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Medical Officers of Schools Association.

FOOTBALL INJURIES.

BEING

A PAPER READ BEFORE THE ASSOCIATION
IN 1903.

BY

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FOOTBALL INJURIES.

MR. CHAIRMAN AND GENTLEMEN,

When your secretary (Dr. Hale) a few months ago sent me an invitation to open a discussion before you on "Football Injuries," I readily acquiesced with your wishes, feeling much complimented. Since that time I have many times thought of the subject, and by degrees it has been forcibly brought to my mind how very rash a thing it was that I so readily acceded to your wishes. The difficulties from my standpoint are many. In the first place the subject is too large to be satisfactorily dealt with in the time at my disposal, and in the second I feel my inability to present to you, a Society of Experts, anything truly novel or of deep scientific interest. I take it that each of you is as familiar with these surgical affections as I am, for during the football season they are by no means uncommon. Your experience must be large and varied, and for this reason your position as critics superlative. Nevertheless, with your consent, it will now be my endeavour to enumerate some of the injuries which we commonly meet with, and to give you my own experience in dealing with them. Reference will, from time to time, be made to lines of treatment which may be considered unorthodox, and, perhaps, for this reason the more likely to give rise to an animated discussion.

In referring to his own experience, the reader of a paper may appear unduly egotistical, I therefore also crave your indulgence in this respect.

Of the two games most usually played, that under the Rugby rules accounts for the greater number of injuries, while the Association, speaking generally, is responsible for the most serious; at least, such is my experience with undergraduate practice; for while contusions, twists, wrenches and the like are more common with the former, injuries to the viscera are more generally associated with the latter.

Besides the *kind of game*, other circumstances would seem to influence the frequency of injury. First and foremost amongst these is the *Season of the Year*. In the autumn players are wont to begin suddenly and to throw themselves at once into hard, well-contested games. During the long vacation which immediately precedes the term, the school-boy and undergraduate have been taking various other forms of exercise—shooting, yachting, mountaineering and other pastimes are resorted to, all useful for the growth and development of the individual, but not in themselves affording sufficient training for the sudden and violent strains demanded by first-class football. The result is that during the first two or three weeks of the October term innumerable lacerations of muscles and wrenches and strains of joints take place. It has been noted again and again at Oxford that more athletic injuries are met with during the first fourteen days of term than during the whole of the remaining six weeks. The muscles are as strong and vigorous as ever, but their tendons have not grown accustomed through gradual training to the strains put upon them. At football, as in all other forms of athletic exercise, gradual muscular training should be recommended. This system of careful training may probably be better regulated at the public schools than is possible at the Universities, where personal control is less. At the present time none but professional football players would seem to pay any attention to gradual training.

Temperature also has some influence in causation. The fact must be familiar to most of us that ruptures of muscle-fibres are more prone in frosty than in damp and warm weather. Recall for a moment the care which a high jumper or sprinter will take to have his limbs sponged over with warm water or rubbed with some rough appliance so as to warm them before competing, yet our boys and young men will think nothing of walking about for half an hour or more on a football field with bare knees and scanty clothing while awaiting the arrival of their opponents.

The teaching of Physiology accentuates the fact that cold retards muscular contraction and renders the muscle more inelastic. Inelastic muscles are more prone to laceration. As to whether "frosty weather makes bones more friable," though this is certainly a popular idea, I am unable to give an authoritative opinion. By paying some attention to these general

considerations at the public schools it is possible that in the future a certain number at any rate of the minor injuries will be prevented.

The injuries may be the result of direct or indirect violence, and almost every tissue and viscus at one time or another suffers.

By far the most frequently met with are *contusions or bruises*; these vary in extent from the smallest patch of discoloration in the skin to extensive subcutaneous hæmorrhages. Bruises, though generally limited to the subcutaneous tissues, are not infrequently deep and involve groups of muscles, are subperiosteal, and even occasionally to be found in the internal organs such as the kidney and spleen.

Nor are the serous cavities exempt, for hæmatocele and hæmorrhages into the pleura and peritoneum are not unknown. The diagnosis presents no difficulty. The principles of treatment are to limit the extent of the effusion as soon as possible after the injury, and then to assist in its absorption.

