left arytenoid cartilage, however, moves perfectly well. The present condition of the larynx is very faithfully represented by the second sketch, for which I am indebted to Mr. E. Waggett. The patient's voice is quite natural, and she can even sing.

Of the tumour, which is shown in natural size in Fig. 3,

Fig. 3.—The tumour after removal, natural size, reconstructed. The piece on the right-hand side lay outside the larynx; the upper transverse piece, connected with the former by a long pedicle, caused the swelling of the epiglottis; the piece below this occupied the left arytaeno-epiglottidean fold.

Mr. S. G. Shattock, F.R.C.S., kindly gives the following description:

"A TUMOUR OF COMPLEX FORM REMOVED IN THREE PORTIONS.*"

"The smallest elongated piece, mounted on the right hand side of the preparation, lay on the thyro-hyoid membrane through which the narrow anterior end passed so as to be continuous with the portion which is mounted highest; the latter lay beneath the mucosa of the epiglottis, and was itself continuous with the third and largest of the three portions, which occupied the right ary-epiglottic fold.

"Of the medium-sized piece of the three, microscopic sections were cut in the direction of the larger axis, and in a plane corresponding with the flatter side, the sections including about half of the mass.

"The structure as so shown is fairly uniform and typical of a soft fibroma (Fig. 4).

Fig. 4.—Microscopic section taken from the extralaryngeal portion of the growth, showing the typical structure of a soft fibroma.

"The tissue varies somewhat in closeness in different fields. Where closest it consists of closely apposed intersecting

* The specimen is now in the museum of the Royal College of Surgeons (No. A 3,502).

bundles of delicate wavy connective tissue; amongst the fibres of these, connective tissue cells are scattered in conspicuous numbers.

"In others spots the texture of the intersecting bundles is less compact, the groups of their component fibres being separated or disparted, yet still interconnected by delicate fibrils pertaining to the bundles themselves. These differences are to be ascribed to the presence of a varying amount of oedema.

"In the oedematous tissue clusters of lymphocytes occur, in addition to the other cell forms. Well-developed arterioles ramify in the new formation. There is no fat in any of the sections examined, nor are any nerve fibres discoverable.

"The elongated form of the tumour and the fact that it has tracked through the thyro-hyoid membrane suggest its possible source in the internal laryngeal branch of the superior laryngeal nerve, and I therefore further examined transverse sections of the narrowest of the three pieces—namely, that which perforated the membrane named. These sections, however, show only intersecting bundles of connective tissue, as already described, and nowhere any medullated nerve fibres.

"Although no evidence is forthcoming that the growth is a neuro-fibroma, it has, nevertheless, probably tracked along the internal branch of the superior laryngeal nerve or the superior laryngeal artery. Whether it was originally extralaryngeal or intralaryngeal is left doubtful by the clinical history.

"There is as yet no record of any similarly-disposed laryngeal fibroma. Of the tracking of connective tissue tumours instances will occur to mind—notably in the case of lipomata, as of those which grow along the spermatic cord from the subperitoneal fat or down the crural canal through the saphenous opening."

REMARKS.

There seems no need for any further commentary upon this extraordinary case than that its histological structure, namely, that of an oedematous fibroma, explains a clinical factor in the case, which had been inexplicable to me until the microscopic diagnosis had been made. I must confess that I had looked with considerable scepticism upon the patient's very positive statement, namely, that the external growth had at various times considerably varied in size, but from the fact that so much serous infiltration is described by Mr. Shattock as existing between the fibrils of the growth, it seems quite possible that the varying size of the external growth, as described by the patient, may have been due to a variable amount of oedema within the tumour itself. Whether the growth began within the larynx or in the tissues of the neck remains, as stated by Mr. Shattock, doubtful from the clinical history, and has not been definitely determined by the histological investigation. But whatever its origin, the case acquaints us with the fact that pure fibromata may simultaneously involve the larynx and the neighbouring parts of the neck, a fact of which no example, so far as I know, has hitherto been recorded in medical literature.

In conclusion, it may be said that the close proximity of the growth to the superior laryngeal nerve fully explains the coughing and retching which immediately occurred whenever the external tumour was handled, whilst no equally tangible cause was detected in the course of the operation for the epiphora and salivation which had latterly formed prominent symptoms of the case. In all probability, however, the belief which was entertained when these symptoms made their appearance, namely, that they were due to irritation of the sympathetic caused by the increasing size of the growth, actually corresponds with the facts.

SOME THOUGHTS ON PLEURISY.*

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ALTHOUGH this subject may be regarded as a well-worn theme, it is, nevertheless, surrounded by questions of considerable difficulty. With all the modern aids in diagnosis, it is still sometimes impossible to determine the causal influences which have produced it; while the attempt to form a forecast of its course is a matter of even greater difficulty. In the remarks which follow the aim of practical utility will be kept in view.

