ON SPRAINS AND THEIR CONSEQUENCES,
MAINLY IN RELATION TO TREATMENT.

[WITH SPECIAL PLATE.]

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THE commonly-reckoned "little things" of surgery are, it must be admitted, not popular with surgeons generally at the present time, when the great achievements of operative work are apt to overshadow so completely the treatment of minor ailments, that they are frequently relegated to the category of cases too uninteresting to call for much attention at the hands of those who are mostly concerned in dealing with matters which are apparently more important. Unless, therefore, I had been asked to do so, I should not have presumed to contribute to the *BRITISH MEDICAL JOURNAL* an article upon such a trivial subject as sprains. It is, nevertheless, probable that the neglect or indifferent treatment of some of these minor matters result in more disability amongst the community generally, especially the wage-earning classes, than would arise from a considerable percentage of the cases which are considered to require operation if they were left alone; and, further, it is undeniable that, if the minor things were always adequately treated at their commencement or when they threatened, operations would be less frequently necessary.

DEFINITION AND CLASSIFICATION OF SPRAINS.

A reference to the latest textbooks will give but scanty information on these points; indeed, excepting sprains of joints, little mention is made of them.

A few years ago the definition of a sprain was "a wrench or strain resulting in stretching or laceration of the soft parts, without external wound." Academically this definition may still be regarded as sound, but for working purposes it has been conclusively shown by the *x* rays that sprains commonly so called are in quite a large proportion of cases complicated by slight fractures, a very important point in relation to treatment. In fact, under the usual nomenclature a good percentage of sprains should be classified as fractures. The fracture, however, in these cases is of subordinate importance in a pathological sense, because the sprain of the soft parts is the predominating feature. A fracture can hardly occur without a sprain at the same time, but a sprain may of course, and frequently does, occur without a fracture. For my own convenience I am in the habit of classifying sprains as follows:

1. Simple sprains involving the soft parts only.
 2. Sprains with fracture, by which I mean a sprain complicated by a fracture, the symptoms of which are so slight as to make it undiagnosable under ordinary circumstances, the symptoms of sprain being altogether predominant.
 3. Sprains with gross nerve injury.
- For clinical purposes this classification will be found not only reasonable but useful. Speaking generally, then, a sprain may be considered as a subcutaneous laceration; at the same time, it must be allowed that certain parts may be susceptible of stretching, without actual tearing, to a degree that will cause great pain. Hence, for working purposes, sprains may be divided into those associated with swelling and those followed by pain and stiffness only, the latter condition being formerly spoken of as "strain."

Immediate swelling means, of course, blood extravasation or the contraction of the proximal portion of extensively ruptured muscle; deferred swelling in the immediate region of the injury being due to inflammatory exudation into the soft parts in the continuity of a limb or about the trunk, or, in the case of a joint, synovial effusion.

In relation to the question of swelling, it must be borne in mind that the possibility of defining it is in direct proportion to its nearness to the surface of the part. A swelling from extravasation on the deep surface of the erector spinae would be quite intangible, whilst in the quadratus femoris it would be easily felt; moreover, it must be remembered that deferred or remote swelling in deep sprain may show itself a long way from the seat of the original injury, in consequence of its being caused by the blood tracking along the fascial planes in the line of

least resistance. I have, for example, recently seen a large haematoma below the buttock show itself a week after a severe sprain of the erector spinae whilst fencing, and I have seen a large blood tumour appear in the popliteal space many days after a sprain of the upper part of the thigh.

DIAGNOSIS AND TREATMENT.

The first essential in all cases of sprain is to determine whether fracture co-exists, which can readily be done by the *x* rays when they are available; it should, indeed, be an accepted practice that, when possible, every sprain, especially those near joints, should be examined by the *x* rays. In the event of the *x* rays being unobtainable, it is wise to regard any case in which the symptoms of sprain near a joint are unduly exaggerated as being complicated by fracture, especially if the parts concerned be the phalanges of the fingers or the metacarpal region. Figs. I to V are from *x*-ray photographs of cases of so-called sprain in which the bone lesion had been undetected until revealed by the *x* rays some time after the injuries had occurred.

