the œsophagus, are not un-

frequently associated with the development of gangrenous cavities in the lungs. This is a condition which may arise partly from involvement of the pulmonary plexuses of nerves in the malignant mass, and partly from the cancerous growth involving the bronchial tube, and so, by insufflation or otherwise, setting up necrotic processes in the pulmonary tissue.

I have said that even at the time of the *post-mortem* examination I misinterpreted the significance of the subcutaneous tumours. I mean that at first I looked upon the superficial tumours as primary and sarcomatous, and upon the mediastinal lesion as secondary; and my original report of the case was entered in these terms. When the specimens came to be minutely examined, and when microscopic investigation had been undertaken, it became at once plain that such an opinion was erroneous. When the examination of the case was completed it became clear that the lesion in the mediastinum was primary, that on the surface of the body secondary. No doubt there were features in the case which were in my experience unusual, and which rendered it more easy for me to fall into the error I did. I was not prepared to find secondary cancerous tumours, such as those in the present case proved on examination to be, so completely isolated and alone—*i. e.*, apart from secondary tumours elsewhere. When general metastatis of cancer takes place it is generally multiple—numerous, sometimes very numerous, secondary formations being developed. In this case it was not so; and, except the two tumours that have been described, no others were found. It would seem, however, that this limited secondary extension is perhaps not so uncommon in connection with primary cancer of the lung as I at first supposed. Dr. Coats in his book refers to a case in which a very peculiar secondary extension occurred to the bones and the brain.*

A much more frequent starting-point for primary cancer of the posterior mediastinum is the epithelium of the œsophagus; but cancerous disease of the gullet is a lesion so easily

* *Loc. cit.*, p. 683.

diagnosed as a rule, and gives rise so constantly to dysphagia, more or less severe, that we have come to regard the affection more from the point of view of the difficulty of swallowing than from its anatomical location in the posterior mediastinum. In order, however, to give completeness to this part of the subject, I propose to relate two cases of malignant stricture of the gullet that have recently come under my notice, one of which happens to be of very unusual interest. The first of these occurred in the Throat Ward of the Glasgow Royal Infirmary, under the care of my colleague, Dr. David Newman, with whom I was associated in bringing the case under the notice of the Pathological section of the Glasgow Medico-Chirurgical Society in December, 1890. I shall here quote Dr. Newman's account of the clinical history, and give my own report of the *post-mortem* examination.

Case 9. *Epithelioma of the Œsophagus at the Level of the Bifurcation of the Trachea—Ulceration and Rupture into the Aorta—Death from Hœmorrhage into the Stomach and Duodenum.*—"G. A., æt. 57, was admitted into the Glasgow Royal Infirmary on the 25th March, 1890, complaining of difficulty in swallowing, which, he said, commenced at the beginning of December, 1889.

"The first difficulty he experienced was in swallowing solid food, and this gradually increased until the middle of February in the present year, when he had to give up taking solids, and since that time his diet has been composed entirely of liquid food. During the act of swallowing he feels as if the difficulty in deglutition was caused by constriction at the level of the cricoid cartilage, but once the bolus has passed that point it occasions him no trouble, nor has he ever suffered from vomiting, cough, alteration in the voice, or pain. The pupils are equal, and the radial pulses are synchronous and equal in force, although somewhat weaker than normal. On passing a bougie (No. 16), a complete obstruction is met with, 13 inches from the teeth, so that the stricture of the œsophagus may be said to be situated between the level of the suprasternal notch and

that of the bifurcation of the trachea. The largest size of bougie which passed through the stricture was a No. 6. On enquiring into the history of the case, no evidence could be found to show that the patient at any time suffered from syphilis, or sustained any traumatic injury to the œsophagus. On palpating the neck, nothing abnormal could be discovered in the line of the gullet nor in the lymphatic glands. The larynx and trachea, as far as could be seen, were strictly healthy, but on the least exertion the patient suffered from well-marked dyspnœa.

"Physical examination of the chest shows the cardiac sounds to be pure, but feeble, and very irregular in rhythm; but there is no evidence of valvular disease. I did not examine the condition of the lungs critically, but posteriorly, in the interscapular space and to the left side of the spine, on a level with the fourth dorsal vertebra, and, extending upwards and downward from that point, there could be detected a distinct localised dulness, occupying an area of about three or four square inches. Associated with this dulness to the left side, and about the same level as the obstruction in the œsophagus, there was evidence that air was not entering the left lung so freely as the right.

"The patient was sent to Dr. Jas. Wallace Anderson, who kindly furnished me with the following report:—'The upper left front of the thorax is slightly retracted, and there is a corresponding diminution of expansion, there also being a rather increased resonance on percussion over the same area. The respiratory murmur over this area is less full and free than on the right side, at some points being hardly audible, at others of a whiffing, wavy character, but always faint.' . . . 'Posteriorly there is a mere suspicion of dulness in the upper left interscapular region. The respiratory murmur is distinctly fainter on the left side at the level of the third, fourth, and fifth dorsal vertebræ, and this diminution is continued one or two vertebræ lower on that side. The respiratory murmur over the left lung generally, though quite audible, is fainter than on the right side. There is no alteration in the vocal resonance, and no râles are heard

anywhere. Cardiac phenomena and circulation generally are all perfectly natural.'

"At this time (1st April) I was quite satisfied that the case was one of cancer of the œsophagus, but as there was no demand for surgical interference I transferred the patient to Dr. Wallace Anderson's care. During his residence in Dr. Anderson's ward he was kept at rest in bed, and as a result of treatment the symptoms became less pronounced, and the patient desired to be dismissed, and to return to his ordinary employment. Between the 1st of April and the 24th of May great improvement took place in his power of swallowing, and he gained in weight, so that when he was dismissed he was able to swallow not only fluids with freedom, but, with a little care, solid food as well. This improvement, with freedom from pain in swallowing, and the absence of vomiting, emaciation, or anæmia led me to doubt the accuracy of my first diagnosis, and consider whether or not the dysphagia and impaired respiration on the left side might not be due to the presence of an aneurism or solid tumour at the bifurcation of the trachea. A large-sized bougie now passed with ease. During the summer months the patient enjoyed moderately good health, and was able to swallow well both fluid and semi-fluid food; but in the autumn he again began to suffer from dysphagia, and he stated that since he was dismissed from the Infirmary he suffered greatly from breathlessness.

"Patient was readmitted into my ward on the 7th October. On passing a bougie (No. 12) it was found to be impossible to get it passed 13 inches from the teeth. At this time I went over the case very carefully again, and found the patient to be very much in the same condition as in April, except perhaps he suffered more from dyspnœa, and I made a note in the journal to the effect that 'although there are no positive signs of aneurism, the situation of the obstruction, the dyspnœa, the impaired respiration on the left side, the area of dulness posteriorly, and the history of the case, raise the gravest suspicion of an aneurism at the bifurcation of the trachea.' On the 18th October the patient spat up a

small quantity of dark blood, and for the first time complained of pain in the chest. On the 28th he again suffered from a deep-seated gnawing pain in præcordial region, and when I saw him in the morning he was looking very ill. At one o'clock on the following morning the patient raised himself in bed suddenly, because of some distress referred to the chest. Immediately he sank back on the pillow and became blanched, his pulse at that time being small and thready, and a few minutes afterwards almost imperceptible, while he continued to breathe after the pulse had ceased.* The breathing was very peculiar in character, being of a sighing nature. Between each respiration an interval of about half-a-minute occurred, which gradually increased until the breathing ceased altogether. This form of respiration lasted for about eight minutes."

I performed a *post-mortem* examination on the day after his death, of which the following is the report:—

External Appearances.—A well nourished body, but extremely pale. The pupils are medium; the abdomen slightly distended; subcutaneous fat considerable, but somewhat soft and œdematous.

Chest.—The pericardium contains about 3 oz. of slightly blood-stained serum. The heart is very soft and flabby, and its external fat is much increased on the surface of the right ventricle. The aortic and pulmonary curtains are competent. There is slight atheroma a little above the free margins of the semilunar curtains, but the orifices of the coronary arteries are patent. The muscular tissue is very soft, but on the whole normal-looking. On cutting into the septum slight yellowishness of the fibres is observed. The lungs, trachea, and gullet are removed together. The left lung is pretty generally, and moderately firmly, adherent, the pleura in this situation being of cartilaginous hardness, and perhaps even slightly calcareous in parts. This very firm adhesion on the left side extends upwards as far as the fifth or sixth dorsal vertebræ, but does not extend round towards the front.

* The mode of death was observed and described by Dr. J. G. Gray, the Resident Assistant, who kept careful notes of the case.