We shall approach the subject of pleurisy from the etio-

* Being the Introductory Lecture of the Mount Vernon Hospital Post-Graduate Course, delivered October 12th, 1904.

logical standpoint, and, in order to have some firm basis upon which to rest our conclusions, the experience of my seven years' tenure of office as a Hospital Physician in full charge of wards will be laid before you. Before giving you the results, however, a few preliminary observations are necessary.

DIAGNOSIS.

The modes of diagnostic inquiry fall naturally into two main groups. The first of these to be considered is the old-established method of clinical examination by inspection, palpation, percussion, and auscultation, along with such chest measurement and tracings as may further help in determining the physical conditions of the chest. After these ordinary means of physical investigation have been fully utilized there are still, secondly, some additional modern methods. Amongst these must be considered in the first place the application of the *x* rays in the exploration of the chest. It is my good fortune to-day to be in a position to hand round for your inspection a series of most instructive skiagraphs, demonstrating diverse pleural conditions, several of which have been very kindly placed at my disposal by my friend Dr. Lawson of Banchory, who has done some admirable work on this subject.

The other line of research consists mainly in cytology and bacteriology. Here we have to examine the exudate, if any be present, in order to ascertain the nature of the cells which are present, and to determine whether any specific organisms exist. The examination of the sputum is also necessary before reaching definite conclusions with regard to the condition of the lungs, seeing that pulmonary lesions so commonly throw light upon the real state of the pleura. The blood requires also to be thoroughly investigated, as the varying proportions of the different corpuscles cannot be disregarded in formulating a diagnosis. In addition to all these methods, the pathological examination of the urine is of considerable importance, as has been elsewhere shown by me,¹ and as will be further alluded to in the course of this lecture.

The investigation of the pleural contents in cases with effusion has, during the last few years, been assiduously practised, and as already said, the main points to attend to are the examination of the various cells, whether arising from the endothelium or from the blood, and of the bacteria which may be present. Both of these objects of investigation are of immense but variable usefulness. The examination of the cells, for example, is of less importance in purulent effusions than in those which are serous, while the determination of the micro-organisms, when this is possible, is of equal importance in both types of exudation.

CYTOLOGY.

In the examination of the cellular elements the methods are extremely easy. Some of the fluid is obtained from the pleural sac with an exploring syringe, rendered thoroughly aseptic, but not antiseptic. If cellular elements are few in number some of the fluid must be centrifuged, and preparations on slides are to be made. After fixing, the stains which have been found most useful in my own work are eosin and methylene blue, or Jenner's stain. Many others are in use, but these have seemed to me to give the best results.

The endothelial cells of the pleural membrane are found in larger or smaller numbers in the exudation. They are often found to have undergone fatty degeneration, and they occasionally appear in clusters. On the whole, however, it is more common to find them discrete. Occasionally amongst the cells derived from the tissues there are some characteristic of carcinoma or sarcoma. It has long been a matter of routine to look for a special arrangement of such cells; but this, on the whole, does not often occur. Sometimes special cells, pathognomonic of such conditions, may be seen.

Of the cells from the blood, erythrocytes and leucocytes are often both present in the exudate. The former present no conspicuous alterations, but the latter give us much useful information. Two forms of leucocyte are chiefly found, the polynuclear neutrophiles and the lymphocytes. They are present in variable proportions, and the former undergo various degenerative changes, chief amongst which are the glycogenic and the fatty. The lymphocytes appear much more stable, and are found in the two forms of large and small cells. The relative proportion of these different blood corpuscles throws considerable light upon the case from which they are obtained, both as regards its nature and duration. Undoubtedly in all types of exudation during the early stages the polynuclear neutrophiles predominate, while during

the later stages of all of these conditions the lymphocytes preponderate.

There is one important question arising in connexion with such observations. Since the appearance of the observations of Widal and Ravaut² it has been a very common belief that pleural lymphocytosis is tantamount to pleural tuberculosis. Some questions connected with this aspect of the subject will be dealt with subsequently; but you will perhaps allow me to mention here my own conviction that the relative proportion of the various leucocytes is an expression of the stage and extent of the reaction rather than a proof of the nature of its cause. One most interesting case may be referred to in this connexion. A young man was recently under my care on account of pneumothorax. The sputum teemed with tubercle bacilli, yet the fluid in the lower part of the pleural sac—a perfectly transparent serous exudate, by the way—contained an enormous excess of polynuclear neutrophiles, with a much smaller number of lymphocytes—the large and small varieties being almost equal in amount—and a considerable number both of eosinophiles and of myelocytes. In this excellent illustration of my contention the examination of the blood revealed the following facts: Haemoglobin 78 per cent., erythrocytes 4,000,000, leucocytes 8,000.

BACTERIOLOGY.

