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CLINICAL LECTURES

IN COURSE OF DELIVERY DURING THE PRE-
SENT SESSION,

AT
GUY'S HOSPITAL.

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LECT. II. *On the General Treatment of Fracture.*

GENTLEMEN,—At the conclusion of the last lecture, after having spoken of the pathology of bone, I was explaining some of the causes of non-union of fractures. I shall not now enlarge upon that part of the subject, but proceed at once to speak of the treatment of fracture, giving you some general rules of practice, before I speak of the particular cases now under my care in the hospital.

I am often very much amused in going round the wards to hear the remarks of some practitioner of the old school with regard to the treatment of fracture. You will often hear such remarks as this, "How do you put up your fracture now? In the straight position, or on the inclined plane? on the side, or the heel?" the questioner expecting to find, as in days gone by, some one plan to which all fractures are subjected. Gentlemen, there is but one answer to such questions as these, and that is—always place a limb in that position in which the bones are brought into apposition, and in which the patient experiences the most ease and comfort. Generally this will be in that position in which all the muscles capable of acting on the fractured extremities of the bone are relaxed, but not always, for a spiculum of bone may be irritating one or more muscles, and exciting them to undue action, and you cannot tell, *a priori*, when this is the case. Your surest guide, then, is the comfort of the patient, and sometimes this consideration will lead you to place a limb in the most extraordinary position, of which we had an instance not long since in our wards, a man who had fracture of the tibia, only being easy when the knee was brought in close contact with the abdomen. Generally this is only necessary in the early periods after fracture, more usual positions being adopted when muscular irritation has subsided.

The grand objects of the general treatment are to prevent inflammation, and to restore the limb to a useful state without deformity. To ensure these results, there are several minutiae in practice which must be attended to, apparently trifling perhaps, but really important. In the first place, as to the kind of bed the patient is to lie on—the friends will probably wish it to be a feather bed, but a flock mattress is far better. The feather bed is softer at first, but after a little

time it becomes knotty and very uncomfortable, and by no means so convenient for the application of local means, such as the bed-pan, as the flock mattress. When called to a case of fracture, be careful not to move the patient until you have procured some solid support for the broken ends of the bone, for great pain and serious inflammation are almost certain to follow any rough handling. Procure a splint then, or some extempore equivalent contrivance, before you attempt to move the sufferer. Then the question comes, would you apply leeches? and looking to the swollen state of the soft parts, you would fancy that acute inflammatory action was going on, and at once direct a number of leeches to be applied. It is occasionally necessary to do so, but their indiscriminate use must be condemned. There are various objections to them. Sometimes the swelling spontaneously subsides almost as rapidly as it came on, and in that case leeching is evidently unnecessary. Again, in strumous constitutions a suppurative inflammation is apt to come on in the bitten parts, and then you have a number of inflamed ulcers on the surface of the injured part, which would obviously prevent the application of a tight bandage. Thus, where early bandaging is necessary, the necessary means cannot be used; for the pressure of the splints would not only produce local irritation, but erysipelatous inflammation. Leeching, therefore, ought to be avoided if possible. In healthy, plethoric subjects, if there be much febrile disturbance or continual pain, I am in the habit of directing a moderate bleeding from the arm, by which the pain is lessened, and there is much less consecutive fever. But you must be careful not to mistake a healthy farmer's man for a bloated brewer's drayman, who, instead of bleeding, requires the most powerful tonics we can command. The subject I mean is the healthy, temperate, robust plethoric subject, not accustomed to the inordinate use of fermented liquors. These you will often meet with in country practice, and such persons will experience great benefit from moderate blood-letting.

To subdue fever and inflammation, active purging is an obvious and common treatment. This is very well in fractures of the upper extremities, but when it is a lower limb that is injured, do not give a drastic purgative for forty-eight hours, as the disturbance to the parts by the constant use of the bed-pan is a very great objection to their early employment. Afterwards they may, of course, be useful.

