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ON DISEASED CONDITIONS OF THE
 KNEE-JOINT

WHICH REQUIRE AMPUTATION OF THE LIMB, AND THOSE CONDITIONS WHICH ARE FAVOURABLE FOR EXCISION OF THE JOINT; WITH AN EXPLANATION OF THE RELATIVE ADVANTAGES OF BOTH OPERATIONS, AS FAR AS CAN BE ASCERTAINED BY CASES PROPERLY AUTHENTICATED.

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SECTION II.—MORBID CONDITIONS OF THE
 KNEE-JOINT.

Affections of the Synovial Membrane.

It seems not to be within the scope of this essay to treat systematically of all the various morbid conditions connected with the knee-joint, but rather to single out for observation those more serious lesions which require the formidable procedure either of amputation through the thigh or excision of the joint. It is, however, impossible to perform this task without noticing some of those diseased conditions which, whilst in themselves not requiring either amputation or excision, yet may progressively lead on to such a thorough disintegration of joint-material as to necessitate either the one or the other of these modes of relief.

Observing the order of frequency in which the different tissues of the knee-joint become involved in disease, it will be necessary to consider first of all those morbid conditions which take their origin in the synovial membrane; nor, when we consider the structure and functions of this membrane in the knee-joint, its extent and exposed position, is it a matter of surprise that it should be peculiarly obnoxious to disease.

Acute Synovitis arises from a variety of causes, foremost amongst which may be mentioned violence to the joint, rheumatic poison, gonorrhœa, pyæmia; or it may arise spontaneously, without any known cause. However different may be these causes, yet the local condition to which they all give rise is nearly identical, and the course of the disease much the same. The advent of the attack is marked by great pain, heat, and swelling of the whole joint from the distension of the synovial sac with effusion. This swelling is principally found in front of the thigh under the quadriceps, on either side of the patella, and sometimes in the popliteal space, although I have never seen the latter; the knee assuming a semiflexed position, thereby giving the largest possible capacity to the synovial sac.* The constitutional symptoms are also well marked. The

flushed and anxious countenance, dry skin, furred tongue, and rapid pulse, all point to a severe inflammatory process going on in a most important part of the body. If this state of things be allowed to progress, suppuration will commence; the skin becomes involved; shortly the matter points and bursts, opening the joint-cavity; profuse suppuration continues and increases; and pain and exhaustion soon destroy the patient. The pathological changes which take place in the synovial tissue itself during this period are well marked. The first effect of inflammation is increased vascularity of the subsynovial tissue, accompanied by increased secretion of synovia into the joint. There seems to be no evidence of an arrest of secretion in this earliest stage. The experiments of M. Richet go to prove that this is not the case; and he asserts that, having opened the joints of dogs, he observed hour by hour the secretion of synovia taking place. The increased vascularity of the membrane is particularly marked in its vascular processes (ligamenta mucosum et alaria). At a later period, shreds of lymph are found floating in the secreted fluid; and sometimes, if the effusion be very rapid, it is tinged with blood. As the disease progresses, the inner surface of the membrane is covered with a substance resembling granulations, giving rise to villous or fringed processes; and at the same time it becomes thickened externally, and a deposit of yellow serum takes place beyond it. The fluid effused into the joint becomes turbid; pus is formed, at first in small quantities; but in time the fluid becomes pure pus. At this period, and rarely before, the cartilages become involved; they lose their polish, and spots of ulceration commence. Sometimes these ulcers are large, with defined sharp edges; sometimes they present a worm-eaten appearance. Soon the bone is laid bare; the absorption of cartilage progresses more rapidly, until frequently the entire surfaces of the femur and tibia are denuded. It is astonishing how soon after the first advent of inflammation destruction of cartilages sometimes commences. Barwell quotes a case in which he examined the knee-joint of a patient who died on the fourth day of the attack, when an ulcer of the size of a sixpence was found on the inner condyle of the femur. The osseous structure becomes involved, and caries sets in; abscesses form all around the joints; the ligaments become softened and relaxed; and nothing short of the removal of the disease by a capital operation can rescue the patient. In this statement, as in others of a like character, I must not be understood to preclude the possibility of cure. In acute suppuration of the knee-joint, especially after injury, free incisions into the joint, to evacuate the pus, will give a very fair chance of ankylosis. This practice is, I fancy, fallen into too much disuse in the present day.

