On the Treatment of Tuberculous Diseases in their Surgical Aspect

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Lecture 1

General considerations on tuberculosis, tuberculous glands, more especially in the neck

In choosing the treatment of tuberculous diseases as the subject of these lectures, I propose to deal with a group of affections which interest both the physician and the surgeon, forming as it does one of the most common of the more serious diseases which come under the notice of the practitioner. As a surgeon I, of course, limit myself to those lesions which are accessible to surgery, and which indeed for the most part come under the care of the surgeon from the first. These lesions are, as a matter of fact, too numerous for consideration in the three lectures which are at my disposal, affecting as they do a great variety of tissues and organs. For example, under the head of Surgical Tuberculous Diseases, we have: - Various tuberculous affections of the skin, such as lupus, scrofulo-derma, tuberculous ulceration, &c.; tuberculous deposits in the areolar tissue, especially in that situated underneath the skin; tuberculous affections of the bursæ and tendon sheaths, the latter being especially important on account of the damage which is apt to result from the disease; tuberculous affections of the great serous cavities, such as tuberculous peritonitis and tuberculous pleurisy; tuberculosis of various secretory glands such as the mamma; tuberculosis of the lymphatic glands, perhaps the most common of all surgical tuberculous affections; the great group of genito-urinary tuberculoses, involving in the male the testicle, epididymis, vas deferens, vesiculæ seminales, prostate, bladder, ureter and kidneys; and lastly, the very important group of tuberculous diseases of bones and joints. I have already discussed the last group on several occasions, and I need not again touch on tuberculous diseases of bones and joints in the present lectures. I propose to confine my attention to tuberculous gland disease, tuberculous peritonitis, and genito-urinary tuberculosis.

There are many points in the etiology and mode of spread of tubercle which are still far from clear, but in any case it may be classed as, in the first instance at any rate, a local disease, as opposed to a general or blood infection. As far as we know, tubercle bacilli, although they may possibly retain their vitality for some time in the blood stream, do not multiply there or cause any trouble while floating in it. They must be deposited in some part before they can grow and cause disease. Were it not for this local character of the disease, and this tendency to remain localized, at any rate for a considerable time, tuberculosis would hardly be amenable to surgical treatment. Were the disease general, or did it spread rapidly from place to place, it would be hopeless to try to overcome it by surgical methods, and the only effect of operative treatment would probably be to depress the vitality of the body and aid rather than interfere with the progress of the disease.

It is only after the bacilli have grown locally for a time that circumstances may arise which lead to their dissemination over the body and the production of a more widespread trouble. Apparently acute general tuberculosis only occurs when a caseating deposit happens to communicate with the lumen of a vein, an artery, or a large lymphatic trunk, in the interior of which no obstacle in the shape of clot exists to prevent the entrance of the cheesy particles and bacilli into the general circulation. In

some of these cases where there is an acute dissemination, especially from erosion of an artery, the disease may remain localized to the organ, such as the lung, in which the disease was primarily developed, and not spread over the body generally. Surgically this is especially seen in connection with glands, testicle, kidney, &c.

Apart from this sudden and extensive escape of tuberculous material into the blood, it is, however, possible, and indeed probable from many clinical facts, that individual tubercle bacilli unattached to cheesy particles may from time to time get into the blood stream and be carried along with it, and either perish or retain their vitality for a considerable time, and ultimately be deposited in some suitable tissue, producing a fresh focus of disease.

The entrance and existence of individual bacilli in the blood stream without necessarily producing disease is probable from various observations. For example, tubercle bacilli have been discovered in distant parts in cases of phthisis, although in these situations there was no sign whatever of disease. The most notable instance of this has been furnished by the researches of Jani, in which he showed that tubercle bacilli were not unfrequently present in the testicles and prostate of phthisical men without there being any tuberculous disease in these parts. Again, the occurrence, after a slight injury, such as a sprain, of joint trouble or other local tuberculous disease in phthisical patients or in those with some localized tuberculous deposit elsewhere, implies the presence of tubercle bacilli in the blood; and the fact that they happen to be at hand just when the injury occurs, or shortly afterwards, seems to indicate either that they are frequently escaping into the blood stream, or that they can live in it for some considerable time. Although there is no definite proof of the latter view, I cannot but think that it is not improbable, and indeed more likely than that any considerable numbers of fresh bacilli are constantly entering the blood without producing disease. If tubercle bacilli were not capable of retaining their vitality for some time in the blood stream it would be very remarkable that it should so happen that when joints are sprained or otherwise lowered in vitality, the tubercle bacillus should also enter the blood stream at or about the same time.

Whether it be that the bacilli are often entering the blood, or whether it be that they may live for some considerable time after they have entered it, a very important question arises as to whence they come. That they must have entered the body at some time or other from without is of course evident, and they either enter during fœtal life or after birth. The former possibility raises the question of heredity of tuberculosis. It is now practically the universally accepted view that heredity only implies the inheritance of some condition predisposing to the growth of the organism when subsequently implanted, and I have myself strongly advocated this view. It is, however, well known that Baumgarten and a number of other competent observers maintain that under certain circumstances the bacilli themselves are inherited. As has just been mentioned, Jani found bacilli in the healthy testicle and prostate, and various other authors have successfully innoculated semen and portions of testicular substance from phthisical patients into the lower animals. Whatever may be the case as regards the male, it does not seem so improbable that the disease may be transmitted by the female through the placenta. Gärtner states that infection in this way is not uncommon, not only where there is acute miliary tuberculosis in the mother, but also where there is chronic lung disease. According to these views, the bacilli do not necessarily produce disease in the fœtus, at any rate to any great extent, but most

probably become localised in some part in which they may remain quiescent for a longer or shorter time, and subsequently produce disease. The part which is especially looked upon as the seat of the bacilli during this stage is the bronchial glands. It is now known that the bronchia glands are the most frequent seat of tuberculosis in infants – much more frequent than the mesenteric glands, as was formerly held to be the case; and those who uphold the non-hereditary view attribute this to greater frequency of infection by inhalation in infants as compared with infection by feeding. That view has always seemed to me a somewhat doubtful one. I cannot but think that the most probable and most natural mode of infection in infants is by feeding, more especially with tuberculous milk. Although I have myself formerly strongly opposed the view of the heredity of tuberculosis, I must confess that I do not now feel so positive about it as I was, and I cannot but think that in some cases of early tuberculosis the bacilli may have been present in the body at birth and have remained there in a quiescent state, probably in the bronchial glands, till some condition arose which was favourable to their spread. I do not wish positively to affirm this, but I must candidly confess that I do not feel quite so sure about this matter as I formerly did.

However this may be, when the bacilli do enter the body and produce disease the first deposit is called the primary deposit; following on that fresh disease may appear elsewhere, which is spoken of as secondary, and which is generally due to spread of infection by the blood or lymph stream from the primary deposit. That this is so in the great majority of cases is highly probable, but it is also possible that some of these supposed secondary deposits have been formed in the same way as the first: that is to say, not by bacilli coming from the primary deposit, but by fresh bacilli which have entered from without; under those circumstances the second lesion would be as much primary as the first. This question whether the tuberculous deposits with which we have to deal in surgery are primary or secondary is not a mere etiological speculation, but one which has a considerable bearing on treatment. That is to say, in operating on a tuberculous lesion, are we operating on the only one present in the body, in which case we have a chance of ridding the patient of his disease altogether, or are we only operating on a local manifestation of disease existing elsewhere? In the former case we may aim at a completeness in the operative procedure perhaps somewhat in excess of the actual necessities of the case in the hope of eradicating the disease; while in the latter instance the outlook as regards results is not so good and we may limit our procedures to the treatment of the local affection. Even in the latter instance, however, it by no means follows that further disease must occur, although there be a primary deposit elsewhere, for that may in future remain quiescent and give no more trouble.

In some situations there is no difficulty in believing that we have to do with a primary affection. In the skin, for example, many cases undoubtedly arise from direct infection, and this is also the case with many mucous membranes, such as the intestinal mucous membrane. A considerable number of cases of glandular disease may also possibly be primary, the bacilli being carried to the glands by the lymphatic vessels from the surface without producing any lesion at their point of entrance; this is more especially true of the mesenteric glands. When we come to tuberculosis of more distant parts, such as bones or joints, or the genito-urinary system, it is clear that the bacilli must, in the great majority of cases, have reached the part through the blood stream, and the question of the primary or secondary origin of the disease is a much more difficult one. In some cases, it is true, infection is carried directly from without

by punctured wounds, but in the great majority of instances no such mode of origin exists, and we must assume that the bacilli were present in the circulating blood and were deposited from it in the part affected.

These bacilli must either have come from some pre-existing lesion in the body or have entered from outside without causing any lesion at their point of entrance. In the former case the disease might be secondary, in the latter it would be primary. As a student I was taught that in scrofulous disease of joints or other deep-seated parts, one could always find a cheesy mass somewhere or other, perhaps most often in the bronchial glands, which was the primary source of the disease, and pathological research has shown that in many cases this is so. Nevertheless, it does not follow that the bacilli which set up the joint trouble were necessarily derived from that source. The two deposits may, in some cases, only be a coincidence and have no causal connection with each other. In a considerable number of cases, however, no such primary deposit has been found, even after the most careful search, and we must admit, I think, that some of the deeper-seated tuberculous deposits are really primary in origin, and probably these cases are more numerous than one would at first think likely. My impression is that, where we have a lesion which remains for a long time single we very probably have to do with a primary deposit, while those arising from an already existing deposit are more often multiple, various lesions appearing at the same time or in rapid succession. Seeing, however, the great risk of dissemination from a tuberculous deposit, early eradication of it seems not only hopeful but very desirable in order to prevent the spread of the disease.

There are other points which may also be referred to which have an important bearing on treatment, namely, the possibility of varying virulence on the part of the bacilli, or of varying susceptibility of the soil. Another, and I believe a still more important point than that of varying virulence of the bacilli, at any rate, is one which I first pointed out, now many years ago; namely, the variation in the number of organisms which come into action in the first instance. More important than these, however, is the varying susceptibility of the body at different times, a fact about which I think there can be no doubt. It is not an uncommon observation, for example, to find that a tuberculous lesion is subsiding and apparently in a fair way towards recovery, when the patient is attacked by some other affection, such as measles, influenza, chicken-pox &c., with the result that the tuberculous disease bursts out again with renewed vigour, and a very acute form may be produced. The same is also true in the case of joints as the result of injury, where the patient sprains a diseased joint which is improving, or where attempts are made to restore the movement, with the result that a more acute form of the disease than ever is set up. In connection with this increased or diminished susceptibility of the individual, we have the different degrees of amenability to treatment. The results of treatment vary enormously in different cases, more especially those forms of treatment which do not aim at the extirpation of the disease; and further, benefit often results from methods of treatment which have no direct action on the bacteria themselves, but which only aim at diminishing the susceptibility of the tissues. Thus, most of the expectant methods adopted in the earlier stages of disease of joints are only really of use against chronic inflammation per se, and not against tuberculosis, and yet they are not unfrequently attended by good results. I have always thought that the reason for this was that these remedies did reduce the chronic inflammation in the region and so brought the tissues around the lesion into a more healthy state, and rendered them more capable of resisting the onset

of the tubercle bacilli. The different susceptibility of the tissues is also evidenced in the selective character of the disease, as already referred to in connection with joint diseases. Even in acute general tuberculosis there is apparently this selective power, because even then the tubercles are not necessarily scattered all over the body, but may be limited to certain tissues and organs.

We may sum up the result of these considerations as follows: - Tuberculous disease is in the first instance a local affection, and it may be local even though it is situated at a considerable distance from the possible point of entrance of the bacilli into the body. From this primary deposit tubercle bacilli may be disseminated either in large quantities along with cheesy particles, giving rise to an acute general tuberculosis, or to acute tuberculosis of an individual organ, or in small numbers which may or may not settle in other parts. These apparently secondary deposits may, however, not arise from the former one, but may be new lesions originating from without in the same way as the original one did. It is also probable that tubercle bacilli may live in the blood for some time, and unless they meet with circumstances under which they can grow, they remain quiescent or die out. Further, in the production of the disease, the number of bacilli which gain access to a part in the first instance plays an important part in the subsequent severity of the disease where the tissues are not particularly susceptible to it; and possibly also there are variations in the virulence of the organisms. Apart from these conditions affecting the bacilli, the chief determining cause of the severity of the disease lies in the tissues themselves, and in their power to resist the attacks of the tubercle bacilli; and on this also depends the effect of treatment, more especially of those forms which may be grouped under expectant treatment, where nothing is done specifically against the bacilli themselves.

In the following lectures I wish to direct special attention to the more purely surgical or operative methods of treatment, the period at which they should be employed, and the extent to which they should be carried. Preceding operative methods, one must in most cases employ the various methods of expectant and medicinal treatment, which are well known, and upon which I do not propose to dwell.

The ideal operative treatment is the complete removal of the tuberculous tissue, especially if it be the primary deposit; and wherever this is possible, and where operation is desirable, such complete removal should be carried out; for as a result the disease may be cut short and the patient restored to health. No doubt he may subsequently suffer from tuberculosis elsewhere, because his tissues still retain the tendency of the disease; and, indeed, it is probable that this tendency is increased by the previous existence of tuberculosis. On the other hand, however, such subsequent tuberculosis may never occur, or not for several years, and in the meantime the patient is restored to health.

Even in cases, however, where the whole of the tuberculous disease cannot be taken away, surgery is by no means impotent, and much can still be done to arrest the progress of the disease and to restore the patient to health. As regards operations for the removal of the disease, partial operations are in some cases wonderfully effectual, although at the same time one must be very careful in employing them, because it is also possible that with some methods, at any rate, the disease may be aggravated and its spread favoured. In my book on "Tuberculous Diseases of Bones and Joints" I have referred to a method of treatment adopted years ago by Lord Lister, of making

large incisions into tuberculous joints without removing any of the disease. Such free incisions are among the best methods of treating simple non-tuberculous chronic inflammations, and it was remarkable how much benefit was frequently derived from them in tuberculous cases. In some instances, it is true, a sinus remained at some part of the incision, and was a long time in healing, but in a very considerable number of cases marked improvement, often going on to complete disappearance of the disease, followed the procedure. The wounds healed, and as they did so the scar contracted, and the thickening diminished or disappeared in the neighbourhood of the wound; and in many cases this diminution extended to the rest of the synovial membrane. This shows in a remarkable manner how treatment directed against chronic inflammation may be of benefit, even although none of the actual tuberculous disease is taken away. Equally, and indeed, more effectual is the partial removal of the disease, although this must be very carefully employed. In cases where the disease is acute in its progress and spreading rapidly, no operative interference except complete removal is advisable; anything short of complete removal would only leave a wound which would not heal, and which, if it should become septic, would do harm instead of good. But where the disease is more chronic, the removal of as much of it as possible, especially of all caseating foci, often has a wonderful influence in arresting the trouble, even although tubercles are left behind. Why this should be so is a little difficult to explain; possibly the healing process leads to encapsulation of the remaining disease, but more probably the infiltration of the tissue with cells and their organization into fibrous tissue extends to the remains of the tuberculous tissue and leads to its complete destruction. Indeed, many of the operations nowadays performed for tuberculous disease are in reality only partial, and that is almost certainly the case with those performed by scraping with the sharp spoon. In the latter instance the parts which can be got away with the spoon are only those in which the tubercles are numerous and the tissues soft and caseating, but beyond that area one finds on microscopical examination that isolated tubercles are present in the denser tissue, and they are liable to be left behind on scraping. Nevertheless, it is by no means uncommon to find healing result after such operations, and it is possible that where the disease is not acute the scraping sets up more irritation and cicatricial formation than free incision, and may thus actually be a more beneficial method. At the same time, as I have already said, whenever it is judicious, it is, I believe, best to remove the whole disease cleanly and thoroughly. The advantages of partial removal will, however, be frequently referred to in these lectures, more especially in speaking of the treatment of genito-urinary tuberculosis.

I may now, without further preface, pass to the consideration of the treatment of some of these diseases in detail.

Tuberculosis of Lymphatic Glands

Perhaps one of the most common seats of tuberculous disease in the human body is in the lymphatic glands. In infancy the bronchial and mesenteric glands are those most frequently affected, and are, perhaps, the most common seats of tuberculosis of any tissue in the body, but they do not come under consideration here. Of the glands which have to be considered in connection with surgical tuberculous diseases, are those whose lymph radicals are situated in the extremities, the throat, the mouth, and the head. In other words, tuberculosis of the femoral and inguinal glands, the axillary glands, and the cervical glands. Of these three groups, tuberculosis of the cervical

glands is by far the most common. Tuberculosis of the inguinal and axillary glands most usually follows some tuberculous ulcer or deposit either in the vicinity or in the limb from which the lymph comes, and in these two examples there is usually some primary lesion to be found on the skin, or else some lesion, say in a joint or bone in the vicinity, from which the infection might have come. It is seldom one meets with tuberculosis of these glands without some primary source being evident. In the case of the axillary glands, however, one does occasionally find masses of enlarged tuberculous glands without any evident primary source, perhaps most often associated with tuberculosis in the lungs. I shall here, however, only speak of tuberculosis of the glands of the neck.

Tuberculosis of the Cervical Glands

In the neck the most frequent seat of tuberculous glands is the anterior triangle, especially towards the upper part; next to that, the posterior triangle, but this is usually secondary to the anterior; and then the sub-maxillary triangles. The mode in which these glands become infected is a matter of very great interest, because it is comparatively rarely that one finds a tuberculous ulcer on the surface. The sub-maxillary glands drain the lymphatic system from the floor of the mouth, the gums, the alveolar processes, and the front part of the tongue. The tonsils and back part of the tongue drain into glands at the posterior angle of the jaw, while deeper glands drain from the pharynx and the naso-pharynx. Superficial to these glands we have in the anterior triangle a set of glands which drain from the skin of the face and neck. The glands at the upper part of the posterior triangle usually drain from the head, while the glands at the lower part of the posterior triangle are usually continuations of those at the anterior triangle and also drain from the shoulder and arm.

The onset of tuberculosis of the cervical glands is often associated with some inflammatory condition such as tonsillitis, pharyngitis, carious teeth (most commonly), adenoids, otorrhœa, eczema about the ears or head &c.; and the ordinary view is that the bacilli enter at these points and are carried to the glands and set up disease there. It is very seldom that any typical tuberculous ulceration is present in these regions, and if bacilli do enter there they must pass through the mucous membrane or through open wounds without causing a local tuberculosis at the point of entrance. The possibility of this rests on the old experiment by Klebs, in which it was found that if animals were fed with course tuberculous material a local ulcer occurred at the point of entrance, while if the bacilli were free, as in milk, although tuberculous infection of the body might occur, no local lesion could be made out with the naked eye, at any rate in the mucous membranes. This view has not, however, been altogether upheld by subsequent research; on the contrary, Baumgarten and Tangl found that it was very seldom that a local lesion was not produced (only once in forty experiments). It certainly is the fact clinically, I think, whatever may happen as regards uninjured surfaces, that where a sore becomes infected by tubercle bacilli a tuberculous ulcer almost always developes [sic] there in the first instance. Hence, if the tubercle bacilli reached the glands from the mouth, in cases where there is destruction of the mucous membrane, as around carious teeth, &c., it seems to me remarkable how very seldom one finds a tuberculous ulcer there.

As has just been said, one of the most frequent irritations associated with tuberculous glands is carious teeth, and it is assumed that the bacilli enter through the tissue about

the root of the tooth. Nevertheless, once a tooth is removed, the cavity heals completely and without any trace of tuberculous ulceration, as I should naturally have expected to be the case. Tubercle bacilli have, however, been found in connection with carious teeth. Thus, Suchannek, in a paper on Scrofula, refers to a research by Starck (I have not been able to see the original paper) in which six cases of carious teeth were investigated, in three of which tubercle bacilli were found (in the tissues around), and in one of these giant cells were also present.