With regard to rollers and bandages, it was formerly the practice to apply them directly, and they doubtless are useful if applied to steady the limb, but if used with an idea of compressing the parts, they are decidedly objectionable. When the thigh is broken, you would bandage the foot and leg to prevent oedema. The many-tailed bandage I never use, because I feel that any object gained by it is to be attained by simpler, and therefore better means. As to the early use of splints and band-

dages, you will often find in private practice, that the friends of the patient are very fidgetty until the limb is set in the orthodox manner, even though the case is one, such as fracture of the fibula, which can hardly ever require a splint in the first instance, doing just as well by merely resting on a pillow. But they are constantly harping on setting the limb, asking, "When will you set it?" and fancying nothing is right till it is fairly set. If you merely lay it on a pillow without splints, they will think you do not know your profession, and therefore it is a good general rule in private practice to pretend to set it, appear to fall in with the common opinion, and humour the prejudices of the many, merely applying a splint or two without making any pressure, and with this they will be quite satisfied. It is the fashion with the mass to regard setting as an exceedingly formidable sort of operation, and formerly it really was so, great force being used to pull the parts together, without reference to the muscles which were causing displacement. But if you act so as to relax these muscles as much as possible, adjustment need not be so very painful. Some little pain is, of course, always produced, but not to anything like the degree commonly believed. In the first instance, then, you would put on splints, but merely keep them applied over the parts, without pressure on the fractured portion of bone; after a time they may be reapplied, or lightened by tapes.

As to the local applications in cases of simple fracture, the common saturnine lotion, liquor plumbi diacetatis dilutus of the London Pharmacopœia, is the one I am in the habit of using. Spirit lotions often do more harm than good; for unless the part is kept open, and constant attention given to keep the linen wet, and favour evaporation, the vapour becomes confined, and then, instead of cold, you have a warm stimulating fomentation. In old persons, instead of cold, you should use warmth and moisture, for in them the circulation is feeble, the blood-vessels indurated or ossified, and there is such a want of action in the whole system, that continued cold would be very likely to induce gangrene.

Your prognosis, in a case of fracture, will be guided by the age and constitution of the patient, and the amount of local injury to the surrounding parts. The situation of the fracture, also, is an important consideration with respect to prognosis. If the bone is but sparingly covered by soft parts, and there is contusion of these parts, they may become disorganized, and slough without any early appearance of serious injury. You would learn the history of the case, and if the fracture and contusion were caused by a blow, would anticipate serious results, much more serious than when the bruise is what may be called internal, that is to say, when it is caused by the projection of the broken end of the bone beneath the integuments. You will be led to see the danger by finding that the bruised integument is insensible to the touch, and then you have to apprehend gangrene and sloughing, with consequent conversion of the case into compound fracture. There is a case, now in Accident Ward, in which the tibia has been as nearly as possible thrust through the skin, but the patient is doing well. I remember a case which was brought to the opposite hospital, about twenty-five years ago, where

the bone was very nearly pushed through the skin, and this case strikingly illustrates the mischief produced by the old practice of swaddling up the limb, so that you cannot see what is going on beneath. The danger of this practice is really very great, for the integument being insensible, the bone will pass through the skin without pain or consciousness of the occurrence on the part of the patient, no active inflammation going on in the surrounding parts. In the case to which I allude, one of the fractured ends of the bone was very prominent, and as I saw them covering the limb with strips of soap plaster and rollers, I suggested that they might probably injure the soft parts; when the surgeon replied, "O no, sir, it will *all round off*." However, when the dressings came to be removed, the bone had penetrated the skin, and thus a simple was converted into a compound fracture by bad surgery, and I have seen this very nearly the case in several other instances. Another effect you must especially guard against in old people, is sloughing of the nates, for there have been many cases in which this has destroyed life, long after all the consequences of the fracture have been repaired. Examine the parts every day, and directly you discover any purplish redness on the parts exposed to pressure, put the patient into a water-bed. Many other bedsteads have been recommended, but I can say from experience that none are so useful as the water-bed.

