A Lecture

ON

LUMBAGO: ITS LESSONS AND
ANALOGUES.*Delivered at the National Hospital for the Paralyzed and
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GENTLEMEN,—There are many ways of acquiring knowledge of disease. Perhaps the most effective—although certainly the least agreeable—is personal experience. Symptoms that are felt, sufferings which have to be endured, are impressed upon the mind as they cannot otherwise be. I do not desire for you this effective way of gaining knowledge, but there are some maladies which you can scarcely hope to escape. You will be exceptionally fortunate if you do not have opportunities, if indeed they have not already come to you, for the subjective study of the disease which I take as my text to-day—lumbago.

What is lumbago? Our conception of its symptoms is sufficiently clear, precise, and perhaps vivid. But our conception of its nature is not at all precise or clear. We think of it as muscular rheumatism—and correctly. But if we are asked what muscular rheumatism is, I am afraid the reply which would be given is that “it is rheumatism of the muscles,” an answer which, you will admit, does not carry us far. Nor does it conduce to better understanding to call the affection “myalgia,” a term which is not much used at the present time, perhaps because its analogy with “neuralgia” suggests spontaneous pain, unexcited.

Consider the symptoms of lumbago. Its great characteristic is pain in the lumbar muscles, but felt only when they contract or are extended. In health we are conscious of no sensation in them. We may, indeed, by attention, become aware of a vague feeling in any muscles, if we direct our attention to them—a feeling which varies if they are contracted or extended. Physiological considerations compel us to consider that these two influences are constantly determining afferent impulses from the muscles, which act on the spinal centres, although normally they scarcely affect consciousness. But we must all have been made aware of such afferent impulses when they are rendered intense by the excessive contraction we call “cramp.” The intense stimulation causes severe pain. It also renders the muscles afterwards over-sensitive, and for many hours the influence of tension is demonstrated to us by pain from a degree of extension which in health would be unfelt. When the calf has been the seat of cramp, you must have noticed the pain produced when the muscle is afterwards extended, as in going up or down stairs. Moreover, if the muscle is pinched, it will then be found to have a sensitiveness far greater than normal. If these suggestive experiences induce you to test your muscles in health, you will find that, even under normal conditions, an unpleasant sensation may be produced by a strong compression of any muscle or by its strong extension. Thus we have ample evidence that the sensory nerves in muscles respond to those influences which in lumbago give rise to the characteristic pain.

The afferent nerves of muscles, which we can only call sensory by the widest use of the word, end or begin, as you know, in a manner quite different from the motor nerves. Instead of terminating on the muscular fibres, as do the latter, they end in the interstitial tissue between the fibres, and the only ending which has yet been generally found is in the remarkable bodies called “muscle spindles.” As far as we know, all afferent impulses from the muscles arise in these, including the pain of cramp and the peculiar pains of lumbago and the allied affections I shall have presently to speak of. It is indeed strange that such acute pain should be produced through structures which normally give rise to no sensation, pain due either to excessive excitation or to an induced excessive susceptibility. But we are familiar elsewhere with the same fact—that acute pain may be produced by morbid action in structures which seem insensitive in health. We meet with it in the pleura, the peritoneum, and the intestinal wall. Indeed, the last is a pertinent example, because we are quite unconscious of intestinal contraction under normal conditions, and yet its increase, as by a simple purgative,

may give rise to intense pain. These facts illustrate the constancy of afferent nerve impulses from all parts, whether we feel them or not, for pain can only be ascribed to the intensification of nerve impulses which are constant in less degree.

The muscle spindles through which contraction and tension of the muscles, in health, produce unperceived impulses, and when excessively stimulated, or rendered over-sensitive in lumbago, give rise to acute pain, are remarkable bodies. They are long structures lying between (or in) the bundles of muscular fibres, narrowed at each end, as their name implies. One or more narrow muscular fibres enter each, and two or more nerve fibres, usually one at the end, one in the middle.

The nerves divide and form a ramification around the muscular fibres, which also divide in the middle region, to reunite before they pass out at the other end. No special nerve endings have been detected. The muscle fibres do not seem to receive any motor nerve, according to the balance of evidence.* They seem to be small portions of the general muscular substance deflected into this meter-like structure. We must assume that they share the contraction of the whole muscle, and as it were, they register it by compressing the nerve fibrils within the capsule of the spindle. Thus they resemble the apparatus for the measurement of an electrical current, which uses a fraction of it as an index to the strength of the whole. If so we may regard the function of the muscle spindle as a muscle meter. But if the contraction of the fibres within the capsule of the spindle acts by compressing the nerves, we can also understand that an intense general contraction of the muscle, as in cramp, may compress them from without as well as from within, and thus give rise to acute pain, which only subsides when forced extension overcomes the contraction. We may expect that with such sensitiveness to lateral compression the nerves will also be responsive to external pressure, and we find that when a muscle is firmly pinched, pain is felt. Moreover, since a strong stimulation of any afferent nerves may cause pain (though normal impressions are unperceived), it is not surprising to find that induced electricity, as the faradic current, causes severe pain. This is probably due to its direct action on the nerves as well as to their compression by the muscular contraction that is excited. The peculiar intensity of pain caused by the serial current, compared with isolated shocks, seems to confirm this. It is an example of the effect of a summation of sensory stimuli, which is met with also in the skin.