After the thoracic viscera have been removed, a probe is passed into the gullet from above, and its further progress downwards is completely arrested at the level of the bifurcation of the trachea. On passing the probe from the gastric end of the gullet, it passes through the entire length of the tube without any difficulty. The trachea is then opened along its posterior wall almost to the bifurcation, but nothing abnormal is seen in it. The thoracic aorta is then laid open by cutting with the scissors from below upwards. Its internal coat presents tolerably healthy characters; but about an inch below the arch, and towards its posterior border, a circular opening with thin and somewhat ragged edges is found; this opening leads into a ragged cavity. The gullet is next laid open, and at the level of the obstruction just mentioned a large ragged ulcerated cavity containing *débris* of blood clot and broken-down tissue is found in its wall. The upper margin of this excavation is raised and rather sharp, and presents the typical characters of the margin of a malignant ulcer. The cavity had evidently eaten its way into the aorta, and produced the aperture in that vessel described above. It should also be noted that the wall of the aorta, in the neighbourhood of the aperture, which is about the size of a threepenny-piece, is somewhat thinned.

The liver is very pale, the margins of the lobules being specially so, as in the case of fatty infiltration. The kidneys present healthy characters. The spleen is large and soft in consistence. The stomach is greatly distended, being filled with red blood clot, which had formed a complete mould of the interior of the viscus. The duodenum and several feet of the upper part of the small intestine are similarly distended with red blood clot.

It will readily be admitted that the peculiarly serious complication, which took place in this case, renders it well worthy of record, apart altogether from the question of its interest as an example of cancer of the posterior mediastinum. It must be a circumstance of the rarest occurrence for the thoracic aorta to be eaten through in the manner that

happened in this case. The case also, as well as that previously recorded, shows the tendency that cancer has to ulcerate and break down, rather than to increase into a bulky fleshy tumour, as happens with the sarcomata. This is a circumstance connected with the comparative pathology of cancer and sarcoma within the chest, which has a very important bearing upon the differential diagnosis of mediastinal tumours.

CASE 10. *Epithelioma of the Œsophagus causing Ulceration and Stricture—Slight Involvement of Lymphatic Glands —Death from Exhaustion.*—Henry W., aged 50, a labourer, was admitted to the Glasgow Royal Infirmary on the 20th March, 1890, under the care of Dr. A. Wood Smith, who has supplied me with the following outline of the clinical history:— On admission he complained of difficulty of swallowing. His previous medical history, with the exception of an attack of pneumonia twenty years ago, and of rheumatism ten years ago, had been good until within the last three years. Since then, he had been troubled with bronchitis and slight asthmatic attacks. The family history was unimportant, and he had never suffered from venereal disease.

The difficulty of swallowing commenced suddenly five weeks before admission, while eating his dinner, when a piece of meat suddenly stuck in his throat as the result of some obstruction encountered in the act of swallowing. After a severe struggle he managed to swallow it, and since that time there has always been some difficulty in swallowing solid food, but none with liquids. He referred the obstruction to a point corresponding to about the union of the middle and lower thirds of the sternum, and complained of pain at that point even when he was not swallowing. Physical examination of the chest was mainly negative, except that there seemed to be a limited area of dull percussion in the interscapular region, to the right of the vertebral column. He had a harsh cough; the pupils were normal; the eye-balls were somewhat prominent; and the radial pulses were equal. The bowels were costive, and there was no vomiting. The urine was normal throughout.

On the 12th April, 1890, a number of small bougies were passed, and a considerable obstruction was encountered about the level of the bifurcation of the trachea. Aneurism and spasm were excluded as causes of the obstruction; and a diagnosis of tumour of the œsophagus was arrived at. The difficulty of swallowing gradually became greater, and the patient died quietly on the 23rd June, 1890.

I made a *post-mortem* examination on the 25th June, 1890, and wrote the following report:—

External Appearances.—The body was emaciated, but not markedly so, and externally presented nothing abnormal.

Chest.—The pericardium contained several drachms of clear serous fluid. The heart weighed 10½ ounces, and was somewhat flabby, the external fat being somewhat increased in amount. Otherwise the organ presented nothing abnormal. With the exception of a few old pleural adhesions and some emphysema, the lungs presented healthy characters. There was a remarkable absence of adipose and connective tissue around the vessels and other structures at the root of the neck, so that they stood out as if dissected. On passing the fingers down along the line of the aorta and œsophagus a hard nodule, about the size of a hazel-nut, was felt in the latter, about half an inch below the level of the bifurcation of the trachea. An œsophageal bougie passed from the pharynx was completely arrested at the level of the nodule, but on passing it from the gastric extremity not the slightest obstruction was encountered. A second attempt to pass the bougie from the pharynx was equally unsuccessful. On laying open the gullet at the level of the nodule, and at a distance exactly six inches below the tip of the epiglottis, a triangular-shaped ulcer was discovered in the anterior wall of the gullet, the base of the triangle being inferior, the apex pointing directly upwards. The edges of the ulcer were slightly elevated and undermined, and they had a pale white colour. The floor of the ulcer had a worm-eaten appearance. The gullet could be freely dissected from the neighbouring parts, except at the site of the ulcer where it was adherent to the posterior surface of the left bronchus; but there was no sign of the bronchial wall having

been involved in the malignant growth. From the shape of the ulcer, which was that of a cone pointing upwards, it is probable that the narrowest part of the stricture was at its upper extremity, and in this circumstance we have a probable explanation of the impossibility of passing the bougie from above downwards, when there was no difficulty in passing it from below upwards. On microscopic examination of a scraping from the surface of the ulcer, numerous large flat nucleated epithelial cells were discovered, showing the epitheliomatous nature of the disease. A scraping from the interior of a lymphatic gland in the neighbourhood of the ulcer also showed large nucleated epithelial cells lying amongst the lymphoid corpuscles, although there was no naked eye appearance of glandular enlargement.

The other organs of the body presented healthy appearances.

Secondary cancer of the mediastinum is of quite minor importance, the chief interest naturally attaching to the primary tumour. It is, therefore, unnecessary to discuss in detail the pathology of this variety of mediastinal disease. As in the case of sarcoma, secondary cancers in the chest are perhaps more likely to develop in the interior of the lungs than in the mediastinal space. It may be noted, however, that the mediastinum may be secondarily invaded by cancerous disease in one of two ways—(1) by continuity; (2) by metastasis; and of these two modes the former is in all probability the more common. Thus, it is quite conceivable that, in the later stages of a cancer of the breast, the pleural and mediastinal spaces might be invaded by processes of the tumour extending directly through the chest walls. This is a complication, however, which is largely prevented by the almost universal practice of removing the primary tumour in cases of cancer of the mamma. Pathologists also are well acquainted with the circumstance that cancerous disease of the peritoneum frequently extends into the cavity of the chest by way of the lymphatic channels of the diaphragm. When the pleura is invaded by cancer in this method, the

nodules are generally small and disseminated, and are not likely to attract any attention during life.

Metastasis, on the other hand, is more likely to cause secondary cancerous formation in the lungs than in the pleura or mediastinum, although secondary tumours originating in this manner are sometimes met with in the latter localities; and, no doubt, most surgeons will have had experience of cancerous pleurisy taking place at a longer or shorter interval after operations for the removal of mammary carcinoma.

V.

FIBROUS TUMOURS OF THE MEDIASTINUM.

III. **Fibroma of the Mediastinum** is an exceedingly rare disease, only seven cases having been discovered by Hare in his search through 520 cases of mediastinal disease.* I quite agree with Hare in his estimate of the extreme rarity of this form of primary mediastinal tumour—*i. e.*, pure fibroma of the mediastinal space. It is to be remembered, however, that sometimes it must be very difficult to be perfectly certain whether one is dealing with a pure fibroma, or with a tumour possessing a somewhat mixed character, to which the terms fibro-cellular or fibro-sarcomatous might perhaps be more applicable. I have met with one case of mediastinal tumour, which I am inclined to classify as a fibroma, although in doing so I am quite aware of the difficulty that certain features in the case give rise to. In this instance, the tumour was associated with a very striking rheumatic diathesis, and it is not improbable that such an association may have an important etiological significance with reference to fibrous tissue tumours of the mediastinum. At this stage, then, it will be better to relate the case, after which its nature and etiological significance may be discussed, special attention being directed to the association of the lesion with rheumatism.

The case occurred in the practice of my friend, Dr. Alex. Napier of Crosshill, who sent me the tumour for examination and report.

* *Loc. cit.*, p. 111.