Various plans are recommended for this purpose. The applications of cold or heat are perhaps the most used. Such a line of treatment is advocated in every text-book. Personally I never use either of these agents, for the simple reason that they are seldom at hand, and are not as efficacious as elastic pressure. Pressure will not only check hæmorrhage more expeditiously than cold, but it has also the double advantage in that it assists re-absorption more materially. All that has been said against the use of cold may be urged in respect to heat in addition to the fact that unless the heat is sufficiently intense to immediately check the hæmorrhage it may even increase the bleeding into the tissues. The treatment of a black eye is an excellent example. If the patient is seen at once or soon after a blow has been inflicted over the eye and a pad of cotton wool and tight bandage are applied, even the usual swelling may be prevented. If there has been swelling this will disappear in about six hours if the bandage is carefully applied and retained in position. Not infrequently in packing the orbit with the wool a small portion of the skin near the inner canthus escapes the pressure. When the bandage is removed some hours later I have observed a small red patch showing that absorption has taken place wherever the pressure had been accurately applied—while the bruising remained everywhere else. Such a result can never be obtained by either

the use of cold or hot applications. Where the blood collects in a cyst as in hæmatoma auris (football ear) or under the periosteum as over the anterior surface of the tibia, or in some artificial brusal formations, much time may be saved by making an incision under rigid aseptic principles into the cavity, drawing off the fluid blood and turning out any existing clots. With ordinary care this is a very safe procedure, and saves much time over the older method of counter-irritation and blistering. Sometimes as much as a fortnight may be gained by using the open method. The same system of drainage is applicable where a serous cavity, such as the tunica vaginalis in hæmatocele, is involved. It goes without saying that the most rigid aseptic practice must be followed both at the time and afterwards until the wound is quite healed.

Next in frequency to contusions are *sprains or strains*, muscular as well as articular. In a muscle as in a joint, every order of strain may present itself from the simple over-stretching of its tendon or fascial attachment to partial or complete rupture of the fibres themselves. "Being out of condition" is generally the predisposing, while some sudden or clumsy movement supplies the exciting cause. The results are pain, loss of function, with stiffness and swelling from bleeding into the tissues. The treatment consists of temporary rest to the muscle or group of muscles. This diminishes the pain, which is, however, generally slight, and also limits the effusion.

In the slighter cases nothing is required but strapping to support the muscle or its tendon, and massage or friction over the plaster to assist and expedite the absorption of the effused blood. The patient may be allowed from the very first either to walk or to exercise the limb with a carefully graduated weight and pulley apparatus. *Active movement* in the case of injuries to muscles is absolutely necessary to prevent atrophy. In cases of complete rupture an open operation may be necessary. The muscles which are most frequently damaged at football are those of the thigh, the hamstrings as well as the quadriceps extensor, and the deltoid.

The hamstrings are sometimes torn close to their pelvic attachment from indirect violence, while the extensors are more frequently injured at their lower connections. Direct violence, such as a kick, sometimes causes an injury to the muscle fibres them-

selves in the middle of the thigh. What in football language is known as the "Pope taken" is an injury to the fleshy part of the quadriceps extensor in the middle of the thigh from a blow or kick, often followed by severe bruising. The tensor fasciæ femoris from violent contraction not infrequently ruptures or splits the fascia lata of the thigh, so that even a hernia of the muscles results. Circular strapping of the thigh is most useful in these cases. Overstretching or rupture of portions of the deltoid muscle is common from indirect violence as "tackling" or "handing off."

The plaster strapping should be applied transversely to the pull of the muscles. By applying it in a circular manner around the thigh the muscles and fascia lata are bound together and supported, and the muscles divided, as it were, into short segments. This plan is found to prevent further tearing during early exercise. The pain in a ruptured muscle is usually insignificant, though numbness may be complained of.

Sprains of the joints are of frequent occurrence from falls or twists. A previous injury of a similar kind is a frequent predisposing cause, especially if play is resumed at too early a date. The precise lesion which occurs when a joint is sprained varies considerably, and it is no easy matter to make out with accuracy what is the exact state of affairs.