Such a nerve ramification, sensitive to the mechanical influence of compression, can be readily conceived as sensitive also to the influence of tension. We cannot, indeed, discern any mechanism which can promote the influence of tension, but of its effect on the afferent nerves we have ample evidence. The same functional capacity may subserve both forms of sensitiveness, especially since the nerve fibrils surround the muscle fibre. The general sensitiveness of nerve fibres to mechanical influences makes it easier to understand the apparent absence of special end organs, and also the absence of the special spindles in some cases, as the eyeball muscles. A ramification of nerve fibrillae between the muscular fibres may serve the purpose of afferent impressions as well as the more elaborate structures.

We are now concerned with these facts as they are related to the symptoms of lumbago. If these muscle spindles are the only sensory structures in the muscle, and as far as is known there are no others, it is through them that the symptoms of muscular rheumatism are produced. They are by some means brought into a state of extreme sensitiveness, and thus pain is produced by the moderate mechanical influences by which, as we have seen, their normal excitation is produced. We might thus conceive lumbago to be a pure affection of the muscle spindles, but we may easily fall into error by regarding the structures through which a disease is manifested as its sole seat. These peculiar bodies seem to belong to the fibrous tissue of the muscle, to that which sheathes and connects the muscular fibres, rather than to the latter. This, indeed, we should expect, for we find elsewhere such special structures related to the enclosing tissues, as in the bodies in which the nerves end in the fibrous sheaths of nerve trunks.

Fibrous tissue, or connective tissue, as it is termed in its looser form, is an element common to all structures and

* Such an ending by a plate on the muscle fibre has been [described only by Ruffini.

organs; by its separation is effected and even seclusion provided, but also connexion as well as isolation. Yet this tissue, although so universal, presents variations in pathological liability in different parts, and it seems prone, beyond any other tissue, to be influenced by certain morbid states. In all parts it seems the most susceptible to the influence we call "rheumatism." I might call it an unknown influence; it is unknown so far as its nature is concerned, but known only too well by its effects. The relation of lumbago to rheumatism would alone make us expect to find it an affection of the fibrous tissue of the muscles, the tissue in which the spindles are situated, rather than of these alone.

But we have another important proof that the malady is an affection of the fibrous tissue; it may spread, and it spreads by continuity of this tissue. It spreads to the tendinous attachment of the muscles to the crest of the iliac bone and the back of the sacrum. Indeed it may begin there. In each case, pain in this position is produced by the contraction of the lumbar muscles, which causes tension on the tendinous structures that connect them with the bone. We know that these are continuous with the interstitial tissue of the muscle, and seem indeed to be a concentration of it. This tendinous tissue contains nerve endings, which resemble the muscle spindles in being peculiar bodies, and consisting of an interlacement of divided nerve fibres enclosed in a capsule. But they are not elongated as are the spindles, and contain no muscular fibre. We can understand this, since they have not to respond to muscular contraction except by the increased tension it involves. To tension, their sensitiveness is manifested by the pain felt in this form of "tendinous lumbago," and also by peculiarly intense pain caused by tension after they have been exposed to a severe strain. But they are also sensitive to compression, although this is not the usual mode of their excitation. You can easily convince yourselves that this is a fact by vigorously pinching your own tendo Achillis, one of the least sensitive structures of the kind. You cannot fail to notice the peculiar pain that is produced. It is indeed possible that tension, by elongation of the tendon, exerts some lateral pressure on these nerve endings. The tendon is composed of wavy, elastic tissue. I once examined microscopically a tendon which had been divided long before, and the contrast between the cicatricial tissue which connected the divided ends and the normal wavy fibres of the tendon was very striking. Any elastic structure, if elongated, necessarily exerts considerable lateral pressure on that which it contains. But the nerves within the end organs must share also the direct traction on the tissue. We can thus understand their stimulation by tension.

The extension of lumbago from the substance of the muscle to the tendinous structures justifies us in regarding, as its seat, the fibrous tissue of the muscle, in which the sensory nerve endings are situated, and with which they suffer. As I have said, the fact seems to preclude the idea that it is an affection of these endings alone. But the extension may go farther, and in doing so it presents us with additional and important information. Such morbid sensitiveness of the tendinous structures at the back of the sacrum—"sacral lumbago" we may call it—whether secondary or primary, often spreads, apparently by the fasciae, and reaches the sheath of the sciatic nerve. There, it may increase to definite sciatic neuritis. Some of the most severe cases I have seen have clearly had this origin, by the extension to the nerve from the sacral tissues. You know that sciatic neuritis is primarily an affection of the fibrous sheath of the nerve. It is a structure prone to inflammation from many causes, and we can understand that it may readily arise by such extension. In some cases of sciatic neuritis, clearly arising thus, the inflammation has spread from the sheath to the interstitial tissue of the nerve, and has there attained such a degree as to impair the conducting function of the fibres and to cause muscular wasting and diminution of sensibility.