CASE 11. *Fibroma or Fibro-cellular Tumour of the Mediastinum, with numerous Subcutaneous Nodules over the Front of the Chest, at the Root of the Neck, and in the Axillæ, associated with Recurring Attacks of Acute Rheumatic Fever and Valvular Disease of the Heart.**—The following is the clinical and *post-mortem* account by Dr. Alex. Napier:—

"The patient was seen by me only once during his life, and that in a casual way. The following are the clinical notes I was able to obtain:—G. J., aged 29, formerly a gardener, latterly a church officer, had throughout his whole life been subject to genuine and acute rheumatic attacks, involving the joints, and ultimately also becoming complicated with valvular disease of the heart. His recurring attacks of rheumatism seem to have been his only ailment till the month of July, 1888, when it was noticed that the lymphatic glands in both armpits were enlarging; they were at first freely movable, but ultimately became fixed, and grew so large that the armholes of his clothes had to be cut to give him room. Towards the end of the same year (1888) numerous little lumps, apparently enlarged glands, appeared over the front of the chest, while larger swellings developed at the root of the neck, over the clavicles; his attention was first drawn to this by finding that his collars were becoming too small for him. At the same time marked enlargement of the veins at the root of the neck and over the upper part of the chest was noticeable. These glandular swellings, as a rule, were not painful.

"In the spring of the present year (1889) he had another severe attack of rheumatism, complicated this time with pleurisy, affecting apparently both sides. From this time onwards he went steadily downhill. He rapidly lost flesh, became pale and anæmic, and short of breath, the slightest exertion sufficing to bring him into difficulties, his face becoming a ghastly whitish-grey in colour, and his lips bluish. His most striking symptom was his cough; this was extremely paroxysmal, the attacks lasting sometimes for nearly an hour,

* The specimens in this case were shown at the Glasgow Pathological and Clinical Society, on Monday, 11th November, 1889; see Glasgow Royal Infirmary Museum, Series X, 234 C.

resembling very severe hooping-cough, and leaving him utterly exhausted. These attacks often came on when eating, and usually ended in vomiting. The glandular swellings steadily increased in size. At the time of my visit, in January, 1889, very many enlarged glands were to be seen in front of the chest, probably somewhere between 30 and 50, some of them as large as walnuts. Over the inner ends of both clavicles, and extending up into the neck, were similar masses; and in both armpits were masses as large as one's closed fist. At this time there was no trace of pleurisy or other lung affection. Of late the patient, in sitting, leaned very much over to the left side, and he slept in this position. The patient was persuaded to enter the Western Infirmary, but took fright, and ran away after only two days' residence, and before any detailed note was taken of his case. He died suddenly when at stool, on 2nd September of this year, fourteen months from the time he first noticed the glands in the armpits enlarging.

"*Post-mortem Examination thirty-six hours after Death.*—Rigor mortis well marked. Body much emaciated, but front of chest apparently unduly prominent considering the general emaciation. Skin everywhere dull-yellowish in colour. Œdema of scrotum, and penis, and left side of face; enormous œdema of left arm, fore-arm, and hand. On making the skin incision in the middle line, there was found over the whole sternum and costal cartilages a thick, hard, cartilaginous plate of glandular tissue, adhering very closely to the bone, but not to the superjacent skin. In the middle line this mass was cut with some difficulty; it was about $1\frac{1}{2}$ inch thick, and gradually thinned off towards the sides of the chest. Enormous glandular masses, of the same hard, almost cartilaginous consistence, were found in both axillæ, close under the anterior folds, and running under the pectoral muscles. Similar dense masses were seen over both clavicles, running up along the cervical vessels. No enlarged glands in the groin, or in any part of lower half of body. The sternum was raised with difficulty on account of its close attachment to the growth underneath, to which, just as to the growth on its outer surface, it was very closely adherent.

A large dense mass was found filling the anterior and posterior mediastinum, and enveloping the heart, which was lodged in a cavity on the left side of the growth. The left pleural cavity was quite full of clear straw-coloured fluid, while the entire left lung was collapsed and compressed against the spine and against the tumour. The right lung was universally adherent, but still crepitant. Liver and kidneys normal. Spleen not enlarged, but apparently firmer in texture than normal. There was not a trace of enlargement of the mesenteric glands, a fact which was very striking when contrasted with the enormous enlargement of the glands within and without the upper half of the body. The mass was removed from the chest, and included trachea, large vessels, heart, left lung, and part of right lung. A portion of spleen was also removed."

Dr. Alex. Napier sent the mediastinal mass to me for detailed examination and dissection, and I shall now describe the results of my dissection.

The specimen consists of the tumour, the anterior wall of the pericardium, the heart, the arch of the aorta, the bifurcation of the trachea, about 6 inches of the gullet, the whole of the left lung, and a very thin portion of the right lung, adherent to the tumour. The growth lies in front of all these structures, is firmly adherent to the anterior pericardial wall, and is of a dense, tough, white, fibrous-looking structure. It is somewhat quadrate in shape, measuring in vertical diameter, after hardening in spirit, about 8½ inches, and in breadth 5 inches; the average antero-posterior thickness is about 2½ inches. At the upper right hand corner, and at the lower left hand corner, are two nodulated projections from the main mass of the tumour. The upper of these, on section, is seen to be pigmented, and of a softer, more encephaloid character than the rest of the tumour tissue—conditions which rather suggest the possibility of the mass having originated in one of the bronchial lymphatic glands. Below the level of the bifurcation of the trachea the main bulk of the tumour is firmly adherent to the pericardium, but it is found that this membrane can, when

considerable force is used, be stripped in its entirety from the posterior wall of the growth, showing that the tumour tissue has not incorporated the pericardial tissue. The gullet is quite behind the mass of the tumour, and is not involved in it. The trachea, however, all except its posterior wall, is encased by tumour, and the arch of the aorta channels its way right through the upper portion of the growth, being surrounded by it on all sides. The superior vena cava, and other great veins at the root of the neck, are also completely surrounded by the tissue of the growth. A dissection of the specimen has been made which displays these relationships, and it is found that all the structures at the root of the neck, though very closely applied to the tumour, can be dissected away from it—*i. e.*, they have not been incorporated, but merely surrounded and closely embraced by the tumour. There is no trace of pericarditis, the interior of the membrane being quite smooth and shining. On slitting up the superior vena cava, what looks like an ingrowth of the tumour into its lumen is discovered. This is situated on that portion of the vessel which tunnels through the growth; the projection is a flat area with irregular rounded margins, measuring about a square inch, and elevated about one-eighth or one-twelfth of an inch above the surrounding surface. The greater part of the wall of the vena cava, even at the site of the apparent ingrowth, can, with care, be dissected from the morbid tissue. The heart, so far as can be satisfactorily made out without separating it from its relationships to the tumour, presents some thickening and contraction of the mitral curtains. The left lung is collapsed.

On microscopic examination the tumour presents appearances which, having regard to histological structure alone, may be designated those of fibroma or fibro-sarcoma—*i. e.*, a pretty abundant fibrous basis with very numerous round and spindle-shaped cells, these being in far greater abundance than would be the case in a hard fibroma pure and simple. The characters are not those of a lympho-sarcoma or lymphoma, and the macroscopic characters noted above are in favour of this statement as to the structure of the tumour. Numerous

sections of thin-walled blood-vessels are observed in the microscopic specimens. I thought that the term "fibro-cellular" (not using the words in the strict and limited sense of Paget in speaking of the fibro-cellular tumour) indicated very well the nature of the microscopic characters.

A careful microscopic examination of sections of the wall of the vena cava superior, at the site of the apparent ingrowth, shows no trace of tumour tissue in the substance of the vein wall, and the appearances are rather those of a thickened internal coat. This examination, taken along with the fact that the vein, even at the site of the projection, could be dissected from the tumour in its entirety, negatives the idea of an ingrowth of tumour tissue. The remarkable features about the tumour are mainly these, most of which have been brought out in the course of the report:—(1) The peculiar way in which the growth has embraced without incorporating any of the normal structures and organs; (2) the exceedingly tough, dense, and fibrous structure of the tumour, almost resembling in section the appearances presented by a myoma of the uterus; (3) the strict limitation of the new growth to the anterior mediastinum and region behind the sternum, and its association, according to the *post-mortem* report of Dr. Napier, with a similar mass of dense fibrous-like tissue in front of the sternum, and in the neck.

It will at once be granted that there are many obscure points in the pathology of this case; but, on a consideration of the whole phenomena, it seems justifiable to regard it as an example of a fibrous tissue tumour of the mediastinum. As was to be expected from the clinical history and the pathological details, the question of Hodgkin's disease was at once raised and discussed when the specimens were presented by Dr. Napier and myself for the consideration of the Members of the Glasgow Pathological and Clinical Society. There seems, however, to be but little reason for considering it as an example of this affection, and that it was not a typical example of Hodgkin's disease was admitted even by those most inclined to favour this opinion as to its nature. The

absence of any affection of the spleen, the fact that there was no enlargement of the glands in the groin, in the abdomen, or in any part of the lower half of the body, and the circumstance that the numerous nodules scattered over the front of the chest were not likely to be glandular from their anatomical situation, are circumstances not at all in keeping with the theory of Hodgkin's disease.