Subacute Synovitis. This affection is of all others the most common to the knee-joint. It is less intense, and accompanied by far less serious constitutional derangements, and of course with far less serious consequences, than the acute form. It is occasioned by general causes or local injury, and commonly yields rapidly to appropriate treatment. It commences with pain in the joint, and swelling soon comes on, bulging out the synovial sac; the joint assuming the semiflexed position. If unchecked, this disease either runs into the chronic variety, becoming then much more troublesome to cure, or else,

* A cast of a case of effusion into the knee-joint accompanied the essay.

especially in strumous subjects, gradually spreads to the other tissues of the joint, involving cartilage and bone, and eventually destroying the entire joint.

Chronic Synovitis. This form of disease is, perhaps, more difficult than either of the others correctly to diagnose; but it is of the utmost importance that the surgeon should form an exact estimate of the peculiar changes which may be slowly going on within the joint. Chronic synovitis, pure and simple, may be the result of either of the previous forms of synovial inflammation, or it may originate without any previous cause. If the latter be the case, it should arouse suspicion as to whether, as is often the case, it is not connected with a constitutional habit of body; it may be rheumatic, syphilitic,† or scrofulous. It may be one of a series of attacks of inflammation, each one leaving a joint, previously damaged by disease, in a worse condition than before. In any case, swelling from gradually secreted synovia, and a remarkable absence of pain or tenderness, are the prominent symptoms. This absence of pain, as Price has well pointed out (Price on the *Knee-joint*, p. 16), is very deceptive, and likely to mislead the surgeon as to the severity of the case with which he is dealing. I have myself seen remarkable instances of this fact—cases where there has been an almost total absence of pain, and yet I have found the entire apparatus of the joint destroyed, and the ends of the femur and tibia extensively diseased. Considering this disease apart from all constitutional diathesis, its great danger arises when it recurs constantly. Once let a knee be subjected to a few attacks of chronic inflammation, and in all probability there will be a constant recurrence of the disease. The synovial membrane becomes over vascular and thickened, and granulations are developed upon it. The effused fluid becomes fibrinous; false membranes are formed, which rapidly become organised. The subsynovial tissue is thickened; the cartilages, and subsequently the bones themselves, become involved.

Gelatiniform Degeneration of Synovial Membrane. By some authors this disease is named strumous or scrofulous synovitis. Without denying that struma may be a predisposing cause to this peculiar pathological condition, and that the two are frequently found associated, yet I believe it is the experience of most surgeons that gelatiniform degeneration of the knee-joint may exist without any strumous diathesis in the patient; and Sir B. Brodie himself states, in many of the illustrative cases which he gives, that the patients were in other respects in good health. I am more inclined to look upon this peculiar disease as one distinct from strumous synovitis, which should rather be classed with those cases of chronic inflammatory conditions of the synovial membrane which we have been just considering. Brodie makes two statements which go very much to strengthen this opinion. First, he states that, although the disease progresses slowly, and remains for a long time in an indolent state, yet ultimately it has always terminated in the *destruction of the joint*; and, again, he goes on to say: "It is a remarkable circumstance, that this affection of the

synovial membrane is rarely met with, *except in the knee*. I have never known an instance of it in the hip or shoulder." (Brodie, *On the Diseases of the Joints*, chap. iii, sec. 1.) Now, in neither case can we say this of that synovitis which is connected with the strumous diathesis.