The ligaments are the structures which suffer most. These may be only overstretched in the mildest cases, or they may be partially or completely torn across when the injury is severe. In the worst cases even fragments of bone may be detached with them, but this is fortunately rare. In joints which have an inter-articular fibro-cartilage, this structure may be detached and adds much to the difficulty of treatment.

The results of sprains vary with the severity of the accident. The immediate symptoms are pain followed by swelling of the joint. In the simplest cases the swelling is insignificant and the pain transient. In most cases some degree of swelling takes place a few hours later due to synovitis, whilst in others it occurs immediately, and is due to hæmorrhage into and around the capsule. The presence of the blood excites synovitis, and this further increases the swelling.

The after effects are due partly to the effusion and partly to the laceration of structures. Unless a joint is properly treated

it may remain painful and stiff for weeks. While various methods are adopted in the treatment by different surgeons, certain principles must be attended to by every one if success is to be attained. The principles of treatment must be first and foremost to check the extravasation of blood into the joint, then to promote the absorption of the material that has been poured out, and lastly to restore the mobility and strength of the articulation.

I will now venture to lay before you the details of the plan which for years I have followed in my practice and found suitable for carrying out the requirements above enumerated.

Firstly, I would mention that I never use any splint or rigid apparatus, feeling strongly that to do so is a mistake. Joints are movable structures, and should never be kept fixed for any length of time. This, I know, is contrary to the teaching of the schools and text-books. Although the injuries vary in severity, the same treatment is applicable in all cases. It is of the greatest possible advantage to commence treatment as soon as possible, and at Oxford I am fortunate in seeing most of my cases early. Every hour saved before treatment is commenced shortens the later treatment by days.

As soon as a sprain comes under notice, if it is severe the patient is anæsthetised, and the joint is put through all its normal movements. In many cases an anæsthetic is unnecessary, as with careful manipulation the pain is inconsiderable. The object of this manœuvre is that if any torn fibres of the capsule or synovial membrane should curl into the joint they will be restored to their former position. Smooth layers of cotton wool are then applied carefully over the whole articulation extending for some inches above and below it, and over this a domette bandage or one of elastic webbing is applied as tightly as it can be drawn and then fixed. The wool should be of, at least, one inch in thickness. If this is carried out early, and before much effusion has taken place into and around the joint, it is possible to limit its amount considerably. In cases where the injury is severe, and the joint fills at once with blood, the elastic pressure will mechanically prevent further effusion taking place. The bandage is not removed for, at least, six hours after its application. By the end of this time the bleeding will have been checked and actual absorption begun. The bandage is then re-applied. It has been stated by many that the use of elastic pressure is a

painful process, and will not be tolerated by patients. This is rarely the case in my experience. I invariably explain the rationale of the treatment to my patient, who generally enters into the spirit of the thing, and readily puts up with the inconvenience if there happens to be any. Perhaps one explanation is, that, by not using a fixed splint the limb assumes naturally the most comfortable position, usually that of semiflexion, whereas if fixed in a splint in the extended position the pressure when applied becomes painful. Pain also results if sufficient wool is not used. There must be some such cause for the pain, for my patients do not often complain. On one occasion, in the case of a very excitable patient, and where it was most essential to save time, I gave an injection of one-eighth grain of morphia on the first night. On the succeeding day he was quite comfortable, and asked that the injection should not be repeated.

It is customary to leave the first application untouched for twenty-four hours. The bandage is then removed, and gentle massage for about five minutes, chiefly of the skin and not deep rubbing, is performed by myself. This flushes the part with oxygenated blood, and gives a sense of relief. The bandage is re-applied and removed daily while the massage is continued for a few minutes longer each time until about the fifth or sixth day. By this time the fluid will in most cases have almost disappeared. It is then usual to begin passive movement, and to increase the massage. Passive movement should never be commenced until the effusion has apparently disappeared, and the elastic pressure should be kept up until it has quite gone, usually for a day or two after passive movements were first commenced. As soon as every trace of the effusion is gone, usually from the seventh to eighth day in the more severe cases, active exercise should be commenced. This is best done by means of a weight and pulley apparatus. The weight should be slight at first and daily increased. The weight and pulley is better than the elastic resistant apparatus, as its action is less jerky, and the patient can use it when recumbent more readily. After all the effusion has disappeared for forty-eight hours, I hand the cases over to a masseur who is well used to my methods. When active exercise has been in vogue for about forty-eight hours, and the wool has been left off, the joint should be bandaged with a domette or other supporting bandage, and the patient

encouraged to lift gradually increasing weights or to walk a little on crutches each day, according to the limb that is affected. The supporting bandage should be worn during the whole period of convalescence.