The frequent overlooking of bone lesions in so-called sprains seems to be greatly due to the fixed idea on the part of many people that crepitus is a necessary symptom of fracture, and that absence of crepitus means absence of fracture, a sadly mistaken belief, inasmuch as, it need hardly be said, fracture often occurs in circumstances in which the detection of crepitus is impossible. On the other hand, crepitus after injury, especially if near a joint, may be elicited when no fracture is present. I have seen several cases of injury near joints in which fracture has been either diagnosed or strongly suspected on the strength of crepitus resulting from osteo-arthritis in the adjacent articulation.

The next desideratum is to eliminate the existence of gross nerve lesion. Speaking generally, the pain in cases of sprain is referred to the seat of injury. Should it be referred to a distant part, to the side of the foot, for example, in a case of sprain of the knee, definite nerve lesion is indicated. In all cases of sprain, especially of the knee, elbow and shoulder regions, the distal parts should be examined for numbness, a much commoner condition than it is usually supposed to be, and one which is frequently, when it does exist, at first unnoticed by the patient. This numbness, which may be exceedingly limited in area, if due merely to nerve shock disappears in a few hours; if, however, it persists for more than twelve hours, a gross lesion of the nerve branch concerned is pretty certain.

Simple Sprains.—Setting aside cases complicated by fracture on the one hand and by nervous lesion on the other, sprains may be, for purposes of treatment, divided into two classes—those with swelling and those without, the latter being a very small minority, which is practically limited to sprains about joints and amongst the deep muscles of the back and neck.

Sprains without Swelling (formerly called "Strains").—Here the main immediate indication is the relief of pain, which in these cases is frequently intense. Rest of the part, combined with very firm compression of the region immediately concerned, is usually effectual in this respect if the pressure is of the right kind; and I know of no means of applying effectual pressure excepting strapping, which should, if obtainable, be to a certain extent resilient, like, for example, the wash-leather strapping made by Messrs. Ewen and Son, which is ideal for this purpose. It is, however, perhaps too expensive for ordinary use, the best alternative being Leucoplast, which, although made in Germany, is in my experience so far superior to the English varieties of the same thing that my patriotism does not prevent my using it. (It should be borne in mind that the real object of the use of strapping in these cases is to give support, and hence rest, to the part; its proper application is therefore a matter of some moment, especially in parts constantly moving, like, for instance, the chest wall. In sprain of one side of the chest the strapping should, of course, be made to include at least two-thirds of the circumference of the thorax, passing well beyond the middle line in front and behind, the application of each strip being made quickly at the end of a complete expiratory effort. An apology is needless for these elementary details, but my experience shows that some little facts of this kind are not familiar to us all.) The immediate pain having been thus relieved,

massage cannot commence too soon; but passive movement in these cases is better deferred for six or seven days, as secondary swelling is apt to follow its use if employed too soon. Voluntary movements by the patient may, however, be allowed from the first, the extent of these movements being determined by the amount of pain; as a matter of fact, in many of these cases, as well as in some other varieties of sprain, voluntary movements by the patient are frequently a source of immediate comfort.

Sprains with Immediate Swelling (from Blood).—The classical indications here are threefold: (a) Arrest of bleeding; (b) promotion of absorption of extravasated material; (c) prevention of adhesions and muscle waste.