I know of no better description of this disease than that given by Brodie himself, and which is quoted, or very closely followed, by all writers on the subject. He says that the synovial membrane "loses its natural organisation, and becomes converted into a thick pulpy substance, of a light brown, and sometimes of a reddish brown colour, intersected by white membranous lines. As the disease advances, it involves all the parts of which the joint is composed, producing ulceration of cartilages, caries of the bones, wasting of the ligaments, and abscesses in different places." (*Op. cit.*) Brodie classes this peculiar deposit with that of tubercle of the lungs, scirrhus of the breast, or the medullary sarcoma of the testicle. Barwell, however, who treats of the disease as strumous synovitis, considers that the pulpy substance is but a further development of those granulations which appear on the surface of synovial membrane as one of the results of chronic inflammation, contending that "the only real difference consists in the degree of development which the granulation undergoes." (Barwell, p. 106.) In addition, however, to the reasons above stated for considering this a distinct disease, there are others to be deduced, which, I think, satisfactorily prove this to be the case. Unlike that form of chronic synovitis which degenerates into or arises from strumous disease, this gelatiniform degeneration is more frequently to be found amongst adults. The swelling, which is the first symptom, is of a peculiar character. It does not convey the sense of fluctuation to the touch, which the ordinary effusions of synovial inflammation do; it is a swelling rather of a doughy, semi-elastic character. Nor does it assume the same form. It is more general and uniform; the bulging of serous effusion is absent; and the whole joint assumes a regular, globular shape. A difficult point of diagnosis may here arise. The successive layers of organised lymph deposited on the synovial membrane, and on the tissues surrounding the joint, by repeated attacks of chronic synovitis, may nearly obliterate the joint-cavity, and give to it very much the same shape and feel as that above described. The history of the case, if carefully collected, will, however, generally enable the surgeon to decide.

Another point of importance, which will assist in diagnosis, is the presence of pain. In my remarks on chronic synovitis, I particularly called attention to the frequent *absence* of pain. In pulpy degeneration, the presence of pain, not the jumping intermittent pain of diseased cartilage, but a constant, dull, heavy, gnawing pain, is the rule. Sir W. Fergusson has also noticed an important point; namely, that the elasticity resulting from the great thickening of the synovial membrane is such that, after pressing the bones together, they resume their former position. One other point, which I do not remember to have seen noticed, but which, I am sure, is characteristic of this disease, is this: that whereas, in chronic synovitis, the knee assumes the semiflexed position, owing, as before stated, to the distension of the synovial sac, and, if neglected, becomes stiffened in that position, in pulpy degeneration this is seldom or never

† The accompanying cast not only showed the distension of the synovial membrane from fluid, but was taken from a case in hospital for inherited syphilis, the patient having interstitial keratitis in both eyes and peg-top teeth. Both knees were affected. A very similar case is reported in the *Ophthalmic Hospital Reports*, vol. iv, page 289.

the case; and in many instances, even when the disease is in an advanced stage, there is considerable mobility about the joint.

The progress of this disease towards complete destruction of the joint is analogous to that before described as arising from acute or chronic inflammation. The cartilages become overlaid with the diseased tissue, soon begin to ulcerate, and finally altogether disappear. Pus is rapidly generated in the joint. The denuded bone soon becomes involved in the disease; sinuses penetrate the periarticular tissue, and lay open the joint; and the constitutional symptoms which accompany these processes compel the surgeon to have recourse to removal of the disease by operative procedure.*

Rheumatic Synovitis. Acute rheumatism is a disease which calls more especially for the physician's treatment. Its local manifestation in the knee-joint is, however, familiar to surgeons, and partakes more or less of those forms of acute or chronic synovitis which have already been considered. It is of rare occurrence for it to run on to total disintegration of the joint; but, as such instances do occur, it is right that we should notice the condition. At the commencement of the attack, a large quantity of synovia is secreted. This shortly becomes milky, and shreds of lymph are found floating on it. The synovial membrane becomes red and thickened, and eventually granular. The cartilages ulcerate, and undergo fibrous degeneration. The tissues round the joint are thickened by infiltration. At an advanced stage, crepitus can often be detected on moving the tibia on the femur. Sometimes, in gouty cases, the fluid in the joint contains gritty matter, consisting of urate of soda.

Traumatic Synovitis will be referred to when considering wounds and injuries of the joint.

Suppuration in the Knee-joint. This condition has been so frequently referred to as one of the results—the most fatal result, perhaps—of the various inflammations of synovial membrane, that I think it right at this point to refer to it more in detail. It is a matter of extreme difficulty to say whether the effusion in a joint be simple synovia, or whether it be pus. In fact, the mere touch cannot decide the question. The occurrence of a rigor, increased tenderness in the part, constant *throbbing* pain, a typhoid condition in the patient, all these, especially the first, will lead one gravely to suspect the advent of suppuration in the joint-cavity. If we have reason to think that pyæmic poisoning affects the patient, we can have little difficulty in concluding that pus has been secreted in the joint. The first advent of pus into the joint is a matter of some curiosity. It has been thought that, in the lesser inflammations, pus is never formed; and that, if the inflammatory process be severe enough to produce it, it is seldom absorbed. Dr. R. Volkmann (Langenbeck's *Archiv für Klinische Chirurgie*, vol. i, part ii, p. 408: Berlin, 1861), however, has stated as the result of his researches, that the thick lining of pavement epithelium on the inner surface of the capsular ligament, under the influence of catarrhal inflammation, se-

