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On Some Diseases of the Knee Joint

To the Medical Faculty.

In systematic treatises on surgery, we find most elaborate descriptions of the various diseases affecting joints in general. It has always struck me strangely, that when the attention of the student is directed to affections of a particular joint, the subject is rendered more simple, and is impressed more fully upon his mind, and thereby he derives more benefit than when he studies those of all the joints at once; each from causes causes having its own peculiarities. The mind which has its attention directed to too many points at once, is in danger of not fully comprehending any one of them.
Every one who has long attended the operating theatre of our Infirmary, must have been struck, with the very great frequency with which limbs are amputated, on account of incurable diseases of the knee; this in itself must have impressed you all with their very common occurrence. If you visit the wards the same thing will be at once evident. Now at first sight it does not seem very apparent why this joint should be so much more commonly the seat of disease than others. A little consideration however will make it clear why it should be so. If we look at the complicated nature of its structure, the many duplications of its synovial membrane, the accumulation of artificadle continuance for the perfection of its movements, and the number of parts which enter into its composition, it will almost seem strange that there should ever work together, in perfect union and harmony. If we look too at the manner in which it is exposed to shock, by
almost every motion of the body, and the absence of surrounding soft parts to protect it from external injury, other causes will be apparent. But human ingenuity has done its best to add to the wear of nature. If the joint be, as nature has formed it, so peculiarly liable to disease, the manner in which we are in the habit of clothing ourselves, instead of tending to obviate this, tends far to increase it. In proof of this, I need only call the attention of each one of you present to the fact, that all of you have far more clothing upon the shoulders and trunk, than upon your lower extremities. The usual modern coat, so loose covering, scarcely ever extends below the knees, and thus leaves them exposed to the action of cold from without, or to the dripping of wet from its own surface.

Before proceeding then, to speak of the special affections, it would be well to say a few words upon the general exciting causes, which may give rise to them. Among these, I may, mention, external injuries. For these, though not the most common cause of disease, are sometimes productive of the worst forms of
it, and even when it is fairly deducible, from some constitutional affection, the patient will generally suffer from the commencement to some slight injury; indeed we can see no reason why a constitutional affection should settle down upon this organ, unless attracted to it as it were, by some slight previous irritation. The forms of external injury which we meet with, are penetrating wounds, contused wounds, bruises, and twists or strains. The first of these, are naturally very serious in their consequences for by entering the joint, and bringing it in contact with the external air, they necessarily create the severest forms of disturbing inflammation. Contiguous wounds of vast of course, simply by the spread of their inflammation to the neighboring joint, and are therefore not so dangerous as the preceding, but we must always bear in mind, that, like wounds in the neighborhood of a fracture, there is always danger of the injury becoming compound. Bruises of course may act, either by the shock that is given to the joint itself, lighting up inflammation, or
by causing inflammation in the surrounding textures, with a tendency to invade the joint secondarily, or, their ecchymosed blood suppurating, they may be reduced to the character of open wounds. The effect of strain, is varied, and sometimes very subtle, they may be of all degrees of intensity, from the slightest twist, to complete tearing of part of the capsule. However slight they are, more to be neglected, for the smallest strain will sometimes be followed by the most serious consequences, if little attention has been paid to it at the time, either the surgeon will accuse himself, or what is worse, the patient will accuse him, of carelessness and mismanagement. Another exciting cause to which the patient will often ascribe his malady is the influence of cold. Like as in every other part of the body, it is a fertile source of disease, it acts by reducing the vital energies of the part below the natural standard, this may take place in a healthy individual, and if it be gradually removed, without any ill effect. But if there be any constitutional predisposi-
that there are few who have not some constitutional predisposition to disease, it will bring it down at once upon the
foot. If we have seen how the knee, as left by our dressing exposed to the influence of cold, it is not to be wondered at that the patient should be often here his sufferings to it. Next too, though by no means a frequent cause, does occasionally produce very serious effects on the joint. I may here refer to a class of cases met with every now and then in practice, although not much dwelt on in surgical works, where seemingly a slight burn of the skin produces complete disorganization of that joint. The report of an actual case seems the best way of illustrating them. H. J. May 20th 1834 fell asleep whilst intoxicated and wet in his chair before a large fire, on awaking although his trousers were entire, he found that his knee was burnt.
In examination two days after, a small dot about the size of a pin's head on point of the patella seemed detached and apparently dead, with a slight blush of redness, for about the space of an inch round it. Plasters were applied. Considerable febrile symptoms soon ensued, with great pain in the knee joint,
followed by synovial swelling. In a week the
slough had separated, disclosing the patella
dead and crumbling. By this time the symptoms
of acute inflammation of the joint were at
their height. From this time the appearance
of internal separation became manifest, and
the matter found its way out, both by the open-
ing on the patella, and by another opening
which formed on the outside. Septic now set
in, and it became necessary to amputate the
limb through the thigh, which was accord-
ingly done four weeks after the onset of
the burn. On examination of the joint there
were the usual appearances of acute suppurative
disorganization, together with a fistulous
opening in the patella. I consider this case
very interesting, as showing the effect of
an amount of heat which was not suf-
ficient to destroy the cartilage of the part.