Tuberculous glands in the neck also frequently follow inflammation or enlargement of the tonsils. Investigations have been made as to the question of tuberculosis of the tonsils in these cases, but in almost all the cases examined the patients have also been suffering from phthisis, and the investigations were made rather on the state of the tonsils in phthisical patients than on the state of the tonsils in cases of tuberculous glands in the neck. Krückmann found that in twenty cases of tuberculosis of the lungs there were tubercles in the tonsils in twelve, and he states that in all the cases where there were glands in the neck there were also tubercles in the tonsils and all of these cases were also suffering from phthisis. Schlenker, in twenty-two post-mortem examinations of cases of phthisis, found tuberculosis of the tonsils fourteen times; more often in adults than in children. Schlesinger says that there is almost always tonsillar tuberculosis in phthisis, and that wherever there is tonsillar tuberculosis phthisis is always present. If the former be the case, when we remember how rare enlarged glands in the neck are in cases of phthisis, it is rather an argument against the entrance of bacilli from the tonsils as a common cause of tuberculous glands. The tuberculous disease in the tonsils in these cases was chiefly in the form of isolated tubercles and small patches of tuberculous tissue, but there was no ulceration of the surfaces, and according to Krückmann tubercles were absent where the tonsil was smooth and without depressions. Dr. Craven Moore refers to an unpublished research by Delepine and Yonge, in which the tonsils were examined in seventeen cases of tuberculous glands without phthisis, and in no instance did inoculation of the tonsils into guinea-pigs produce tuberculosis. These patients were aged from six to sixteen years. In nine cases of tuberculous glands on both sides of the neck Schlenker found that in four only one tonsil was affected with tuberculosis, and in five neither tonsil was diseased. He thinks that it is possible that in these cases the tonsillar tuberculosis may have healed before investigation, but that seems to me rather a strained view. Schlenker states that the tuberculosis of the tonsil in connection with gland disease may sometimes be secondary to the glandular disease, for he has found in some cases that the tuberculosis in the tonsils was apparently much more recent than in the glands. Where the tonsils are not visibly affected it is suggested that the bacilli lodge in the crypts of the tonsils, penetrate through the mucous membrane, are seized by phagocytes and carried on to the lymphatic glands; but there is no proof of this, and the theory seems hardly satisfactory in view of the facts already mentioned. On the whole, it seems to me that we must take a verdict of non-proven as regards the frequent entrance of the bacilli through the tonsils in cases of tuberculous glands. The fact seems to be that where there is evident infection of the tonsils there are not necessarily tuberculous glands, and in cases of tuberculous glands without phthisis there are seldom tubercles in the tonsils.

In the cases of tuberculous glands secondary to ear disease there is no question that many of these ear cases are in reality tuberculous, and with regard to them there is no difficulty in accepting infection of the glands by the lymphatic stream from the ear. In

cases of eczema capitis it has been said that tubercle bacilli are present at the surface, but several investigators have failed to find them. In all these cases of enlarged glands in the neck it is very common to get a history of an acute inflammatory enlargement of the glands in connection with some acute process at the origin of the lymphatic vessels, such as boils, carious teeth, quinsy, eczema capitis &c., at the commencement of the trouble, and that as this passed off the glands began to subside, but then, instead of disappearing as would be the case in a healthy subject, began to enlarge again and assumed the characters of tuberculous glands. No doubt it might be that tubercle bacilli entered the glands from the mouth or other region at the same time as the acute inflammation occurred, and that they afterwards grew and led to the tuberculosis of the glands; but in view of the researches above mentioned, and the remarkable absence of tuberculous sores at the supposed points of entrance, even although wounds or abrasions are present, and in view further of the very frequent occurrence of these glands in different members of the same family, I cannot think that this represents the whole truth. When we remember that in the case of joints and other lesions the infection must practically always come from the blood, and that in children the bronchial glands are so frequently tuberculous, I cannot but think that in the case of the cervical glands infection often occurs from the blood also. And, in the absence of a primary tuberculous focus, I am inclined to think that in many cases we have to do with a non-specific inflammation of the glands in the first instance, and a subsequent infection of them with tubercle bacilli from the blood stream.

A good deal has been written about possible differences between scrofula and tuberculosis, some asserting that, clinically, scrofulous glands differ from the enlarged glands which are secondary to tuberculous lesions, such as phthisis, and that they also differ clinically from local tuberculosis elsewhere, more especially in that they run a milder course. I must confess that I have not been able to convince myself of these views. All tuberculous lesions in the first place are local, and just as patients with phthisis may go on for years without developing tuberculosis elsewhere, or patients with a joint trouble may get well of their joint trouble without fresh tuberculosis, so may a patient with enlarged cervical glands. The course of the disease in phthisis is hardly a fair comparison, for the sputum containing bacilli is free and constantly passing over a variety of mucous membranes, and thus giving rise to the possibility of fresh tuberculous deposits much more frequently than in the case of a gland, where the bacilli are confined in the interior; nor have I been able to observe any marked difference in clinical characters between glands occurring in phthisical patients and glands occurring in those without phthisis. Further, tuberculous glands are, I think, undoubtedly a source of danger to the body, and it is not correct to assume that the chances of further spread of the tuberculosis are in these cases slight. Thus, Schlenker gives various statistics showing that from 10 per cent. to 25 per cent. of cases of cervical gland disease die of phthisis in from one to sixteen years. I have myself known acute tuberculosis follow the operation of scraping tuberculous glands in the neck, and König was, at one time at any rate, averse to radical operations on glands in the neck on account of the fear of dissemination of the disease. Again, in statistics by Hack, of thirty-nine cases there were nine or ten suffering at the time they came under observation from other tuberculous diseases, more especially phthisis. Further, it is very frequent in cases of joint tuberculosis and also not uncommon in genito-urinary tuberculosis to obtain a previous history of tuberculous glands or to find that enlarged glands in the neck are still present.

Founded on this assertion, which I consider to be erroneous, many experiments have been performed in order to explain it. Some have asserted that the supposed mildness of the disease was due to a small initial dose of bacilli; others that it was due to attenuation of the bacilli; others, again, that it was due to some condition of the tissues. The latest investigation on this subject is contained in a very excellent paper by Dr. Moore in recent numbers of *The Journal of Pathology*, and he finally comes to the conclusion that it is rather the nature of the tissues that determines the supposed mild clinical course and neither less virulence nor a small initial dose of the bacilli. He thinks that the resistance of the tissues in the gland to the growth of the bacilli is greater than normal; in other words, that there is abnormal vulnerability of the channels of affection associated with increased but variable powers of resistance on the part of the lymphatic glands themselves. I have no special objection to this conclusion, except in so far as I cannot admit any exceptional mildness in the course of the disease. Where we have to do with less severe cases the occurrence may no doubt be explained by the above hypothesis. Dr. Moore also, as the result of a long series of investigations, comes to the conclusion that the bacilli present in tuberculous glands are in an attenuated state. That bacilli growing under difficulties may lose virulence I do not deny, and this is probably a factor in the spontaneous cure of bacterial diseases. Nevertheless, I hardly think that even Dr. Moore, excellent as his experiments are, has fully proved his point, or has completely excluded the possibility that the results obtained are simply due to a small dose of the organisms introduced into the animals, dependent on the small number presumably present in these glands. One or two of his experiments undoubtedly support the attenuation theory, notably Nos. 19 and 20, but the results of the others may, I think, still be explained on the view of the small initial dose. However, as I do not admit the clinical basis on which these researches are founded, I need not pursue the subject further.

Turning to the clinical characters of tuberculous glands, we find great variations in different cases, as regards the number and size of the glands affected, the rapidity in the progress of the disease and the tendency to softening and abscess formation. From the point of view of treatment we may consider the cases under the following five heads:-

1. In some cases the glands remain small and hard, not large enough to produce deformity and with no marked tendency to softening.. Here one usually finds a number of glands of varying size, but for the most part small, hard, moveable, and without any matting together. Fresh glands tend to become involved, though slowly, and if there is no intercurrent trouble, either local, such as sore-throat, &c., or general, such as measles, chicken-pox, influenza, &c., they tend to disappear gradually as the patient grows older. Where, however, intercurrent troubles, such as those mentioned appear, suppuration may occur in one or more glands, or the whole trouble may take on a more acute course.

2. In a second set of cases the glands enlarge steadily, or it may be by fits and starts, attain a large size and become very numerous, so that by-and-by the whole side of the neck becomes a mass of enlarged glands and great deformity is produced. This condition is usually bi-lateral, although it may be more marked on one side than the other, and it may go on for a long time without the occurrence of suppuration, the glands also remaining more or less mobile and discrete. The glandular disease tends to spread to the axilla. The patient frequently has a pasty complexion, feels weak, and the general health is not good. On removing these glands one frequently finds that they have been

practically converted into large masses of cheesy material; in other cases, while some show only a few caseous or calcareous nodules, others appear fleshy on section to the naked eye without any sign of degeneration; under the microscope, however, one finds that the latter are infiltrated with tubercles and tuberculous tissue.

3. A third variety is where the glandular trouble is more acute and more likely to end in suppuration. Here, in the first instance, the disease may be apparently limited to a few glands, which, however, enlarge pretty rapidly. Further, peri-adenitis occurs, the glands tending to become more or less matted together and adherent to the tissues around while fresh glands enlarge. Where we have this state of matters we find that the glands are breaking down, and suppuration will in all probability occur. If left to itself abscess after abscess may form till numerous ulcers are present, often extending round the neck in the sub-maxillary regions and downwards along the triangles.

4. We may have to deal with tuberculous glands with unopened abscesses. Suppuration in connection with tuberculous glands may be met with under various conditions. Most commonly the state of matters is that described in No. 3, but in some cases the disease may be much more limited, and only one gland or one or two small glands may break down. Again, we may divide these cases into those where the abscess is still beneath the deep fascia, and those where it has burst through and formed a subcutaneous swelling often with thin skin over it. Again, in some cases the gland may be only partially broken down and a large quantity of cheesy material and disorganized glandular tissue is found at the bottom of the cavity when the abscess is opened. Or, on the other hand, the gland may have completely broken down and we practically have only a bag of pus. The latter condition is seldom found except where the abscess has gone on increasing underneath the fascia, usually beneath the sterno-mastoid muscle. Where the abscess comes quickly through the fascia it generally bursts before the gland has been completely destroyed.

5. Lastly, we have to do with cases where abscesses have burst or been opened and where sinuses remain. In some cases these sinuses may be numerous, while in others there may be only one or two. In any case, the sinus leads down through a hole in the fascia to the remains of the gland, and generally there is a quantity of cheesy and calcareous material and broken-down gland-tissue at the bottom. In addition, the skin at the orifice of the sinus becomes the seat of a tuberculous ulcer, so that we may have a large sore in that situation with undermined edges.

In discussing the treatment of tuberculous glands I do not propose to enter into detail on the medicinal treatment, but to indicate the cases which require surgical interference and to describe the nature of such interference. Medically there is very little to be done actively against this disease. The patient should of course be placed under the best hygienic conditions - country or seaside air, sunshine, cod-liver oil and a nourishing diet. Some surgeons place great reliance on arsenic in the treatment of this and other tuberculous diseases. Buchner was one of the first to advocate the use of arsenic, on the supposition that it led to the development of fibrous tissue around the tuberculous lesions, and so encapsulated them or even brought about their disappearance. However that may be, increasing doses of arsenic not uncommonly lead to diminution in the glands, and should be tried except in cases where immediate

operation is imperative. Where the glands are showing any tendency to enlarge or become matted together it is well to fix the head, and this can be readily done by means of a black splint, which takes a purchase around the thorax, with wings coming forward at the upper part and grasping the sides of the head above the ears - practically the splint introduced a good many years ago by Mr. Treves. Attention should also be paid to all possible sources of irritation; carious teeth should be removed, enlarged or diseased tonsils should be excised, adenoids should be operated on, eczema of the skin should be seen to, &c.

As regards local applications over the glands, such as mercurial or iodide-of-potassium ointments, iodine, &c., they are, in my experience, of little use. Indeed, where the gland is large and superficial and on the point of breaking down, the irritation of the skin over it with iodine may actually precipitate the suppuration instead of preventing it. Attempts have also been made, and I have made a good many myself, by injecting antiseptic materials into the substance of the glands, to arrest the disease, the materials employed being arsenic, undiluted carbolic acid, iodoform, &c., but none of these have led to any good result, and I cannot recommend them.

With regard to these expectant methods of treatment, it is of great importance to remember that they must not be carried too far, and it is of especial importance not to send the patient so far away that he cannot be kept under observation. One is very apt to allow the patients to go off to the country for an indefinite time, and then find when they come back that suppuration has taken place and that operation is imperative; the operation then required will probably be more extensive, certainly it will be more difficult and less certain as regards its results, than if it had been done earlier. Where there is any doubt about the case, and especially where one sees the patient for the first time, it is better to watch the case for a time than to send the patient away at once.

The operative procedures adopted in these cases are two-fold, namely, either excision or scraping. If excision is adopted its aim is not only to get rid of the actually enlarged glands, but to remove the disease, if possible, completely, so as to avoid recurrence. To do this it is clear that not only should the large glands be taken away, but also the smaller ones in the vicinity which are likewise infected, and the operation to be effectual must be pretty extensive even in comparatively limited cases. The sort of operation which I recommend, and am in the habit of practising, will be presently described. Scraping, on the other hand, only affects an individual gland or glands which are breaking down and leaves any others which may be infected behind. These may subside and not give any more trouble, or, on the other hand, especially in the third form above mentioned, they may rapidly enlarge, and fresh scraping may be necessary. This method has its uses in certain cases, as will be presently pointed out, but it must rank second in importance and in choice to complete excision.

As a matter of curiosity I have looked out the last 100 cases of tuberculous glands in neck on which I have operated, with the view of seeing the sort of treatment adopted and the results. Of these 100 cases, 30 had unopened abscesses and 18 had sinuses. In some cases scraping and excision were performed in different situations at the same time. The following are the facts:-

In 84 cases excision was employed in the manner to be presently described (in 4 of these, sinuses in the neighbourhood were scraped). In some both sides were operated on either the same day or after a week's interval; 19 of these had abscesses and 10 had sinuses. In 12 cases other glands in the neighbourhood subsequently enlarged and required further operation; for example, where the anterior triangle had been cleared out glands subsequently enlarged in the submaxillary region, or on the other side, or in the posterior triangle. In none did recurrence take place in the area operated on.

In 20 cases scraping was done either because sinuses were present or because there was a large single abscess. In 11 of these, unopened abscesses were present and in 9 sinuses. In 9 recurrence took place *in situ* and further operation was necessary.

Let us now consider the treatment to be adopted in each of the five classes of cases above referred to.

1. These cases may well be watched for a time, treated with arsenic, country air, good hygienic conditions and so forth, and unless the disease becomes active, most usually as the result of some intercurrent affection, there is as a rule no need for any surgical interference. There is no marked deformity in these cases; there is not as a rule much tendency to suppurate, and probably no great danger of dissemination of the disease. As long, therefore, as the glands remain quiescent these cases may be left alone in so far as active intervention is concerned.
2. The second class of cases, where there is marked enlargement of glands amounting to deformity, and where the glands are numerous and the disease spreading, generally requires operation. A trial of the arsenic treatment may be given, but if it fails operation had better be resorted to. It is not advisable to wait too long in these cases, for the tendency is to progressive infection of the glands, and country air and other expectant means have but little influence on them. As has already been said, in many cases these swellings are simply composed of a mass of caseous material, and while they may not break down the disease has a great tendency to spread down the neck into the thorax and axilla and to prove a distinct source of danger to the body generally. The only operative procedure possible here is excision; scraping is quite out of the question. The excision to be of use must be especially free, and if it is found that any glands beyond the area of operation have escaped they should subsequently be removed.
3. In this group the matting together of the glands as the result of peri-adenitis shows that active inflammatory processes are going on in them, and while they sometimes subside after careful treatment their progress must be especially closely watched, and, if no improvement follows, operative interference should be carried out before a definite abscess has formed. In these cases some surgeons adopt scraping, others free excision, and I have no hesitation for expressing my very decided preference for the latter course, and that for the following reasons. In the first place, we seldom have only one gland enlarged, while the scraping only affects the individual gland penetrated by the instrument. It is of course possible to push the instrument on into other glands, but the result is not very satisfactory, and the smaller glands which are also infected are left untouched. Besides, even as regards the glands which are scraped out, it is often difficult, unless they are very much broken down, to clear them out completely, and thus tuberculous material is apt to be left

behind, which rapidly grows and infects the wound, and thus recurrence very often takes place. It often happens also that the smaller glands enlarge and a mass quickly forms as large or larger than the original one. And it is probable that the irritation of the scraping increases the inflammation and leads to this enlargement. Further, in a certain number of cases acute general tuberculosis has followed such scraping. The results of excision in these instances are as a rule highly satisfactory, provided that the operation is so extensive as to include the fat and smaller glands in the neighbourhood and that none of the operation is done by scraping. Some surgeons, when glands are adherent to the jugular vein, as they often are, remove as much as they can with the knife and scrape the part adherent to the vein; but, as I shall state presently, there is no objection to removing the vein along with the adherent gland, no harm whatever resulting from this procedure. I have seldom seen recurrence after these operations, and this is the experience of others, and I have no doubt that in many instances the patients have been saved from a great risk. It is also very important in all cases to look for and remove a possible primary focus, such as enlarged tonsils, carious teeth, mastoid disease, &c., at the time that the excision of the glands is carried out.

4. Suppurating Glands – The conditions under which one meets with suppuration in the glands are various, and we may arbitrarily divide them into three groups.

    a) The abscess in the gland has burst through the fascia, but only forms a comparatively limited swelling under the skin. In these cases I advocate complete excision of glands, abscess, &c., in the manner to be presently described, an oval piece of skin being taken away over the abscess. In these cases it is usually necessary also to remove the jugular vein. Care should be taken as far as possible to avoid puncturing the abscess, although in many cases if large it is very apt to burst, and pus escapes over the wound; even when this takes place it is very remarkable that I have never noticed tuberculous infection of the wound. I have of course always washed the pus away immediately, but even doing that, if we judge from the result when a cancerous gland bursts, it is surprising that in some cases, at any rate, the wound does not become tuberculous.

    b) The abscess in the gland has burst through the fascia and formed a large swelling under the skin with marked thinning of the skin over it. Under these circumstances the removal of the whole of the thin skin, which would be necessary in complete excision, would leave a gap which it is difficult to close, and the scar of which would be apt to stretch afterwards; hence I prefer in these cases to open the abscess in the first instance and then later on (in three or four weeks), when the skin has recovered and only a sinus is left, to carry out complete excision. In some cases it is well to scrape out the gland and abscess in the first instance, instead of merely opening it, and it may be that this will suffice for a cure; but if fresh swelling appears, excision should be performed as soon as the skin has recovered.

c) An abscess is present which has not yet burst through the fascia. Here one may in many cases wait and allow the abscess to increase till it is probable that the gland has become completely broken down, and then open and scrape out the abscess, inject iodoform and glycerine and stitch up the wound again. A very small incision behind the sterno-mastoid frequently suffices in these cases, and the resulting scar is practically invisible. Cases, however, in which this result can be obtained are not very common, and sometimes a sinus remains, and if it does and will not heal, and if fresh glandular enlargement occurs, excision should be performed.

5. Enlarged glands with sinuses – Here also excision is the best treatment unless the sinuses are so numerous that the operation is not practicable. The operation is no doubt somewhat more difficult, but if it be carried out in the systematic manner to be presently described I have never failed to complete it. Where the sinuses are too numerous for excision, thorough scraping and the subsequent application of undiluted carbolic acid is the best treatment.