The subject of contusions, in connexion with fracture, is a very important one, as this complication gives rise to some of the greatest difficulties that you will meet with in practice. I think it right, therefore, to go into this point at some length. Now, whenever a part of the human body has been struck by a hard substance, with force sufficient to crush the soft structures beneath the skin, without dividing the surface, that injury is called a contusion. If the skin has been torn through, so that the internal bruise communicates with the external opening, it takes the name of a contused wound. A contusion, therefore, is simply a laceration of vessels and other soft textures beneath the skin, from the pressure and concussion of blows inflicted by hard and heavy substances; whilst a contused wound differs from a lacerated one, inasmuch as the parts are always crushed, and consequently disorganized by the nature of the injury. A lacerated wound is occasioned by a solid body driven through the soft parts; a contused wound is produced by the pressure and concussion of hard substances driven down upon the parts. A lacerated wound may extend to any distance beyond the first point of contact; a contused wound confines its sphere of action to the part where it first strikes. Let me give you an example. A man falls perpendicularly upon his head upon the pavement, and makes a contusion upon the part; but if he pitch upon an iron railing, it passes through the parts, tears them, and makes a lacerated wound.

The effects produced by a contusion are well known to you, namely, swelling and discoloration in the part, with tenderness under pressure, and a greater or less degree of continued pain. The swelling is occasioned in the first instance by effusion from the divided vessels. This, however, is in most cases inconsiderable, and unless a large vessel has been ruptured, the quantity of blood poured out in this way bears no proportion to the

second cause, namely, the effusion of serum and adhesive matter, which the consequent accession of inflammatory action throws into the surrounding parts. This deposit, with the extravasated blood, is poured into the adjacent cellular membrane, and these textures, therefore, become filled and distended, in part by blood from lacerated vessels, in part by effusion from subsequent vascular excitement. The most common examples of the effects of contusion present themselves in what is commonly called a black eye. In the first instance the swelling is confined to the point of contact, but in a very short time, the loose cellular textures surrounding the eyelids are filled by extravasated blood, serum, and adhesive matter. The accompanying pain is produced not only by the violence done to the nerves in the part, but also by the pressure they suffer from surrounding distended structures. In wounds this distension is in part prevented by the outlet to the secreted fluids, while, in contusions, these are confined in consequence of the skin remaining undivided, and exert compression upon the surrounding parts, causing pain which varies with the extent of the compression.

The nature and consequences of contusions will depend, not upon the degree of force with which the injury is inflicted, but upon the resistance which is offered to the blow by subjacent bone. Thus, if a hard solid body be struck against muscular or other soft parts, these structures will yield considerably before their fibres give way, and it therefore requires a very considerable degree of violence to produce extensive injury. But when the skin and cellular membrane lie in close apposition to bone, a firm resistance is offered, and the intervening soft parts will be readily broken down between the two solid bodies. Whenever, therefore, you meet with a case of contusion occurring in soft parts far removed from bone, you will seldom have to fear any serious consequences, for if the partial destruction of parts and the effusion from divided vessels and inflammatory action, present a mass of substance disproportioned to the restorative action which has been set up, an abscess will be the consequence, and the dead parts will be thrown out by suppuration and ulceration; but it will be a simple abscess of parts which are easily reproduced or repaired. On the contrary, a severe contusion of the integuments covering the fore part of the tibia will be attended with very different consequences; yet the first appearance would lead you to suppose that it was an accident of minor importance. But in these cases we frequently find that although the swelling is trifling, yet the mischief has been great; that the skin and cellular membrane have been crushed beyond the power of future organization; they slough, therefore, and leave a large ulcer upon the part. If the periosteum and bone have suffered, exfoliation will take place, and thus a long protracted disease is set up. I am not stating an imaginary case, for a short time ago I amputated the leg of a man in Cornelius Ward, who had fracture from contusion followed by slough of the integuments, and necrosis of the bone, and an obstinate malignant warty disease. You would therefore be very guarded in your prognosis, where a severe contusion complicated a fractured bone, especially in the extremities of old people, whose circulation in the extreme vessels is but imperfectly carried on by ossified arteries and varicose veins.