(a) With regard to the first indication, I do not think local treatment other than rest has any material effect. I have rarely seen the application of ice do anything but harm, although in an occasional case the instinct of the patient may lead to its being suggested. At all events, it is wise, if its application should be decided upon, to ascertain, especially in middle age and later, whether the kidneys are sound, for I have seen three cases in which extensive sloughing followed the continued application of ice in sprains with swelling in confirmed albuminuria, no precaution having been taken before the adoption of the treatment to inquire as to the possibility of renal disease; an excellent example of the way in which the apparently trivial nature of a case may lead to careless treatment of it. So far as the comfort of the patient is concerned, a fomentation, the hotter the better, has served my purpose best. Pressure during the increase of immediate swelling I do not use; it is as often as not distressing to the patient, and frequently produces oedema of the tissues below, if the part concerned is a limb. To sum up, rest of the part with very hot fomentations are the means I have come to rely upon.

(b) The increase of the immediate swelling having ceased, should the part involved be a joint, firm pressure by means of a porous bandage, such as crepe velpeau, firmly and evenly applied for twenty-four hours, followed by massage, gives the best and quickest results. The use of impermeable rubber bandages I have long since given up. Should massage not be available, skilfully-applied strapping is the best alternative, the frequency of its renewal being determined by the rate of diminution in the swelling. If the sprain be of the soft parts without joint complication, hot soothing compresses, such as the old and well-tried lot. plumbi cum opii, frequently changed, are more helpful than any other means, so far as I have seen, the pressure being increased as the swelling subsides. As soon as appreciable diminution in the swelling has occurred massage is indicated unless the part is abnormally hot to the touch.

(c) For the prevention of adhesions and muscle waste, voluntary movements, massage, and passive movements rank in the order mentioned. Slight voluntary movements cannot be commenced too soon; splints, therefore, should in a general way not be used. The patient should, in fact, from the earliest moment amuse himself by seeing how far the part, if a joint, can be bent without permanent increase of discomfort. Massage should not, except in special circumstances, be delayed for more than twenty-four or at the most thirty-six hours after the cessation of increase in the local swelling. Passive movements should follow freely as soon as all heat has left the damaged part, whether the swelling be tense or not; and if the tension be rapidly diminishing, gentle passive movement may be used in spite of slight local increase of heat; but if the increase of the heat, which under these circumstances is sure to follow, does not subside within an hour or two, passive movement should be deferred for a time, although voluntary movements may be continued.

When an interval occurs between the receipt of the injury and the oncoming of the swelling, and in cases in which swelling, having followed directly after the injury, reappears after it has entirely disappeared or nearly so, the line of treatment mainly depends (1) upon the absence or presence of heat, and (2) in the case of joints upon the amount of tension.

In the absence of local heat, free massage and manipulation are indicated, combined with firm elastic (not rubber) pressure. In effusion without heat occurring in joints a fortnight or more after the accident, the possibility of syphilis or gout as contributing factors must not be over-

looked. Iodides in some form internally are often helpful, especially when combined with free inunction of vasogen iodine locally. I know of no application which ensures the local effects of iodine without irritation to the same extent as this.

In well-marked haematoma in easily accessible soft parts coming on immediately after sprain, the course of the case may be greatly shortened by free incision and cleaning out of all clots, followed by immediate suture of the wound.

Tension in Joints after Sprains.—This may be immediate or secondary, that is, occurring after an interval varying from two or three days to a week. When occurring later than this it may be regarded as due either to a repetition of injury, or to some constitutional cause, for example, syphilis, rheumatism, gout, septicaemia, etc.

Tension is always associated with local heat, although in some cases this is very slight; the more quickly a high degree of tension follows the injury the greater is the heat; the same may be said of the pain, which, in immediate tension, is sometimes of great intensity. Hence it is the pain from which relief is sought. Rest, of course, is essential, and if this, aided by very hot fomentation, fails to give comfort, direct relief by means of the aspirator is the indication. This in the hands of a competent practitioner who understands the value of cleanliness is not only more effectual than the alternative usually recommended, namely, leeches, but is also, I think, safer. I have seen no harm follow aspiration, which I cannot say in the case of leeches. The withdrawal of only a sufficient amount of the bloody fluid to relieve the tension should be made, as this is less likely to be followed by a recurrence than when as much fluid as possible has been drawn off. The tendency to recurrent tension in cases of this kind is also, I have reason to believe, diminished by the administration internally of calcium chloride. In the case of tension coming on after an interval, on the other hand, if relief by aspiration become necessary as much fluid (synovia) should be removed as possible, and firm pressure immediately applied. After the relief of tension, the use of massage and movement, voluntary and passive, will be regulated entirely by the behaviour of the local temperature of the part, to which reference has already been made.