The slighter cases will be well in from ten to twelve days, and the more severe in twenty-one. I can safely say that during the last ten years I have never had a knee or ankle joint that was not fit for football or other exercise in twenty-one days. They have all been treated by the same principles—viz., temporary rest without any splint, elastic pressure, early massage and movements. Passive movements will not prevent atrophy in muscles, therefore active exercises should be commenced as soon as they may be borne with safety. Rest should be absolute in bed or on the sofa until the effusion is quite gone, movements, passive and active, allowed only after this. Elastic pressure and massage are far and away the most rapid means of assisting absorption. Weights and pulleys, though often inconvenient, give a more steady and helpful exercise than do any of the elastic apparatuses.

As to the methods generally advocated; I have tried cold and heat. The former is of little service, the latter harmful in some cases, as it encourages bleeding. Splints are not only unnecessary, but positively harmful. They prevent early movement and lead to stiffness. Nor is this difficult to understand. A joint is sprained, bleeding takes place into it, and it is filled, the ligaments, capsule, and synovial membrane are torn and often curl inwards into the joint. Orthodox treatment requires a splint. This is promptly adopted, and cold or heat applied, the bleeding may or may not cease. A splint is used to ensure "rest," as Hilton would have advocated twenty or more years ago. Gentlemen, this very watchword "rest" is a mistake where an apparatus such as a joint, constructed and adapted by nature for movement is concerned, and if too rigidly adhered to, is productive of much mischief.

Other bogeys are "*inflammation*" and "*synovitis*." The fear in the profession of synovitis is terrible! Synovitis is nature's first process of repair in an injured articulation; by its means the torn fibres are floated into their normal positions and rest ensured for a time. It is only a temporary condition and if kept within bounds does little or no harm. Even when blood is effused into a joint the succeeding synovitis must tend

to dilute it and render its absorption more rapid. When an immovable splint is applied, what happens? The joint is full of blood or serum, the synovial membrane and capsule are torn and adhere to the clot, the ligaments and tendons around are injured and left for weeks in this same position. Gradually, the fluid parts of the blood are absorbed. The clotted lymph meanwhile is organised, and new adhesions are formed between the various surfaces of the synovial membrane so that the quondam cavity is contracted in all directions. After a varying number of weeks the splint is removed, the individual released from his imprisonment, only to find his joint stiff, with its cavity diminished in capacity, the muscles wasted and the ligaments and tendons matted together. When movement is at last attempted, is it surprising that pain is experienced, that adhesions are torn across, and that the heat and swelling return? In a great many cases this is interpreted as meaning that the movements have been tried too soon, and that more rest is required, then, alas! the splint is re-applied, and the joint more hopelessly damaged. This goes on for weeks till muscular atrophy or faulty position supervene, and the joint is ruined by its surgical treatment. Now this may appear to most of you as a gross exaggeration, yet I assure you it is not. I have drawn the picture only as I have seen it, and until the text-books (and there are, I am glad to say, some notable exceptions), will alter the old classical treatment of our forefathers, young athletes will be disqualified and many persons lamed for life.

As at football the knee is the joint most usually damaged, it may be well to consider some of the chief difficulties in dealing with it at this stage. In an ordinary sprain the internal lateral ligament which, from its flat ribbon shape, is not very strong, and from its position exposed to great strain, is the one most usually damaged. In almost every injury to the knee the pain is referred to a point having its centre near the upper attachments of this ligament to the condyle of the femur.