In the next place, the question of connective tissue hyperplasia has to be considered in connection with the pathology of this case. The term "malignant fibrosis" indicates very well the general nature of the case as brought out in the foregoing description, and from this point of view many of the phenomena are analogous to certain of the morbid changes observed in cases of scleroderma and allied conditions of the connective tissues. We are thus led to consider the etiological significance of the strongly marked rheumatic diathesis, which existed in this case. It is now very well known that the development of subcutaneous nodules, especially in connection with the tendons, is a common manifestation of the rheumatic state, and for one of the best clinical accounts of this condition we are indebted to Dr. W. B. Cheadle of the Great Ormond Street Hospital for Children.* Such nodules occur much more frequently in children than in adults. Dr. Cheadle has only seen two cases in adults, and a third has been recently reported by Dr. George S. Middleton of Glasgow.† The characters of the nodules are well described in the following sentences from Dr. Cheadle's Harveian lectures:—"Once I have seen them the size of almonds studded over the flexor tendons on the palms of the hands, and once in great numbers over the tendinous structures of the intercostals, on the front and sides of the thorax. There may be only one of these nodules, but more usually three or four are to be found; sometimes the number is large, as many as thirty or forty. I have counted thirty-five at one time. . . . Their duration varies from a few days to several months. The shortest time I have

* *The Various Manifestations of the Rheumatic State as Exemplified in Childhood and Early Life* (London, 1889), p. 68 *et seq.*

† *The International Medical Journal*, 1887.

noted is fourteen days, but Dr. Barlow observed one to come and disappear again in three days. . . . When the nodular growths are exposed by dissection they appear as 'oval semi-transparent fibrous bodies, like boiled sago-grains.' Examined microscopically in thin section, they exhibit wavy bands of tissue, with caudate and spindle-shaped cells and abundant nuclear growth, and they are highly vascular. They consist, therefore, of nuclear growth in process of development into fibrous tissue in all stages of transformation." This description of the histology of the nodules agrees very closely with that of the tumour which is at present under consideration.

In another part of his book Dr. Cheadle goes on to show that such fibrous nodules are frequently associated either with pericardial or endocardial inflammation, and that such a combination is, in his opinion, generally of the very gravest import—"almost equivalent to a sentence of death."

Drs. Thomas Barlow and Francis Warner made rheumatic subcutaneous nodules the subject of an important paper read before the Seventh International Medical Congress in London in 1881, and their paper is well worthy the careful study of all interested in this matter.* In reference to the case of mediastinal tumour at present under discussion, the following sentence from the description of one of Dr. Cheadle's cases of rheumatic pericarditis associated with subcutaneous nodules is worthy of being quoted:—"And mark what is found after death: usually the two surfaces of the pericardium glued together by a thick layer of adhesive lymph; the pericardium itself greatly thickened; the walls of the sac tough, dense, fibrous tissue, an eighth of an inch thick, perhaps; the chronic inflammatory process spreading sometimes from the external sac to the anterior mediastinum, so that these are matted together in a thick fibrous mass—'indurative mediastino-pericarditis,' as seen in the specimen from one of these cases now before you."†

I have referred to these rheumatic manifestations at some

* *Transactions of the International Medical Congress* (London, 1881), vol. iv, p. 116.

† *Loc. cit.*, p. 84.

length, because I think they are of importance in the endeavour to trace out the etiology of the rather obscure case of mediastinal tumour, which has just been related. On the whole, I am inclined to regard it as a fibrous tissue tumour of rheumatic origin. Notwithstanding the fact, as pointed out in the report, that at one part the growth looked as if it might have originated in connection with the thoracic lymphatic glands, I am still inclined to think that the starting point of the tumour, both within and without the thorax, was in the connective tissues. The very close relationship of the tumour tissue to the anterior and posterior surfaces of the sternum is in favour of this view, as is also the tolerably definite limitation of the intrathoracic mass to the anterior mediastinum. The association of the tumour, also, with chronic endocarditis of the mitral valve is in favour of this view of its etiology.

It might, of course, be urged that if the opinion as to the rheumatic origin of this mediastinal growth be correct, then it is scarcely logical to classify it as a tumour, in the strict acceptation of the term. Notwithstanding this, however, it is difficult to see how the mass described in the foregoing report could be regarded in any other light than that of a new growth. From what has been written in connection with Case 11, the practical outcome seems to be that, in all cases of fibrous tissue tumour of the mediastinum, the probable relationship of the thoracic lesion to the rheumatic diathesis should be carefully considered in any attempt to unravel the etiology of the condition.

VI.

SPECIFIC NEW GROWTHS OF THE MEDIASTINUM.

IV. **Tubercular and other Specific New Growths of the Mediastinum.**—Tubercular tumours are probably among the most frequent of the tumour formations of the mediastinum, although it is probably not often that they attain to such dimensions as to cause inconvenience from their bulk alone. They may, however, give rise to very serious results in other ways, as shall shortly be pointed out. Occasionally such tubercular formations grow to very large size, and give rise to all the classical physical signs of an intrathoracic solid tumour, as is well illustrated in the example I am about to record. The case occurred in the practice of my friend, Dr. Samuel Johnston Moore of Glasgow, and was seen by Dr. James Finlayson in consultation. I was asked to perform the *post-mortem* examination, and I am indebted to the kindness of Dr. Moore for the notes of the clinical history of the case.

Case 12. *Tubercular Tumour of the Anterior Mediastinum, associated with Tubercular Manifestations in various Glands and with Uterine Myomata; complicated with intense Pruritus, and Swelling of Left Arm resembling Phlegmasia Dolens.*—The following are Dr. Moore's clinical notes:—

"Miss —— was 39 years of age, and still menstruating regularly. When 19 she had suppuration of the cervical glands on the left side, which had left several cicatrices, and she was never in the enjoyment of robust health. Six months

prior to her death she was seized with what she describes as 'intolerable itching all over her body,' and pains in the muscles, which were supposed to be rheumatic in nature. She was advised to go to Buxton, where she remained for some time, taking the baths and waters without advantage. She afterwards went to London, and was under treatment there for the intolerable itching. She came under my care on the 4th October, 1889, and her condition may be described in a few words. The pruritus kept her from sleeping, and her limbs and every part of her body she could reach were severely marked by scratching. On examination, the lungs, heart, and other organs were found normal, and there was no albumen, no sugar, and no bile in the urine; the pulse was regular, and equal on both sides; and on microscopic examination of the blood there was no great excess of the white corpuscles. The temperature was normal. There was an enlarged gland about the size of a pigeon's egg in the infraclavicular space on the right side. On percussion an area of dulness was observable, of about 3½ inches in diameter, under the upper part of the sternum, and extending equally to both sides, but it did not appear in the neck. The case was so interesting and peculiar that I asked Dr. Finlayson to see her with me on 29th and 31st October. The signs of an intrathoracic tumour seemed to us both to be conclusive; and there were absolutely no signs of an aneurismal character. The left arm was at this time much swollen, somewhat resembling the character of the swelling found in the leg in phlegmasia dolens; notwithstanding the swelling, a good sphygmographic tracing was obtained from the left radial artery, which beat as strongly as the right. This swelling lasted for several weeks, but disappeared completely about a week before her death. At the consultation special attention was directed to an examination of the lower part of the right side of the abdomen, on account of pain felt in this region, or rather down the right thigh; but no definite swelling could be felt there. The diagnosis agreed on was:—Tumour in the anterior mediastinum, probably lymphadenoma, with perhaps some similar, but smaller mass, in the abdomen.

"For treatment she had iodide of potassium and arsenic; and the pruritus was much relieved by the use of pine baths and gentle friction when in the bath.

"Before her death the emaciation became extreme, and not only had the swelling of the left arm completely disappeared, but the enlarged gland, also, below the clavicle on the right side disappeared. She died on the 9th December, 1889, having been under my care from the 4th October previous."

Post-mortem Examination.—The following is an account of the autopsy, which, at the request of the physicians in attendance, I performed on the 11th December, 1889.

External Appearances.—The body is much emaciated; the skin is of a dark tawny colour, and somewhat scurfy, but no marks of scratching are observed; no swellings are present on any part of the surface that could be regarded as glandular enlargements.

Chest.—On raising the sternum a large white-coloured tumour, about 4 inches in diameter, is found lying behind the manubrium sterni, and occupying the upper portion of the anterior and middle mediastinum; the tumour is slightly adherent to the sternum, so that in raising this bone two or three little cartilaginous or bony particles are left sticking to its anterior surface. The lungs are quite non-adherent, except for a very few loose bands near the middle portion of the right. All the organs of the chest are removed *en masse*, and are not further dissected at present. A dissection is made beneath the right clavicle, and lying near its outer extremity an enlarged gland, about the size of a large hazel nut, is discovered. A similar dissection is made beneath the left clavicle, but no glands and no abnormality of the subclavian vein are detected. On the left side of the neck, just above the clavicle, depressed white cicatrices in the skin are seen, but a careful search detects no glands. The trachea and larynx are removed and present no abnormality.