Sprains with Fracture.—The treatment of these injuries differs only from that of simple sprains in the following particulars: Although massage may be, and as a rule should be, commenced at once, rest for the part in splints of some kind must be maintained for a long enough period to enable the detached piece of bone to reunite sufficiently to retain its position during voluntary movements. Hence, as early movements are essential to quick recovery, these must be *passive*, and not voluntary, as in simple sprain. This is a most important point in the treatment in these cases, especially in connexion with deformities following sprains—a matter with which I shall deal presently. The treatment of simple sprains may be tabulated thus: (1) Voluntary movement, (2) massage, (3) passive movement and exercises; whilst that of sprains with fracture would run: Massage, passive movement, voluntary movement, and exercises; the reason for the early use of passive rather than voluntary movements being obviously that the detached piece of bone is not disturbed during the use of passive movement if properly carried out; whereas, if voluntary movement were allowed, imperfect or faulty union would not improbably follow, with the usual imperfect recovery.

These remarks apply only to cases in which there is a definite detachment of a portion of bone; they have no bearing upon cases of so-called "sprain-fractures" in joints in which the cartilage is in part torn from the articular surface, the bone being involved in the lesion. The treatment of such cases, which are generally undiagnosed if they often occur, differs in no respect from that of simple sprains.

Sprains with Gross Nerve Injury.—Of all cases of sprain, these are in some respects the most important, because of the difficulty in their treatment and the resulting imperfect cure which so commonly follows, although it must be admitted that the defective recovery is not generally attributed to its real cause. As is the case with sprains with fracture, many of the imperfect results are due to indifferent diagnosis, the nerve lesion having escaped notice in consequence of the slightness of its

symptoms at the time of injury. Hence, as I have already said, the importance of a definite search for evidence of nerve damage in cases of sprain cannot be overemphasized.

In the treatment of these cases, when the evidence of nerve lesion is pain along the line of distribution of the nerve, rest and rest only will bring about a complete and permanent cure. This rest, if it is to be successful, must be continued until all symptoms of nerve pain have passed away. Herein lies the difficulty in treatment, for it is next to impossible to induce some patients to realize the importance of resting the part concerned long enough to ensure immunity from the persistent pain which is prone to follow in these cases. Massage does nothing but harm in the early stages of this type of case, but if the condition becomes chronic from neglect of treatment in the early stages, it may be of use, especially if associated with static electricity; and the exacerbation of pain in chronic cases is frequently greatly relieved by the repeated application of the fine point of the thermocautery along the line of pain.

In cases where numbness is the indication of nerve lesion the treatment is altogether different, for if this symptom has not disappeared in 24 hours the only hope of cure lies in the skilful use of massage, supplemented after two or three days by galvanism. If the affected part be a limb, exercise should be encouraged, and in any part flying blisters over the seat of the lesion may be safely used, since in a certain number of cases they do good, and in none does harm arise from their employment. It is singular how readily areas of numbness may sometimes escape the notice of both surgeon and patient. In a case which came under my observation a patient having "sprained" his leg was entirely unaware of any loss of sensation in the foot until, in attempting to get some warmth into the part, he found he was charring his toe by unconsciously holding it in contact with the bar of the grate.

REMOTE CONSEQUENCES OF SPRAINS.

The later consequences of sprains may be tabulated in the following way:

Preventable	...	Persistent pain.
		Stiff joints.
Unavoidable in certain cases	{	Wasting of muscles (apart from gross nerve lesion).
		General relaxation of joints.
Unavoidable in certain cases	{	Deformity.
		Osteo-arthritis.
		Local paresis.
		Myositis ossificans.