Excision of tuberculous glands is an extremely satisfactory operation if carried out sufficiently widely. If the enlarged glands alone are removed recurrence is very apt to take place, and this is more likely to happen if suppuration occurs in the wound. Under the latter circumstances the glands which are infected but not excised tend to enlarge and undergo suppuration.

I have already said, and I cannot emphasise the point too strongly, that in operating on tuberculous glands one must not be content with shelling out the infected glands, but must remove the whole of the glandular area, whether the glands are visibly affected or not. To shell out the enlarged glands is only to remove the most affected of the glands, leaving behind numerous others which are also affected but not markedly enlarged. It does not of course necessarily follow that these glands left behind will enlarge, but they are more especially likely to do so if the operation has been an extensive one followed with much tearing of the tissues, and therefore with increased lymphatic flow, or accompanied by suppuration or even a less degree of inflammation. Under those circumstances the glands swell up and the tuberculous disease makes progress in them and generally forms fresh masses. And it must be borne in mind that a second operation in the same region is very much more difficult than the first on account of the cicatricial tissue distorting the relations of the parts. Hence where glands are removed for tuberculous disease one must map out and remove all the fat containing small glands in that particular lymphatic area, in addition to the large ones.

The situation where one most commonly has to operate on tuberculous glands is in the anterior triangle of the neck, especially towards the upper part, and there one must remove not only the whole of the fat and fascia present in the anterior triangle of the neck, leaving the vessels, nerves and other structures thoroughly clean, but if one is to avoid recurrence one must also thoroughly clean out all the tissues underneath the sterno-mastoid, so that the muscles on which the sterno-mastoid rests are completely bared. This cleaning out process must extend backwards into the posterior triangle, and, if glands are enlarged there, one can very often by working from the front clear out even the greater part of the posterior triangle. In any case, it is essential in

removing glands from the anterior triangle, whether they be tuberculous or whether they be malignant, to remove all the material around the vessels whether infected or not, and all the fat and glands underneath the sterno-mastoid. Especially with regard to the latter, the removal must extend quite up to the mastoid process, because very often glands enlarge about the region of the transverse process of the atlas, and therefore the material there must also be taken away. The following is the operation which I perform in all cases where the glands of the anterior triangle of the neck are enlarged and require operation:-

The incision varies according to the extent of the disease and other circumstances. The one which I use most commonly is an incision commencing over the edge of the sterno-mastoid from half an inch to an inch below the ear, and running downwards in the line of the anterior edge of the muscle to a point opposite the cricoid cartilage. In some cases, especially in females or where the disease is not extensive, the incision need not run so low. Another incision where the disease is not very extensive, or in the case of women, where the scar should be as little noticeable as possible, is a shorter and curved one so as to fall more in the line of the natural folds of the neck. This incision begins a little lower and also further back than the first, and curves downwards and forwards till it ends close to the pharynx at or above the level of the middle of the thyroid cartilage. The elasticity of the skin allows of retraction to a sufficient extent to get good access to the part. In both these cases if an abscess is present the incisions should be so planned as to include the thinned skin in an oval incision. A third incision suitable for the extensive enlargements causing deformity described under No.2, and involving not only the anterior but also the posterior triangle, in fact the whole side of the neck, is that introduced by Dr. Beatson, of Glasgow, which gives very complete access to the parts, and although extensive is very little noticeable. This is a curved or horseshoe-shaped incision beginning over the upper part of the anterior triangle just in front of the sterno-mastoid muscle at a point opposite the angle of the jaw, running backwards to the posterior triangle, curving down the centre of that triangle to the lower part, and then forwards again to the anterior edge of the sterno-mastoid at the lower part. This large flap of skin being turned forwards, free access is obtained both to the anterior and posterior triangles. The resulting scar is scarcely noticeable from the front, and the greater part of it is readily concealed by the hair and collar of the dress.

Whichever incision be made in the skin, the dissection is then carried down through the fat to the deep fascia, and the skin and superficial fascia are separated and cleared off the deep fascia over the anterior triangle. One should begin by exposing the edge of the sterno-mastoid muscle along the whole length of the incision, and then, when one has exposed the sterno-mastoid muscle, one can at its anterior border readily define the deep fascia, and then separate the tissues over the whole of the anterior triangle. Where a curved incision such as has been described is employed it is well to detach the skin and fat at the lower part of the wound for some distance and then to pull it down as far as possible by means of a retractor.

At the very lowest part of the wound an incision is then made through the deep fascia close to the edge of the sterno-mastoid muscle, and the jugular vein is defined. This is the key of the operation; the glands always lie close to the jugular vein and are often adherent to the sheath of the vessel, and if one attempts to cut them out without previously seeing the vein one may get into a great deal of trouble. But by beginning

at the lower part, below the area of enlargement of the glands, and exposing the vein and stripping up the common sheath, one can avoid any subsequent injury to the vein.

Having exposed the vein and divided the sheath, one can insinuate a separator, and in many cases also the finger, between the sheath and the mass of glands. Where the vein is very adherent, and especially where the glands are very much matted together and suppurating, one is very apt to fail in getting the mass properly away by trying to peel it off from the jugular vein, and under those circumstances the best plan is, having exposed the vein at the lower part, to ligature it in two places and divide it between the ligatures. Then, picking up the lower end of the upper part of the vein, insinuate the finger behind it so as to separate the vein along with the mass of glands forwards from the artery and vagus nerve. The loss of the jugular vein apparently does not make the slightest difference to the patient, and it makes all the difference as regards the ease of the operation, and also as regards the subsequent freedom from recurrence. Hence, probably in the majority of cases – in all cases where there are sinuses, and practically all cases where suppuration is present – I make a point of dividing the vein between two ligatures and taking it away along with the mass of glands.

Having insinuated the finger either behind the vein, or, if it is to be left, between it and the mass, one proceeds next to define the inner border of the anterior triangle. This can usually be readily done, as the matting is more or less generally limited to the outer part, and by peeling the fat and glands forward from the carotid artery one can usually begin to divide the tissues upwards at the level of the side of the larynx. One or two large veins, namely, the superior thyroid, the lingual and facial veins, will be met with, and if the vein is being taken away they must be clamped before they are divided. These are freed and clamped in two places and then divided, the parts of the veins which run into the jugular vein being turned back with the mass. When the mass is turned outwards, the vein can be seen running on its inner surface in cases where it has been divided below, and it should then be divided at the upper part, a ligature passed around it and tied as high as possible. The vein is then divided below that point, and the intermediate portion comes away with the mass. The descendens noni nerve can be preserved quite easily.

The next step in the operation is to ascertain the position of the spinal accessory nerve. This is usually readily done by turning back the edge of the sterno-mastoid, and peeling off the fascia from its deeper surface; one very soon finds the point of entrance of the nerve towards the upper part, and can then usually pass the probe end of the separator upwards along the nerve, which often runs through the glandular mass, and thus define its course exactly. In most cases it will be found that the mass of glands is divided into two parts by the spinal accessory nerve; the largest mass is usually below it, but there is generally also a considerable mass above the nerve. Having defined the nerve, one tears asunder the glands over it so as to expose it throughout its whole extent. And then, keeping the nerve in mind, one proceeds to separate the glands at the upper part. In this region it will usually be found that the mass is fairly firmly attached to the fascia over the transverse process of the atlas. This should be next divided, and then the glands and fat can be pulled down. In some cases, where this forms the chief part of the tumour, this is not so easily done, and Mr. Stiles suggests that the sterno-mastoid muscle should be divided at the upper part so as to expose the region thoroughly. This certainly gives excellent access to all the

tissues underneath that muscle, and is of especial value in the removal of malignant glands. Having separated the glands in this situation, one continues with the finger and dissector to bring down all the fat and glands beneath the muscle as far back as the upper part of the posterior triangle. Usually, having separated the glands from over the transverse process of the atlas, the glands further back along with the fat can be readily peeled down. This peeling down of the fat and glands beneath the sterno-mastoid muscle is continued until one can pull them right down below the spinal accessory nerve. Having once drawn down the mass underneath the spinal accessory nerve, one pulls the sterno-mastoid outwards and the nerve upwards, and then proceeds to clean the under surface of the sterno-mastoid muscle and the muscles beneath it so as to remove the whole mass of fat and glands in one piece. It is well, after having cleaned the tissues for some distance, to ascertain the point of exit of the branch of the spinal accessory nerve which runs across the posterior triangle to the trapezius muscle, and to take care to preserve this from injury. In this way one can also pull out a quantity of fat and glands from the posterior triangle, and this should always be done whether they are affected or not. When the mass is removed a clean dissection of the anterior triangle and the parts underneath the sterno-mastoid muscle should be seen. In some cases glands are also present beneath the vessels, and in peeling off the vein it is well to try and take these along with it; if not they should be removed subsequently, and one should always investigate whether there are or are not glands in this situation.

If one proceeds in this methodical manner the chances of recurrence in the anterior triangle are extremely slight, as all the glands are removed. Recurrence may take place in the posterior triangle lower down, or anteriorly in the sub-maxillary triangle, but recurrence rarely takes place in the anterior triangle itself, more especially in the cases where the vein is removed along with the other tissues.

It is well to bear in mind one other point, namely, towards the upper part of the incision one is very apt to catch a little twig of nerve which runs down under the jaw to the lower lip. The result is that there is paralysis of a little bit of the lower lip close to the angle, so that when the patient speaks or laughs the lower lip goes rather to the other side. This trouble can hardly be avoided in bad cases, but the patient may make his mind quite easy about it because I have never seen recovery fail to take place. In two or three months the whole thing has disappeared again, and I believe the trouble is more often due to the division of the platysma than to division of the nerve, and when the platysma has firmly united again and the scar is getting loose, recovery is, as I have said, complete, so that, although it is a thing which it is well worth trying to avoid, if it does happen it is not an occurrence which need give one the slightest anxiety.

In cases where the gland has undergone suppuration and the skin is quite thin, if the abscess is not large it is well to include the thin skin in the incision and to avoid, as far as possible, rupturing the abscess cavity while dissecting out the gland.

In other cases, where the abscess is large, and where, therefore, a large amount of skin will have to be taken away, I believe it is best to divide the operation into two stages, and, in the first place, to open the abscess and put in a small drainage tube, and then in the course of three or four weeks, when the skin has recovered and we have only a

sinus running to the part, to operate with the view of removing the glands. In this way less skin is taken away.

After the operation has been completed, the incision is stitched up with fine silk and a continuous suture, no drainage being employed. Sponges should be incorporated with the dressing so as to excise pressure over the anterior triangle, and the dressings should not be changed for about ten days.

Where sinuses are present, which are usually septic, it is well before beginning the operation to scrape out the orifice of the sinuses but not to go far in, and then to sponge the surface with pure carbolic. In fact, I usually take a tiny bit of sponge which has been soaked in undiluted carbolic acid and push it well into the sinus. The incisions are then so planned that the sinuses are included between oval incisions, and care is taken not to open them in the course of the operation. The result is that I have hardly ever seen infection of the wound occur even in operations with septic sinuses. At the same time, where one has operated in cases with septic sinuses, it is well to put in a drainage tube for a few days in case infection should have occurred, because one cannot, under those circumstances, feel anything like certain that infection will not take place. Where a drainage tube is employed it is well to perforate the skin behind the sterno-mastoid and bring out the end of the drainage-tube there; that allows the anterior incision to heal and at the same time it gives the most dependent point for drainage.

In cases where we have enlarged glands both in the anterior and posterior triangles, which is often the case where the glands are causing a considerable amount of deformity, we may either remove the glands by two incisions, one such as I have described in front of the sterno-mastoid, and another running along the posterior border of the sterno-mastoid at the lower part, or employ the incision introduced by Dr. Beatson, of Glasgow, which I have already described. When the flap has been turned forwards we can then proceed to the removal of the glands in the systematic manner just described.

Where the posterior triangle alone is the seat of enlarged glands, the main mass is usually just above the clavicle, and it can be removed either by a vertical incision running upwards and slightly backwards in the middle of the space, or by a triangular incision running backwards from the edge of the sterno-mastoid along the upper border of the clavicle to the trapezius, and then upwards along the edge of the trapezius. In any case, the essential point in this operation is to take care of the branch of the spinal accessory nerve running to the lower part of the trapezius, and this is very often difficult to do, because the glands run especially along this nerve, and are very apt to completely surround it. So that the first part of the operation would consist in detaching the fascia from the posterior border of the sterno-mastoid and specially paying attention to the point where this nerve comes out. Then, having defined the nerve at the anterior part, a probe is insinuated along it, and the tissues divided over the probe, so that in most cases, with a little care one can lay bare the nerve in its whole extent, and having done so free it and avoid injury to it afterwards.

At the lower part one will generally find that the glands run beneath the sterno-mastoid and are attached to the jugular vein. In fact, when one pulls on the mass one can generally bring the jugular vein out behind the sterno-mastoid. Here the vein

should be defined at the upper part and then the sheath divided, and the mass of glands detached from it. On the right side there is very little trouble about doing this quite satisfactorily; on the left side at the lower part one must bear in mind the presence of the thoracic duct and avoid injury to it, for the glands are very apt to be pretty adherent in this region. One may also in pulling the glands away too violently pull out large lymphatic branches entering the duct, and so leave holes which may leak. Under the latter circumstances one need not be anxious, for though chyle may escape, still, in a short time the hole closes, and there will be no further trouble.

In cases where the glands affect the sub-maxillary region, a curved incision from the centre of the lower jaw carried downwards to the hyoid bone and then backwards and upwards to the angle of the jaw, will usually expose the whole area. In many cases the glands are very closely adherent to the sub-maxillary gland, and while one should always try to leave this gland if possible, in some bad cases it may be necessary to take it away. There is no particular point about this operation. It is a perfectly simple one. One may injure the facial vein and even the artery, but they are quite easily secured.

I need not discuss the extirpation of tuberculous glands in other regions. In the axilla one would make a curved incision and turn down a flap from over the floor of the axilla, and clear out the space. In the groin one must sometimes make T-shaped flaps; in other cases a curved flap with the convexity downwards below Poupart's ligament will expose both femoral and inguinal glands.

LECTURE II

Tuberculous peritonitis

Tuberculous disease affecting the peritoneal cavity is not by any means an uncommon affection; its frequency has been variously estimated, but it seems to occur in rather over 5 per cent. of tuberculous patients examined post mortem.

The pathological conditions present in these cases are very various and a number of classifications have been made according to the state of matters present. It is not, however, easy to draw a hard and fast line between the different groups of cases either clinically or pathologically. In some cases one finds an eruption of minute tubercles over the peritoneum which have not yet caused any inflammatory or other change in the membrane, the endothelium over the tubercles being unaltered and not showing any evidence of inflammation. This condition is usually associated with acute general tuberculosis and it is generally spoken of as tuberculosis of the peritoneum, in contrast to tuberculous peritonitis proper, in which the disease is more or less limited to the abdominal cavity and in which inflammatory changes have occurred on the peritoneal surface. On opening the abdomen in cases of tuberculous peritonitis the following are the chief types of lesions which may be found:

1. The peritoneum may be studded with tubercles of varying size, some small, greyish and transparent (the ordinary miliary tubercles), others larger and tending to become cheesy. These tubercles are scattered over both the visceral and parietal peritoneum, and there are frequently patches of fibrinous exudation over them which readily peels off, and in the early stage there is not

necessarily any matting together of the intestines or shrinking or adhesions of the omentum or mesentery. The peritoneum is usually markedly hyperæmic. In these cases there is almost always more or less fluid present in the abdominal cavity, usually of a lightish straw colour, but in more acute cases somewhat more opalescent or stained with blood. The sensation on putting one's finger into such an abdomen is the same as if it were passed into a bag of sago.

The tubercles are not usually equally distributed over the whole cavity, but are most numerous in patches, and this is more especially the case where the origin of the tuberculous peritonitis is some tuberculous lesion inside the abdominal cavity. For example, in peritonitis originating from the tubes the tubercles are most numerous in the pelvis and become less numerous as one passes from it; or again, in tuberculous peritonitis originating in connection with tuberculous ulcer of the intestines, the tubercles are, in the first instance, most numerous over the intestines in the neighbourhood and less numerous elsewhere.

Although, as it has been said, in these cases the intestines are not usually matted together, still in some instances the fibrinous exudation produces sufficient adhesion to prevent the free spread of the fluid over the whole abdominal cavity, and thus we may have one or more collections of fluid simulating cystic tumours.

2. In a second set of cases the formation of adhesions and fibroid induration of the omentum and mesentery are the marked features. The intestines become bound together in masses by new fibrous tissue in which military tubercles may be present. These adhesions are often very firm and may in parts constrict the intestine, or in other parts from their shrinking lead to kinking of the intestine, and in both ways they may cause partial or even complete obstruction. Further, the intestines are not only adherent to one another but they are also very apt to contract adhesions to the abdominal wall, and this forms a great difficulty in performing laparotomy in these cases; and it is also the great objection to aspirating the abdomen where fluid is present. Where the whole abdomen is involved these adhesions are especially marked between the liver and diaphragm. The omentum is also early involved in these fibroid changes; the two layers of the omentum become matted together, and the whole structure becomes much thickened and shrunken, and in an advanced stage forms a thick rolled-up mass like a sausage lying about or above the level of the umbilicus and usually running more or less transversely across the abdominal cavity; it is generally adherent to the abdominal wall at this part. This thickened omentum contains numerous tubercles in its substance and scattered over its surface. The mesentery is also markedly affected with similar changes and becomes thickened and shrunken and drags the small intestine up towards its root, and thus it comes about that when fluid is present it is most apt to collect towards the left side and lower part of the abdomen. The mesenteric glands are also enlarged, but not as a rule cheesy.

In these cases a certain amount of cirrhosis of the liver may be met with, or there may even be tubercles in the substance of the liver. The spleen also is not uncommonly enlarged, either as a result of passive congestion or hyperplasia, or in some cases from the presence of tubercles. This adhesive form of tuberculous peritonitis may or may

not be accompanied by the presence of fluid, and where fluid is present it is most often encapsuled, and there may be more than one collection.

3. A third condition which may be present, and one which is extremely grave, is where caseation is taking place. Under these circumstances the tubercles run together and form large masses which undergo caseation; the mesenteric glands are large and caseous; the omentum is often converted into a caseous mass; and caseating masses form in the adhesions which bind the intestines together. The contractions and distortions of the intestine and the shrinking of the mesentery and other changes mentioned under the second form are usually much exaggerated. This condition is especially associated with intestinal ulceration, and the intestine is usually thinned, and may even be perforated. Collections of fluid are frequently present, most usually encapsuled and multiple, and not uncommonly purulent. The pus may present all the characters of ordinary tuberculous pus, but in other cases it may be foul-smelling, either as the result of infection through the intestinal walls or as the result of actual perforation of the intestines. In this form, in infants especially, the condition may be most marked in the neighbourhood of the umbilicus, and the pus may make its way through the abdominal wall at this point. Where this occurs we find a sinus passing into the abdomen, and not uncommonly a fæcal fistula is present as well. As this fæcal fistula is usually in the small intestine and often pretty high up, the child rapidly emaciates and goes downhill.

In both these last forms the upper part of the abdominal cavity may be healthy, the disease being shut off above by the adhesion of the omentum to the abdominal wall at the level of the umbilicus. In other cases it may be still more circumscribed and form a limited patch with fluid in the interior, this condition being most commonly met with in the form of an irregular fluctuating swelling in the left iliac fossa. Another local form is where the disease is limited to the pelvic region, which occurs especially in connection with infection from the Fallopian tubes; or again, we may meet with a tuberculous perityphlitis forming in the mass of the right iliac fossa, which has been mistaken for a malignant tumour. These masses are usually secondary to tubercle of the appendix or cæcum.