Besides these local causes, there are sev-
eral general diseases which tend to pro-
duce mischief in the joint. The most
common of these is the sthenic diathesis.

Of course I need not attempt, to go into
an elaborate description of struma, that cause of our climate, suffice it to say, that a whole class of diseases of the knee, sty, the gelatinous degeneration of the synovial membrane, are commonly referred to its influence. At the same time I am not altogether assured of the entire truth of this, it is very easy to ascribe any disease to struma, where you sit down the patient at strumous, from the mere fact of his labouring under it. I can only say that I have seen this disease in patients, who proved otherwise perfectly beyond the suspicion of any tubercular diathesis. Gout and chronic atmaton too, rank high in the scale of exciting causes. The affections proceeding from them however, though highly painful and sometimes very chronic, are not generally of a dangerous character; they are chiefly confined to the fibrous investments, although there is a mild and tractable form of synovitic inflammation, which I believe can often be traced to a strumatoic tendency.
Syphilis too, may give rise to almost every form of bone joint disease, it often produces the same forms as chemonatism, though generally they are more unendurable, and the bones, as in other syphilitic affections, are often involved.

There are many constitutional affections which may give rise to disease of the bone joint, but none of them so frequently or especially as those above mentioned. Certain bone diseases, and arrangements of the digestive functions, may be sustained, as also many certain fevers, some of the eruptive fevers occasionally, but more commonly suppurative or surgical fever.

I have thought it advisable to classify the affections of the bone joint, according to the manner in which they affect its component parts, not that I believe this to be a perfectly natural classification, for we seldom find one part invaded, without some other being involved, but as some arrangement must be made for,
that has seemed to me the most simple.

The surrounding fibrous capsule then, comes first under our notice, that is liable to local injury, and to specific inflammation. The only injury of the capsule of the knee joint with which I am acquainted, besides general penetrating wounds, as a rupture of the lateral ligaments.

I do not find this mentioned in most books on surgery, and yet it is an injury which does occasionally occur, and which is of serious consequence, from the weakness which it causes. I may mention a case which was under treatment of a friend of mine, James Gardner, at 10 May 8th 1855. While half intoxicated, fell from the back of a horse, and as far as he can remember, struck his left knee upon a large stone, in such a manner, that it was greatly bent upwards. On as say he found that he could not rest any weight upon the left leg, as it gave way under him. On examination four hours afterwards, it was found that the knee
sent inwards laterally, but could be straightened by little force, though on being left to itself, it resumed the same position, no exsitaus could be elicited in any manner, and the bums seemed perfectly natural. There was considerable swelling around the knee. From these symptoms, rupture of the internal lateral ligament was diagnosed, as there was nothing else that it could be. The treatment was obviously to allay inflammation of the joint, and to obtain rest in the straight position by a firm splint applied laterally. It was twelve weeks, before the patient obtained in this manner, the firm use of his limb. Of course an effusion of this sort is well worthy of the attention of the surgeon.