PREVENTABLE CONSEQUENCES OF SPRAINS.

Persistent Pain.—This condition is usually caused by excessive immobilization in ordinary cases giving rise to adhesions and matting of the parts, but it may be due to too early movements in cases associated with nerve lesion. Speaking generally, it may be said that in simple sprains the discriminating use of massage and movement cannot be commenced too soon after the immediate effusion has ceased to increase; on the other hand, if nerve lesion with pain exists, rest is essential until the pain has passed away.

Stiff Joints.—Stiffness of joints after sprains is almost always due to the prolonged use of splints or delay in the commencement of voluntary and passive movements. Stiffness of this kind can be nearly always avoided by the removal of splints, if their use is considered necessary, once daily for an hour or so, during which the patient is encouraged to move the part as much as the pain will allow. It appears that one of the main reasons for the prolonged use of splints in sprains of joints is the fear of tubercle, but in the absence of persistent local heat it is hardly needful to say that the fear of tubercle is entirely unnecessary.

Recently I have seen a case in which, in consequence of acute effusion into the knee-joint after sprain, the part was immobilized in splints for six months, with the result that a bony ankylosis followed. Nothing can be more harmful in sprain of joints than the too prolonged use of splints. Personally, in sprains—the existence of fracture having been excluded by the use of the x rays—I have long since given up the use of splints altogether.

General Relaxation of Joints.—This, the exact reverse of the condition just referred to, may, in the absence of very extensive laceration of the capsule, etc., for practical pur-

poses be considered to be due to wasting of muscles on the proximal side of the articulation, the knee for many reasons being the joint mainly concerned. Wasting of the muscles of the thigh invariably leads to laxness of the capsule of the knee-joint, and the bagginess of the capsule thus resulting means passive effusion, a fact which does not seem to be familiar to some people. The resulting fullness of the joint, especially when the patient stands, leads the inexperienced to devote the entire attention to the "fluid in the joint," with the result that one of two extremes in the way of treatment is adopted—(1) prolonged use of splints, or (2) vigorous methods confined to the joint itself—for example, blisters, actual cautery, strapping, etc., the result being almost invariably a "wobbly" joint.

If, in cases of this kind, it were generally recognized that the primary factor of importance is the muscle waste, the condition of the joint being secondary, the number of lax joints would be very small, because, with very few exceptions, the condition follows only in cases improperly treated. If voluntary movements be commenced sufficiently early, whilst the patient is resting, and are aided by massage, and later on by passive movements plus resistance exercises, muscle waste will be entirely avoided unless the injury has caused gross tearing of muscles, especially at their aponeurotic or tendinous attachments; for example, the muscle waste in "rider's sprain" (laceration of the tendon of origin of the adductor longus in the thigh) is rarely, if ever, so far as I have seen, completely repaired.

Deformity.—This is in some respects the most interesting of the remote preventable results of "sprains" so-called. These deformities are met with most commonly in the

DESCRIPTION OF FIGURES ON SPECIAL PLATE.

Fig. VII.—Myositis ossificans of quadratus femoris following sprain of the thigh. The photograph was taken fifteen months after the injury. The disposition of the layer of calcification is characteristic.

Fig. II.—"Motor sprain." Comminuted fracture of lower end of radius, caused in the same way as Fig. I. There was no deformity; the fracture had not been detected until shown by x rays three months after the injury.*

Fig. I.—"Motor sprain" of wrist. Separation of styloid process of radius caused by attempt at starting the engine of a motor car. Fracture discovered by use of x rays some time after the injury.