There are many intermediate forms and varieties of these pathological changes which it is impossible to enumerate here, but these are the three chief types, and they are of especial importance from the point of view of treatment.

Origin – Tuberculous peritonitis usually occurs in the course of tuberculous disease elsewhere, such as phthisis, tuberculous disease of bones and joints, tuberculous glands, genito-urinary tuberculosis, tuberculous ulceration of the intestine, and so forth, and it is therefore a secondary affection. In a few cases, however, tuberculous peritonitis has been the only tuberculous lesion discovered, so that evidently some cases may be of primary origin and due to the deposit of the bacilli from the blood. These primary cases are, however, apparently very rare. Judging from a large number of published statistics, the frequency of the primary form varies from 2 to 10 per cent. of the total cases. Whence bacilli come in these primary cases, and why they are deposited in the abdominal cavity, are points which are not cleared up. Some have supposed that they enter through the intestine, passing directly through its wall to the lymphatics of the peritoneal surface, and then being distributed over the whole of the

peritoneum; most probably, however, they are deposited from the blood, attacking in the first place some portion of the peritoneal surface in which the resisting power is diminished, and then rapidly spreading over the rest. Injury, alcoholism and cirrhosis, seem to be predisposing causes, and a hereditary history of tuberculosis can be obtained in the majority of cases.

As a secondary disease tuberculous peritonitis may follow either some intra-abdominal condition or tuberculosis elsewhere. Of the intra-abdominal conditions, the most common are tuberculous ulceration of the intestine, tuberculous mesenteric glands, and tuberculous disease of the genito-urinary system, more especially of the Fallopian tubes.

Many authors look on intestinal ulcer as one of the most common causes of tuberculous peritonitis. The highest estimate is that given by Pribram, who found that the intestine was primarily affected in 87 out of 168 cases; this is, however, quite an exceptional proportion, and a fair estimate of the ordinary frequency is about 20 per cent. The probable course of events in these cases is that the tubercles which form the base of the intestinal ulcer gradually infiltrate the coats of the intestine till they reach the sub-serous coat, and then infection of the peritoneum quickly follows. The form associated with intestinal ulcer is usually the caseating form (No. 3), and is the most serious both as regards the chances of recovery and as regards the general condition of the patient. It is in these cases more especially that perforation of the intestine takes place, followed either by an acute perforative peritonitis or more commonly by rapid formation of pus in a localised cavity.

Another common source of infection, at any rate in the female, is the generative organs, more especially the Fallopian tubes. For example, Schmalmack found in 21 post-mortem examinations of women who had died of tuberculous peritonitis that in 10 the primary source was tuberculosis of the generative organs; in 6 of these the tubes alone were affected; in 2, the tubes and ovaries together; and in 2, the tubes, ovaries and uterus. This again is quite an excessive estimate, but there is no doubt that in the female tuberculous peritonitis is often associated with tubercle of the generative organs, more especially the tubes, and is most probably secondary to it. In these cases the tubes are enlarged, hard and tortuous, and often form thick, sausage-like tumours full of cheesy material and with their walls dotted with tubercles. They usually fall down into Douglas's pouch and become firmly adherent there to the uterus and rectum. In some cases it may be that this tubal disease is secondary to tuberculous peritonitis, but most often one finds either no tuberculous peritonitis at all or a commencing tuberculous peritonitis clearly secondary to disease of the tubes. The disease in the Fallopian tubes almost always commences close to the fimbriated extremity, and the canal is quickly shut off from the peritoneum by firm fibrous adhesions.

Tuberculous mesenteric glands or retro-peritoneal glands are the least common of these three sources of infection.

In many cases the primary seat is not in the abdominal cavity at all, and of these the most frequent is tuberculosis in the thoracic cavity, either of the lungs or of the pleura. Tuberculosis of the lungs is found in something like 25 to 30 per cent. of all cases of tuberculous peritonitis, while tuberculosis of the pleura is not at all uncommonly

associated with this disease. The latter is of course easily explicable on account of the intimate lymphatic connection between the two cavities.

As regards age, the great majority of cases occur between twenty and thirty-five years of age. For instance, of 109 per cent, referred to by Lindfors, 35 were between twenty and thirty-five. It is also common in children, but is comparatively rare after thirty-five years of age, and quite exceptional above fifty.

As regards sex, a very curious result is obtained according as we take the statistics of cases operated on or of cases examined post mortem. If the statistics of surgeons are taken, the great majority of the cases occur in women. For example, taking at random one or two statistics, Lindner publishes 186 cases, of which only 21 were males. Lindfors publishes 109 cases, of which only 9 were males, and König publishes 130 cases, of which 10 were males. This difference, though still maintained, is not so marked in children. Thus, in Aldibert's tables I find 106 adult female cases and 11 males, while in children there are 30 females and 17 males.

On the other hand, if we take the statistics of the *post mortem* room, we find a larger number of cases in males than in females. Thus Vierordt, in 24 cases, had 19 males and 5 females; König, in 108 cases, had 89 males and 19 females, and Schmalmack, in 54 cases, had 33 males and 21 females.

How these results are to be explained is very difficult to understand. We must, I think, assume that a much larger proportion of female cases come to operation than males, and if this be true we must also, I think, conclude either that the disease is much more readily recovered from in females than in males, of which there is no evidence, or else that operation has a remarkably beneficial effect upon it. That the latter is true will be evident when I come to consider the results of operation; and it must also be true that a much larger proportion of females are submitted to operation than males. Many of these operations have been and are done from mistaken diagnoses or for exploratory purposes; the mistaken diagnosis is most usually an ovarian cyst, and hence it occurs only in females; and besides, in women the abdomen is more often opened and the proposal to do so is more often acceded to than in men. Then also women with enlargement of the abdomen are more likely to come under the care of the gynæcologist and of the surgeon than men, and the surgeon thus chiefly sees cases of localised tuberculosis simulating tumours, while the physician sees cases of diffuse ascites and those which do not so often come under the care of the surgeon. To some extent, also, the difference between the two sets of statistics may be taken to represent the relative value of medical and surgical treatment, the patients not operated on appearing much more often on the *post-mortem* table than those who are.

Symptoms – The commencement of the disease is usually insidious and slow, although in some cases it may be rapid and may then be mistaken for typhoid fever, tuberculous meningitis &c. In most cases the early symptoms are quite indefinite. The patient has a feeling of *malaise* and weakness, he is subject to headache, may suffer from thirst, does not sleep well, and frequently has night sweats. He soon begins to lose his appetite, feels out of sorts, and not uncommonly has occasional vomiting. The bowels are irregular; he frequently suffers from obstinate constipation or from diarrhœa, or, again, from alternate constipation and diarrhœa. By-and-by he begins to have occasional abdominal pain, especially of a shooting character, or it may be only

a feeling of weight or pressure. In other cases there is no pain at all; indeed, it is very seldom that pain is severe at the commencement of the trouble. The pain, if present, is increased by exertion. The temperature is very variable; there is generally an evening rise, but it may not be marked. In a good many cases there is no rise at all, the temperature being normal; while in others, again, after it has been normal for some time, it may suddenly commence to rise in the evenings and assume a marked hectic type. In the early stage, except in the acute cases, the patients are able to go about, or even follow their employments, but from time to time they may have to lie up on account of feeling out of sorts, or of general weakness, or of increasing pain, and then after a few days' rest they are able to go about again. After some weeks or months, however, the patient has to give up work either on account of increasing weakness, or more commonly on account of gradual swelling of the abdomen, a feeling of weight, or more rarely severe pain, shortness of breath, &c. As the disease goes on the general symptoms increase, there is rapid advance in the malnutrition and emaciation, the skin becomes pale and sallow and dry, the cheeks sink in, and the patient acquires the suffering aspect of those with abdominal trouble. In others, again, the symptoms are much more acute, and in a considerable number of cases they have been mistaken for those of typhoid fever.

On examining the abdomen the condition of matters present depends on the pathological changes already described, and to a great extent, also, on whether there is or is not fluid, and on whether the fluid is free or in loculi. Where there is much free fluid present the abdomen is distended, somewhat flattened at the sides, and the ribs everted. The abdominal wall is stretched and shining, with big veins running over it, and it is usually so tense that nothing can be felt through it. The pain is not generally marked in these cases. Where the fluid is less, the thickened omentum is readily felt in the form of a tumour-like mass of a sausage shape, generally running more or less transversely across the abdomen about or just above the level of the umbilicus, the omentum being thickened and rolled up by the fluid and the distended intestines, and pressed against and becoming adherent to the abdominal wall. The percussion note is uncertain and atypical, fluctuation is not distinct, and the fluid, as a rule, only changes its position slowly owing to having to make its way among the adherent intestines. Under other circumstances, again, the fluid may be more or less completely encapsuled, and form definite fluctuating tumours which may be mistaken for ovarian or other cysts. On the other hand, there may be little or no fluid present: the coils of intestine become adherent, the mesentery contracts, the omentum is thickened and shrunken, and hard bands and thickenings are formed in the abdomen. Thus, one may not only feel the thickened omentum, but also indefinite patches of hardness elsewhere due to these bands and thickened adhesions, or one may find more definite hard tumours which are generally composed of masses of glands or of thickened adhesions studded with tubercles, or of small collections of encapsuled fluid. The abdomen is uneven owing to irregular distention of the intestinal coils with gas. There may be marked meteorismus, and when the intestine is kinked, or in any other way obstructed, the coils of contracted intestine may be seen through the abdominal wall. In the latter cases, of course, there would probably be other signs of obstruction. The splenic dulness, if it can be made out, may be increased. The liver dulness is not uncommonly diminished, but, on the other hand, the liver may be enlarged as the result of early cirrhosis or fatty infiltration. There is often decrease in the quantity of the urine, and not unfrequently albuminuria. The stools are frequently light in colour, due to imperfect digestion of the fat.

It is not uncommon for the disease to be associated with various complications, more especially with intestinal obstruction due to kinking, bands, or narrowing of the lumen in connection with ulcerations; or, on the other hand, perforation may have occurred, either through an ulcer or above an obstruction; or again, we may have inflammation and thickening around the umbilicus, especially in children, which has been already referred to and which is pathognomonic of tuberculous peritonitis. In bad cases belonging to type III., where suppuration is present and emaciation is usually rapid, there is generally considerable fever and the patient quickly goes downhill. It is not uncommon for the disease to be combined with phthisis, or with pleurisy. Schreiber gives 26 cases, of which 12 had also tuberculous pleurisy; and Heintze in 25 cases had 20 with pleurisy. Though not as a rule so frequently present, pleurisy is nevertheless not at all an uncommon accompaniment; it may precede the peritonitis or the two may begin simultaneously, or more commonly it comes on after it. It often sets in insidiously, and in any case it is grave and increases the dyspnœa.

Diagnosis – The diagnosis of tuberculous peritonitis is a matter of considerable difficulty. It has chiefly to be distinguished from ulcer or cancer of the stomach, gastro-intestinal catarrh, typhoid fever, peritoneal cancer, chronic peritonitis from other causes, and ovarian cysts. The points in favour of tuberculous peritonitis are a hereditary history of tuberculosis, the presence of tubercle elsewhere, the presence of localised atypical thickenings in the abdomen, a fairly rapid formation of exudation, a feeling of weight and uneasiness, an atypical percussion note changing very slowly with alterations in position, the presence of little or no fever, or if fever be present, of the hectic type, slight or no albuminuria, and no demonstrable cause for the ascites. Edebohls describes as typical the presence of small plaque-like circumscribed thickenings of the deeper parts of the abdominal walls resembling urticaria wheals. He says that these are due to localised hyperæmia and swelling of the sub-peritoneal tissue and they do not necessarily correspond to underlying patches of tubercle. I have only seen this well marked in one instance. Rivolta distinguishes between the fluid in tuberculous peritonitis and ordinary ascitic fluid due to disease of the liver by the fact that in the former with glacial acetic acid a precipitate is thrown down of nucleo-albumen, whereas in the latter there is no such deposit. The former also contains fibrin, leucocytes and red corpuscles, and tubercle bacilli are frequently present in it. The presence of tubercle bacilli is best demonstrated by injecting the fluid into lower animals, and it is further found on making such experiments that, whether bacilli be present or not, the fluid is charged with toxines.

As to chronic peritonitis from other causes, it is a question whether, apart from tubercle or cancer, or the localised forms which occur in connection with the female generative organs, the appendix, stomach, &c., there is any other cause of generalised chronic peritonitis. Certainly, where there is no clear etiological factor, and where with a tuberculous history or the presence of tubercle elsewhere the above symptoms arise, the probability is very great that we have to do with a case of tuberculous peritonitis. It may be stated, however, that some hold strongly to the view that, especially in children, we may have a generalised chronic peritonitis other than that due to the above-mentioned causes – that these cases are not infrequent, and that many of the cases of supposed tuberculous peritonitis which recover under medical treatment are not in reality tuberculous at all.

Prognosis – The prognosis of tuberculous peritonitis where no surgical intervention has taken place is undoubtedly very grave, but much depends on the form of the disease and on the presence or absence of complications. The older writers looked on it as almost certainly fatal, and held that the cases which recovered were not tuberculous. Of late, however, the views have become more favourable. Pic put together some years ago the results obtained in 67 cases of children by medical treatment alone. Of these the diffuse form of peritoneal tuberculosis (Form 1) was always fatal. The caseating form (Form 3) was fatal in 70 per cent of the cases (where suppuration was present the mortality was 82 per cent; where it was absent the mortality was 52 per cent). The fibrous form (Form 2) was fatal in 17 per cent. (of these the dry form was fatal in 14 per cent, and the ascitic form in 19 per cent). Pic's actual figures were, 67 cases in all: of these, 27 died; 5 steadily got worse; 11 remained in *statu quo*; 21 improved; and 3 were apparently cured. Monti in 11 cases treated medically had 2 which were apparently cured, and 9 which either remained in *statu quo* or showed some improvement. On the other hand it must be mentioned that Herringham takes a much more favourable view of the disease in children, and publishes 34 cases with only 12 deaths, 9 of these being from intestinal ulcers. He considers that the fatal result is due rather to the complications than to tuberculous peritonitis itself, and that the results in uncomplicated cases in youth are as good after medical treatment as could be expected from operation.

Apart from the nature of the pathological changes found, as in the above classification of Pic's cases, the prognosis is gravely affected by the complications which are present, more especially by the co-existence of ulceration of the intestine, of advanced phthisis, of disease of the liver, of tuberculous pleurisy &c. As regards tuberculous pleurisy, it must, however, be stated that, according to Vierordt, the presence of pleurisy is not unfavourable; on the other hand, Boulland says that almost all these cases terminate unfavourably in a few weeks owing to generalisation of the disease. I think there can be no doubt that tuberculous pleurisy is a very serious complication.

Treatment. Medical – As regards medical treatment, the patient should in the first instance be placed under the best hygienic conditions, and care should be taken to regulate his diet, which must be highly nutritious and at the same time easily digestible. In the more advanced stages of the disease, and especially where there is intestinal ulceration, the diet should be entirely fluid. The bowels should be regulated; if constipated, small doses of castor oil or calomel or cascara being given, or rectal injections, while if there is diarrhœa salines should be used. Where there is ascites, diuretics may be given along with salines. A great variety of medicinal remedies are employed. If there is fever the temperature is kept down by phenacetin, quinine, &c. Col-liver oil is given either by the mouth or by the rectum or rubbed in. Arsenic is sometimes of use. Intestinal antiseptics are advisable, such as creosote, salol and guaiacol. Inunction of the abdomen by mercurial ointment has been praised by some authors. Dr. Burney Yeo attributes good results to inunction of the abdomen with iodoform ointment and the internal use of iodoform. Where the pain is marked the application of unguentum belladonna to the abdomen or even the subcutaneous injection of morphia is desirable. Ice has also been applied to the abdomen with benefit.

While some cases may be improved by these measures, it must nevertheless be carefully borne in mind that in surgical procedures we have a more certain and

effectual method of treatment in many cases, and that therefore the medicinal treatment should not be continued for a long time unless distinct improvement is resulting from it.

Surgical Treatment – The value of surgical measures was found out quite accidentally. In 1862 the late Sir Spencer Wells, in operating on what he supposed to be an ovarian cyst, found on opening the abdomen that he had before him a case of tuberculous peritonitis. He therefore at once closed the wound again, but to his surprise the patient soon began to improve and ultimately got well, and was alive and well twenty-five years later. As abdominal surgery became more and more developed, similar mistakes were frequently made, and further, as exploratory operations were introduced, tuberculous peritonitis was not uncommonly discovered. It was found that in a considerable number of cases after such mistakes or explorations, the patients got rapidly well, and by-and-by it became clear that this could not be regarded as a mere coincidence, but that laparotomy had a distinctly beneficial effect in a considerable proportion of cases of tuberculous peritonitis. Hence surgeons began to perform laparotomy as a curative measure in cases which were diagnosed as tuberculous peritonitis, with results which have established it as a highly successful means of treatment. König was among the first to bring this plan of treatment definitely forward; in 1884 he wrote a paper on the subject, and in 1890 he collected from various sources 131 cases, with the following results: 8 died from the operation, mostly as a result of shock; 16 died some days or weeks later, chiefly as the result of extension of the disease, giving a mortality, immediate and remote, of 24, or about 19 per cent; 23 improved, and 84 were apparently cured. In 48 of these latter cases a year had elapsed since the operation; in 30, over two years; and in 3, more than six years. Maurange gives statistics of 71 operations with 6 deaths from the operation, 7 deaths from generalisation of the disease, and the remaining cases were successful, the improvement being confirmed in nearly half the cases one year or more after the operation. In 87 cases by Pic and Maurange, in which sufficient details are given, there were 7 deaths from the operation; 10 deaths from generalisation of the disease (17 in all, or nearly 20 per cent), and 28 of the remainder were well a year or more after the operation. Roersch (quoted from Voigt), in 1893, put together 358 cases, of which 20 died apparently from shock; 1 of acute bacillary peritonitis; 1 of intestinal fistula; 10 of septic peritonitis, and 51 within 18 months, of extension of the disease, such as general tuberculosis, tuberculous meningitis, marasmus with stercoral fistula, &c., some of these having shown temporary improvement. In the remainder improvement followed, and in a large number there was apparently cure. For example, in 53 cases two years and upwards had elapsed since the operation and the patients were apparently well. Many other statistics might be given, but these fairly represent the results obtained and show that of published cases of tuberculous peritonitis something like 75 per cent are improved or cured by laparotomy. Whether this represents the real state of matters is, however, very doubtful, because statistics made up of isolated published cases are certain to be one-sided, for the publication of a successful case does not imply necessarily that no other cases were operated on, and if they were the results were probably not so good. My own experience and the study of numerous complete statistics of small numbers giving all the cases operated on would lead us to reduce the above favourable figures considerably; and I should say that, if all cases of tuberculous peritonitis were operated on (not merely selecting those that are most favourable), 50 per cent would probably be the outside limit of improvement or cure as the result of the procedure. On the other hand, if the more

favourable cases only were treated by laparotomy, the percentage of successes would be much higher. It is well to add also that, although laparotoly may fail on the first occasion, a repetition of it, especially if the fluid has reaccumulated, may be followed by success. Thus, D'Urso repeated the operation four times in the course of seven months, and after the fourth time success was obtained. Richelot likewise repeated it four times in the course of two years with ultimate success, and others have repeated it successfully on two or three occasions. Hence a failure where the fluid tends to re-accumulate should not discourage one from making a second attempt.

