EXTRACTS FROM
THREE LECTURES
ON
TUBERCULAR DISEASES OF BONES AND JOINTS.

Delivered at the Royal College of Surgeons of England.

By W. WATSON CHEYNE, M.B., F.R.C.S.,

Hunterian Professor; Surgeon to King's College Hospital; and to the Paddington Green Children's Hospital, etc.

LECTURE I.—(Continued)

IN discussing the morbid anatomy of tubercular diseases of bones and joints we shall study, in the first instance, the changes which occur in the synovial membrane, and, in the second place, those which occur in the bones. The disease may be primary or secondary in either of these tissues, and the character of the changes which take place varies accordingly.

CHANGES IN THE SYNOVIAL MEMBRANE.

We may divide the changes which occur in the synovial membrane into four main groups: (1) various forms of diffuse thickening of the synovial membrane; (2) limited thickening of the synovial membrane, more especially the formation of one or more fairly limited nodules; (3) acute miliary tuberculosis of the synovial membrane; and (4) a form where there is not much thickening of the capsule at first, but where there is hydrops or pyarthrosis, a condition described by König, and termed by him "tubercular hydrops and tubercular empyema of joints."

The most important of these forms, and that which comes under our notice by far most frequently, is the diffuse thickening of the synovial membrane. Here we find a great variety of conditions and all sorts of transition stages; but if we examine the state of matters at an early period in the disease, we find that the changes may be divided into three great types. A frequent condition is where there is moderate thickening of the synovial membrane, which may be roughly divided into two parts—an internal layer where the tissue is soft, and at an early stage villous, and later covered with caseating material; and an external layer of firmer consistence, and of a glistening character without caseation. The soft tissue on the surface has a gelatinous appearance, and can be frequently rubbed off with very slight pressure. In some cases this soft material is not present over the whole surface of the thickened membrane, and in any case it is usually distributed irregularly as regards its quantity, and is generally in largest amount at the reflection of the synovial membrane on to the bone or cartilage, or in the neighbourhood of any osseous deposit. What I have just described may be looked on as, so to speak, the normal condition in this type of diffuse thickening, but great differences exist as to the relative amount and distribution of the two kinds of material. Thus in some cases the soft tissue on the surface forms only a thin layer, the greater part of the thickening being composed of the firmer material, while in others again the reverse is the case, and the whole of the thickened part may consist of the soft tissue. In a second type we do not find this sub-

division into two layers, the thickening being composed essentially of the firmer tissue, but this tissue is dotted over with transparent or opaque yellow spots of varying size, and sometimes shows distinct caseous patches or commencing chronic abscesses. In a third class of cases we have often very marked thickening of the synovial and subsynovial tissue of the firm, oedematous, glistening character above described, but without the diffuse speckled appearance due to caseating patches, though it is not uncommon to find these collections here and there, especially over an osseous deposit which has reached the surface outside the joint, at the point of reflection of the synovial membrane. In the first form the joint generally contains fluid, serous or purulent, while in the last two types fluid is usually absent.

On studying the microscopical characters of complete sections of the synovial membrane we find a similar diversity in the appearances, and we see the explanation of the naked-eye characters; and I shall now show a few specimens to illustrate the chief points.

The first specimen which I show (Fig. 1) is a transverse section of the ligamentum teres from a case of hip-joint disease in a girl, aged 5, in whom the disease had developed after a fall two months

and a half before admission. A few days before admission the head of the femur became dislocated forwards and upwards during the night, and on admission this condition was found, while the joint was evidently distended with fluid. I excised the joint, and clear fluid containing white flocculent matter was evacuated, and a dense tubercular deposit was found at the lower part of the neck of the femur, just outside the epiphyseal cartilage, which was evidently the starting point of the disease, and which had communicated with the joint. The surface of the synovial membrane was villous, and caseation was occurring here and there at the free surface; this villous material was soft and easily broken away. This specimen is a transverse section through the ligamentum teres; at one part a small portion of the surface has become detached, but nevertheless we obtain an excellent idea of the state of matters. It will be seen that the section consists of two parts, a central lighter portion and an outer darker part. If we look at the outer portion we see that here and there at the edge it is breaking down and undergoing caseation, but at the innermost part it is composed of closely

Fig. 1.

aggregated circles, with light centre, dark outline, and often a small dark body in the interior of the circle. This peculiar material is seen to extend pretty completely round the margin, and to penetrated into the interior at various parts, especially between the bands of fibrous tissue. I shall next show more highly magnified photographs from the deeper part of the dark portion, from the edge and from the lighter central part.