Fig. IV.—Fracture of base of fifth metacarpal bone shown by x rays after ten weeks' treatment for sprain.

fingers, but are also seen in the knee, in the form of genu valgum principally; in the hip, and at the wrist and ankle. In adults they are virtually always the result of undetected fracture; in

Fig. A.—Diagram illustrating the mechanism of deformity following upon undetected fracture of base of phalanx of finger.

growing people they may arise from injuries to the epiphyses, but even in these subjects undetected fracture is the commonest cause. Sprain of an epiphysis may cause arrest of development or irregular growth, the best example of the latter condition being certain cases of genu valgum.

Fig. A is a diagram showing the mechanism of a characteristic case of deformity of a finger following "sprain." There has been an oblique fracture of the base of one of the phalanges; the fracture having been undetected, no means were taken to secure adhesion of the separated part during the use of massage, etc. The result is that

* In three cases of "motor sprain" the x rays showed separation of the lower epiphysis of the radius; it was intended to illustrate one of these, but the negative had been too much damaged to provide a presentable print.

Fig. VII.

Fig. II.

Fig. I.

Fig. IV.

Fig. VIII.

Fig. VI.

Fig. III.

Fig. V.

the fragment has glided upwards in such a way as to cause the distal part of the finger to fall over in an angular deformity.

Fig. VI is a skiagram of a case of a very exaggerated kind in which the same distortion is in course of occurrence. Such deformities of the fingers after sprain are not unfrequently attributed to osteo-arthritis; genu valgum and genu varum may arise in the same way. The following is a typical example.

A young man, 22 years old, strong and healthy, consulted me on account of genu valgum of an exaggerated kind, which was said to have come on rather rapidly during the convalescence from a severe sprain of the knee. An x-ray photograph clearly showed that the external condyle had been detached by an oblique fracture and had glided upwards, so that when attempts at walking were made the leg necessarily bent outwards from the knee. A few years ago "sprains" of the hip were spoken of as being sometimes followed by shortening of the limb from a mysterious change in the bone, which was thought to bring about an alteration in the angle at which the neck of the femur left the shaft. The x rays have abundantly shown that the common cause of this deformity is undetected fracture of the neck of the thigh bone, and in a few cases perhaps injury to the epiphyses in growing subjects.

It is a singular thing that there is even now a disinclination upon the part of some people to utilise the x rays in cases of sprain. Recently an instance has come to my knowledge in which a practitioner of large experience and repute advised against the use of the x rays on the grounds that they would merely corroborate his diagnosis in a case of "sprain."

DESCRIPTION OF FIGURES ON SPECIAL PLATE.

Fig. VIII.—Ossific masses in relation with the elbow, eighteen months after a sprain. Absence of fracture was shown by x rays shortly after the accident.

Fig. VI.—A very exaggerated case of undetected fracture of the finger, showing deformity arising as in Fig. A. The case came under observation about six months after the injury, as the appearance and character of the swelling around the part suggested tuberculosis.

Fig. III.—Fracture of head of phalanx of finger shown by x rays after two months' treatment for sprain.

Fig. V.—Fracture of base of proximal phalanx of thumb after six months' treatment for sprain. Acute pain was the symptom complained of, which rendered the hand quite useless. Removal of the ununited fragment effected a cure.

of one of the larger joints. Symptoms having subsequently arisen which were hardly consistent with a mere sprain, however severe, the x rays were employed, upon the recommendation of another authority, with the result that a very manifest fracture was revealed.

An attitude of this kind towards a means of diagnosis which in competent hands can set at rest once and for all any question as to fracture with absolute certainty passes the comprehension of a person of only ordinary intelligence.

UNAVOIDABLE CONSEQUENCES OF SPRAINS.

Osteo-arthritis.—The relation of osteo-arthritis to injury cannot be said to be much understood; it is, however, quite certain that its first manifestation frequently follows upon some comparatively slight injury to a joint, especially if this is followed by effusion. The subject generally is too large for discussion here, but it is I think undeniable, if my own experience is of any value, that excessive immobilization of joints after injury tends to the development of this condition. In other words, the chances of osteo-arthritis developing after injury is much greater when unnecessary rest has been used than when, by massage and rational movements, the parts have been kept supple from the commencement.