While taking all cases together the above is the average result, there is no doubt that some forms of the disease are more amenable to surgical treatment than others. Opinions differ very much on this matter, some saying that it may do good in all forms, and others that it is only in the fibro-adhesive form with ascites (No. 2), especially where the collection of fluid is localised, that it is of use. Some also point out that it is useless where there is ulceration of the intestine or where the disease is secondary to tubal disease, whether the tubes are removed or not. The most complete attempts to work out this point have been made by Aldibert and Roersch, and though the results have often been quoted, I may introduce them here. I have arranged Aldibert's first three groups in tabular form and have worked out the length of time during which these cases were under observation (see table p.66). The *post-mortem* appearances described in my first group correspond to Aldibert's Groups I., 1, 2, and 3a, and II., 1. The changes described under the second heading correspond to Aldibert's Groups I., 3b, and II., 2; and the changes described under my third heading correspond in part to Aldibert's Group III.

Aldibert also refers to 4 cases in which the abdomen was opened and enlarged mesenteric glands were found; in three of these recovery took place, but in two of them the length of time during which the cases were under observation is not given (in both of these some of the disease was removed). In one, where the abdomen was simply shut up again, the case was well after eleven months. One case died of septic peritonitis. He also gives 14 cases of intestinal obstruction in connection with tuberculous peritonitis, of which 5 died from the operation and 4 subsequently of the disease; 5 recovered, but in only one instance was the patient under observation for a sufficiently long time. Further, he gives 17 cases of tuberculous salpingitis with tuberculosis limited to the pelvis; of these, 4 died and 13 recovered, 3 being well for over a year. Lastly, there were 70 cases which on account of absence of details could not be classified, and of these 15 died, 6 improved, and 49 recovered; 16 of the latter have not been traced from one to fifteen years.

ALDIBERT'S CASES TREATED BY LAPAROTOMY.
A. CHILDREN UP TO 16 YEARS OF AGE.

	Total	Died		Recovered				Not improved	Remarks
		Of operation	Later	Traced for one year and upwards	Traced for from six months to one year	Traced for less than six months	Length of time not stated		
I. With Ascites 1. Acute Miliary Tuberculosis	1	1	...	...	...	...	...	...	* One of these had recurrence and was operated on a 2nd time.
2. Subacute ,,	6	...	1	1	3	...	1	...	
3. Chronic ,, *a* Generalised	16	...	1	3	4	4*	4	...	
b Encysted Fluid	9	...	...	1	2	2	4	...	
Total	32	1	2	5	9	6	9	...	
II. Fibrous Form without Ascites 1. Without Adhesions (*i.e.*, Tubercles over Peritoneum undergoing Fibroid Changes.)									
2. Generalised Adhesions	5	...	...	3	...	2	...	...	
Total	5	...	...	3	...	2	...	...	
III. Caseating Form 1. Dry	1	...	...	1	...	...	...	...	
2. Suppurating *a* Generalised	1	...	...	...	...	1	...	...	
b Localised Multiple	...	...	...	...	...	...	...	...	
Single	5	1	...	1	2	...	1	...	
Total	7	1	...	2	2	1	1	...	
	...	2	2	10	11	9	10	...	
GRAND TOTAL	44	4		40				...	

ALDIBERT'S CASES TREATED BY LAPAROTOMY.
B. ADULTS.

	Total	Died		Recovered				Not improved	Remarks
		Of operation	Later	Traced for one year and upwards	Traced for from six months to one year	Traced for less than six months	Length of time not stated		
I. With Ascites 1. Acute Miliary Tuberculosis	1	...	1	...	...	...	...	...	* Three after operation for recurrence.
2. Subacute ,,	12	1	5	1	3	1	1	...	† All recurred.
3. Chronic ,, *a* Generalised	48	1	13	12*	9	6	5	2	‡ Recurred after one year.
b Encysted Fluid	56	...	7	19	7	9	10	4†	
Total	117	2	26	32	19	16	16	6	
II. Fibrous Form without Ascites 1. Without Adhesions (*i.e.*, Tubercles over Peritoneum undergoing Fibroid Changes.)	1	...	...	1	...	...	...	...	
2. Generalised Adhesions	19	...	5	4	1	4	4	1‡	
Total	20	...	5	5	1	4	4	1	
III. Caseating Form 1. Dry	3	...	3	...	...	...	...	...	
2. Suppurating *a* Generalised	5	...	2	3	..	...	...	...	
b Localised Multiple	1	...	1	...	...	...	...	...	
Single	5	1	1	1	...	1	1	...	
Total	14	1	7	4	...	1	1	...	
		3	38	41	20	21	21	...	
GRAND TOTAL	151	41		103				7	

I may also refer to Roersch's statistics, which are larger and which have been worked out in the same way as Aldibert's (quoted from Voigt). In the ascitic form in children there were 40 cases with 5 deaths, 35 recoveries, 7 of these being spoken of as definite, that is to say, observed for a considerable time (whether long enough I cannot say). In adults there were 146 cases, with 32 deaths and 99 recoveries (18 of these being definite). In the fibro-adhesive form in children, there were 6 cases, with 1 death and 5 recoveries (3 definite). In adults there were 24 cases, with 6 deaths, 17 recoveries (3 definite). In the caseating form there were 22 cases, with 9 deaths and 13 recoveries, 3 of these being definite.

If we study these figures the results come out very much as one would expect from one's own experience. In the first place, I do not think that we can draw any definite contra-indication to operation from them. All, even the gravest forms, show some

good results, and there is no form in which we can say that laparotomy is absolutely useless. Most certainly we cannot go to the length to which some go in saying that, unless in cases with ascites, there is no use in performing laparotomy. On the contrary, as is evident from Aldibert's statistics, the percentage of recovery in ascitic cases (76 per cent.) is not very much greater than in the dry fibrous forms (70 per cent.) and even in the caseating cases a percentage of recovery of 46 per cent is shown). In my own experience I have had success in the dry form as well as in the ascitic, though of course one meets with many more cases of the latter. The statistics rather help us to give a prognosis as to the probability of recovery than enable us to state that laparotomy must not be performed in a given case. The immediate mortality of the disease, which in some of these statistics seems pretty high, will no doubt be less as time goes on. Septic peritonitis, for example, ought not to occur nowadays unless the intestine is ruptured, and deaths from shock ought not to be frequent. In the first place, cases should not be left until they are practically moribund before the surgeon is called in, nor in any case ought the operation be so extensive as to lead to any material shock, more especially no attempts should be made in bad cases to remove any portion of the diseased tissue. Most of the deaths after operation are from intercurrent disease, or phthisis, and very frequently there is a temporary improvement before death takes place. These deaths would likewise have resulted without operation, and we can only say with regard to them that the patient has had the chance but without success.

The prognosis of laparotomy naturally varies in different cases. The most favourable are certainly those belonging to the first group with localised ascites, and the next most favourable are those where the fluid is diffused over the abdomen. I must confess that I have been surprised at the recovery in some of these cases. On opening the abdomen one finds tubercles everywhere, the intestines protrude from the wound and are seen to be red, inflamed and covered with tubercles (some of them sometimes of considerable size), the abdominal cavity feels like a bag of rice; and yet in these cases recovery may follow. In two instances in which I made a very bad prognosis after the operation, on account of the size and number of the tubercles scattered all over the intestine and abdominal cavity, recovery took place rapidly and apparently completely. The next most favourable are the cases where there is no ascites and where we have the fibro-adhesive form in a moderate extent as described under heading No. 2. Indeed, favourable results have been obtained in this form even where the adhesions were so great that the operator never penetrated into the abdominal cavity. By some, this fibro-adhesive form is looked on as a healing process, and it is held that the operation probably merely gives it a fillip in a good many cases. Where the abdomen contains large caseating masses the prognosis is much more grave, and as is evident from the results mentioned above, the successes are not nearly so great. At the same time they do occur, and I have myself had a successful result where there were large masses of caseating material. In this group, however, it is rather the case of giving the patient a chance than of any great probability of curing him. It must also be borne in mind that it is in these cases more especially that harm may be done by the operation, for unless great care be taken the intestine may be very readily torn and a fæcal fistula established. Indeed, in some instances, even though there is no apparent injury to the intestine, a fæcal fistula may result after the operation. In these cases also it is not uncommon to find that the scar breaks down subsequently, having become infected with tubercle; but, even in spite of this, healing may ultimately occur where a

fæcal fistula has also formed, provided that it is not so large, nor situated high up in the small intestine

Cases with slight phthisis frequently improve both locally and also as regards the lung after operation, but where the phthisis is extensive the result is not good. Opinions differ as regards the effect of pleuritic effusion on the results of operation, but on the whole it is not looked on as a contra-indication. Cases with intestinal ulceration are particularly unfavourable, and it is a question there whether laparotomy does any good at all. Spaeth also asserts that cases secondary to tubal disease are not benefited by laparotomy, even although the tubes are removed, but this is contrary to the experience of Aldibert and of a number of other observers, who obtained good results even where the tubes were not touched. The great risk of tuberculous peritonitis in these cases of tuberculous salpingitis, however, makes it essential that when a diagnosis of tuberculous salpingitis is made the tubes should be removed at once.

From the evidence I should say that in practically all cases where improvement does not follow under medicinal treatment after a reasonable time, say in from four to six weeks in acute cases, to four to six months in chronic cases, the abdomen should be opened whether there be ascitic fluid or not. The operation may do good in cases where it is least expected to do so, and it is but seldom that it can do any harm. Do not in any case allow the patient to go downhill too much, otherwise one cannot expect good results to follow, and it is fair neither to the patient nor to the surgeon. It seems to me a very questionable thing whether it is good for the patient that the ascitic fluid should be absorbed, seeing that it contains toxines and bacilli, and therefore, as I have said, where improvement does not follow soon I believe that early laparotomy is best. And the medical treatment can follow the operation just as well or better than if it precede it.

On the other hand, it apparently does not do to operate too soon. Where one operates quite in the early stage, recurrence, curiously enough, is very apt to take place, and the explanation of this I believe to be that which I shall give presently in connection with the *modus operandi* of the operation. However it may be explained, it certainly is the case that most of the cases where repeated operations for recurrence have taken place have been those in which the first operation was performed quite at the commencement of the disease. On the other hand, it is most important not to wait till the patient has gone too far downhill. If the patient suffers pain from bands or from kinking of the intestine, or from obstruction, operation is necessary, even although much good may not result.

In operating, as has been before stated, it is well not to carry the procedure to the extent of attempting to remove any of the diseased tissues, such as excision of an ulcer of the intestine, the removal of tubes &c., unless indeed one finds only quite a commencing peritonitis at that part. The removal of the tubes, for example, in the cases of advanced peritonitis, would mean a prolonged and very difficult operation, owing to adhesions in a peritoneal cavity already very much inflamed, and one which would almost certainly precipitate the patient's death from shock. On the other hand, if on opening the abdomen one finds only slight commencing peritonitis around the tubes, then I believe they ought to be removed so as to prevent further infection. Similarly, in the case of the appendix or cæcum, while a few cases have improved as the result of simply opening the abdomen, the best results have been obtained in cases

where the disease has been localised to that region and where the appendix or the cæcum itself have been resected.

On the other hand, in cases with intestinal fistula, operation is out of the question. The patient cannot stand a proper operation for resection of the fistulous portion, and the intestine in the neighbourhood of the fistula is usually so thinned and diseased that any attempt to stitch up the hole without resection practically always fails and such attempts leave matters worse than they were before. Lastly, it may be said that if one is in doubt it is better to operate than to leave things alone.

Operation – A few words as to the surgical procedures. Some, thinking that the beneficial effects of laparotomy were simply due to the evacuation of the fluid, have concluded that the same result could be obtained by aspirating the abdomen; this, however, does not seem to be the case. Good results have certainly, in a few cases, followed puncture with evacuation of the fluid, and injection of air, but simple tapping of the abdomen seems to be quite inefficacious. Further, puncture of the abdomen is a procedure by no means free from danger in these cases. It is not at all uncommon for the intestine to become adherent to the abdomen in the middle line, and cases have occurred where it has been punctured by the trocar and the death of the patient has resulted. Hence, partly on account of its inefficiency and partly on account of its danger, puncturing the abdomen should be given up as a means of treatment.

The operative procedure is very simple in most cases. Where effusion is present without adhesions, it simply consists in opening the abdomen in the middle line below the umbilicus, allowing the fluid to run out, aided by turning the patient on his side and perhaps removing some of it by means of sponges, and then stitching up the wound again. In former days the abdomen was washed out with various antiseptic solutions, such as carbolic acid, sublimate, &c., some leaving the solution in, others flushing out the abdomen afterwards with salt solution. Others, again, very carefully dried the cavity as far as possible with sponges, and so forth. All this seems, however, to be unnecessary, and in reality inadvisable, for as good results are obtained by simple laparotomy, without the introduction of any chemical substance at all, or even without flushing out the abdomen or complete removal of the fluid, as where these measures are adopted.

Where adhesions are present, care must be taken, in opening the abdomen, not to injure the intestine, and if the adhesions are firm it is better to leave them alone and close the wound than to try to force one's way in, unless fluid be present.

In the dry fibrous form, unless the intestine is becoming kinked or bound down by adhesions, it is seldom advisable to try to separate the coils, on account of the risk of weakening the wall of the bowel and consequently leading to a faecal fistula. If, however, obstruction is present, it must be relieved, or an anastomosis must be made between the coils above and below. Should a rent occur in the peritoneal coat in the course of such an operation, it should be very carefully stitched up.

Where pus is found it should be washed out by salt solution, and it is then well to introduce a little iodoform and glycerine emulsion into the cavity before closing it.

The question of drainage has been raised in these cases, but there does not appear to be any advantage in drainage where the fluid is serous, and there is the disadvantage that in some cases it has happened that a tuberculous sinus has been left at the seat of the drainage tube. Even where pus is present, unless it be foul-smelling, it seems best to treat it like a chronic abscess elsewhere by washing it out thoroughly, injecting a little iodoform and glycerine, and closing the wound again.

An important point arises, namely, whether a primary focus, such as a tube or appendix, &c., if found, should be removed. This, as I have already said, depends very much on the extent of the disease. If the whole peritoneum is infected, then no attempt should be made to remove the primary focus, such attempts having generally ended disastrously. On the other hand, if the tuberculous peritonitis be limited to the immediate vicinity of the tube or appendix or caecum, the removal of the primary source is very important, and much better results are obtained by doing so than by simple laparotomy.

As regards the course followed after laparotomy, in some cases immediate improvement begins, while in others ten days or longer may elapse before any noticeable effect is produced. In any case, medical measures should be superadded to the surgical as soon as possible. In some cases the fluid re-accumulates, and there is then no objection to a subsequent laparotomy; indeed, as has been already said, there are some instances where several laparotomies were performed and where cure was ultimately obtained.

As to the *rationale* of the operation, we are still absolutely in the dark. None of the explanations advanced are satisfactory.

The earliest view was that the improvement was due to the anti-bacteric action of the antiseptics employed during the operation. In some of the earlier operations which were done intentionally, the abdomen was washed out with carbolic acid, iodoform was introduced, and so on. It has, however, been found that cases have done equally well, if not better, when no antiseptic was introduced into the abdominal cavity, and at the present time we are particularly careful to avoid their use. In any case, an antiseptic solution must be inert against bacteria embedded in the tissues, whilst it also weakens the endothelial cells and thus must do harm instead of good.

The good effect of laparotomy has also been attributed by Lauenstein and others to the action of light destroying the bacilli, and in part also to the drying of the cavity; and Lauenstein allows strong sunlight to pour into the abdominal cavity for at least ten minutes. Against this light theory, however, it may be pointed out that the whole abdominal cavity is not exposed to light, and yet the good effect is general; besides, very few of the successful cases have been treated in this way; some, indeed, having been operated on by artificial light. Further, there is no evidence that in such a disease as lupus does the prolonged action of strong sunlight have any permanent beneficial effect. As to the question of dryness, there is no possibility of really drying the peritoneum, and, besides, it does not seem to be necessary for a cure that even the whole of the fluid should be removed, and further, improvement follows in the dry fibrous form without effusion.

Another theory is that the benefit is due to contact with the atmospheric air, and chiefly with oxygen; but apart from the fact that the tubercle bacillus is an ærobic organism, the same objection holds good as to the light theory, namely, that in laparotomy the air does not come in contact with the whole cavity, and such air as may remain in the abdomen after the operation becomes absorbed in a very short time. Acting on this view, however, cases have been tapped and atmospheric air injected into the abdominal cavity; in some cases the air being sterilised and in others unsterilised. In some of these cases, it is true, good results have followed, but the evidence is not sufficient to establish this as a method of treatment, and in all probability the results obtained have been due to the irritation of the procedure rather than to any chemical effect of the air.

It has also been supposed that the good effect was due to the entrance of non-pathogenic bacteria from the air, which, growing in the fluid in the peritoneal cavity, destroy the tubercle bacilli. Of this, however, there is no proof whatever.

Others, again, think that the result is due to the removal of the pressure of the exudation, and the consequent alteration and improvement in the circulation both of the blood and the lymph. Against this view, however, is that simple puncture alone is quite ineffectual, and further, this theory does explain the successes in cases where there is no ascites.

Again, it has been supposed that the toxines in the ascitic fluid exercise a pernicious effect, and that it is by the removal of these that benefit results. There may be a little truth in this, but the same arguments apply here as apply to the preceding theory.

Another theory is that the result of the operation is to set up adhesions which encapsule the tubercles and destroy, or at any rate, render the bacilli innocuous. Adhesions, however, are not necessarily set up all over the abdomen by laparotomy, they are not always sufficient to encapsule the tubercles, and besides, in the fibrous form the disease may progress if left alone, while, on the other hand, recovery may result if laparotomy is performed.

None of these views, as a matter of fact, throw any real light on the process, and the problem seems to be still unsolved. The matter seems to be very much on the same footing as the problem of why it is that when we open an acute abscess antiseptically we do not have any more suppuration, and it seems to be on the same footing also in this respect, viz., that if we cut down on a commencing suppuration too soon before an abscess has formed, we do not necessarily check the suppuration. As I have already said, if we operate too early in tuberculous peritonitis, we apparently do not get the same good result as if we wait till the disease has become more established. The question in the case of the abscess is as great a mystery as the other. The theory which I have suggested in the case of acute suppuration is that during the course of the disease an antitoxin is being formed in the blood, and that as the result of opening the abscess large quantities of serum are poured out and brought thus into contact with the bacteria in the wall of the abscess, and exert an antibacteric effect. On the other hand, if the operation is performed too early the serum has not had time to acquire a sufficient anti-bacteric property, and further, the same amount of serum is not poured out. It is possible that the conditions are somewhat similar in tuberculous peritonitis; where a large quantity of fluid is rapidly removed serum is certain to be poured out to

a considerable extent, and this serum may, as I say, be more or less be anti-bactericidal. Even in dry peritonitis the irritation of opening the abdomen and separating a number of adhesions leads also to effusion of serum, and it may be that the reason why in dry peritonitis the result is not quite so good as in peritonitis with effusion, is that this serum does not act over the whole of the affected area, as it would do if adhesions were absent, or if the whole area were exposed to rapid increase in circulation where a large diffuse collection of fluid had been removed. Further, following on the weakening of the bacilli as the result of this anti-bacteric serum which is poured out, we have exudation of cells and increased fibrous formation and fibroid changes in and around the tubercles which complete their destruction.