The photograph (Fig. 2) from the deeper part of the marginal layer has been already shown, and we see that the tissue at this part consists of densely packed tubercles frequently with large giant cells, and surrounded by a ring of leucocytes. At the upper part fresh tubercles are seen forming in the more centrally placed tissue.

Passing now to the free edge (Fig. 3) we no longer see the individual tubercles; they have run together, and we have the condition which I have termed tubercular infiltration, and quite at the free edge this tissue is undergoing caseation.

If, lastly, we study the central tissue (Fig. 4) we find that it is composed of very vascular, delicate, fibrous tissue, which is much swollen, and contains elongated cells with processes like

myxomatous cells, along with a few leucocytes. Except in the immediate neighbourhood of the tubercular masses there are no tubercles among this fibrous tissue. We may term this condition shortly "gelatinous infiltration."

The sections of the synovial membrane show exactly the same appearance, except that the tubercular layer is only at one side, and the whole of the inner part of the synovial membrane is occupied by tubercular tissue which is caseating at the free surface, while the outer part is composed of this swollen fibrous tissue. The sections of the synovial membrane in this particular case were too thin to photograph well under a low power, but if we imagine the section of the ligamentum teres (Fig. 1) cut in two, one half will give the exact appearance of the synovial membrane.

The sequence of events in these cases is plain. The tubercular virus has attacked the surface of the synovial membrane, and spread into its substance. In the ligamentum teres the tubercular growth is spreading in on all sides where the tissue is not too dense. The oldest parts of the tubercular tissue, those next the cavity of the joint, are breaking down and undergoing caseation, and the caseous material is being shed into the joint forming the flakes which were present in the fluid. Further, the fibrous tissue in the outer part of the synovial membrane or the interior of the ligamentum teres has become much swollen, is more highly vascular than normal, and there has no doubt been new formation of tissue. These specimens represent very well the state of matters in the first form of synovial thickening which I described, where two layers can be made out—an inner, soft and often caseating, and consisting of tubercular tissue; and an outer, composed of swollen vascular fibrous tissue. This condition most frequently occurs, I think, as the result of infection from the interior of the joint, for example, from the bursting of an osseous deposit into it, and, associated with it, we generally have caseous material in the joint due to the caseation of the surface of the tubercular growth.

As time goes on this tubercular material gradually involves the whole of the synovial membrane, which is then no longer divisible into two layers, but consists entirely of soft caseating tissue, with swollen fatty and fibrous tissue outside.

[Specimens were shown to illustrate this, and also to illustrate another variety of what is essentially the same type, where the tubercular layer at the surface contains numerous blood vessels running at right angles to the outer part of the synovial membrane; between these vessels are tubercles and tubercular tissue. The last appearance is that generally met with in those cases where the granulations are very vascular and sensitive, and bleed profusely on introducing a probe.]

Passing on now to the second type of diffuse synovial thickening, we find that the thickened synovial membrane is not distinctly divisible into two layers, but that it is somewhat tough, with small and large transparent or yellow spots scattered through it. In this type the tubercles are not deposited in the first instance on the surface of the synovial membrane, but in its substance and in the subsynovial tissue, and they are generally scattered irregularly throughout the thickened tissue. As time goes on, however, the whole thickness of the synovial membrane becomes involved, and we may ultimately have a condition somewhat resembling that shown in connection with the first type. Here, however, caseation is not so common at the surface, nor is pus so frequently present in the joint; the older tubercles are in fact in the deeper

part, and where they are numerous and closely packed together caseation is very apt to occur, and chronic abscesses form in the substance of the thickened tissue. Even where the whole synovial membrane is converted into tubercular tissue we are more likely to get caseation somewhere in the substance of the tissue than at the surface, for the central portions of the mass are the older. In some cases, however, where the tubercles have formed in the first instance close to the surface of the synovial membrane, we have a very close approach to the first type, the whole superficial part being converted into tubercular tissue, but even in this case we see that in addition to the layer on the surface there are numerous tubercles scattered irregularly through the swollen tissue around. In this type of synovial thickening we have generally to do with primary synovial disease. [Specimens were shown illustrating these points].