The treatment is that before described as applicable to all joints. In beginning early movements they should be carefully carried out so as never to put the damaged ligament on the stretch, while the other movements are made. Displacements of the semi-lunar cartilages of the knee ("semi-luxations," "internal derangements," &c.), though, strictly speaking,

coming under the sub-luxations, are usually treated as sprains. This is a condition by no means uncommon, and to the football player the most serious that can overtake him, for in the vast majority of cases it entirely unfits him ever afterwards for first-class play. Time will not permit me to enter into the physics of the movements which bring about this disaster; sufficient will it be to say that the internal cartilage is more frequently displaced than the external, and for anatomical reasons; and that the left knee suffers more frequently than the right. Various conditions give rise to the special train of symptoms to be described later, and they may be classified as:—

- (1) True displacement of a semi-lunar cartilage.
- (2) Nipping of folds or shreds of synovial membranes between the bone ends.
- (3) Loose pedunculated bodies in the joint.

(4) To these a condition has been described by Sir William Bennett as "attributable to the bruising of the peripheral edge of a semi-lunar cartilage and its attachments without displacement or necessary loosening; the immediate result of the injury being a local effusion of blood, a portion of which insinuating itself between the bone ends acts as a foreign body."

A player while "scrumming" or dodging an opponent or carrying out some other movement which involves semiflexion of the joint with a screw action, feels a sudden pain with a sensation as if something slipped out of its place. The limb becomes fixed, and complete extension of the leg upon the thigh is impossible, while it may assume any angle between complete extension and half way to semiflexion. The pain and fixity are followed by effusion into the joint with tenderness over one or other semilunar cartilage.

Relief may occur from spontaneous reduction, but more commonly surgical manipulation is required. This may be carried out with or without the use of an anæsthetic. Having determined from the history and posture of the limb that manipulation is necessary, the leg should be bent upon the thigh, the thigh upon the abdomen as completely as possible; then after rotating the tibia upon the femur inwards or outwards according to the particular cartilage that has been displaced, complete extension is brought about by a sudden movement. If successful, the limb will be capable of the fullest extension. In recurrent

cases various devices are used by different patients themselves to bring about reduction. A good plan is to place the patient prone on the floor and advise him to carry out the movements of swimming. This will almost invariably bring about reduction; the act of swimming in a bath is better still, but not always at hand. This device was taught me by one of the house-masters of a famous public school, and I have many times made use of it with success.

In some cases do what you will, and even with the aid of an anæsthetic, sudden relief is unattainable and complete extension impossible. In such I believe that the existence of the local condition first described by Sir Wm. Bennett is the cause of failure. Here there is no true dislocation of a cartilage, but the extension of the limb is prevented by the effusion which takes place around the cartilage and which becomes insinuated between the bones. On many occasions the symptoms are due to the presence of *abnormal folds* of the *synovial membrane*. These spring from behind the ligamentum patellæ, and are portions of the ligamentum mucosum and hypertrophied ligamenta alaria. I have myself more than once opened a joint that had all the classical symptoms and found no detachment of a cartilage, but only thickened and abnormal outgrowths of the synovial membrane.

After reduction has taken place the treatment in *first or second cases* is the same as that used for severe sprains, viz., temporary rest, elastic pressure, early massage and movements. Football should be disallowed for that season. Although football is forbidden, *rowing* may be allowed in the majority of first cases. The change of exercise is so beneficial and the knee so soon recovers that football may even be possible in the succeeding winter. Believing as I do that most cases of "internal derangement" are brought about through primary weakness of the thigh muscles (a subject too long to discuss here, however), I am led to advocate rowing as a means to develop the muscles, and I have found it not only helpful but curative.

In *relapsing cases*, one of the knee supports which prevent rotation may be used for walking, but with their use games will be out of the question. In a certain number of the most obstinate cases, or where the patient wishes to enter the services, or where he is seriously crippled, it is my practice to entirely remove the

detached cartilage or thickened mucosa. The removal of the cartilage is much preferable to stitching it down into position.

The *photographs* will show examples in which I have adopted the plan of removal and with admirable results. Formerly I used transverse incisions, now generally longitudinal. One of the photos is taken from a patient from whom I removed all four cartilages (semilunar), and who has now complete movements.

The ankle joint presents no special difficulty in treatment even when the external lateral ligament has been torn. It is very necessary to make a careful diagnosis and to see that there is no fracture of the fibula. Considerable subcutaneous extravasation may take place around the joint. Elastic pressure will disperse this and the massage remove it.