However the matter be explained, the truth is that laparotomy in tuberculous peritonitis often leads to a real cure of the disease. This has been definitely proved, quite apart from the fact that the symptoms completely disappear and the patient apparently entirely recovers. In some cases the abdomen has been subsequently opened for some other reason, and it has been found that not only has the tuberculous effusion disappeared, but that even the adhesions and results of the tuberculous peritonitis have also gone. In some cases the abdomen opened a year or two after an operation for tuberculous peritonitis has been found with its peritoneal lining quite smooth and normal. In cases where the abdomen has been opened for a second time during the course of the disease, and where portions have been removed for microscopical examination, it has been found that the mode in which the disappearance is effected is similar to that already known with regard to disappearance of tubercles elsewhere; namely, spindle cells form in the tubercles, possibly to some extent from the epithelioid cells themselves, and the tubercles are gradually converted into fibrous tissue. I had the opportunity in one case of examining the state of matters in a healing tuberculosis of the peritoneum, namely, in a case where I operated for radical cure of hernia, and where, to my surprise, I found that the omentum, and the whole of the peritoneum, as far as I could reach, were studded with tubercles. In that case there was no previous history of pain or other trouble about the abdomen, so that I could not ascertain when this tuberculosis of the peritoneum had set in. I removed portions of the omentum which were present in the hernial sac, and on examining them microscopically, found that the tuberculous nodules were, for the most part, completely converted into fibrous tissue. In some of the nodules, however, I could still detect sufficient remains of the original structure to satisfy me that it had really been a case of tuberculous peritonitis. In conclusion, I may mention that similar results have been obtained experimentally in the lower animals. Thus Gatti introduced tuberculous material into the peritoneal cavity of guinea pigs. After about fourteen days he performed laparotomy, and then some time later performed a second laparotomy. He found that, although many of the animals died of general tuberculosis, in some the peritoneal tuberculosis disappeared completely after the first laparotomy, and the tissues taken for microscopical examination on the second occasion showed that fibrous formation was taking place in the tubercles.

Bachiocchi and Nanotti produced tuberculous peritonitis in dogs and rabbits by the introduction of tubercle bacilli into the peritoneal cavity, and found that if the animals were left to themselves death occurred, in rabbits in seven to nine, and in dogs in eleven to thirteen weeks, the tuberculosis having spread from the peritoneum to the

lymphatic glands, the liver, the pleura and the lungs. But in the case of dogs it was found that after laparotomy was done, and if necessary repeated, healing resulted; indeed, in seven dogs they were able to obtain cures, in two there was only improvement for a time, and two were quite unaffected by the operation. In the case of rabbits they were never able to prevent death from general tuberculosis by employing laparotomy, but nevertheless the fatal result was delayed very considerably in the animals operated on as compared with the control animals.

Lecture III

Genito-urinary Tuberculosis

Tuberculosis, as it affects the genito-urinary system, is of great interest and importance, and is particularly difficult as regards treatment. The striking characteristic is the way in which it spreads from one organ to another, and for some time, at any rate, may remain localised to the genito-urinary system. It may affect almost all the organs in that system in the male, more especially the kidney, ureter, bladder, prostate, seminal vesicles, the vasa deferentia and epididymis.

The disease may start primarily in one or other part of the genito-urinary system, or more often it is secondary to tuberculosis elsewhere, more especially in the bones and joints, and in the lungs. In both types the bacilli are probably deposited in the organ affected from the blood, although some writers hold that in the case of primary disease, at any rate, there may be a direct infection from without through the urethra.

As to the relative frequency of primary and secondary tuberculosis in this region, Heiberg found in 84 *post-mortem* examinations that 29 were probably of primary origin and 55 of secondary origin. Again, as to the relative frequency with which the urinary and genital organs are affected in the first instance, the following are some statistics. Guyon gives 264 cases, in 41 of which the genital system alone was affected; in 88 the urinary system alone, and in 135 both together. According to Oppenheim, in 37 males the genital system alone was affected in 5, the urinary system alone in 10, and both together in 22. On the other hand, in 23 females the genital system alone was affected in 16, the urinary system alone in 2, and both together in 5. There is also a marked difference in the relative frequency according as the disease is primary or secondary, the urinary system being more frequently attacked in secondary cases than in primary ones. Thus in primary cases the urinary organs were attacked in 13.8 per cent, while in secondary cases they were attacked in 25.5 per cent. Heiberg's statistics give 16 primary cases in males, in 5 of which the genital system alone was attacked, in 1 the urinary system alone, and in 10 both together; and 13 cases in females, in 5 of which the genital system alone was affected, in 3 the urinary system alone, and in 5 both together. On the other hand, in 33 secondary cases in males the genital system alone was attacked in 13, the urinary system alone in 7, and both together in 13; and in 17 females the figures were, the genital system alone in 8, the urinary system alone in 7, and both together in 7.

Much discussion has arisen as to the course which the affection takes in spreading over these systems, and two views have more especially been debated. One of these is the "descending" view, according to which the disease begins in the kidneys and spreads downwards to the genital organs; the other is the "ascending" view, according

to which it begins in the genital organs and spreads upwards to the kidneys. The "descending" view was especially defended by Steinthal, who in 1885 published elaborate papers on tuberculous disease of the kidneys and of the male genito-urinary organs. He came to the conclusion that in cases secondary to disease of the lungs the bacilli were carried directly to the kidneys by the blood, and were usually deposited in the bases of the pyramids, whence the disease spread on the one hand towards the capsule and on the other hand towards the papillæ and thence into the pelvis of the kidney. Once the mucous membrane is destroyed further infection results from the urine carrying down the bacilli, and thus the ureter, bladder and prostate may become infected. From the prostate the disease further extends along the vasa deferentia, affecting the seminal vesicles and vas, and ultimately the epididymis and testicle. On the other hand, Simmonds a year later asserted that as a rule the primary starting point of the disease was in the genital system and that the infection spread upwards until it ultimately reached the kidneys. Both views are undoubtedly at times correct. As has just been said, in cases arising secondarily to tuberculosis elsewhere, it very frequently begins in the kidney, and in these cases the disease may very readily spread downwards to the bladder and prostate and so on to the genital system. On the other hand, in primary cases it most often begins in the genital system, in males more especially in the epididymis, and from thence it spreads upwards to the urinary system. At the same time it is also possible that the bacilli may be deposited in more than one place at the same time, or in one part shortly after another, without any actual continuity or infection from one organ to the other. As a matter of fact, the original seat of deposit of the bacilli and the parts subsequently affected must depend very much of their susceptibility to the disease, a susceptibility which may be induced by injuries, the existence of previous inflammatory affections, natural predisposition, &c. A very common predisposing condition in genital tuberculosis is a previous attack of gonorrhœa, and it is not at all uncommon to find a gonorrhœal epididymitis immediately followed by tuberculous disease, while in tuberculous disease of the prostate and epididymis one frequently obtains a history of previous gonorrhœal inflammation.

As regards the mode in which the bacteria reach the seat of the disease, it is, I believe, almost always by deposition from the blood stream, but, as has already been said, some writers have advocated the view that in many cases they enter by direct infection from without. In the female it has been stated that the infection enters *per vaginam*, and in the male per urethram. It is difficult to accept this view even in the case of the female, for there the disease begins most commonly towards the abdominal end of the Fallopian tube. Some authorities, however, assert, with regard to its association with gonorrhœa in the male, that it is not merely due to weakening of the tissues by the inflammation but to actual infection from without by tubercle bacilli. Thus Schuchardt states that in 6 cases of gonorrhœa in males he found the tubercle bacilli as well as the gonococcus present in the discharge in two; in one of these, as the acute symptoms subsided, chronic catarrh of the urinary passages followed, and in the discharge the gonococci had almost completely disappeared, while the tubercle bacilli were found. He believes that, as the result of his observations, we should admit the existence of a new form of primary disease of the mucous membrane, namely, superficial tuberculous catarrh, which does not lead either to ulceration or other organic change and which may disappear of itself. Apart from these observations, however, tuberculosis of the urethra appears to be very rare,

although it does sometimes occur at the upper part secondarily to disease of the prostate and also to tuberculous cystitis.

Tuberculous Epididymitis – Of the male organs the epididymis seems to be that most frequently affected with tuberculosis, but as the disease rarely remains localised to the epididymis for any length of time it is not always easy to be certain in cases seen at a late period whether it has originated in the epididymis or in the prostate or in some other part. In adults, however the probability is that in the majority of cases the disease commences in the epididymis. Thus Heiberg found in 26 cases of secondary tuberculosis that the epididymis was affected in 23, the prostate in 15 and the vesiculæ seminales in 14; while in 15 primary cases the epididymis was affected in 13, the prostate in 11 and the vesiculæ in 8. Simmonds in 60 cases found that the epididymis was affected in 31, the vesiculæ in 29, the prostate in 26 and the testicle in 15. Guyon asserts that he has almost never found the nodules limited to the epididymis. In 127 cases the prostate alone was diseased in 56, the prostate and vesiculæ in 11, the epididymis alone in 2; prostate, vesiculæ and epididymis in 50 and epididymis (prostate doubtful) in 2, and the prostate and epididymis (vesiculæ doubtful) in 6. In 26 autopsies he found the vesiculæ alone diseased in 2 cases, the prostate alone in 1, the prostate and vesiculæ in 10, and the prostate, vesiculæ and epididymis in 13.

In many cases the lesions are bi-lateral. Thus in 79 cases reported by Reclus 21 were bi-lateral. Badenheuer, indeed, has found that in almost all the cases the lesions are, or ultimately become bi-lateral.

The bacilli may reach the affected organ in various ways. Some assert that they may come from the urethra, but this seems to me to be very doubtful. They are probably most frequently deposited from the blood, or come by the lymphatic vessels, or they descend along the vas or by lymphatic vessels from the urinary system, or they may spread from the peritoneum; the latter mode of infection is especially observed in infants, and it is apparently not so rare as one would at first sight imagine, In these infants one not infrequently finds the mesenteric glands enlarged and the disease extending to the peritoneum, and following down the vaginal process ultimately invades the testicle and epididymis. Under these circumstances the tunica vaginalis is first attacked and the testicle is more often the seat of the disease than the epididymis.

In the epididymis and testicle we may have an acute tuberculosis which occurs in connection with general acute tuberculosis and to which it is not necessary to refer, or we may have a local disease limited in the first instance to these organs. Of the local disease there are two forms, the one a local acute tuberculosis which generally begins in the testicle, and the other the ordinary or more chronic form which usually commences in the epididymis. The acute form generally begins with the deposit of tubercles in the inter-tubular tissue of the testicle and subsequently spreads to the epididymis, and the process goes on rapidly and leads to the destruction of the testicle. In the other and common form which commences in the epididymis there has been much discussion as to the tissue in which the tubercles are first deposited, some holding that they first appear in the connective tissue outside the vas and others that they commence in the interior of the duct. Probably the truth is that both forms of origin occur – that in some cases the disease begins in connection with the blood and lymphatic vessels outside the duct, while in others, and probably most frequently, it

commences inside it. In connection with the latter view it will be remembered that tubercle bacilli have been demonstrated in the semen and the apparently healthy testicles of phthisical men , so that their presence in the interior of the duct and the commencement of the disease in that situation in secondary cases especially is highly probable. Growing in the interior of the duct, they set up in the first instance a catarrh with accumulation of epithelium in the lumen. These cells soon undergo caseation and the duct becomes distended with caseous material; its walls at the same time become affected and tubercles spread into the surrounding tissue. In some cases the process comes to a stop and the caseous material is either absorbed or encapsuled, or calcareous salts are deposited in it. Very often, however, the mass breaks down and suppurates and abscesses burst through the skin.

Much discussion has also arisen as to the part of the epididymis which is first affected. Bardenheuer maintains that the disease commences in the globus minor, owing to the stagnation of the secretion containing bacilli at the point where the vas leaves the epididymis and where it has a more or less abrupt bend and is tortuous. The weight of the evidence, however, is in favour of its commencement in the globus major. Wherever it begins it quickly spreads over the whole of the epididymis and before very long extends into the testicle itself and also along the course of the vas. It is only in the early stage that the disease is confined entirely to the epididymis. Spreading into the testicle, the tubercles are first found in the corpus Highmori, usually in the intertubular tissue, and subsequently isolated tubercles can be found in the testicle. In the case of the vas it may spread along the interior of the tube, but in my own experience the tubercles are more frequently found in the lymphatic vessels in the wall of the vas and in the tissue around it. Spreading along the vas deferens, the vesiculæ seminales soon become involved and ultimately the prostate; indeed, in some cases the two latter structures may be affected without any detectable disease of the vas deferens itself.

Symptoms – From the point of view of treatment we have to consider various conditions under with the disease is met with.
1. *Acute Tuberculosis of Testicle and Epididymis.* These cases are comparatively rare. The disease begins acutely without apparent cause. As a rule, for the first few days it presents the character of an acute epididymitis with severe pain and marked swelling. The pain may often subside for a time, but the local condition spreads till ultimately the testicle and epididymis form a uniform large mass. Abscess occurs very quickly, often within a month or six weeks; this abscess may form in the interior of the testicle and cause much pain. In a few cases the testicle alone has been found affected, the epididymis being at first free, and in these cases the local symptoms and pain are very acute.

2. *The ordinary Sub-acute or Chronic Tuberculous Epididymitis* – This may be met with in various stages. In some cases the disease is sub-acute; in others it is chronic; in others, again, it is accompanied with abscesses or with sinuses. In this connection also it is very important to bear in mind the probability of disease in other parts, more especially in the testicle itself, in the vas deferens, in the vesiculæ seminales and in the prostate. One very characteristic feature in these cases is the comparatively slight pain which is usually present. In some instances there may be pain at the commencement of the disease, but it is never very severe; it is generally intermittent and of a drawing character,

and the chief sensation complained of is a feeling of weight and pressure in the testicle. The enlargement generally reaches its full size in the course of a few weeks, and it may then remain stationary for a long time unless abscess forms. The swelling is in the shape of a characteristic horseshoe enlargement which surrounds the testicle, and which is greatest in the globus major. Abscess formation is very common in the course of these cases, and is generally accompanied by increase in the subjective symptoms, more especially the pain, and sinuses soon form which lead down to the epididymis. After a time the disease spreads both upwards and downwards, tubercles form in the corpus Highmori and subsequently in the testicle itself, and, on the other hand, the disease spreads up along the cord to the vesiculæ and the prostate; and one can generally find, even at an early stage of the disease, some enlargement of the vesiculæ seminales. Thickening and tenderness of the vas is not always present, and although it is usually given as one of the diagnostic signs of tuberculous epididymitis, it is not in my experience one to be relied on. In many cases the epididymis on the other side also becomes affected, either soon after the first (within a few weeks or months) or it may be years subsequently. The disease is also very apt to spread to the urinary system. In the early stage there is often marked mental depression, &c.

Treatment – The treatment of tuberculous epididymitis, like that of other tuberculous lesions, must be considered under two categories, namely, non-operative and operative. It is certainly the case that a considerable number of cases of tuberculous epididymitis become quiescent either without suppuration or after suppuration has occurred, and the thickening may after a time almost entirely disappear. It is extremely difficult, however, to say in any given case whether it is likely to become quiescent or not. In the acute rapidly breaking-down forms, especially those affecting the testicle, one may feel pretty confident that they will not become quiescent; but in the more chronic cases, where the swelling has been found more or less accidentally in the first instance, where it is firm and where there is but little pain, one can never be quite certain. Some of these cases gradually improve under general treatment, while others which at first may have seemed progressing favourably break down and suppurate. In all of them, however, there is a tendency for the disease to spread to other parts of the genito-urinary system or to the other side, even where the primary disease is improving. In fact, in the great majority of cases, when the patients come under notice, the vesiculæ seminales, or at least the vesicula on the affected side, can generally felt to be enlarged and nodular, and the disease tends to spread to the prostate and thence to the urinary system.

Non-operative treatment may be employed either when the case when first seen is very chronic with a strong tendency to recovery, or where other parts of the genito-urinary system are already seriously affected. It consists essentially of placing the patient under good hygienic conditions, in efficient support to the testicle and in avoidance of injury. As regards drugs, benefit may be obtained from cod-liver oil, guaiacol, iodoform, &c. In addition to support to the testicle, compression and the application of ointments of mercury or iodide of potassium are frequently employed, but the former is to my mind a very doubtful measure, and as regards the latter I cannot say that I have seen any beneficial effect. If there is much pain or tenderness belladonna ointment is sometimes of use. In cases where the disease is evidently advancing, injections of various materials into the epididymis have been advocated,

those most frequently employed being the iodoform emulsion so much used in tuberculous cases, and chloride of zinc, on the principle introduced by Lannelongue in the treatment of joint disease; these methods, however, do not appear to do any good, and the latter especially causes much pain.

The operative treatment may be either partial or radical; the former consisting of scraping and epididymectomy and the latter of castration. Epididymectomy may, however, in some cases, especially when performed early, be classed as a radical and not a partial operation.

Some French surgeons more especially have advocated the employment of scraping or ignipuncture, and the former is useful in some cases where neither epididymectomy nor castration are advisable or permitted. Such are cases where there is suppuration or where abscesses or sinuses are present, and where castration is not advisable or not acceded to by the patient. It has also been advocated at an early stage as a substitute for epididymectomy or castration, but I should not recommend it at that period. As I have already said in speaking of glands, one can only remove with a sharp spoon the soft, breaking-down tuberculous material; the tubercles situated in the firmer tissue beyond escape; and I can see no advantage in scraping out the epididymis at an early stage over the cleaner and more satisfactory operation of epididymectomy. If scraping is employed, a free incision should be made so as to expose the parts completely, and then starting from the point where the abscess has originated, the cheesy mass in the epididymis should be thoroughly cleared out and portions of the wall around should be clipped away. It is well afterwards to sponge the surface with undiluted carbolic acid and then to pack the wound with iodoform gauze, or cyanide gauze sprinkled with iodoform, till granulation has taken place.

As regards the operative treatment for use in ordinary cases, two methods are at our disposal, namely, castration and epididymectomy. I need not say anything about the mode of performing castration, but, as epididymectomy is not generally known, I may describe this operation, and I shall describe the method employed by Badenheuer, who was the first to advocate this operation.

The operator stands on the affected side, grasps the testicle, and turns it inwards so that the epididymis looks towards the operator. An incision should then be made over the testicle, and as I think that the vas deferens should always be removed as high as possible, I should advise that the excision commence over the external abdominal ring and extend downwards to the lower edge of the testicle. If an abscess is present which has caused adhesion of the skin, or if there is a sinus in the skin, the incison must diverge on each side of the affected skin so as to include those portions in the parts removed. The various tissues are then divided till the cord above and the testicle and epididymis below are exposed. The next step in the operation is to separate the epididymis from the testicle. These structures are only organically connected together by the globus major, the body being free, and the globus minor being simply attached by fibrous tissue. In separating them, therefore, one begins at the body and the globus minor. Without much trouble a blunt instrument can be very soon insinuated between the body of the testicle, unless in advanced cases, where marked adhesion has taken place between the two. The globus minor is then removed by detaching it from the tunica albuginea, and when the body and the globus minor have been thus detached one can raise them up, and so ascertain the condition and relations of the globus

major. At this stage care must be taken to avoid division of the vessels which enter and supply the testicle. These are present on the deeper surface of the epididymis as it lies in the position indicated, that is to say, they enter the testicle chiefly on the inner side of the epididymis. On that side, therefore, the substance of the cord should be pushed off from the epididymis with the handle of the knife. On the other side the incision is made through the tunica albuginea close to the margin of the testicle, and then the connection between the globus major and the hilum is divided, and in this way the epididymis is separated from the testicle and remains attached to the vas. If it is found that the hilum at the point of detachment is not perfectly healthy, one may cut into it and remove portions of the tissue, taking care as far as possible to keep to the outer side. Indeed, further slices of the testicle itself may be taken away if it is found that marked disease is present. The vas deferens is then freed from the other structures of the cord and followed up to the external ring, and it is pulled down through the external ring as far as possible and divided as high up as one can. After tying the bleeding point the incision in the testicle is closed by two or three catgut sutures and the wound sewn up. It is not necessary to suture the tunica vaginalis. Usually, if the surface of the testicle and tunica vaginalis are rinsed out with sublimate solution no subsequent hyrodcele occurs. It is very important to see that all bleeding points are stopped, otherwise the scrotum may become very much distended with blood, and healing thus much delayed. If there is much oozing it is well to put in a drainage tube at the lower part for from twenty-four to forty-eight hours, so as to allow the blood to escape.