It frequently happens that a serious mistake in practice may arise from a want of knowledge respecting the appearances which contusions sometimes produce upon the scalp; and in making these remarks, I wish you distinctly to understand that I am by no means applying them to the case of injury of the head, admitted a few days since. I find that there were peculiarities in that case, which differ from the class I am about to describe, but I do not allude to them, as they will probably form a subject of clinical remark for my colleague. The following is the sort of case of which I am speaking. A patient is brought to you, who has fallen from a height upon his head, or who has received a violent blow upon the part. You shall find no wound, but apparently evident depression of bone. You feel, as you suppose, a distinct *ledge* of bone, and a depressed portion underneath. The patient is labouring under symptoms of compression from the accident, and the nature of the case appears beyond the possibility of a doubt. Now if you should be ignorant of the proper mode of distinguishing the common appearance of contusion in this part, you would immediately proceed to trephine, but, when you had denuded the bone, would be surprised to find that there was no depression. Let me, therefore, tell you the cause of this fallacious appearance, and how to distinguish it from real depression of bone.

In consequence of violent contusions upon the cranium, that portion of the scalp which has received the blow becomes completely deprived of all vital action from the violence done to the vessels and nerves. The consequence of this will be, that when inflammatory action is set up, these disorganized vessels are incapable of receiving into their cavities the increased quantity of blood which is sent to the part, for they remain jammed with the adjacent cellular membrane into a condensed mass, without sensation. This part, therefore, receives no impression from the inflammation which is set up around it. The surrounding parts, however, are excited to an increased degree of vascular action, and pour out adhesive deposit as far as the border of the disorganized scalp. This line of demarcation between the injured and the sound parts, is, in all these cases, remarkably abrupt, and consequently you have a defined ridge of adhesive matter overhanging a surface of disorganized scalp. The ridge is mistaken for the sound bone, and the circumscribed and disorganized scalp for the depressed portion. So firm is this deposit, that any one unacquainted with the appearances of contusion in these parts might very readily be deceived, and be led to propose an operation by the performance of which you might probably lose a considerable share of reputation.

Let me now tell you how to avoid falling into this mistake, by pointing out the distinguishing marks between such a case of contused scalp and a real case of depressed bone. In both cases you find effusion of adhesive matter to a greater or less extent around the part; in both a defined edge: and very frequently in both, coma, stertorous breathing, and every symptom of depressed bone, and consequent compression of the brain; but in the spurious case, by comparing the injured with the sound side of the head, you will find that the ridge overhanging the supposed depressed portion is somewhat above the level of the opposite side, whilst the supposed depressed portion is exactly

in its natural situation. In a case of real depression it will be the reverse. But the most distinguishing mark is this: place and press your finger across the defined edge, which lies above the supposed or really depressed surface; if by firm and continued pressure you feel the parts yield—if a deep pit is formed by your finger, without any sensation of that hard edge which a real depression of bone would produce—if by continuing that pressure you bring your finger on a level with the supposed depressed portion, of course the nature of the injury will be clear. But if by continued pressure you find the parts becoming harder until a defined sharp edge of bone is opposed to the point of your finger, then you may be assured that depression really exists. Those who have not witnessed these cases, would hardly believe that so great a similarity could exist between appearances presented by depressed bone, and the effusion of adhesive matter from contusions of the scalp; but there are many present who can confirm from experience what I have now stated; and as such cases are frequently occurring in the public hospitals of this metropolis, you will probably have an opportunity of seeing several of them in our two hospitals during the present season. In some cases the disorganized scalp recovers its vital powers, and after a length of time becomes again organized. In other cases it is permanently destroyed, and must be thrown off by the sloughing process.