Abdomen.—The spleen is normal in size and soft in consistence, and in its substance a few yellowish, slightly caseous, ill defined nodules about the size of small marbles are found. The liver presents normal characters; and the kidneys are

healthy, although the right is perhaps unduly movable from the absence of fat.

A careful search is made on both sides of the pelvis and sacrum, and in front of the vertebræ for enlarged glands, but with the exception of one mass, about the size of a large marble, situated at the brim of the pelvis, and lying close to the iliac artery near its origin, nothing is discovered. On section this mass is found to be a lymphatic gland totally converted into soft chalky material.

The uterus is enlarged, and in its walls are found numerous myomatous tumours varying in size from a green pea to a walnut. From the os uteri a glairy mucus exudes, and on section a considerable amount of fluid blood escapes from the organ.

*Dissection of the Tumour.**—The specimen, as preserved for the Museum, consists of the growth, the heart and pericardium, both lungs, the bifurcation of the trachea, the thoracic œsophagus, the arch of the aorta, and the pneumogastric and phrenic nerves. The tumour lies in the upper part of the anterior and middle mediastinum; in vertical diameter it measures about 4 inches, and in transverse about 3. It is firmly adherent to the anterior margin of the upper lobe of the right lung for a distance of $2\frac{1}{2}$ inches; but on dissection it was found that it can be easily separated from all the other structures, except the innominate veins. Neither the trachea nor the œsophagus is in the least affected by the growth, and on turning these aside it is found that the arch of the aorta and the great vessels can be cleanly dissected from the posterior surface of the tumour, in which distinct grooves marking their position have been left. The right innominate vein and the superior vena cava are firmly adherent to its posterior surface, along their anterior and left aspects. The left innominate vein passes right through the substance of the tumour at a considerable depth from its sternal aspect, and a piece of coloured glass rod has been introduced, which easily enters the superior vena cava. The pericardium is not in the least affected by the tumour, there

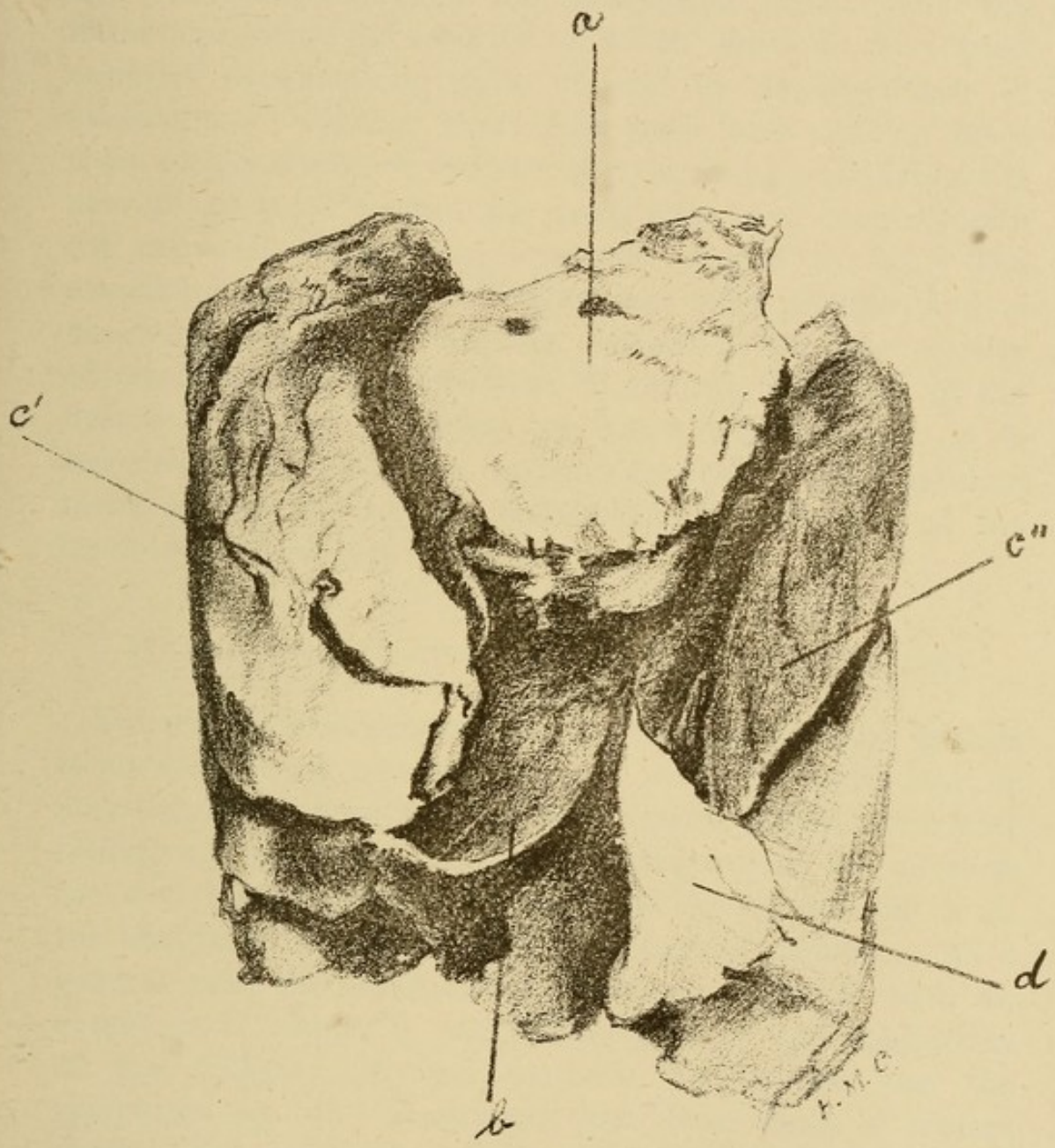
* Glasgow Royal Infirmary Museum, Series X, 234 B.

being no trace of pericarditis; the heart is highly fatty, the external adipose tissue being greatly increased in amount.

Posteriorly, the parts brought into view are the descending aorta, the œsophagus, the trachea, and both pneumogastric nerves, with the œsophageal plexus. The interior of the tumour was exposed by a longitudinal incision parallel to the plane of the anterior and posterior surfaces. The cut surface is seen to be coarsely fibrous, with here and there rounded areas of caseation. At one point, near the upper extremity of the growth, the caseous change has gone on almost to the formation of an abscess cavity—the softened tissue having a green-coloured, purulent appearance.

The naked eye characters are quite indicative of a chronic tuberculosis of the thoracic glands, an opinion which is borne out by the histological appearances revealed by microscopic examination of sections of the tumour. On microscopic examination of the spleen, rounded nodules, composed of small cells, and having the characters of tubercles grouped together, are seen. The round-celled nodules are surrounded by masses of brown coloured pigment. The gland removed from beneath the clavicle presents for the most part a fibrous structure, with here and there groups of round cells, sometimes showing a tendency to caseation. A search for the tubercle bacillus in the primary tumour was not successful; but, in the presence of the macroscopic and microscopic characters, and having regard to the manifestations of tubercular disease in other parts, there could be little doubt of the tubercular nature of the mediastinal mass. The enlarged gland in the abdomen, which had undergone calcareous change, was in all respects similar to what is frequently seen in healed mesenteric tubercle; and the cicatrices in the neck had all the characters of those resulting from strumous disease of the cervical glands. Around the numerous areas of caseous softening in the substance of the tumour the tissue had a dense and tough fibrous character, as if the tuberculosis had induced a fibroid, as well as a caseous, process.

The chief point of interest in this case is the very severe itching to which the patient was subject for six months



Case 12. TUBERCULAR TUMOUR OF THE ANTERIOR MEDIASTINUM.

a. Tumour.

b. Heart with Right Ventricle laid open.

c^{I}, c^{II}. Right and Left Lungs.

d. Anterior layer of Pericardium turned to the left.

before her death. I have often wondered if there could be any connection between the mediastinal tumour and the intense pruritus, the severity of which seems to have been regarded as something quite unusual by the physicians in attendance. Whether there may have been nothing more than a coincidence, or whether the tumour, by involving the nervous plexuses within the chest, may have been directly the cause of the itching, I cannot pretend to say. The association of the two conditions was very peculiar, and is deserving of record. Another element in the case worthy of comment was the presence of multiple myomata of the uterus. This is a feature of some interest when it is associated with the great tendency to fibrous tissue development around the caseous nodules in the substance of the intra-thoracic tumour.

Tuberculosis of the Tracheo-Bronchial Glands.