We may now discuss the relative advantages and disadvantages of these two operations, and the cases for which they are severally suitable.

1. Castration – If one regards the affected part alone, this is certainly the most effectual operation, especially if combined with section of the vas as far up as possible, and were it not for the objections to be presently mentioned, it is the operation which one would advocate in preference to any other. In some cases, indeed, it is necessary, while in others, in spite of the objections, it is advisable. It is necessary, for example, in cases of acute tuberculosis of the testicle and epididymis at an early period, as the only possibility of checking the disease, and it is also necessary in cases where the pain is great, and more especially where it is due to suppuration of the substance of the testicle. It is advisable in some of the advanced cases where there is much suppuration, and where the patient's health is giving way as a consequence, even although disease may also be present in the vesiculæ seminales and the prostate.

On the other hand, castration in cases of tuberculous epididymitis is a very serious operation, and not one to be lightly undertaken. If one could be sure that the removal of one testicle alone would arrest the disease, or at any rate that the possibility of the other becoming attacked was extremely slight, then undoubtedly castration would be the best procedure at any early stage of the disease; but unfortunately this is not the case. Even quite at an early period the trouble spreads along the cord and affects the vesiculæ seminales, or at least the vesicle on the affected side, and in many cases the epididymis on the other side becomes sooner or later attacked. The proportion of cases in which both sides are affected is variously given by different writers, but in my experience the majority of the cases are ultimately bilateral. The affection of the second epididymis may occur soon after that of the first, or it may be delayed for a long time. In a case which I had last summer, an interval of seven years had elapsed

from the time when I had removed the first testicle before the second became affected. It is this tendency to disease of the second testicle which renders the operation of castration a very serious one, and for the following reasons: in the first place, if one testicle has been already removed the patient becomes extremely discouraged when he finds that the disease reappears on the other side, he is very apt to blame the surgeon as if he were at fault, and is by no means ready to submit to a further operation; besides, as one cannot assure him in the first instance that that the disease will not reappear on the other side, indeed as one ought to tell the patient of the possibility of the other side becoming diseased before performing castration, it is by no means easy to persuade him to have the operation done at an early period in the course of the disease, at the only time indeed when it gives a fair prospect of complete recovery. There can be no doubt that the loss of both testicles exercises a very deleterious effect on the patient, more especially as the disease has previously produced great mental depression and anxiety. In young patients this effect is not so marked as those who are getting up in years, but in them the result is often that they lose interest in their affairs, become less acute men of business, become lazy, irritable and morose, and in some cases may actually become demented or maniacal. Indeed, in these cases of double castration for tuberculous testicles a very considerable proportion have ultimately committed suicide. Some attribute this mental disturbance entirely to the psychical effect of the loss of the testicle and the fear of consequent sterility, and surgeons have tried to deceive their patients by introducing artificial substitutes, such as balls of celluloid, silk, &c. Apart, however, from the fact that healing does not always occur over these materials, and that they not infrequently have had to be removed subsequently, the fact that a patient could in this way be deceived would almost imply that his mental caliber had already been impaired. These attempts have not met with much success and have been now practically given up.

Apart, however, from the generative function of the testicles, it is now generally admitted that they have another and most important action, and that by means of their internal secretion they exert a very great influence on the well-being of the patient, and it is to the loss of this internal secretion that the bad effects of double castration are mainly due. There is ample evidence that where the vasa are blocked as the result of inflammation, or where they are removed and thus the generative functions are abolished, the testicles do not waste nor are those serious effects to which we have referred produced.

A further question has been raised, namely, whether after the removal of both testicles the patients do not more readily succumb to the attacks of the tubercle bacillus as well as of other organisms than where they are present, and experiments which have been performed on dogs seem to support this view; dogs which have been previously repeatedly injected with testicular fluid resisting inoculation with tubercle bacilli, while others not so prepared have succumbed.

2. *Epididymectomy* – These objections to castration are to a great extent met by the operation of epididymectomy. In the first place, one must bear in mind that the generative function of the testicle is at once destroyed by the disease, and thus the patient is placed in no worse condition by the removal of the epididymis and vas, as regards that point, than if no operation were performed. At the same time with epididymectomy the testicle is left and the internal

secretion remains. Hence the great difficulty as regards early operation is removed, and the patient is more likely to consent to this operation at an early period, when it may be of benefit in arresting the disease, than if castration were prosposed. And even if the disease does appear on the other side subsequently, a similar operation is more readily acceded to. Besides, if one is only going to remove the epididymis one need not delay the operation because some cases get well without operation, for what you propose to do does not place the patient in a worse condition than he at present is, while on the other hand, it may, when performed sufficiently early, be the means of arresting the spread of the disease.

As regards the results of epididymectomy, the majority of cases heal without any trouble. In some cases, more especially where the disease is advanced, a fistula is left, and if this is the case one may after a time scrape out the fistula and treat it in the ordinary manner before described, and not infrequently on scraping out such a fistula one finds only a small cheesy patch, after the evacuation of which the wound heals. As regards function, it is found that after the removal of the diseased epididymis, the patient, who has generally been in a depressed state before, recovers his tone, while the sexual functions, which were previously in abeyance, return and may even be increased. Again, epididymectomy is of use where the vesiculæ are affected, for the disease in the vesiculæ, and even in the prostate, frequently comes to a standstill. I have indeed seen the same after unilateral castration, so that disease of the vesiculæ seminales is not really an absolute contra-indication to operation; certainly it is not a contra-indication to epididymectomy. It is probable that, when the flow along the duct carrying bacilli with it, and the lymph flow, are arrested as the result of the operation, a considerable stimulus to the extension of the disease in the vesiculæ and in the prostate is removed, and further we must bear in mind that the influence which the removal of the vasa in other cases seems to exercise on the prostate.

Various objections may be urged against the operation of epididymectomy, of which the following are the chief.
1. The operation is often only partial because tubercles and tubercle bacilli may be present in the testicle itself: this is no doubt true in many cases unless the operation be performed at quite an early period, but I have already pointed out that partial operations are sometimes very effective, especially where the tubercles left behind are isolated and not in masses. Besides, the operation cuts off the communication between the testicle and the rest of the genito-urinary system, and even if recurrence takes place in the testicle it can be treated locally by scraping out sinuses and so forth.
2. It has been pointed out that one may find on cutting down that the testicle is badly diseased, and that castration is necessary after all: granted that this may be the case, the condition is no worse than if we cut down with the intention of performing castration in the first instance, and we have, on the other hand, the satisfaction of knowing that we are not needlessly sacrificing an important organ.
3. It is urged that the vascular supply to the testicle may be interfered with and that that organ may subsequently necrose: this has certainly happened in some cases, either where sufficient care is not taken to avoid injury to the vessels entering the testicle or where the disease of the testicle itself has been so extensive that it has been necessary to take away the greater part of that organ.

In the latter case it is of course doubtful whether castration was not the proper procedure in the first instance.

4. Bardenheuer himself thinks that recurrence on the other side is perhaps more frequent after epididymectomy than after castration, and he further states that the secondary disease may be more acute than the primary. That, however, does not seem to be the general experience; besides, if it were so and castration were necessary on the other side, the patient would still be left with one testicle, whereas in double castration both are taken away.

From these various considerations it seems to me that the operation of epididymectomy is well worthy of more consideration than it has yet received in this country, but like other procedures it must be employed with judgement and is by no means applicable to every case. It is distinctly contra-indicated where the whole of the body of the testicle is diseased; where there is a deposit in the centre of the testicle; where there are advanced lesions of the vesiculæ and prostate, especially with suppuration; where the urinary system is invaded; and where the patient is suffering from advanced phthisis. In these two latter cases, castration or scraping are the better operative procedures, if operation is necessary at all.

Tuberculosis of the Prostate - As has already been seen, the prostate gland is one of the most frequent seats of tuberculosis in this region, and it is probably the organ most frequently affected in genito-urinary disease, because the disease in it may not only occur primarily, but may be secondary, both to disease of the epididymis and to disease of the urinary system.

Tuberculosis of the prostate leads to irregular enlargement of the organ, more especially of the lateral lobes; these enlargements being due to the deposit of tubercles, and the nodules so formed tend to break down, undergo caseation and either become calcareous or lead to the formation of abscesses. The disease in the prostate is most readily detected *per rectum*, especially after the introduction of a sound into the bladder. One then feels that the prostate, instead of being smooth and elastic, contains a number of hard nodules of varying size, and is often very tender. As the disease goes on these nodules tend to soften, and subsequently if abscess forms, fluctuation may be detected. In the early stage the symptoms of the patient may not be very marked. He may have some little difficulty in micturition, a feeling of bearing down, or of weight and uneasiness in the perinæum, &c. As the enlargement increases, however, and more especially if an abscess forms, retention of urine or great pain immediately after micturition, as the result of the spread of the inflammation to the neck of the bladder, or of a passage of a few drops of blood towards the end of the act, are characteristic. Indeed, in cases which have progressed so far as this the bladder is often also affected, and then we have the symptoms of that disease as well. The abscesses which form in connection with tuberculous prostate not uncommonly burst into the urethra, leaving a ragged ulceration which does not readily heal, and through which urine makes its way into the interior of the prostate. In other cases, where they are situated more to the back of the organ, the abscesses may perforate into the rectum; infection then occurs in the abscess cavity, which leads to further extension of the suppuration, and an opening into the urethra as well, so that a recto-urethral fistula is very apt to be established in these cases. Again, the abscess may make its way down to the perinæum and may ultimately burst there, leaving sinuses which lead up towards the prostate. This condition of suppuration in connection with tuberculosis of

the prostate is a very serious one and one which it is very difficult to treat with satisfaction; and therefore the progress of a case of tuberculosis of the prostate must be very carefully watched, and should symptoms of suppuration occur surgical intervention should be at once adopted.

This treatment of tuberculous disease of the prostate resolves itself into palliative and operative treatment. The palliative treatment consists in rest, good hygiene, the avoidance of sexual excitement, the employment of antiseptic injections *per urethram*, the administration of antiseptics by the mouth which pass out with the urine, in morphia and belladonna suppositories introduced into the rectum, and so forth. So long as there are no signs of breaking down and no marked increase in the prostatic trouble the case should be watched without operation. In France some surgeons recommend that if the disease is progressive injections of iodoform in glycerine or ether, or injections of chloride of zinc, should be employed, and various operations have been elaborated with the view of carrying out these injections. In employing chloride of zinc, for instance, some surgeons open the urethra in the membraneous part and then push a needle attached to a syringe containing chloride of zinc into the substance of the prostate. Others, again, introduce a needle through the rectum, but this is very apt to be followed by sepsis. Some have even done a suprapubic cystotomy.

This injection method is, however, a most uncertain and unsatisfactory one, and it cannot be at all recommended. Certainly it is not so satisfactory as to lead one to perform any of the operations above mentioned with the view of carrying it out. Practically surgical intervention limits itself to cases where suppuration is occurring, and in these instances it should be carried out early with the view of evacuating the pus before the abscess opens into the urethra or into the rectum. For this purpose the best way for reaching the prostate is probably by means of a transverse or curved incision with the convexity forwards just in front of the anus. This is deepened, the urethra pushed forward, its situation being indicated by a sound, and the rectum pushed backwards, and as it is deepened the levator ani is divided. Usually where an abscess of any size is present one finds, after getting through the levator ani, that the finger passes into a large cavity containing the pus, and from thence one can follow out the cavity into the prostate. Having opened the abscess it should be scraped out, care being taken, of course, not to scrape through the wall of the urethra or of the bladder, and having evacuated it as thoroughly as possible, the cavity should be packed with iodoform gauze. This operation should be done even in cases where pus is escaping into the urethra, because without it the patient is almost certain not to get well. Where, however, the abscess has already burst into the rectum, it is well to avoid an operation of this kind, for the result would be very apt to be a rectal fistula. In these latter cases it is better to dilate the anus and attempt to enlarge the opening into the rectum and scrape out the cheesy deposit through that opening, and in those cases the wound may heal.

In the after-treatment, a catheter should be tied in for a week or ten days, and if there has already been a communication between the urethra and the abscess cavity the patient should be taught to pass a soft catheter for himself, until the wound has healed. Healing usually occurs fairly satisfactorily in these cases where all the cheesy material has been removed. A sinus may, however, remain for a long time, or it may be

necessary to open up the wound again, but in most cases the result is fairly satisfactory.

Tuberculous Disease of the Vesiculæ Seminales – In the case of the vesiculæ seminales the disease often follows the same course as in the prostate, although, as far as I can judge from my own experience, softening and abscess formation are not so apt to occur. At the same time abscesses do form in connection with the vesiculæ seminales and burst into the rectum or into the bladder, or in other cases make their way down behind the prostate into the perinæum. Tuberculous peritonitis and tuberculous cystitis are apt to follow extension of the disease in this region, while the tuberculosis invariably spreads on to the prostate. Here, again, the surgical treatment is practically limited to cases where suppuration has occurred, although some surgeons have performed elaborate operations with the view of removing the vesiculæ seminales before suppuration has taken place. Some remove the coccyx, and pushing aside the rectum, try to get at the vesiculæ in that way. Others perform a trans-sacral operation as if for excision of the rectum. Others, again, make a curved incision in front of the anus, carrying it well towards the diseased side, while a combined operation has also been employed, namely, in the first place in cases where castration has been performed, the vas being traced up towards the bladder as far as possible and divided, and then a perineal operation usually towards one side of the rectum being employed, so as to get at the divided end of the vas, pull it down, detaching the vesiculæ at the same time, and so removing it. These operations, however, are extremely extensive, and I do not think that they can be recommended. Where suppuration has occurred it is difficult in many cases to diagnose the primary suppuration in connection with the vesiculæ from the primary suppuration in the prostate, and where an abscess has formed in connection with the vesiculæ, or partly in the prostate and partly in the vesiculæ, the same line of treatment of a free incision in the perinæum already recommended for tuberculous disease of the prostate is best.

Tuberculosis of the Bladder – Tuberculosis of the bladder is not at all uncommon, although it is much less frequent there than in the kidney. Thus König in 107 cases of urinary tuberculosis found the kidneys affected in 93, the bladder in 19 and the ureters in 7. The disease may be primary or secondary; the primary form is very rare, and indeed its existence has been doubted by many authorities. Where the disease is secondary it usually follows disease of the kidney, but it may also occur after tuberculosis in the genital system. The disease may occur at any age, but by preference it attacks young adults, and males more frequently than females. Cold and all causes of inflammation of the bladder, including gonorrhœa, seem to be predisposing causes.

Morbid Anatomy – The tubercles in this disease are generally deposited in the superficial layers of the mucous membrane, and consequently ulceration takes place before very long, the ulcers varying in size from a pin's head to a sixpenny piece or larger. The disease most usually begins towards the apex of the trigone, and in any case it is generally most advanced there. The ulcers may, however, be numerous and scattered over a considerable portion of the mucous membrane of the bladder. In bad cases, indeed, the ulcers may extend over the whole bladder and the patient die of uræmic poisoning. The ulcers are irregular in shape, with a glazed surface and sharply cut or ragged borders, and generally with tubercles in the mucous membrane around. The wall of the bladder itself is the seat of chronic inflammation and is usually much

thickened, especially beneath the ulcers; it is also much reduced in size and can only contain a small quantity of urine. The muscular fibres are much hypertrophied, and the wall loses its elasticity. The disease may spread into the prostatic portion of the urethra, and thence into the prostate.

Symptoms – One of the most common early symptoms is the frequent desire to micturate. At first this may occur at intervals of a couple of hours, but these intervals gradually become reduced, so that in bad cases the patient may pass water every five to ten minutes. During the night micturition is as frequent and sometimes more frequent than during the day, so that in bad cases the patient gets no rest and sleep becomes impossible. Micturition is as a rule also extremely painful, and in bad cases the pain is almost unbearable. At the commencement of the act the pain is often great and burning, and may be accompanied with spasm; it subsides during the act and then becomes very intense at the end. There is frequently, also, a frequent sense of discomfort or pain in the intervals, or at least a feeling of weight in the hypogastric region, sometimes extending to the perinæum and increased by exercise or position. Hæmorrhage is common and is frequently one of the earliest symptoms. It may be very considerable in amount, indeed in some cases almost pure blood is passed; it generally occurs towards the end of micturition, a few drops of pure blood being expelled at the last. This symptom is not usually improved by rest, and in some cases the bladder may fill with clots and retention occur. Retention is also not uncommon as a result of the spasmodic stricture. On palpation the bladder is found to be tender and thickened, and this is especially made out on bimanual examination, in which case one may also find localised thickenings corresponding to the ulcers. There is often polyuria, especially at the commencement of the disease. The urine may be acid or alkaline; it is usually muddy and contains pus and mucus. Where large quantities of pus are present in the urine, however, the probability is that it comes from the pelvis of the kidneys. As a rule the disease progresses slowly, sometimes with temporary improvement, but this improvement is generally illusory, and the patient ultimately dies as the result of the extreme debility from loss of sleep and appetite, hæmorrhage, hectic fever &c., or he dies from involvement of the kidneys or from tuberculosis elsewhere, as in the lungs, perinæum, meninges of the brain, &c.

Diagnosis – In advanced cases the diagnosis is not usually difficult, more especially if there are tuberculous lesions elsewhere, as in the epididymis, &c. The insidious onset of the disease also increases the probability. The diagnosis is completed by the discovery of tubercle bacilli in the urine and by cystoscopic examination.

Treatment – The treatment may be either medical or surgical. Unfortunately by neither method can we with any certainty bring about a cure, but nevertheless much may be done to relieve the patient's distress. Medically, good hygiene, country, or seaside air, &c., are of the first importance, and light exercise is also advisable. In acute cases relief may be obtained by warm saline baths, mustard to the hypogastric region, warm-water injections into the rectum, &c. The food should be light and easily digestible, and consist essentially of large quantities of milk. Cod-liver oil should be given in large doses, and benefit may also be obtained from the use of arsenic, creosote, opium and belladonna, for the pain, &c. These means are, however, often ineffectual, and local measures are frequently adopted, more especially washing out the bladder so as to get rid of the pus and mucus, and injecting various substances either to relieve the pain, such as weak concaine, opium, or antiseptic substances, with

the view of trying to interfere with the growth of the bacteria. A warm boracic lotion, about from 3 to 4 per cent, is one of the most suitable fluids for washing out the bladder. Iodoform and glycerine is often injected into the bladder and left in, but the results are disappointing. Iodoform and vaseline, about 6 drachms of a 5-per-cent mixture, has been strongly advocated by some French surgeons. Injections of nitrate of silver, which are of use in other forms of cystitis, almost always do harm. The installation of weak sublimate solution (1-1,000 to 1-5,000) has also been employed and is much praised by some. Cocaine and opium injected into the bladder are very transient in their effects and must be very carefully used, as they are apt to be absorbed. Benzoic acid taken internally helps to keep the urine sweet. Pills of iodoform in half-grain to one-grain doses, tincture of buchu, triticum repens, &c., may be employed. Attempts have also been made to increase the capacity of the bladder by gradual distention with fluid, and this subject has been referred to by Mr. Battle, only as recently as in the *Lancet* of December 9, 1899.

Coming now to the more strictly surgical treatment, it must be admitted that it is by no means always efficacious; nevertheless, in many cases marked relief is afforded to the patient, while in some the disease apparently subsides. This is more especially the case in those instances where the tuberculosis of the bladder is the primary disease. Even where a cure is not obtained, the relief afforded to the great sufferings of the patient amply compensate him for the operation.