The capsule is also liable to inflammation, acute, and chronic. This is nearly always set down as acute or chronic rheumatism, but cases do occur, as is acknowledged by most surgeons, where it seems quite idiopathic, and many are apparently
caused by syphilitic taint. In all the
varieties however, the symptoms of inflam-
mation are the same. They are character-
ized by the common symptoms of inflam-
ination, redness, pain, heat and swell-
ing. The pain has a tendency to spread
along the peristeme and tendons,
and is most severe at the prominent
parts, the swelling is tense, and sometimes
slightly edematous, and is regular in
form. There is generally a considerable
amount of fever, and for the most
part exacerbations occur at night. The
symptoms of the chronic form, are
much the same only of a modified de-
gree. Extension may take place to
the synovial membrane, especially in
the non-syphilitic cases; and in the
syphilitic cases the bones sometimes
become affected with cases. The only
appearance observed after death, is that
the capsule becomes thickened and
keratinize, or earthy deposits may take
place around it. The duration of this
disease is generally rather long, but in the majority of cases it eventually yields to treatment.

The splanchnal membrane comes next under our attention, the only three of the processes of it which I propose to consider, are dyspepsia, inflammation and degeneration, and I think that these will be found to include its whole pathology. By dyspepsia of the splanchnal membrane I mean an effusion of fluid into its cavity, on the production of which inflammation is not at any rate a marked feature. Its causes are sometimes very obscure. Persons of rather a weak frame of body, seem most liable to it, and in them it will often arise without any apparent cause. It is very common too in persons who lead a sedentary life, and who are in the habit of impairing their digestion by the use of tobacco or other means. It is in general a very manageable affection, but occasionally it must be
borne in mind, that it is a symptom, and often the only one of the commencement of more severe knee-joint disease. Its only symptom is that caused by the presence of the effusion. There is swelling to be felt, chiefly, while the synovial membrane is nearest the surface, and fluctuating between the two sides of the joint. The patella appears loose and floating, so that it may be moved freely in a lateral direction, or pressed backwards or the bones. There is very little pain, but a sensation of stiffness and uneasiness. The synovial membrane has not undergone any alteration in texture.