Tubercular enlargement of the tracheo-bronchial glands is an exceedingly common affection in children, and may, or may not, in the first instance, be associated with a tubercular condition of the lungs. The chief phenomena of this affection are well known, and are to be found fully discussed in all the standard textbooks on the diseases of children. As a general rule, the enlargement does not go on to such an extent as to render it easily detectable by the application of the ordinary physical methods during life, but the symptoms are well recognised, and from these a correct clinical diagnosis is frequently possible. Among the chief of the symptoms are attacks of an asthmatic nature, hoarseness of the voice, and paroxysmal cough. The asthma may be due either to pressure upon the nerves or to obstructive pressure on the trachea or main bronchial stems, and in the last case the respiratory distress is mainly during the expiration. Dr. Eustace Smith has described a physical sign which may often lead to the diagnosis of this condition in its early stages.* When the glands are enlarged, if the

* *On Disease in Children* (London, 1884), p. 183.

child be directed to bend the head backwards so that the face looks towards the ceiling, a venous hum may be heard on the application of the stethoscope over the manubrium sterni, which disappears as the head is brought forward. This sign is developed by the enlarged glands being carried forward by the lower end of the trachea and pressing upon the left innominate vein, and it only takes place when the bifurcation of the trachea is freely movable. It is unnecessary to dwell further upon the signs and symptoms of this affection of the glands, as they are fully described in such works as those of Eustace Smith and Ashby and Wright.

It is important, however, to bear in mind the serious complications to which such affections of the bronchial glands may give rise. Pathologists are quite familiar with them in the *post-mortem* examination of adults, and they are frequently found to be responsible for the production both of local tubercular lesions in the lungs and of acute miliary tuberculosis. From the close relationship which the affected glands bear to the main branches of the pulmonary blood-vessels arises the fact that they frequently give rise to disseminated miliary tuberculosis by the direct entrance of the tubercular virus into the blood.* Cases are on record, and I have myself seen such, where a caseating tubercular gland has perforated the wall of one of these vessels, the morbid tissue thus projecting into the blood stream and sowing the virus broadcast.

By perforating the bronchial wall, such infective glandular tumours may produce the most intense localised tubercular processes in the lungs, the infective material being sucked into the lung by the inspiration. In the case of children, such a perforation of the main bronchi has given rise to severe and even fatal suffocative symptoms. These serious results are so well known to hospital physicians and pathologists, that it is unnecessary at present to cite cases illustrating them in detail; but I may briefly refer to a quite recent case of my

* Coats, *loc. cit.*, p. 208; Weigert, *Virchow's Archives*, vol. lxxvii; and *Deutsch. Med. Woch.*, 1883 and 1885.

own as an example.* The patient was admitted to the wards of the Glasgow Royal Infirmary, suffering from the signs and symptoms of dry pleurisy in the right side. While in the ward he developed symptoms of very acute tuberculosis, and died. At the *post-mortem*, widely generalised acute miliary tuberculosis of a very intense kind, and a limited area of very acute caseous pneumonia at the base of the right lung, were discovered. The bronchial glands were much enlarged, and highly caseous; and scrapings from them were found to be teeming with tubercle bacilli. They were closely related and adherent to the walls of the great pulmonary vessels, and although no actual point of perforation could be discovered, there was no doubt as to this having been the cause of the acute miliary tuberculosis. On examining the bronchus going to the patch of acute catarrhal pneumonia, a small ulcer on its mucous surface was found, the floor of which was formed by the exposed tissue of one of the suppurating glands, a morbid feature which at once fully explained the local pulmonary condition. This was the second autopsy on the same morning in which a disseminated miliary tuberculosis was found to be associated with marked enlargement and tubercular caseation of the bronchial glands.

Syphilitic Formations.

I have myself had no experience of syphilitic tumours of the mediastinum, but there is no reason why this region of the body should be exempt more than any other from this form of disease. When syphilitic formations arise in the mediastinum, they are very likely to originate in connection with the bony structures of the thorax, and from these to extend into the thoracic cavity. In this connection, a specimen of gummatous disease of the manubrium sterni preserved in the Glasgow Royal Infirmary Museum is of considerable interest, as illustrating the mode in which

* Pathological Reports, Glasgow Royal Infirmary, No. 341, 17th June, 1891.

syphilitic tumours of the mediastinum may arise.* The specimen shows very considerable enlargement of the manubrium sterni due to the syphilitic process, and the tumour of the bone has encroached for a good distance upon the space of the anterior mediastinum, as the swelling projects more from the internal than the external surface of the sternum. The patient, a labourer aged 49, also suffered from gummatous disease of the first, second, and third cervical vertebræ, which had given rise to wide-spread paralysis. There was a very clear clinical history of syphilis. This is the only case which I have personally met with that bears upon the subject of syphilitic mediastinal tumours.

* Glasgow Royal Infirmary Museum, Series II, 59 A and 28 A.

VII.

MISCELLANEOUS TUMOURS.

V. **Miscellaneous Tumours of the Mediastinum.**—In the preceding sections have been discussed the tumours which are most frequently met with in the mediastinum. The present section, although it cannot be regarded as either a scientific or a logical sub-division of the subject, has been thought necessary in order that a brief reference might be made to those forms of mediastinal new-growth which could not be included under any of the foregoing sub-divisions. Although, in the course of my own pathological experience, I have not met with any examples of intrathoracic tumours differing from those varieties already described, yet some other forms of mediastinal new-growth have been recorded. Dr. Norman Dalton has recorded a case of enchondroma of the lung (right) and lymphatic glands of the mediastinum.* The patient was a man aged 44, who suffered from pain in the right side and arm. Enlargement of the glands above the right clavicle set in. The right arm became œdematous, and then thrombosis of the right external jugular vein occurred, to be followed by a similar condition in the left. The patient died comatose. At the *post-mortem* the mediastinal glands were found to be greatly enlarged, and closely involving the veins. In the anterior border of the upper lobe of the right lung there was a tumour the size of an apricot. On microscopic examination hyaline cartilage was found at the edge of the tumour, and

* *Pathological Transactions*, 1884, vol. xxxv, p. 82.

developing in the walls of the air vesicles. The microscopic structure of the enlarged glands was similar to that of the external portion of the pulmonary tumour, which was found to be composed of fibro-cartilage.

Examples of teratoma have also been described as occurring in the mediastinum, and a typical case was recorded by Dr. James Gordon in 1825.* The patient was a stout young woman aged 21, who was first seen on account of the symptoms of pneumonia, and a "convulsive and suffocating" cough. In the course of a month or two a tumour developed beneath the sternal extremity of the left clavicle, which was supposed to be aneurismal on account of its pulsating strongly and regularly. The swelling slowly enlarged, and in the long run burst, nothing but a little serum escaping. This was followed by a period of good health, but some time afterwards the patient succumbed to an indefinite feverish attack. After death the tumour was found to be pretty firmly adherent to the sternum, and to have enveloped very closely, by means of the connective tissue around it, the innominate artery. The mass contained sebaceous matter, hair, teeth, and a fragment of bone closely resembling the superior maxilla. The nature of the growth at once became apparent.

It is also quite conceivable that primary tumours, originating in connection with the ribs, the bodies of the vertebræ, or the sternum, may grow in such a manner as to involve the mediastinum, and thus give rise to many of the signs and symptoms of primary solid growths of that region.

It has been pointed out that tubercular enlargement of the mediastinal glands is an exceedingly frequent form of disease. It is also within my experience that these glands may undergo very considerable simple enlargement, so as at the time of the *post-mortem* examination to form tumours of some size. In cases of severe acute pericarditis, with much fibrinous and serous exudation, it is not at all uncommon to find a marked enlargement of the lymphatic glands in the neighbourhood of the base of the heart. About two years ago I met with a very striking example of mediastinal gland enlargement,

* *Medico-Chirurgical Transactions*, vol. xiii, part i.

associated with severe fibrinous pericarditis, the specimen having been preserved in the Glasgow Royal Infirmary Museum. In this case, however, it may be doubted whether the enlargement of the glands was altogether simple and non-specific, for the following reasons:—The patient, an elderly seafaring man, was under my care in Ward III of the Glasgow Royal Infirmary, and he seemed to be at one and the same time the subject of the malarial, the tubercular, and the syphilitic diathesis. The ague was proved *post-mortem* by the enlargement of, and the pigmentary changes in, the spleen; the pericarditis looked quite simple to the naked eye, but on histological investigation miliary tubercles were discovered in the inflamed membrane, and, on staining with the Ziehl-Neelsen fluid, tubercular bacilli were seen in some of the tubercles; in the liver were nodules presenting all the characters, naked eye and microscopic, of gummata. The glandular enlargement, therefore, in this case may not have been quite simple, but there can be no doubt that in cases of simple pericarditis a pure irritative swelling of the mediastinal glands does occur.

VIII.

DIAGNOSIS AND TREATMENT.