In the third type of diffuse synovial thickening the great mass of the thickened tissue is composed of the swollen fibrous tissue which is seen outside the tubercular growth in the first type, and the tubercles are few in number and in parts entirely absent. It is most important to bear in mind the existence of this type of disease and the fact that there may be marked thickening of the synovial membrane without any tubercles in it. This condition is either associated with primary synovial disease where the deposit is limited to some part of the thickened tissue, or perhaps it most often occurs in connection with osseous deposits which have not yet reached the surface or have done so at the point of reflection of the synovial membrane but have been shut off from the joint cavity by the soft tissues over their point of exit. In cases where we meet with this type of synovial thickening we may have to search a little before we find the tubercular area, which, however, is present. Usually it will be found at some part where there is a marked degree of thickening, more especially at the reflection of the synovial membrane or in some portion of the bone. [This condition was illustrated by specimens. Fig. 4 shows the character of this thickened tissue].

It is worthy of note that in some of those cases where no tubercular tissue is present we find collections of leucocytes around the walls of many of the blood vessels, and I have a certain amount of hesitation in asserting that the parts showing gelatinous infiltration are entirely non-tubercular, as it may be that the tubercular virus is really commencing to develop at these points, although I have not yet been able to demonstrate bacilli there. On the other hand, if these were really points where tubercular growth is about to commence, we should expect to find many more fully developed tubercles in these cases, seeing that this is not an uncommon appearance.

To sum up, the diffuse thickening of the synovial membrane may occur as a primary or secondary lesion. If it occurs primarily the deposit may, and indeed often does, commence at one part in the substance of the synovial membrane, and not diffusely over the whole membrane at once. At the point of commencement there is a deposit of tubercles and swelling of the surrounding tissue and the tubercular growth soon spreads through the whole of the synovial membrane, being often, however, preceded by thickening of the membrane due solely to swelling and gelatinous infiltration of the tissue. In these cases of primary disease of the synovial membrane the tubercular growth commences in its substance or in the subsynovial tissue, and these are the cases in which we have the greatest thickening of the synovial capsule.

Where the diffuse thickening occurs secondarily to deposits in the bone we may have one of two conditions according to the

Fig. 2.

point where the deposit reaches the surface of the bone. If it communicates freely with the cavity of the joint there is rapid infection of the whole surface of the synovial membrane, tubercles form in the superficial layers, grow rapidly, and caseate at the free margin, while they quickly penetrate into its substance. At first the tissue outside becomes swollen from gelatinous infiltration, but subsequently this material is invaded and destroyed by the tubercular growth. In other cases the osseous deposit may reach the surface at the margin of the synovial membrane, which becomes thickened in the first instance and shuts it off, for a time at any rate, from the joint cavity. This thickened patch is full of tubercles, and these rapidly spread in the substance of the synovial membrane, or in the subsynovial tissue, while the synovial membrane becomes swollen and gelatinous, even before the tubercular deposit has reached it.

At first sight one might be inclined to think that these details as to the various types of diffuse synovial thickening are only of pathological interest, and not of any special practical importance, but in reality their recognition is of great importance in treatment. Indeed the leading idea which I had before me in carrying out this research was mainly a practical one, namely, to ascertain the exact extent and distribution of the tubercular areas, and thus to learn precisely how much tissue it is necessary to take away in order to remove the disease; the aim being, more especially in children, to remove as little of the non-tubercular tissues as possible. It is not part of my present programme to point out the relation of the pathological facts which I show to the treatment; they really speak for themselves; but I may this once refer to one point in treatment in connection with these three types of diffuse thickening of the synovial membrane as an example of how small points, which may at first sight appear to be only of pathological interest, may have a marked bearing on treatment.

Suppose that we open a joint with the view of removing the tubercular disease (I do not mean by excision, for that is an operation which ought to be comparatively limited in its application) and find that a primary caseous deposit has burst into the joint, we know from what I have shown that the tubercular disease will be confined, in the first instance, to the superficial layers of the synovial membrane, and that these layers are soft and easily removed, while the outer layers are tougher and composed only of inflamed and swollen fibrous tissue. It is evident, therefore, that in order to remove the tubercular disease we need not dissect away the whole of the thickened tissues, destroying ligaments, etc., in our course, but that thorough scraping of the surface with a sharp spoon will remove the whole of the disease, or, if we wish to make certain, the removal of a thin layer of the firmer tissue by knife or scissors will effect the purpose, and in this way we leave a strong joint, and may subsequently obtain some movement.