The operative interferences consist in opening the bladder, draining it, attempting to remove the tuberculous ulcerations, or applying antiseptic substances to them. My own opinion is that the essential benefit which follows operative treatment is the result of the drainage of the bladder, which is thus placed at rest. In two cases in which I did nothing else marked improvement resulted – quite as marked as in cases where attempts have been made to get rid of the ulceration or to destroy the bacilli. Nevertheless, I think that that although the essential point is rest to the bladder, it is well, if one can, to try to improve the ulcerated condition. In some cases, where the ulcers are quite small, the piece of mucous membrane and the ulcer may be pinched up and snipped off, any bleeding being stopped by the electric cautery. In other cases, where the ulcer is larger, an attempt may be made to scrape away the surface by a sharp spoon; this, of course, is difficult, seeing that there is no firm background against which to scrape. A background may be provided by a bag in the rectum, or in some cases, where the ulcer is low down, by the finger in the rectum; but in any case scraping the ulcer cannot be very satisfactory. After scraping it as well as one can, it is well to touch the surface of the ulcer with the point of an electric cautery. Having scraped and cauterised the ulcers some iodoform should be rubbed into the surface, and then the bladder should be left open and drained. This is best done by introducing an india-rubber tube into the bladder above the pubis and carrying the other end into a basin of antiseptic solution. Care should be taken that the tube does not go too far into the bladder; if it touches the posterior wall of the trigone it is apt to give rise to great spasm, and thus make the patient worse instead of better. In most cases it suffices to have the end of the drainage tube simply projecting into the bladder, and to prevent its shifting its place it is well to take a stitch through the tube, the wall of the bladder and the skin, which can be afterwards removed when one wishes to remove the tube. The skin should be stitched up round the tube so as, if possible, not to permit any leakage; and the tube should be large enough to thoroughly fit the hole which has been made into the bladder. The wall of the bladder above the ureters may project forwards and

touch the anterior wall at the lower part, so as to leave a cavity in which urine collects and which the patient passes *per urethram*. Under such circumstances, of course, the rest to the bladder is insufficient. This may be avoided to some extent by raising the foot of the bed very considerably, so as to take the weight of the intestines off the upper part of the bladder. The tube should be left in for from four to five days, and then should be taken out, washed and re-introduced. It is well to wash out the bladder twice a day through the tube with weak boracic lotion at the temperature of the body, and some introduce from time to time a little iodoform and glycerine emulsion; the latter is, however, not of any great consequence. The drainage of the bladder should, in my opinion, be kept up till, as far as one can judge, the cystitis has completely subsided. I believe that it should be continued for at least six weeks, and I have continued it for as long as six months in one case. Some French surgeons close the bladder at once without drainage, being content with excising and cauterising the ulcers. This I have never attempted, and I very much doubt if it is likely to be so satisfactory as thorough drainage of the bladder and complete rest to the organ.

Along with the local treatment the general health should be attended to. Large quantities of milk should be given, and also large quantities of cod-liver oil; good hygiene conditions and the other palliatives and measures already alluded to in speaking of the medical treatment.

As to the results of treatment, my own experience of five cases has been complete cure in one case and relief in the other four. In one, about six months after the first operation, the left kidney was found to be enlarged and tuberculous and was removed, the result being marked improvement of the patient and almost complete cessation of symptoms for two or three years. At the end of that time, however, he returned with increased symptoms again. In the other cases the patients left my care very much relieved, but still with some pus in the urine and with a certain amount of frequency and slight pain. More extensive statistics seem to show that about 80 per cent of the cases are much relieved by the operation, and about 20 per cent are apparently cured.

Tuberculosis of the Kidney – The kidney is one of the most common seats of tuberculosis in cases of genito-urinary disease, and it may be affected either primarily or secondarily. Where it is primarily affected the disease generally commences towards the cortical part of the kidney. When it is secondary, we usually have to do with an ascending tuberculosis, and the disease commences more towards the pelvis of the kidney. Tuberculosis of the kidney may occur at all ages, but most usually it is met with in adults of from 15 to 30 years of age. It seems to be more frequent in females than in males.

The occurrence of the disease is predisposed to by some previous trouble in the kidney, such as nephritis or catarrh of the urinary passages. It may also follow a blow in the loin or alcoholism, or indeed any condition which has led to more or less permanent congestion of the organ.

The tubercles are usually deposited towards the base of the papillæ, and tend to spread both towards the capsule and also towards the pelvis. The tuberculous masses soften and form cavities containing cheesy material, which after a time open into the calyces, and so discharge their contents by the pelvis and the ureters. When such openings have taken place and the mucous membrane lining the pelvis of the kidney has

become diseased, we have typical tuberculous pyelonephritis. As the disease goes on the kidney becomes more and more disorganised, till by-and-bye it may be chiefly made up of a series of cavities containing cheesy material. The ureter may also be obliterated either temporarily or permanently, leading to distension of the pelvis of the kidneys with all its resulting consequences. Where the ureter becomes permanently blocked the kidney may undergo complete disorganization, being converted into a shrunken mass of cheesy material; or in other cases a condition of hydro-nephrosis is produced presenting all the characters of an ordinary hydronephrosis. Where the ureter is temporarily blocked we have the signs of intermittent hydronephrosis added to those of tuberculous kidney. In old-standing cases of tuberculous kidney the organ may become very much reduced in size and remain quite shrunken. In a few cases the disease may recover. Not uncommonly calcareous salts are deposited in the pelvis or in the cheesy masses, forming renal calculi.

A tuberculous kidney is most commonly considerably enlarged, though in some cases it may be normal in size, and in others again it may be much atrophied. It is usually somewhat irregular in shape, being covered with projections corresponding to the cheesy nodules of the dilated calyces. The capsule becomes adherent and thickened, and the tuberculous disease may perforate through the capsule and lead to suppuration around the kidney. In any case in old-standing tuberculosis of the kidney the perirenal fat becomes inflamed and adherent to the organ. As the result of the perirenal inflammation and subsequent contraction of the fibrous tissue the kidney becomes more or less fixed, while it may also be drawn towards the middle line, or, on the other hand, the vessels may be drawn towards it. The latter is a very important point to remember in performing nephrectomy in these cases, because the renal vein in particular may be pulled towards the kidney, and thus the vena cava may come to lie quite close to the organ, and it has happened more than once in the case of an attempted nephrectomy that the vena cava has been injured with fatal results. The ureter is often attacked in cases of primary tuberculosis, and almost always in the secondary form it becomes thickened, its walls indurated, its mucous membrane ulcerated with stricture in places. The bladder may or may not be infected with the tuberculous disease.

Renal tuberculosis is, in the early stages at any rate, not uncommonly uni-lateral, but at a later period of the disease the second kidney becomes attacked, though as rule one finds that the disease in the kidney last attacked is less advanced than in the first. The second kidney may also without being tuberculous be the seat of a pyelonephritis or of waxy degeneration, and this condition is one that it is important to remember in connection with operation. The genital system is also frequently affected secondarily, more often of course, in the male than in the female.

Symptoms – In the early stage of the disease the trouble is often indicated by the congestive phenomena, more especially by polyuria, frequency of micturition and hæmaturia, which is somewhat analogous to the hæmoptysis which occurs in pulmonary tuberculosis. Hæmaturia is not at all uncommonly the first symptom present and may occur before any other urinary trouble is manifest. It appears without any apparent cause, the patient simply happening to notice that the urine is tinged with blood. The occurrence of the hæmorrhage is not affected by movement and it is not improved by rest, as in the case of hæmaturia due to calculi. The urine is generally uniformly mixed with blood, which may be bright or dark in colour. In some cases the

presence of blood is only detected on microscopical examination; in others the hæmorrhage is profuse and may last for some days and then disappear without a cause. Renal hæmaturia due to tuberculosis must be distinguished from that in connection with hypertrophies prostate, acute cystitis, stone, more especially in the kidney, tumour, &c.

One of the earliest symptoms in addition to polyuria and frequency of micturition is the occurrence of pain in the loin, and in the absence of any physical signs of pus, of hæmaturia and so forth, one may be led to suspect stone in the kidney. The characters of this pain are variable. In some cases it is transient and slight; in other cases it is severe, intermittent, sharp, lancinating or boring. Walking, pressure or the recumbent position have no special influence on the pain. In the female the attacks sometimes coincide with the menstrual period. In cases where the pain is due to a temporary blockage of the ureter it ceases when the tube again becomes open. The persistent character of the pain, its occurrence without any definite cause, the age of the patient, the presence of other tuberculous lesions &c., lead one to think of renal tuberculosis. Usually at this stage the kidney is found to be enlarged, and sometimes, where there is retention of secretion or where there is tuberculous pyelonephritis, it may attain a very considerable size. The urine at first may be clear, but later on it contains pus, after it is passed a greyish deposit falls to the bottom of the vessel varying in thickness (in a test tube from a quarter to perhaps two inches), and the rest of the urine remains muddy. The presence of a large amount of pus in the urine is pathognomonic of a renal affection. The urine is usually acid; in many cases there is albumen which may be out of proportion to the amount of pus, in which case it indicates the existence of a chronic nephritis or of waxy degeneration. Tubercle bacilli may be found in the deposit, and in order to examine it, it is well to centrifugalise the deposit, and in doubtful cases one may inoculate guinea-pigs.

As regards the other symptoms, frequency of micturition is an almost constant occurrence. Sometimes it is extremely painful, and even at night it may be impossible for the patient to retain the urine. The irritability of the bladder is usually in the first instance a reflex occurrence, but later on it may of course indicate commencing disease in the bladder itself. The patient may also suffer from colicy pains or diarrhœa, often with a considerable quantity of mucus.

In the early period the general condition may remain good, but as the case goes on all the general symptoms of tuberculous disease set in, namely, loss of flesh, hectic fever, continual sweats and so forth. If there is much retention of toxic products in the kidney there may be anorexia, vomiting, insomnia, and later on signs of pyæmia or septicæmia, with shivering, sweating, &c. The tongue becomes red, dry and rough. The temperature oscillates markedly and is of the hectic type.

I need not go into the medical treatment of tuberculous kidney, and indeed I have but little time to refer to the surgical treatment. Of late years the application of surgery in the treatment of renal tuberculosis has become more and more frequent, but we are still far from having attained any clear ideas as to the sort of surgical procedure, nor can we always obtain a good result. The surgical procedures which may be adopted are:
1. Incision into the kidney or nephrotomy, or nephrotomy followed by drainage of the kidney through a lumbar incision with the view especially of enabling

the more rapid escape of the decomposing pus and also preventing infection of the urinary passages.
2. Nephrectomy accompanied by scraping out as much as possible of the tuberculous material.
3. Nephrectomy often accompanied by the removal of a portion or the whole of the ureter as well.
4. Partial nephrectomy, in which only the diseased portions of the kidney are taken away.

Before proceeding to surgical measures one must try to ascertain the following points:
1. Whether the disease is really situated in the kidney.
2. Which kidney is affected.
3. Whether the kidney is the only one of the genito-urinary organs which is diseased.
4. To what extent the disease in the kidney has gone.
5. Whether the disease is unilateral or whether the opposite kidney is also affected.

With regard to nephrotomy, which was the operation almost solely employed at first, it consists in making an incision down to the kidney in the lumbar region, opening the pelvis and attempting to establish a permanent opening through which the pus and urine may escape. This operation is, however, only slightly curative; in a certain number of cases no doubt the kidneys do shrink up and the disease becomes quiescent, and the fistula may ultimately be allowed to heal; but in the majority of cases the disease goes on and but little benefit results. By this means it is very difficult to prevent pus escaping down to the bladder, and thus one object of the operation, namely, that of preventing the spread of the infection, is defeated, while this difficulty is further increased by the constant tendency of the opening to contract; and further, in cases where the opening remains open, the patient ultimately finds that this constant escape of urine in the loin is a source of great trouble to him. Nephrotomy is, however, indicated where the general state of the patient is so bad as not to permit of any more prolonged operation, and where, on the other hand, the progressiveness of the trouble necessitates immediate intervention. It is also necessary where there are perinephritic abscesses and also where one is not certain that the other kidney is healthy. In most cases, however, it must be looked on as a preliminary operation with the view of getting rid of the fever and generally bad condition of the patient, and after a time the question of nephrectomy as a curative procedure must be considered.

Nephrectomy – In order to justify nephrectomy one must be sure that the other kidney is intact, and also that the bladder is free from disease. These are points which it is by no means easy to be certain of. The condition of the bladder may no doubt be made out by cystoscopic examination, and the condition of the other kidney might also be ascertained at the same time if there was much pus coming from it. But very often the urine discharged from the second kidney, although it is diseased, does not contain enough pus to enable one to make a certain diagnosis by a cystoscopic examination. In the female, no doubt, one can pretty easily catheterise the ureters and so examine the urine from each kidney separately, and before performing nephrectomy it would be well to do this. In the male the procedure is so difficult that I doubt if even in the most expert hands complete reliance can be placed on the result. Other ways in which

the condition of the kidney may be ascertained have been adopted. For example, some surgeons advocate that before performing nephrectomy an incision should be made into the abdomen in the middle line in front and both kidneys examined by palpation. This is, however, a very uncertain method. On the one hand, no doubt, if one finds that a kidney is nodular and knobby with all the other symptoms of tuberculous kidney, one may safely say that it is tuberculous, but it does not always follow that because a kidney is smooth and of normal size that it is not tuberculous. Again, where one finds that a kidney is distinctly enlarged, one is apt to look on that along with the other signs of tuberculosis as an indication that that is the affected kidney; but it has happened more than once that the kidney on the side where tuberculosis was suspected has been found to be small or normal in size, while that on the other side was markedly enlarged, and subsequent examination has shown that the small one was the tuberculous one, while the large one was simply a healthy one undergoing compensatory hypertrophy. Hence palpation through the abdomen is in reality of very little use and only adds to the complications and risks of the operation. More important than palpation through the abdomen is the proposal to cut down on each kidney; in the first place, to cut down on the kidney which is supposed to be diseased, and to ascertain, without opening the kidney, whether the conditions are such as to render nephrectomy advisable; if this is the case, to temporarily stitch up the wound, turn the patient over on the other side and expose the other kidney, which should then be turned out and if necessary incised, with the view of making sure as to its healthy condition. The objections to this procedure are that it of course means extra shock, which cannot always be borne by a patient with tuberculosis of the kidney, and further even with incision into the kidney one cannot be quite certain that there may not be early tuberculosis at some part. Nevertheless this procedure is the one which it is probably best to adopt if by no other method of examination one can come to any definite conclusion as to the healthy condition of the second kidney. In some cases, however, the matter must be left to chance, and where the patient is suffering very severely and one kidney is hopelessly disorganized, one must allow him to take his chance as regards the condition of the other kidney, for if the one kidney is hopelessly destroyed, one must assume that he has been living with the other kidney, and that unless there is any reflex suppression of urine as the result of the operation. He can still go on living with the other kidney after the removal of the first, and with a better chance of recovery when the debilitating disease on the one hand has been removed.

The chief indications for nephrectomy are the unilateral character of the lesion, the absence of lesions in other organs, definite symptoms of tuberculosis, and sometimes the occurrence of severe hæmaturia. The contra-indications are where the general state of the patient is very grave, where there is tuberculosis of the second kidney, or where there is tuberculosis elsewhere. There is no doubt that of all the procedures adopted for tuberculous kidney, nephrectomy gives the best results. At the same time one may occasionally have a disastrous result where there is disease on the other side. Nephrectomy also may be performed either as a primary operation or secondarily to nephrotomy. The operation is no doubt most simple and most likely to be beneficial where it is a primary operation, but in some cases, as has been before remarked, the condition of the patient is so bad in the first instance that nephrotomy is all that can be done, and then when the patient's condition has improved the question of nephrectomy has to be considered. In these cases where the kidney is removed secondarily one generally finds that the adhesions have very much increased in number, so much so that the operation is prolonged, accompanied with considerable

loss of blood and much shock, and there is also a risk of damaging the vessels which have been displaced by the contraction of the fibrous tissue. In some cases, indeed, the best plan is to remove the kidney piecemeal rather than to attempt to take it out as a whole but where it can be removed as a whole it should be done. Under such circumstances the capsule is separated till the hilum is reached; a pair of forceps are then applied over the hilum and the kidney broken up and removed in pieces; finally, the hilum is examined carefully and the vessels tied.

In all cases where the kidney is removed one must remove more or less of the ureter and if necessary, the whole of the ureter should be removed, and this can be readily done by an incision running downwards in the lines of the operation for tying the common iliac.

As regards the operative procedures, where there is no peri-renal abscess and not much adhesion of the kidney around, the oblique lumbar incision is perhaps the best; but in advanced cases, especially after a previous nephrotomy, I prefer Terrier's method.

Of late good results have been obtained in some cases by a partial nephrectomy, especially in the early stage, the diseased portions of the kidney being removed and the rest left behind. Several cases of this kind are chronicled in Mr. Henry Morris' lectures on Diseases of the Kidneys. The portions involved in the disease are scraped and clipped away, and the remainder of the kidney is tightly stitched up. In a considerable number of cases, however, the removal of the rest of the kidney has subsequently been necessary. This partial operation may also be combined with a nephrotomy in cases where on cutting down the kidney nephrectomy is found to be the desirable operation. Any bosses on the surface should be cut into, and all the material scraped out, and if the kidney is fairly loose and can be taken out of the wound one can pretty thoroughly clear out the tuberculous material. These cavities should then be packed, a drainage tube introduced into the pelvis and the wound closed. Some, indeed, stitch up the kidney after such operations without any drainage, but the other is probably the best procedure. As a matter of fact, owing to the uncertainty as to the exact state of matters, when one cuts down on a tuberculous kidney one must do so with an open mind, prepared to do one of the various operations which we have referred to; either to remove the whole kidney, to remove portions of it, or to be content with a nephrotomy, combined or not with scraping. But on the whole, where the kidney is healthy, the best results are obtained by nephrectomy.

As regards the results of these operations, the following are some statistics. Palet collected 136 cases of nephrectomy for tuberculosis of the kidney, and found 85 cures and 51 deaths; of these, 110 were primary nephrectomies and 26 were secondary nephrectomies. In the primary cases the mortality was 29 per cent; in the secondary cases the mortality was 23 per cent. The causes of death were shock, septicæmia, generalisation of the tuberculosis, increase in the cachexia, and amyloid degeneration of the other kidney. Israel, in 12 cases of renal tuberculosis, performed nephrectomy 11 times; in the twelfth he only performed a partial operation. Of these 12 cases the tuberculosis was primary in 11. Tuffier, in 152 cases of operation on the kidney, had 15 for renal tuberculosis; in 5 he performed nephrotomy; in 2 he performed nephrotomy followed by nephrectomy, and in 6 he performed nephrectomy. The

result of the 5 nephrotomies was 3 deaths and 2 recoveries; of the 6 primary nephrectomies 6 recoveries; of the 2 secondary nephrectomies 2 deaths. As regards the more remote results, there are very few cases of certain recovery, most of these statistics being compiled from cases published comparatively soon after the operation. The results, so far as are known, may, however, be considered from two points of view:

1. the effect on the general state and
2. the local effects

As regards the effect on the general state, those patients where the second kidney was healthy recover, in the great majority of cases, without any trouble; the other kidney increases in size and the patient may subsequently live for a long time. I have cases which have lived nine, eight, five and three years after the removal of the kidney without any recurrence. As regards the local effect after nephrectomy, a persistent fistula is rare, but it sometimes does occur as the result of a diseased state of the ureter. Hence, where the ureter is diseased the incision should be plunged downwards, so as to take it away as close to the bladder as possible. In most cases the fistulæ are temporary, and are due to ligatures or stitches which ultimately are expelled.