Local Paresis.—Gross nerve lesion may of course result in permanent loss of power, in spite of the most skilful treatment; but it is often of much moment that the practitioner should be able to warn a patient of the possibility of results of this kind; hence, as has been already indicated, the desirability of ascertaining immediately after the injury whether nerve complication does or does not exist is a matter of some urgency.

Traumatic Myositis Ossificans.—This is, perhaps, the rarest, and at the same time the most interesting, of the remote consequences of sprains. Sprains of muscles, involving as they may do the points of attachment to the bone, may be followed, especially in the case of the quadratus femoris, by gradual ossification, completely or in part. The process is slow and little, if at all, painful, such pain as may be felt being of the nature of a dull aching or feeling of weight. The joint controlled by the ossifying muscle becomes increasingly restricted in its movements. For example, in myositis ossificans of the quadratus femoris (Fig. VII) flexion at the knee becomes slowly less and less, although it is rarely that flexion to a right angle cannot be ultimately accomplished. The muscles involved become hard and seem to be exaggerated in size; there is little or no tenderness, but the limb becomes more and more heavy as the disease goes on. The liability to this condition seems to be too little understood.

Fig. VII is a skiagram of a portion of the thigh of a girl about 24 years of age, by whom I was consulted in consequence of amputation having been advised on account of sarcoma. In another case which came under my notice amputation had been suggested by a very experienced surgeon on the same grounds. Again, within the last six months a naval officer was referred to me on account of a large mass involving the middle of the thigh after an injury, which had been regarded as malignant disease. In this case, as in the others with which I have met, the x rays showed superimposed layers of calcification arranged in accordance with the muscle structure as shown in Fig. VII.

With regard to the treatment of this condition, it seems certain that, once it has actually commenced, rest is essential until it has ceased to increase; massage and movements, passive or voluntary, during its progress, undoubtedly stimulate it to increase. Operation in some of these cases has been adopted, masses of bone-like material having been removed, but unless the periosteum with which some of these masses are connected is also completely removed, regrowth with increased vigour follows. Operation is, in fact, generally harmful, and should be rejected. Rest having been used until the tendency to increase in the condition has ceased, massage and exercise should follow, with a view to obtaining as much usefulness as possible in such portions of the muscle as have remained intact. The alteration in the bulk of the muscle remains permanently, the normal state is never recovered. The comparative painlessness of the condition should make it difficult to confuse it with periostitis, the lesion for which it is generally mistaken.

Fig. VIII shows traumatic myositis ossificans after a sprain of the elbow—the possibility of fracture having been originally eliminated by the x rays. Massage and exercise were tried in this case, with the result of steadily increasing the bulk of the mass; subsequently complete rest for six months caused a diminution to about one-half of the previous size.

The relation of tuberculosis of joints and of tendon sheath to sprain is of much interest, but its discussion is out of the question in an article which has already exceeded a reasonable length.

COLONEL NICHOLAS SENN has reprinted from the *Journal of the Association of Military Surgeons of the United States* an address on First Aid on the Battlefield, delivered before the Military Section of the International Medical Congress at Lisbon. The introduction affords numerous sententious observations, from which the following may be selected: "The military surgeon must imitate the example of his colleagues in civil life. This most important function consists in making ample preparations for war in times of peace." Passing on to first aid, the address enunciates some general propositions directed mainly to the importance of inculcating the principles and practice of asepsis among soldiers, to the nature of the dressing, and the extent of the first aid to be given. The duties of surgeons at the first dressing stations are touched upon, the address concluding with the "Instrumentarium of the Surgeon in the Field," and a demonstration by Colonel Senn of his surgeon's field case. The weight of this—4½ lb.—precludes the case forming a portion of the surgeon's personal equipment. The address was suited to its purpose, even though no important facts unknown to military surgeons were included.