The bacteriology of pleurisy has received more attention than the investigation of the cellular elements found in pleural exudations. The methods of detecting the various micro-organisms which are commonly employed are threefold: First, the results of microscopical examination; secondly, the products of culture incubation; and, thirdly, the effects of inoculation experiments. The methods of microscopical examination and of culture incubation are similar to those utilized in other bacteriological investigations, and there is no need to linger over the details, but you will perhaps allow me to mention that in staining pneumococci thionin-blue and Muir's stain have given me the best results, while ordinary methylene agents are in every way adequate for detecting streptococci and staphylococci, and the Ziehl-Nielsen process is unsurpassed for use in detecting tubercle bacilli.

The effects of inoculation should be ascertained in all doubtful cases; unfortunately, in many instances the results are, nevertheless, absolutely negative. Even in instances of serous pleurisy, undeniably produced by tuberculosis, no results have followed. It is probable that in such cases the bacteria have been destroyed by the activity of the processes which they have induced, and this idea is supported by the extreme difficulty of detecting some other microbes in pleural effusions.

A large number of different organisms are found in pleuritic exudates, but those which predominate are the pneumococcus, the streptococcus, the staphylococcus, and the tubercle bacillus. Each different observer who has recorded his results has, as might be expected, a different story to tell as regards the relative number of cases produced by each of these microbes. My own results will be referred to shortly.

SPUTUM, BLOOD, AND URINE.

The examination of the sputum yields certain useful results, but a considerable number of cases may afford no definite information by such means. Very often the expectoration consists merely of a serous fluid containing certain epithelial elements from the mucous membrane, without any definite pathogenetic organisms. But in certain instances the pneumococcus, the streptococcus, the staphylococcus, or the bacilli of tubercle or influenza, may be most helpful from the standpoint of diagnosis.

Turning, in the next place, to the blood, it must be premised that there may be no change in its constituents. This is true of all forms of pleurisy, in which the blood, examined by every known method, may be absolutely normal. In early cases of dry and serous pleurisy there may be a distinct leucocytosis, and the predominant elements in such instances are the polynuclear neutrophiles. An absence of leucocytosis at an early stage in such cases is rather suggestive of tuberculosis, and, according to some observers, the employment of tuberculin in such cases has given a definite reaction. It must be added that in pleurisy produced by the pneumococcus, even when pneumonia is absent, high counts of polynuclear leucocytes are common. In almost all cases of purulent pleurisy the blood shows a considerable increase of the polynuclear neutrophiles, and, as a rule, along with those a considerable diminution in the number of the lymphocytes.

Leucocytosis is the rule in cases of malignant pleurisy, and in such cases, together with an excess of polynuclear neutrophils, coarsely granular eosinophiles are in excess, while myelocytes are not infrequently present.

In the last place, the bacteriological examination of the urine is sometimes useful. In certain doubtful cases complicated by pleural affections, the presence of tubercle bacilli may be established by careful investigation, and the presence thus shown of urinary tubercle is of great use. A certain amount of caution must be exercised in regard to this matter, as the smegma bacillus is only separated with considerable difficulty from the tubercle bacillus. A new light has further been thrown upon one form of infection occasionally resulting in pleurisy. Although undoubtedly far from common, rheumatic pleurisy does exist. Quite recently a beautiful example of general rheumatic inflammation of the serous membranes—pericardial, pleural, and peritoneal—was in my wards, with abundant diplococci in the pericardial exudate. In so far as is known to me the diplococcus of rheumatism has not yet been obtained from any pleural exudate, but my own personal observations have placed me in a position to be able to point out that its presence in the urine may be detected by centrifuging the fluid and staining the deposit.

ANALYSIS OF STATISTICS.

Having now considered in a manner as concise as possible the various methods of investigating the causes of pleurisy, you will allow me to refer to the cases which have, during the last seven years, been under my care in hospital.

Analysis of 118 Cases of Pleurisy.

Without pericardial implication:

Dry pleurisy:

Pneumococcal	...	...	...	21
Streptococcal	...	...	...	2
Rheumatic	...	...	...	4
Tuberculous	...	...	...	16
Influenzic	...	...	...	1
Metabolic:				
Gouty	...	...	...	1
Renal	...	...	...	1
Neoplastic:				
Sarcomatous	...	...	...	2
Cause uncertain	...	...	...	17

65

Serous pleurisy:

Pneumococcal	...	...	...	4
Rheumatic	...	...	...	1
Tuberculous	...	...	...	13
Metabolic:				
Renal	...	...	...	1
Neoplastic:				
Carcinomatous	...	...	...	4
Cause uncertain	...	...	...	15

38

Purulent pleurisy:

Pneumococcal	...	...	...	1
Streptococcal	...	...	...	2
Staphylococcal	...	...	...	1
Pneumococcal and streptococcal	...	...	...	1
Tuberculous, streptococcal, and staphylococcal	...	...	...	1