cretes pus-cells; and he thus accounts for the turbidity of the effused fluid which is often found in synovial inflammation. He moreover asserts that this pus may disappear by disintegration of the pus-cells and absorption. If the deeper parenchymatous tissues be affected, then a severe form of inflammation is produced, and the secreted pus maintains a pyogenic state in the synovial membrane. The cartilages are very soon affected by ulceration; and the bone, denuded of its cartilages, in turn becomes diseased. If the pus be not evacuated by the surgeon, it will soon ulcerate through the synovial membrane, and, burrowing in various directions, open externally. In a case where Mr. Holt, of the Westminster Hospital, amputated a thigh, the pus had burst through the synovial membrane round the tendon of the popliteus muscle, and, finding its way beneath the expansion over it to the inner side of the tibia, pointed at the oblique line. I am not aware that this pathological condition has ever before been noticed; and I am indebted to Mr. Heath, of the Westminster Hospital, for having directed my attention to it in the accompanying preparation of the knee-joint.

Diseases of the Articular Cartilage.

It is almost certain that disease never commences in the articular cartilage. Originating either in the synovial membrane or in the osseous structures, disease is communicated to the cartilages. It was the generally received notion—one propounded and supported by Sir B. Brodie—that active changes took place in the cartilages of joints by the intervention of vessels permeating their substance. The entire absence both of vessels and nerves has, however, been demonstrated; and this fact has led many into the error of supposing that inflammation cannot take place in articular cartilages. Virchow (*Archiv*) was the first to demonstrate the fact, that changes in cartilage were inflammatory. Goodsir and Redfern demonstrated the changes which took place in the cell-growths; and Barwell has entered minutely into the question in a paper, "On the Nutrition and Inflammation of Articular Cartilages". (*Med.-Chir. Rev.*, October 1859.) He divides ulceration of cartilage into inflammatory and degenerative; the latter being again divided into fatty and granular.

Inflammation of Cartilage consists in the rapid generation of cells from those previously existing. If the inflammation be acute, the hyaline substance is absorbed, and an ulcer results; the cells set free falling into the joint, and multiplying as pus-cells. If it be less active, the hyaline substance is converted into fibre.

In *Fatty Degeneration*, the corpuscles are filled with oil; and the hyaline substance becomes fibrous.

In *Granular Degeneration*, the hyaline substance again becomes fibrous, and the corpuscles present opaque spots on them, and ultimately shrivel up and form scales on the free edges.

In certain *Chronic conditions of Inflammation*, the cartilage-cells become *fibre*-cells, and form a sort of coarse areolar tissue. This tissue, meeting with the granulations on the synovial membrane, forms connections with it, and gives rise to false ankylosis. Mr. Aston Key, who asserted (*Med.-Chir. Trans.*) that cartilage became disintegrated by its contact with the fringed vascular processes of the synovial membrane, was evidently misled by these appearances. It is a condition most frequently found when the

* In the last edition of Sir Benjamin Brodie's works, I find the following modification of his views respecting this disease. "I formerly had been led to regard the disease as one which does not admit of a cure, and I still see no reason to doubt the correctness of this opinion respecting it in its more advanced stages. My later experience, however, leads me to think more favourably of it, if it be attended to at an earlier period."

disease commences in the synovial membrane. When, however, it arises in the osseous structure, as shown in the accompanying preparation of a knee-joint excised by Mr. Wood of King's College, the following process takes place. A portion of bone becomes inflamed, and over that spot degeneration and separation from the bone takes place, owing to the nutritive supply being cut off; the portion of cartilage being sometimes thrust into the joint-cavity. All round this spot inflammation is set up and eventually ulceration, and thus in a short time the whole joint becomes affected. The pain and starting of the limb which accompany ulcerations of the cartilage of the knee-joint, were at one time referred to the cartilage itself, but are now understood to arise from the exposure of the bony structure by the removal of the cartilage. Sir B. Brodie writes that he is "inclined to the opinion that the increased sensibility in these cases is in the bony plate beneath the cartilage rather than in the cartilage itself; and that the presence of severe pains, with involuntary startings of the limb, is always to be regarded as a sign of the bone partaking in the disease." We may be pretty sure that simple degeneration or ulceration of cartilage will in itself give little or no indication of its presence. When active symptoms show themselves, extensive mischief has already been done in the joints. If the disease have commenced in the bone, and involved the cartilages, we may expect severe symptoms rapidly to supervene; a condition which will be further noticed when treating of the diseased conditions of the osseous structures entering into the joint.