Inflammation of the synovial membrane or synovitis is a much more serious matter, as it may run on to disorganization of the joint. It arises from old, injuries, rheumatism, gout, and other diseases, or sometimes apparently spontaneously. It may either occur in an acute or chronic form. Acute symptoms of the knee
is characterized by great pain, aggravated by motion, and generally felt more particularly in one part of the joint. The knee assumes a semi-flexed condition in order to produce as much relaxation as possible. There is some redness of the skin, and considerable symptomatic fever. Swelling is great, both in the joint and around it, and the latter generally causes the joint to have a regular rounded appearance. In this state the joint does not continue long. If treatment has been early applied, it may end in resolution, or the inflammation may become chronic, if however it goes on, effusion of fibrine takes place into the joint, or the membrane separates. In this last case, the consequences are very disastrous, in cause of time the matter makes its way to the surface, and then irritative fever is set up, which either causes the patient off, or settles down into a state of hectic. If amputation be not now
performed, the most favourable termin-
ation that can be hoped for is com-
plete ankylosis. The appearances
to be seen in the synovial mem-
brane are the following: In the first
stage there is intense hyperemia
of the whole surface, along with this
the whole joint is filled with fluid;
this much is consistent with complete
resolution. Next we have lymph thrown
out in the form of a solid excava-
tion, and if the disease now becomes
chronic, this may become formed into
a complete membrane. The last
stage of the disease, is marked by
a mixture of pus, and flakes of
lympho with the synovial fluid, and
sometimes the joint has the appearance
of a simple abscess. Such is sim-
ple acute synovitis, when it runs its
course as a simple inflammation.
In many cases it tends to diverge in-
to that form of degeneration of which
I shall afterwards speak. Chronic
synovitis may either be such from
the beginning, or may be preceded by some amount of the acute form. In its mildest types, it merges very much into the simple hypertrophy of which I have spoken. When well marked, it possesses the same characteristics as acute synovitis, in a more mitigated, although a more prolonged form. It has a greater tendency to submit to the effects of treatment, but in many cases it runs on eventually to the same disorganization. It may become arrested either at the stage of effusion, or at that of thickening of the membrane by deposit of lymph. During its progress, there are often semi-acute exacerbations, and not infrequently abscesses are formed in the neighbourhood of the joint, by the irritation of the disease. It too, has a strong tendency to lose its character of a simple chronic inflammation in a chronic degeneration of tissue. Relations degeneration of the
Synovial membrane to which we must next turn our attention, is a most intractable form of disease, and unfortunately of very frequent occurrence. It is most common in children and is very rarely met with beyond the age of puberty. In speaking of it, it will be necessary to depart somewhat from my original plan, as it is so often inseparably connected with disease of the neighbouring cartilages, and as it is impossible to separate the affection of the one, from that of the other. I must speak of them together. Considerable discussion has taken place as to its pathological nature, whether it constitutes a disease in itself, or is merely a result of inflammation. Although admitting that it very frequently follows, and is excited by inflammation of the joint. I have little doubt that we must consider it as a special disease. The fact stated by Borrde and others, that we never meet with it as the result of inflammation on the second membranes, or even in the
synovial sheaths of tendons, and rarely in any other joint than the knee, tends to bear out this conclusion. Its non-occurrence in adults also where inflammation is equally common, would lead to the same inference. By most surgeons, it is considered to be a product of the strumous diathesis, and certainly we do very generally meet with it in young persons of a strumous tendency. But there is no doubt that many cases occur when the only suspicion of struma arises from the disease itself. The very common recurrence also of struma in young persons in hospital practice, renders the ascription of any disease to that diathesis a matter of some doubt. The degeneration arises in different ways. In most cases it is ascribed to some slight blow or twist. If the patient be seen soon after, he will often be found to labour under some slight degree of synovitis. In this stage it is impossible for
the surgeon to prognosticate with any certainty, that spinal degeneration will ensue, he applies the ordinary treatment for chronic spondyloitis, and discovers after a lapse of time, sometimes very considerable, that it is unavailing, and that the symptoms of a more formidable disease are beginning to manifest themselves. In other cases the patient is attacked from some cause with severe acute spondyloitis, the utmost energy of treatment is required, and at last appears to be successful. The joint resumes its proper shape, and regains its native power, the patient begins to walk about again, and is perhaps dismissed from our charge. But after the lapse of a month or two he returns, and we are surprised to find that he has laboured under well-marked spinal degeneration. As an instance of this form of origin I may cite the following. J. D., aged 26, admitted to the Royal Infirmary, June 1st, 1873.
A fortnight ago his left knee began to swell and grow painful, so much so as to confine him entirely to bed and prevent him from attaining any sleep. On examination the joint was found to be hot, red, considerably swollen, the swelling extending some distance up the thigh. There was fluctuation over the two sides of the patella, and intense pain felt chiefly over the head of the tibia. The usual treatment for acute synovitis was put in force, but in spite of this the fever was very high, and the pain excruciating. A fortnight after an abscess appeared on the outer side, apparently external to the joint, which was opened. A large quantity of pus escaped, and considerable relief followed. From that time he gradually improved and was dismissed in the middle of July with both joints in an apparently healthy state.