Again, if we have to do with a case of primary synovial disease we know—as seen in the specimens which I have shown—that the tubercles are scattered irregularly throughout the thickened tissue, which is too tough to yield to the sharp spoon, and if we decide that it is necessary to remove the whole of the tubercular disease we can only make sure of doing so by dissecting away the whole of the thickened tissues. I do not say that this is necessary in many cases where partial arthroctomy is nevertheless desirable; I merely point out the importance of a knowledge of the distribution of the affected tissues in cases where it is felt that all the disease should be removed.

In the third place, if an osseous deposit has reached the surface at the margin of the synovial membrane and caused thickening at that part, or if there is a localised primary deposit in the synovial membrane at one part, all that may be necessary at an early stage is to remove the primary deposit and a good area of the synovial membrane around, without touching the greater part of the synovial membrane, even although it may be somewhat thickened, and thus the structure of the joint need not be greatly interfered with.

I merely mention the above points as an example of the bearing of the facts which I have shown on treatment, and not as in any way a discussion of the operative treatment of diffuse synovial thickening.

2. *Pendulous Growths in the Synovial Membrane.*—A comparatively rare condition is that described by Riedel, König and others where we have pendulous tubercular growths on the synovial membrane; this generally occurs in the knee-joint. In most cases of synovial thickening the synovial membrane shows irregular projections, but this is not the condition which is referred to here. In the cases to which I allude there are one or more firm nodules projecting from some part of the capsule, generally

in the pouch above the patella, and not infrequently accompanied by hydrarthrosis. At first there is no general thickening of the synovial membrane, but if the disease is allowed to progress, the whole of the synovial membrane ultimately becomes swollen and infiltrated with tubercles. Riedel describes the characters of these cases as follows:—The synovial membrane is reddened, often thickened, and shows one or more firm prominences on the surface; the joint frequently contains fluid and rice-like bodies; the nodules contain numerous tubercles often closely packed together.

I have only seen one or two instances of this kind, and have only had the opportunity of examining one case. It was that of a lady who had suffered for some months from a troublesome synovitis of the knee. On the inner side of the joint a nodule was felt which seemed like an attached loose cartilage. On cutting down this was found to be a polypoid thickening of the synovial membrane, and was freely removed. The patient remains well. On examination the nodule was found to be tubercular.

3. *Acute Miliary Tuberculosis of the Synovial Membrane.*—

König describes a form of tuberculosis of the synovial membrane in which miliary tubercles are found in the subsynovial tissue, and in which the synovial membrane is not at all altered; there are no symptoms of disease. This condition occurs in acute general tuberculosis, and is only of anatomical interest. I have in one case of acute general tuberculosis examined the synovial membrane of the knee and hip-joints, but failed to find any tubercles.

4. *Hydrops Tuberculosis and Empyema Tuberculosis.*—Lastly, we have the conditions of tubercular hydrops and empyema of joints, which have been described more especially by König and Volkmann. A certain amount of hydrops is not uncommon in connection with general thickening of the synovial membrane, and more especially with the pendulous nodules just described, but the condition to which I refer here is that in which a joint affected with tubercular disease contains fluid, but where there is no marked thickening of the synovial membrane at first, although the disease is primarily synovial. This is, as a rule, only a temporary condition, and as time goes on the synovial membrane becomes swollen, the swelling generally commencing at the point of

Fig. 3.

reflection of the synovial membrane on to the bone, as is occurring in a case which I have at present under observation, and ultimately the joint assumes the appearance of a tubercular joint. These cases are usually diagnosed in the first instance as simple hydrops, and it is not, as a rule, till the thickening of the synovial membrane has occurred that their true nature can be recognised, or that operative interference seems to be called for, and consequently I have no specimen at the early stage to show. König, however, has examined these cases at an early stage, and he states that there is a formation of a thin layer of tubercles on the surface of the synovial membrane along with a slight amount of chronic inflammation.

The empyema tuberculosum is a similar condition, where, however, there is caseous pus in the joint cavity, also, without any marked thickening of the synovial membrane in the first instance. The typical cases of this kind are primarily synovial affections, occur especially in old people, and are particularly intractable. A very similar condition may, however, be found in some cases soon after an osseous deposit has opened into a joint; and the specimen which I show is one of this kind, where there was a primary deposit in the patella. The appearance of the synovial membrane is very similar to that where this condition is primarily synovial except that the membrane is somewhat thicker.