[To be continued.]

STATISTICS OF IRELAND. According to the quarterly return of the Registrar-General, the population of Ireland has decreased by 27,000 during three months of this year. The births registered during the quarter were 38,816, and the deaths 24,763; but the number of emigrants was 41,124, of which 24,331 were males. The births registered in the Dublin district during the week ending September 15th last year, were 189. The deaths registered were 181. Fifty-five deaths from cholera were registered, being three more than the number registered during the preceding week; in each of the six preceding weeks, the number of deaths registered from cholera was 2, 5, 13, 15, 41, and 52. Twelve deaths were referred to diarrhoea.

DEATH IN THE MINE. In the ten years ending December 1865, 849,615,952 tons of coal were raised from the mines of Great Britain. The number of coal-miners in 1861 was 282,473. There were 9,916 deaths by colliery accidents in the ten years: one-fifth of them from fire-damp explosions; two-fifths from falls of roof and coal; less than a fifth from shaft accidents; more than a fifth from miscellaneous causes in mines and at the surface. During five years (1856-60), 381,067,047 tons of coal were raised, and there were 5,089 deaths from accidents; in the next five years (1861-65), 468,548,905 tons of coal were raised, and if the deaths had increased in the like proportion they would have been 6,257, but they were only 4,827, a reduction of 22.9 per cent. in five years, or at the rate of 4.58 per cent. per annum in the ratio of deaths to the coal raised. Whatever may have been the cause, it is the fact that the reduction in the number of deaths to the quantity of coal raised has been greater since the passing of the Duplicate Shaft Act.

Addresses and Papers

READ AT

THE THIRTY-FOURTH ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION.

[Held in CHESTER, AUGUST 7th, 8th, 9th, and 10th, 1866.]

THE RESULTS ATTENDING THE RE- MOVAL OF THE FIRST GROWTH OF CANCER.

By JOHN BIRKETT, Esq., Surgeon to Guy's Hospital.

IN consultation with gentlemen practising in the provinces, I have been frequently told that they regard the operation of the removal of a breast affected with a growth of cancer to be useless. Some, indeed, have advanced the very decided opinion, that such an operation is attended with the worst results, and that in their experience the proceeding had rather hastened the final catastrophe, without mitigating the sufferings of their patient. These opinions prevail very generally. Doubtless, they are founded upon experience; but an experience of a very limited kind, and of a nature to produce a very strong impression upon the memory.

Taking advantage, then, of the opportunity which an assembly of this kind offers for the discussion of the subject, I propose to relate the results attending the removal of the first growth of cancer from patients who have been, all of them, under my own personal observation for longer or shorter periods.

I propose, therefore, in this communication to state, as concisely as possible, the results which have followed the operation of excision of the entire mammary gland, or of a part of it, when involved with a cancerous growth. And I am obliged to do this without taking into consideration many collateral circumstances of very great importance; such as the condition of the integuments, of the axillary lymphatic glands, the duration of the growth, the progress made by the disease in each individual case, the variety of the disease, and other points. The above, singly or collectively, exert much influence on the result; but it would occupy too much time to enter upon these important details at this meeting.

I trust, however, to be able to give a satisfactory answer to the question, What advantage does a patient obtain by submitting to the removal of a cancerous tumour?

The facts upon which to base a reply to this inquiry are derived from the investigation of a hundred and fifty cases carefully recorded by myself; and, although I have not always performed the operation, I have seen the patient and examined the growth after its removal. A majority of the patients are dead; for it should be borne in mind that this collection of cases was commenced eighteen years since, and that not a little difficulty arises in being able to follow out patients who survive several years.

Also, it must be stated that I have not made any selection of the cases with the view to uphold or support any particular statement. The sufferers who succumbed to the disease were placed in the order in which death occurred, and therefore some allowance should be made in those cases in which death ensued