This day again he made his appearance at the Infirmary, and stated that for about two months the joint continued
perfectly well. It then began to stiffen and to swell again, though not to the same extent as before, and without pain. On examination now there were all the symptoms of synovial degeneration, but the joint still continues thus, the disease apparently becoming worse. But in many cases the symptoms of the disease appear to come on without any preceding inflammation, and often originate by some exceedingly trifling injury. When thus arising the symptoms may be described as follows. At first the patient receives a slight injury, he may think little of it at the time, or he may be confined to bed for a day or two. On beginning to walk about however he finds that his joint is not quite so useful as before, and that there is some degree of stiffness, instead of diminishing in size, and that the joint is beginning to swell slightly, he will then consult a surgeon. On examination the motion of the joint will now be found to be somewhat impaired, and the longer the disease has
continued the same will this be the case. On laying the hand upon the joint, the temperature will be found to be little if at all increased, and the colour of the skin is natural. There is little pain, but rather a feeling of tension, and the patient will sometimes state that he feels as if his joint was stuffed. Evident swelling is to be observed, which is less regular than that caused by synovial excitation. It is of course found chiefly at those parts where the synovial membrane is most prominent, and least covered by the surrounding tissues. It has a peculiar pulpy elastic feeling, and has in some cases rather a deceptive similarity to fluctuation. If care be not taken in the examination, it is always necessary to use both hands. Such are the symptoms as long as the disease is confined merely to the synovial membrane. The progress of the case is in most instances excessively slow; in weeks.
months, and sometimes even years, little or no change takes place. The patient is merely incapacitated for all usefulness, and constantly indulges in the hope that he will yet get quite well. But at last the disease begins to invade the other textures, and now a marked change in the symptoms takes place. In the language of Sir Benjamin Brodie "When the cartilages become ulcerated, there is pain in the affected joint, at first slight, and only occasional, and in the early stages of the disease it is completely relieved by remaining in a state of rest. By degrees the pain becomes constant and very severe, particularly at night, when it disturbs the patient by continually arousing him from sleep. The pain is aggravated by motion so that the patient keeps the limb constantly in one position, and generally half bent. This pain is the sure sign of invasion of the cartilages. It is distin-
quished from other diseases, by its slight commencement and gradual increase. Upon striking the heel no great pain ensues on the knee, the constitutional symptoms also change along with this invasion of the cartilages. The patient begins to lose his natural rest, he grows thin, and loses his appetite. A species of hectic fever sets in. He generally now begins to wish for amputation as a relief to his sufferings, and it is not often that the surgeon sees fit to refuse it. If left to itself the progress is rapid. The acute suffering which he endures will sometimes alone wear out the patient, and destroy him by exhaustion; or the cartilages being eaten through, the bones in their turn become invaded with caries. Infection ensues and the cartilages being destroyed, dislocation may take place in any direction. Amputation, death by exhaustion, or
more rarely enchondrosis, are now the only results to be looked for.

The appearances observed on dissection of the joint, are the following. In the 1st stage the synovial membrane is alone affected, and the original seat seems to have been in those joints not covering the cartilages. The whole structure of the membrane is altered, it becomes thick, soft, and jelly, and is often even half an inch in thickness. In some cases it is darker, and firmer, and some surgeons have made two affections out of these conditions. The contents of the joint, are at first simply watery effusions, but afterwards they become mixed with pus, and the debris of the other parts. The cartilages are next affected, and undergo what is called ulceration. Mr. Gordon has shown that this is owing to a change in the cartilage capulcles, which become filled with undulated cells, while the matrix becoming softened, these
break down and become disintegrated in the surface, and so the cartilage gradually disappears, as if it had been gnawed out. The bones are affected in various ways, but chiefly by a kind of destroying caries.

Loose cartilage, the only other affection on which any time will allow me to enter at present, is characterized by symptoms, which, at first are often very obscure. The patient merely complains of a little stiffness of the joint, with a slight catch occasionally when he walks. Suddenly however some day he is caught, as if a sharp instrument had been driven into this knee, and for some time dare not attempt to move. This is often followed by a slight attack of synovitis. On being asked to examine him, the joint is found apparently quite normal, or containing a very small quantity of fluid, but on closer inspection a small body very or by an edge from a pen, to a large tear, may be felt at some part of the
joint, generally about the side of the patella. It is quite loose and moveable, and may be made to disappear into the inner parts of the joint. This taken along with the preceding symptoms is perfectly diagnostic of the affection, and the only source of fallacy, is that the body may be deep in the joint when the patient first comes under our notice, and thus may escape observation, if only a careless examination be made. In structure these bodies are firm, and fibrous, but they are not all of equal density, and occasionally they contain some brown matter in the centre. Many explanations have been given of their origin. Hunter and others believed them to arise in precipitates of various kinds within the joint, and examples have been produced to corroborate this view. Lamees thought that they were first produced outside the joint, and afterwards pushed their way into it, as similar bodies are formed outside the tunica vagin-
als. A case which I lately saw would tend to confirm this idea, for the body could then be felt at the commencement, to be inseparable into situations where the synovial membrane could not well reach. Another very probable explanation is, that they are bodies very similar in their nature to the gummosis of synovial membrane, and that these bodies become destroyed.