In the foregoing sections of this essay I have described in some detail the more common varieties of new growth that are likely to occur in the mediastinum, and it now remains to sum up what has been written by making a few remarks upon diagnosis and treatment.

In the diagnosis of mediastinal tumours, as I have already pointed out, nothing helps us more than an intimate knowledge of their pathological anatomy. In the detection of solid growths within the chest the careful study of the pathological anatomy is quite as important as the determination of the physical signs; and it is to the demonstration of the assistance afforded us by the study and investigation of the former, rather than of the latter, that I mean chiefly to address myself in the remarks upon diagnosis. As the physical signs are the direct result of the anatomical changes produced, it naturally follows that, given an intimate knowledge of these changes, the physical signs can be thoroughly understood and, to a certain extent, anticipated. I shall, therefore, not deal with the physical signs *per se*, but with the physical changes in structure giving rise to them.

The establishment of the diagnosis of intra-thoracic solid tumours naturally resolves itself into two parts—

(1) The determination of the presence of a solid tumour in the chest;

(2) The determination of the variety of tumour which is present.

In the first place, the solid tumour has to be distinguished from other morbid conditions within the chest, which may give rise to similar signs and symptoms. Roughly speaking, the physical changes induced by the development of a solid tumour in the mediastinum, which are available for diagnostic purposes, arise from the effects of pressure, and these effects are of two kinds—

(1) Pressure effects pure and simple;

(2) Pressure effects accompanied by structural alterations in the neighbouring tissues set up by the vital action of the tumour.

It is necessary to distinguish between these two conditions, because by strict attention to the points of difference we are aided in our efforts to differentiate the various morbid states giving rise to them. Pressure effects pure and simple may occur without any marked reactionary alteration in the neighbouring tissues other than simple atrophy, and they may be caused by other morbid states than the formation of a solid tumour. Thus, an aneurism or a benign growth of the mediastinum (*e.g.*, the rounded spindle-celled tumours met with in children, see page 31) may in the process of growth do nothing more than cause simple atrophy of the neighbouring structures, with, of course, the resulting functional defects. Malignant sarcomatous growths, upon the other hand, produce changes in the neighbouring tissues, which cannot be regarded as the mere effects of pressure alone, but which are due quite as much to the characteristic infiltrating action of the primary growth. From this cause the second variety of pressure effects are more serious and more constantly present than the former, the pernicious effects of which are, to a certain extent, dependent upon more or less accidental external and internal circumstances. An aneurism or a benign solid tumour will only give rise to pressure effects when it has attained a certain size, or when the pressure can be applied in such a manner as to develop the signs by which the fact of injurious pressure can be recognised. Thus, an aneurism of the transverse portion of the aortic arch, from its anatomical situation, and from the close

packing together of important structures within a small bony circle, is much more likely to cause alarming pressure effects than one of any other portion. Varicosity of veins and localised œdema are relatively rare in cases of aneurism, because the veins, though pressed upon and dislocated, are not very likely to be crushed against resistant points, and so the blood still circulates through them.

Pressure effects of the second variety are not necessarily dependent upon the size or anatomical situation of the growth, and this is the reason why the signs of pressure are relatively more numerous and more frequent in cases of malignant intra-thoracic tumour. In addition to mere pressure a cancer or a sarcoma has a disintegrating and an irritative action on the tissues in its neighbourhood. In the case of the mediastinum veins are narrowed and their walls incorporated, bronchial tubes are perforated and obstructed, and nervous trunks are not pushed aside, stretched, or pressed upon, but are buried in the substance of the malignant mass. The irritative effects of a growing malignant mass have in the foregoing pages been well illustrated by the pleurisy, pericarditis, and pneumonia which were frequently found to have been set up in the neighbourhood of the tumour.

By bearing such general principles in mind we may often be able to judge of the kind of pressure which is being effected within the chest—whether a simple pressure, or one accompanied by tissue change around the seat of disease. Generally, too, the pressure effects of solid tumours within the chest are more numerous than those, for example, of aneurism. In aneurism we can often demonstrate only one pressure effect —*e. g.*, recurrent nerve pressure—whereas in solid growths we often have a large number—*e. g.*, localised œdema, varicosity, dyspnœa, obstructed bronchi, hoarseness, &c., in one and the same case. In this way it is seen, then, that a careful study of the pathological anatomy of mediastinal tumours aids all our efforts at rational diagnosis, and affords a lucid explanation of the physical conditions made out on examination. After what has already been written it is quite unnecessary to discuss the physical signs and changes caused by the

growth of intra-thoracic solid tumours in detail; but, before leaving the matter of general diagnosis, I should like to refer very briefly to one or two specially useful diagnostic points:—

(1) *The development of fulness and nodular or glandular projections beneath the clavicles and in the neck.*—Such developments are specially characteristic of the presence of lympho-sarcomatous formations; and in the investigation of all such cases should be carefully sought for. In Cases 1, 2, and 5, distinct evidence of this kind was obtainable; in Case 4 the *post-mortem* condition would have suggested that, possibly, some fulness might have been made out before death. In Dr. Macintyre's case, referred to at page 36, there was strong evidence in support of the opinion that the tumour had extended up from the mediastinum into the posterior triangle of the neck.

(2) *The development of secondary nodules.*—This is a condition of great diagnostic importance, and may occur both in case of cancerous and sarcomatous formations within the chest. Thus, in Cases 1 and 2 of lympho-sarcoma, there were nodular swellings over the right angle of the lower jaw and over the scapula respectively, each of which, I have no doubt, was a secondary growth. In Case 2, the liver was found to be studded with secondary nodules presenting the same characters as the primary thoracic growth. In the case of primary mediastinal cancer described at page 52, there were two very typical secondary subcutaneous nodules which I have already commented upon (page 56). Glandular enlargements may also be met with in tubercular formations within the chest (see Dr. Moore's case, page 76), and it is interesting to note that, as in this case, such enlargements may entirely disappear after death, a circumstance not likely to happen to a malignant nodule.

(3) *Spasmodic asthma, and paralysis of the vocal cords.*—Spasmodic attacks of dyspnœa are very common in cases of glandular enlargement within the chest, and this symptom has been probably sufficiently discussed at pages 35 and 36. I would like, however, again to insist upon the fact of spasmodic asthma—*i. e.*, spasm of the whole bronchi rather

than of the vocal cords—as a symptom very specially indicative of the presence of a malignant growth within the chest.

(4) *Local œdema and local venous varicosity.*—These symptoms need no further elucidation. It is necessary, however, to mention that both may entirely disappear before death, and may not be discoverable at the *post-mortem* examination. The disappearance of local œdema was well illustrated in Drs. Moore and Finlayson's case of tubercular mediastinum (see page 78); and I have recently had a case of intra-thoracic lympho-sarcoma, where a well marked varicosity of the superficial subcutaneous veins was present during life, and entirely disappeared after death.

Of the differential diagnosis between mediastinal tumour and pleurisy with effusion, it is unnecessary at present to say more than that, so far as the physical signs are concerned, the resemblance between the two conditions may be exceedingly close—a resemblance which may be enhanced by the fact that both conditions may be present in the same case. This circumstance is well illustrated in Case 2, and it is only by not trusting too implicitly to the physical signs, and by giving every heed to the general principles enunciated above, that we are in some cases enabled to arrive at an accurate diagnosis.

The present state of our pathological and clinical knowledge, however, permits of our going a step further. Not only should we be able to diagnose clinically the presence of a solid tumour within the chest, but we should also be able to arrive at a tolerably clear idea of the kind of solid tumour with which we are dealing. I quite agree with Letulle, who in a clinical lecture delivered in the Hôtel Dieu, and published in *La Semaine Médicale* for 18th September, 1889, stated that he believed it possible nosologically to classify cases of primitive tumour of the mediastinum under observation during life.* Here, again, it is by careful discrimination of the pathology of the affection, and not by a mere investigation of the physical signs, that we must proceed. In the first place, we must get rid of the notion that the majority of

* *Annual of the Universal Medical Sciences*, 1890, vol. iii, B-14.

mediastinal sarcomatous tumours are related to lymph-adenoma or Hodgkin's disease. I have already written at sufficient length upon this matter (see pages 9-12). Again, the result of our previous study of mediastinal tumours has been to convince us that by far the largest proportion of primitive mediastinal tumours are lympho-sarcomata, a circumstance not to be forgotten in the determination of the variety of tumour with which we may be dealing.