6

With pericardial implication:

Pleuro-pericarditis:

Rheumatic	...	...	...	1
Tuberculous	...	...	...	3
Cause uncertain	...	...	...	2

6

Mediastino-pericarditis:

Tuberculous	...	...	...	2
Metabolic:				
Renal	...	...	...	1

3

Total 118

The total number of all cases which have passed through my wards is 2,710. Of these 118 were instances of pleurisy, whether simple or associated with other diseases, showing a percentage of 4.35 of all the patients admitted to the wards. It has appeared well to me to separate cases of pleural affection, without implication of any other serous membrane, from those in which the pericardium was affected. Of this class, without pericardial implication, there were 65 cases of dry, 38 of serous, and 6 of purulent pleurisy. Separating the

cases with pericardial implication into two groups according as there were mediastinal adhesions or not, it will be seen that there were 6 cases of pleuro-pericarditis and 3 of mediastino-pericarditis.

ETIOLOGY.

It must be obvious from the most cursory consideration of the table that two causes stand out as predominant—the tuberculous and pneumococcal infections. Tuberculous infection was present in 35 of the cases, or 29.7 per cent. The pneumococcus was responsible, either alone or along with the streptococcus, for 27 cases, or 22.8 per cent. Contrasting the two different infections it is a matter of extreme interest to observe that their influence is in an inverse proportion as regards the production of dry and serous pleurisy.

The most startling point as regards the investigation of these facts is that in 34 of the cases (17 of dry and 15 of serous pleurisy) it was impossible by any means of investigation available to assign any cause for the pleurisy. In other words, in 28.8 per cent. the cause was absolutely uncertain. After the physical examination of the chest had yielded its conclusions, and every modern means of investigation had been employed, the causes of this large percentage of cases baffled detection. In all of them the blood was examined as a matter of routine, and in those presenting a fluid exudation, whether serous or purulent, the effusion was examined from the cytological as well as bacteriological points of view, while in a considerable proportion inoculation experiments were also resorted to.

Nowadays the doctrine is being more and more taught that such doubtful cases are of tuberculous origin. What is the evidence upon which this doctrine rests? In the first place, it is held that a considerable degree of lymphocytosis in the pleural effusion must be accepted as significant of tuberculosis, but it is admitted, even by those who push the tuberculous doctrine to its furthest limits, that in cases of rheumatic pleurisy a large number of lymphocytes may be present.

Another point upon which great stress is laid is the subsequent history of cases of serous pleurisy. It is universally allowed that in a considerable proportion of cases pulmonary tuberculosis is the sequel of pleurisy. But it may be fearlessly asserted that in many cases the subsequent tuberculosis is the result of a later infection, the pleurisy not having even led to the pulmonary affection by leaving damaged tissues behind. One such instance always rises, and always will rise, before me in considering this question. The patient was an undergraduate suffering from what was proved to demonstration to be a case of rheumatic pleurisy with effusion. From this he made a perfect recovery, but two years afterwards pulmonary tuberculosis set in, and he was carried off very rapidly. Several similar cases have been under my own personal observation, and they have led me to be somewhat sceptical as to the proofs of the tuberculous origin of pleurisy derived solely from the subsequent history of the cases. It must indeed be admitted that a considerable proportion of such cases may undoubtedly be tuberculous, even when no tubercle bacilli are present, when cultures from the exudate remain sterile, and when no result follows inoculation. Sometimes after death in such instances hidden tubercle is found in fibrinous adhesions binding the edges of the sulci together. In such instances it is probable that the organisms have been destroyed by their own activity. Osler's results from the *post-mortem* records in Baltimore are of great interest in this connexion.¹ In 101 successive cases occurring in his own wards tuberculosis was only determined in 32. As Osler points out, such evidence as this is of much greater value than mere clinical impressions. While only accepting the presence of characteristic bacilli, or positive inoculation, or tuberculous lesions elsewhere, as evidence sufficient to definitely establish the presence of tuberculous pleurisy, it must be allowed that a large lymphocytosis at an early stage in the exudation, and the absence of any definite leucocytosis in the blood, are eminently suspicious appearances, leading to the fear that cases of pleurisy presenting such features may be tuberculous. With this admission my remarks may be brought to a close. It only remains for me to express my sincere hope that the present course of lectures may in no respect fall below its predecessors, and that, as heretofore, the post-graduate instruction of the Mount Vernon Hospital may be of signal utility to the medical profession.

REFERENCES.

- ¹ BRITISH MEDICAL JOURNAL, 1904, vol. ii, p. 1001. ² *Comptes Rendus de la Soc. de Biol.*, 1903, p. 648. ³ *Boston Medical and Surgical Journal*, 1893, vol. cxxix, p. 53.