I have thus mentioned some of the main diseases of the knee. I have spoken of ruptures, and inflammations of its capsule, of simple distroy of the joint, simple inflammation in its sheave, and acute forms of the synovial membrane, pulpy gelatineous degeneration of the same part, together with its common sequenee destruction of the cartilages and ends of the bones, and loose bodies in the joint. The last might have been greatly lengthened had time permitted, but I think it will be found that in practice, the preceding objections with their combin-
ations constitute the main elements of disease. I might have spoken of hypertrophy of the fascia, which however is scarcely diagnosable, and requires no special treatment, of the different complications of destruction of cartilage to which the same remark applies, or of that intractable affection neuralgia which however is not a disease of the joint, but of the nervous system, and which for its diagnosis requires only a correct knowledge of the true disease of structure, that then absence may be known by negative signs.

I must now say a few words on the treatment of each of these, and of course in this I can only speak of general indications, although particular cases may demand special treatment. We have seen that in the great majority of cases there is some predisposing state of the system as rheumatism, asthma, etc., and of course our attention must at once be turned to these, else no amount of local treatment will be of any avail. It may be laid down as a general
rules that the nearer we can bring the patient's general system, to the standard of health, the speedier will be the cure of the local affection. It must be left to the surgeon's discretion, to observe in what lies the deviation from health, and to his knowledge of, or belief in, the practice of physic to counteract it.

Inflammation of the capsule of the joint is in a great majority of cases rheumatic, and its treatment constitutional, by alkalies, calomel, or other drugs applied to the systemic disease. It occurs occasionally where there seems to be no rheumatic tendency, and where antirheumatic remedies have no effect. These cases must be treated on the same general principles as any other local disease.

Simple effusion into the joint is sometimes a very intractable affection, at other times the contrary. These mild cases which depend upon a disturbed state of the digestive functions, yield easily to a few days' rest, with some mild opulent, and tonic medicine. Severe cases of long continued standing are often very
difficult to get rid of, and we must her
make use of the various remedies which
are supposed to favour absorption. The
local application of iodine, or of plaster,
is sometimes useful. Inflammation of
the synovial membrane in its acute form
especially when depending on penetrating
wounds must be met by the most severe
treatment on account of its dangerous re-
sults to limb, and life. Complete rest
is the first indication, as it is in all
other inflammations, and this must be
done effectually, and if the patient can
bear it in the straight position. Local
bleeding by leeches is often remarkably
useful and the application of warm fo-
mentations, not however with a view of
encouraging cell growth in the joint.
Inflammation fever often runs high, and
cannot be met by the ordinary antiphlogis-
tic measures, low diet, antisyphicity, etc. If
once pus should have formed in the joint,
it will find its way to the surface, but
of course we will not attempt to expedite
it by making incisions. Care must be
taken however to discriminate those cases-
tions of matter which often take place outside the joint, the evacuation of which causes great relief. When the joint is opened into, a certain amount of irritative fever is set up, and amputation while this is going on is not generally successful. The moment however it has somewhat abated, the surgeon must make up his mind whether he will amputate the limb, or leave the patient to attempt to swim through the state of hectic which must follow for the sake of an unchylized joint. In most cases amputation will be necessary, no general rule can be laid down however. But the surgeon must take into account the amount of the patient's strength, and the use that an unchylized limb will be to him afterwards. Always bearing in mind that the longer inflammation goes on, the less able will he be to endure an operation.

When the inflammation assumes a chronic form the treatment must be considerably modified. All active antiphlogistic measures are now unnecessary unless during
the slight acute returns which often take place. Local measures must be used with a derivative tendency, such as blistering, and the patient's general system will usually be such as to require some support. Here however as in the acute form rest is indispensable. The treatment of gelatinous degeneration as far as understood at present is simple but unfortunately unsuccessful. It consists mainly in freely supporting the patient's system, and in enforcing complete rest of the joint. Sotto dressing with adhesive plaster, and mercurous ointment, seems sometimes successful mainly no doubt from the complete rest which it affords. Issues in other directions may also be tried, but generally without much permanent result.

In treating loose cartilage we must first make the attempt to fix it in one position by constant rest of the limb and by the irritation of a succession of blisters. This generally fails however, and it may then be cut out by an incision down upon it, or much better
It may be extended from the synovial
sac by a subcutaneous incision and
either left in the surrounding tissue
or afterwards removed.

Walter Williamson