As regards the differential diagnosis between sarcomatous and cancerous tumours of the mediastinum, there are several points, which have already been illustrated in the accounts of cases, and which may help a good deal in the distinction. As a general rule lympho-sarcomatous growths are large bulky tumours, often giving rise to very definite physical signs, and causing multiple pressure effects, which there is usually little difficulty in recognising. Such tumours also very readily grow towards the front of the chest. Primary cancers of the mediastinum, on the other hand, are usually smaller and more limited tumours, and in respect of their individual size or bulk are often incapable of giving rise to physical signs capable of detection. Primary cancerous growths, as has been pointed out, originate almost always in the posterior mediastinum, and as they are specially liable to break down by ulceration, it is possible that evidence of their presence might be obtained by microscopical examination of the sputum. With the exception of malignant stricture of the œsophagus, primary carcinoma of the mediastinum is frequently very difficult of diagnosis, and is probably most likely to be mistaken for phthisis pulmonalis. This was so in the case reported at page 52, and a similar diagnosis was also made in a case of carcinoma of the mediastinum in a young woman aged 27, reported by Lissier in the *Bulletin de la Société Anatomique* for 20th December, 1889.* It is to be remembered also that even in cancerous strictures of the gullet pressure symptoms may sometimes be met with. In this regard an important paper by Drs. James Finlayson and Joseph Coats may be referred to, in which a case is recorded

* *Annual of the Universal Medical Sciences*, 1891, vol. i, A-51.

where a cancerous tumour of the œsophagus caused paralysis of the left vocal cord.* To this paper Dr. John Macintyre contributes an important note, in which he gives a full account of the literature bearing upon laryngeal paralysis as a symptom of œsophageal cancer. It is essential, then, that such a combination should always be borne in mind in every attempt to arrive at a diagnosis of mediastinal cancer. Cancerous tumours within the chest are also prone to metastasis, and the significance of this as a diagnostic feature should also be kept in view. In the case recorded at page 52 there were two secondary metastatic tumours, and in Dr. Finlayson's case just referred to there was a tumour in the body of the twelfth dorsal vertebra, which during life had given rise to an inexplicable pain in the abdomen.

It is quite unnecessary to refer at any length to the differential diagnosis of fibromata and tubercular new-growths of the mediastinum. What has already been written with regard to the possible association of the former with the rheumatic diathesis should help us in arriving at an opinion as to whether we have to deal with a fibrous tissue new-growth within the chest; and the association with multiple subcutaneous fibrous nodules should by no means be forgotten. Tuberculosis of the bronchial glands in children is a disease quite within the reach of diagnosis during life; but, as the features which lead us to an accurate opinion have already been sufficiently adverted to, and as they are to be found in detail in all the good text-books on children's diseases, it is unnecessary to allude again to them here. Some difficulty, however, might be experienced in forming an opinion as to the nature of a tubercular tumour like that described at page 76, and under such circumstances the symptoms and signs might readily enough be regarded as pointing to the presence of a lympho-sarcomatous tumour. Under such circumstances I would urge the necessity of giving due weight to the other manifestations which the patient may present of the tubercular disease. Due and judicious importance should be attached to all the signs of the tubercular tendency

* *Glasgow Medical Journal*, September, 1890, vol. xxxiv, p. 161.

in dealing with any intra-thoracic tumour, as to whose real nature we are in some doubt.

With regard to the differential diagnosis of the forms of new-growth which may attack the mediastinum, but which are on the whole rare in occurrence as compared with those varieties already discussed, I feel that very little can be said. In the case of the more ordinary varieties of tumour formation being excluded, one cannot do more than attempt to arrive at a correct conclusion by the careful consideration in detail of all the clinical and pathological features of the individual case. Thus, there are well known special features about such affections as hydatid disease and teratomatous tumours, which might be made use of in attempts at differential diagnosis, and it is necessary to do no more than to mention this in order to indicate the lines along which such efforts should proceed. With regard to syphilitic tumours in the chest we have seen that they are most likely to originate in connection with the bony structures of the thorax (page 83), particularly the sternum, and this circumstance, along with a careful search for other syphilitic manifestations, should always be carefully taken into account in considering the question of diagnosis.

The prognosis of mediastinal tumour is almost always very grave, even in the case of those varieties in which a possibility of ultimate recovery might perhaps be looked for. Tubercular, syphilitic, and hydatid disease constitute a series of affections in which recovery may not unreasonably be hoped for; but, when they affect the mediastinum, the proximity to important structures renders the prognosis exceedingly grave even with regard to them. In the case of malignant disease the outlook is hopeless.

Concerning the treatment of mediastinal tumours there is unfortunately little to be said. As in my previous remarks I have endeavoured to show that all sound diagnosis of these very serious affections must rest upon a clear and practical knowledge of their pathology, so also it is right to make it plain that all rational treatment must be established on a

similar foundation. The treatment of malignant disease is always a hopeless thing, and it must be especially hopeless when the seat of the disease is so inaccessible as the interior of the thorax. Modern surgery can sometimes attack, with more or less success, the malignant disease of the abdomen, but I do not think that it has yet affected anything against that of the mediastinum. Medical treatment of these formidable affections has been no more successful, and all that the physician can accomplish is simply to alleviate symptoms and complications as they arise. One of the most disagreeable symptoms met with, in the course of malignant disease of chest, are the suffocative paroxysms which are apt to arise from nerve pressure, particularly in cases where the tumour spreads up into the root of the neck, and involves the pneumogastric trunk, as in those referred to at page 36. The important practical point to remember with regard to tracheotomy is that it can only be expected to give relief if the distress chiefly arises from spasmodic closure of the glottis. Unfortunately, as we have seen, the laryngeal spasm, in many cases, is associated with very decided bronchial spasm as well, and if the latter symptom be at all severe, it will practically undo any good in the way of temporary relief that might otherwise arise from tracheotomy.

In cases where the tumour has caused a large quantity of fluid to be effused either into the pleura or the pericardium, relief may be afforded by the operation of tapping the chest. In a case of secondary cancer within the thorax following the removal of a scirrhus of the mamma, I have seen marked temporary relief from this procedure; and, as has already been pointed out, paracentesis thoracis may often be of service from the point of view of diagnosis, as in cases of mediastinal malignant disease the fluid withdrawn is frequently bloody. Often, however, the fibrinous element may so predominate in the pleural and pericardial exudations in such cases, that the operation of paracentesis is rendered of little service either for diagnosis or treatment.

Local œdema of the upper extremities may possibly be relieved by the very careful and accurate application of a

soft flannel bandage from the fingers to the shoulders. Considering the very obvious mechanical cause of the œdema, and the very slight possibility of our being able to remove the cause, attempts to relieve the swelling by punctures or by the use of Southey's trocars should not be made, except as a last resort in cases where there is a risk of the skin giving way. Cough, dyspnœa, restlessness, and pain must be treated on general principles.

In cases of fibrous disease of the mediastinum, like that recorded at page 68, in which it is possible that the mediastinal lesion may be associated with and dependent upon the rheumatic diathesis, a carefully regulated course of anti-rheumatic medicines might at least be tried. Such treatment might possibly have the effect of arresting the course of the connective tissue hyperplasia, if it did nothing more. The fact that subcutaneous rheumatic fibrous nodules do disappear, and sometimes with very remarkable rapidity, is, so far as it goes, encouraging, but against this we must place Dr. Cheadle's opinion that an abundant eruption of such nodules is of very serious and even fatal import, at least in the case of children. It is possible, however, that in the case of adults such an opinion might require modification.

It is quite unnecessary to speak in detail of the general principles involved in the treatment of tubercular affections of the mediastinum, as the same rules must be followed out here as in dealing with the other varieties of tuberculosis. It is essential, however, if one is satisfied of the presence of tubercular glands or of a tubercular tumour within the chest, to pursue the constitutional and hygienic treatment of the case with the most unremitting zeal; for, as has been shown, a tubercular nodule may at any moment ulcerate its way into a bronchus or a blood-vessel with the most disastrous results. That tuberculosis of the mediastinal glands is capable of cure is a fact with which everyone, who has had much experience of *post-mortem* work, is perfectly familiar. As a general rule, tuberculosis of the bronchial glands is quite removed from local treatment, but occasionally an abscess pointing at the surface of the chest may form and be amenable

to surgical treatment. "In other instances," say Ashby and Wright, "the glands may form an abscess which points in one of the intercostal spaces close to the sternum, as in a case under the care of Dr. Eustace Smith, or may open into the œsophagus. In one of our own cases a mediastinal abscess pointed near the left edge of the sternum, low down."* The possibility of such an occurrence should, of course, be borne in mind.

Syphilitic affections of the mediastinum may be treated with very reasonable hope of cure according to the ordinary rules; and I know of one case of syphilitic disease of the lymphatic glands, presenting many of the classical clinical features of Hodgkin's disease, that completely recovered under a prolonged course of iodide of potassium.

In conclusion, however, it must be admitted that in the majority of cases the treatment of the tumour formations of the mediastinum is very hopeless; and in what has been said, I have simply endeavoured to suggest a few principles which I trust may be of service to the practitioner when called upon to deal with individual cases of this very formidable disease.

* *The Diseases of Children, Medical and Surgical* (London, 1889), p. 204.

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