Sprains in the region of the claviculo-acromial joint are often very troublesome. The pain in movement is intense, and it is most difficult to properly apply elastic pressure. Massage and early movement is more than ever useful here. Sprains in the deltoid region very soon lead to stiffness of the shoulder and atrophy of the muscle. Movements should be made very early in these cases, and the active are more useful than passive. The subdeltoid bursa is often filled with blood and adds to the pain in movement. If elastic pressure fails drainage of the bursa may be useful.

Dislocations, complete and incomplete, occur from time to time. The shoulder and elbow are more common, but the thumb is not rare. The diagnosis is simple. The treatment after reduction, which should always be as early as possible, and by manipulation with an anæsthetic if necessary, is the same as that recommended for sprains. Elastic pressure to remove the effusion and passive movement from the very first, providing only that the particular movement which occasioned the dislocation is not made. No splint nor fixative apparatus is necessary. The prognosis is good, but football must be given up for at least a month.

Dislocations of the fingers present no special features. *Fractures and separations* of the epiphyses are met with from time to time, the most common being the clavicle, radius, fibula, lower end of humerus. The diagnosis presents no real difficulty, nor does the treatment. Early gentle massage, at any rate, after ten to twelve days, will greatly facilitate early union.

Fractures of the patella and olecranon are very rare. In the former I invariably open the joint in a young person and suture the fragments with catgut or kangaroo tendon. By a longitudinal incision the joint is opened, and the clots turned out. The fragments will readily fall together if the intervening clots and fibrous tissues are removed. The sutures are passed around the fragments, being inserted through the quadriceps tendon above and the ligamentum patellæ below.

Early movement is commenced in ten days, and in six weeks the patient should walk with perfect freedom and strength. Without an operation the union is often weak and unreliable, and the convalescence extremely slow.

Fractures of the olecranon are best treated by the open method. All the other fractures may be treated on general principles.

Of the viscera those most frequently injured are the brain and spinal cord, kidneys, testes and eyes.

Concussion of the brain is by no means rare, and varies considerably in degree. Sometimes there is a very short period of unconsciousness followed by some slight mental confusion, with perhaps some sickness and a headache the next day. In other cases the insensibility may last for hours. In one case the patient became quite maniacal on the fifth day and required the services of two male nurses for nearly a fortnight afterwards. Such cases are exceptional. Still, it is a wise precaution to keep a concussed patient quiet for at least a week, preventing all excitement physical as well as mental.

Spinal symptoms sometimes occur. Tingling of the nerves of the upper extremities with even numbness and formication have followed upon a fall upon the head with sudden flexion of the neck, and in one case paraplegia lasted for two days in an undergraduate who was tackled while stooping down, so that his spine was suddenly and acutely bent forwards upon itself.

The kidneys are often bruised, as evinced by the transient hæmaturia which occurs after a blow in the loin or a severe squeeze while playing at the Rugby game. It usually lasts for twenty-four hours and the blood passes in varying quantity. Renal colic may follow from the passage of clots down the ureter.

The treatment is rest and attention to general principles. On two occasions I have met with *laceration* of the right kidney, in each case the result of a kick while playing at Associa-

tion. In the one case the patient came to my house to report himself and fainted and nearly died on the floor of my study from severe internal hæmorrhage. For many hours he hung between life and death. The bleeding eventually ceased with the use of ergotin and the extract of suprarenal capsule. After a long convalescence he recovered. In the other the shock was not so great, though the hæmorrhage was alarming. Some days later he had to be opened because of a large extravasation of urine behind the peritoneum. This man ultimately made a complete recovery and is now an officer in the Army. They were both desperate cases at the time.

The testis is occasionally contused so severely that the patient suffers from serious shock and hæmatocele. The tunica vaginalis testis is very slow in absorbing blood. The quickest means of treatment is to lay the cavity open and drain.

On one occasion I saw a partial detachment of the retina from the blow of a football over the right eye, and on another a dislocation of the crystalline lens from the same cause. These were curiosities, however, and must be of very rare occurrence.

In conclusion I must apologise for the lengthy though incomplete nature of this communication, and earnestly crave your indulgence. Too much of the personal experience has perhaps been introduced. Your attention has been chiefly drawn to the common injuries with which we meet. Many controversial points have been touched upon, and if a heated discussion should arise from any remarks that have been made my efforts will not have been in vain.