NORFOLK COUNTY (Population, Rural Districts, 271,980; Urban Districts, 50,763).—The Norfolk County Council have exercised their powers under the Local Government Act of appointing a medical officer of health, and one of the advantages of their having done so is apparent in an interesting report which has been prepared by Dr. Shephard Taylor. In that report Dr. Taylor has summarised the vital statistics of 1889 of the various sanitary districts included in the county, compared the statistics and circumstances of the several districts, and indicated the more salient matters to be gathered from the reports of the local health officers. By this means much useful information which would otherwise be lost may be gathered together and employed for the good of the community. We hope the number of reports of this character will ere long be largely increased. In the present instance it is satisfactory to observe the low death-rate (15.3 per 1,000) which the statistics of 1889 for the county as a whole show. In the rural districts the rate was 14.9 per 1,000, whilst in the urban it was 16.0 per 1,000. The zymotic death-rate was also exceptionally low—0.8 per 1,000; whilst the infant mortality was only 110 per 1,000 births. As regards zymotic diseases, Dr. Taylor points out that, speaking relatively, diarrhoea was nearly twice and diphtheria nearly four times as prevalent in the towns as it was in the rural districts; whereas, on the other hand, whooping-cough was considerably in excess in the rural districts, whilst it was almost absent from the towns. The death-rates from typhoid fever and measles were also much heavier in the rural than in the urban districts, whilst there were no deaths at all in the towns from scarlet fever and continued fever of a doubtful character. The work of sanitary administration throughout the county is also summarised, and Dr. Taylor observes that it shows "an enthusiasm in the public service which is simply astonishing, considering the slender emoluments medical officers of health too often receive for their arduous labours, and the difficulties which so often beset them in the conscientious discharge of their duties." He also points out that the publication of these reports by the county authority will result in the reports of the local officers being more carefully drawn up and the work carried out even more conscientiously than before.

REMARKS ON THE SURGERY OF THE CENTRAL NERVOUS SYSTEM.

Read in the Combined Sections of Surgery and Neurology at the International Medical Congress, held in Berlin, August, 1890.

By VICTOR HORSLEY, B.S., F.R.C.S., F.R.S.,

Surgeon to the National Hospital for the Paralysed and Epileptic; Assistant Surgeon to University College Hospital.

GENTLEMEN,—In fulfilling the wish you have done me the honour to express that I should open the discussion on the Surgical Treatment of Diseases of the Nervous System, it appeared to me that the subject was one of such wide extent that it could only be treated profitably by the adoption of some definite plan, excluding details as far as possible, or leaving them to publication in tables. Such a plan I have endeavoured to form, and it is as follows:

I propose to enumerate and to place in tabular form (Table I) the various conditions of the brain and spinal cord which it is at the present time considered reasonable and justifiable to attack by surgical interference, and to illustrate in some way the object of such treatment, its chance of success, and the reasons for or against it. Of course, I need hardly say that I do not intend to do more than touch upon some of the most debatable points among those described in the tables, and I hope you will permit me, in support of my observations, to allude to certain cases which have come under my own care.

Before, however, proceeding further with the subject, it is necessary that I should trouble you with a few preliminary remarks explanatory of the first table to which I have alluded, and to which I shall constantly have occasion to refer. In the first column are enumerated all the disease conditions as they involve either the brain and its meninges alone, or in addition the skull in connection with them; but it is only those which are indicated by the

Fig. 4.

asterisk in the margin that I shall have time to bring to your notice. Let me here say that the purpose of Table I is to provide at a glance points for discussion other than those I can touch upon. In the second column are arranged, opposite each lesion, both its immediate effects and its ultimate consequences. In no branch of therapeutics is it more necessary to take into consideration these two factors, and I shall presently urge that even in those cases where it is impossible to do anything for the latter, active interference to produce palliation of the immediate effects should certainly be resorted to, the attainment of a euthanasia for the sufferer being a distinct step in advance.

In the third column is placed the nature of the surgical interference, which I venture to think ought to be adopted in each instance, and, finally, the results which may reasonably be hoped for from such treatment are given in the fourth column.

Of diagnosis I shall not speak, as it does not come under the title of this discussion, but it is the subject of surpassing interest and importance in the present issues. Modern surgery provides for the technique of the therapeutics of these conditions: I am