The local treatment in cases of fracture, accompanied by contusion, will consist, first, in regulating the degree of vascular action in the part, and secondly, in producing by various means the absorption of the extravasated and effused matter. In slight contusions, attended with considerable tension and tenderness in the part, you would first apply cold evaporating lotions, keep the limb at rest, and in a position to relax the integuments and muscles as much as possible. You would avoid leeching if you could, but very often you have no choice; for if you do not apply them, suppurative inflammation would come on, and convert the simple into a compound fracture. If any considerable portion of the injured structures had been *completely* disorganized, this will alter your plan of treatment, for the subsequent inflammation will not yield until suppuration has been established; and to promote this, you make use of fomentations and poultices, keeping in mind at the same time the necessity for relaxation and perfect rest of the parts. In addition to this, the bowels should be freely acted upon by purgative medicines.

When you have a fracture about a joint, and contusion of the soft parts, or even severe contusion over a joint without fracture, it will very frequently become necessary, in addition to topical bleeding and the other means I have mentioned, to lessen the tendency to inflammatory action by abstraction of blood from the arm. In this you will be guided by the pulse, and by the degree of pain in the part. If the pulse is accelerated and sharp, and febrile irritation has been set up in the system, and if the surrounding parts are tender under the touch, you will lose no time in arresting by antiphlogistic remedies the progress of a diseased action, which might otherwise terminate in synovitis and destruction of the tissues of the joint. After inflammatory action has subsided in

any case of severe contusion, whether over fracture or not, your next object will be to use such measures as may tend to promote the removal, either by absorption or otherwise, of the deposit which has been thrown out under the skin. If that deposition is not of great size or extent, this will be easily accomplished by friction and the various liniments in common use, by which you excite increased action in the neighbouring absorbents. It sometimes happens, however, that a large vessel has been ruptured, and consequently that a considerable coagulum is thrown into the cellular membrane, or that a slough of dead cellular membrane is confined beneath the skin. In both of these cases all attempts to promote absorption will be fruitless. A large coagulum of blood or slough of cellular membrane beneath the skin must act as extraneous substances, and will consequently require the process of suppuration and ulceration for their removal. These results of contusion require the same treatment (for the parts are nearly in the same state) as in a common case of carbuncle or anthrax. In both you find an extraneous substance formed by disorganized animal matter beneath the surface of the skin; in both, suppurative and ulcerative processes are set up for their removal; and in both, the plan of treatment will be precisely the same. In carbuncle you find a slough of cellular membrane beneath the skin produced by diseased action in the part, of which debility is the cause. In contusions you find a slough of cellular membrane beneath the skin produced by mechanical violence, and debility will be the consequence of the efforts which nature is called upon to make for its removal. In both cases you divide by a free crucial incision the integuments which cover the dead substances, in order to allow of its free exit from the living matter by which it is surrounded. In both cases you give tonic medicines and generous diet, and for these reasons—in carbuncle the *cause* of the disease is debility, and you wish to remove that cause by a stimulating plan of treatment—in contusion, debility will be the *consequence* of the future suppurating process by which the removal of the extraneous body is effected, and you therefore wish by a stimulating plan of treatment to assist Nature in the demand which has thus been made upon her resources.

When these sloughs communicate with the broken end of a bone, the case is a dangerous one; but still, as soon as you have evidence of suppuration, you would freely divide the integuments by a crucial incision, even though you would thus convert the case into one of compound fracture. The slough must be separated by a natural process if you did not interfere, and then you see the occurrence of compound fracture is unavoidable in either case, but by your incision you not only expedite the process of separation, but limit the extent of the disease. You merely assist Nature, and prevent greater mischief. Mere punctures can be of no use, for the dead matter is locked up in the cells of the cellular membrane, and will only flow from those cells which have been opened by your punctures; you will therefore, by such a mode of treatment, be putting your patient to unnecessary pain, for no possible good purpose.