The importance of this fact is definite. If a morbid process, by extension, presents itself as manifest inflammation, it must be originally inflammatory in nature. We are thus compelled to regard lumbago in particular, and muscular rheumatism in general, as a form of inflammation of the fibrous tissue of the muscles. We are familiar with other forms of inflammation of such tissue. We know that the looser "cellular" tissue may be inflamed, especially from certain causes, as septic influences, and we call it "cellulitis." But we apply the word to those conditions that are hyperplastic in nature, and produce induration or suppuration. I think we need a designation for inflammation of the fibrous

tissue which has not such results, and yet, we cannot doubt, is of this nature. We may conveniently follow the analogy of "cellulitis," and term it "fibrositis."

The conception of muscular rheumatism as a rheumatic inflammation is, I know, old enough, and the term "fibrositis" is so convenient that I cannot doubt that it has been used. But I have mentioned the evidences of the inflammatory nature of the process, and I desire to insist on them, because the features of the malady differ from those of ordinary inflammation. There is no indication of the formation of "inflammatory products," as we call them, but this is certainly not enough to justify a denial of its inflammatory nature. It has the acute course of an inflammation, and may result from a frequent cause of this in any part—exposure to cold. It presents another peculiarity in the extreme suddenness with which its symptoms seem to come on. You are familiar with this. But the suddenness is, I believe, often apparent, not real. The pain, which may transfix the sufferer in a moment, and make any movement impossible, usually occurs on the first movement after a period of rest. Often it is the first motion in the morning, or there has before been some slight definite discomfort in the muscles, and then some peculiar action causes an extreme stimulation of the structures which had been gradually becoming over-sensitive. Hence the morbid process may be much less sudden than is its manifestation; the production of the pain is sudden, but the condition on which it depends has been gradually developed. The fact that the pain is never spontaneous is a clear distinction from the nerve pains, especially neuralgia, with which we might be disposed to associate it. Hence I think the term "myalgia" is equivocal; it suggests spontaneous pain, and not that which is purely induced.

We must moreover remember that the process, compelled though we are to regard it as inflammation, varies a good deal according to its cause and seat. Apart from the muscles and tendons, the fibrous tissue of the joints is liable to a condition in which tension causes acute pain; although there is no effusion, we regard this state as inflammatory. In the compact fibrous structure we can best observe—the sclerotic—inflammation may have, as its chief result, tenderness and vascularity, but with spontaneous pain. There is no evidence of a hyperplastic process, no thickening of the sclerotic or suppuration within it, but vascularity is conspicuous. We cannot know the state of the vessels of the hidden tissue of the muscles and tendons, but they probably share the acute disturbance in the morbid condition we are considering, and which we must conceive as a rheumatic inflammation.

You may think that I am labouring too much to prove what is commonly accepted. If you do, I quite agree with you. But I have found that many students, and many who have ceased to be nominal students, have no definite conception of the nature of muscular rheumatism, and that those who would say that it is a rheumatic inflammation can go no further. I have also endeavoured to give you the evidence of the nature of lumbago because I wish to impress on you the features of a malady, similar in nature but different in seat—that which I would call muscular fibrositis in the arm. It may be called brachial myalgia, if you restrict the term to this class of affection. It is met with in every degree of severity, and when intense it is a very terrible malady, distressing and prolonged, for which the term "muscular rheumatism," as generally understood, is inadequate. Its great feature is pain in the muscles, not spontaneous, or only in slight degree spontaneous, but induced by their contraction, or by sudden tension, however slight. Any attempt at passive movement causes such pain from the tension that an involuntary muscular contraction occurs to prevent it, a contraction which itself causes even greater pain. The result is very singular. The joints, shoulder, elbow, and even wrist, seem as if fixed. Every attempt to move them is prevented by secondary contraction in the muscles, secondary, but seeming simultaneous, which is so painful that it may make a strong man cry out. Yet, if the patient does not know what you are doing, and you proceed with such gentleness that the movement is really imperceptible, you will be surprised to find how much passive motion is possible. You may not be the only person who is surprised. I remember a severe case of this character, in which all the muscles of the left arm were affected, and the patient—indeed his doctor also—believed the shoulder-joint to be fixed by adhesions. No passive movement of it seemed possible. But the hindrance to such movement was only the strong and most painful muscular contraction which occurred on every attempt. While questioning the patient on some other

symptom, I moved the arm very, very gradually, so that the movement could not be noticed until it had reached a considerable degree. Then the muscles passed into painful contraction. I desisted for a minute, keeping the arm in the position reached; the contraction passed off, and then I renewed the gentle movement until the arm was abducted to an extent that neither the patient nor his doctor had thought possible. In the same case any attempt at passive movement of the wrist caused extreme pain through the whole arm; but when I held the forearm, gently but firmly, above the wrist, I was able to extend or flex the wrist-joint slowly without causing any pain. Muscles far apart are linked together in function. Unless the forearm was thus held, the passive movement of the wrist excited supporting contractions in the muscles of the upper arm which were most painful. When the forearm was held no tension on the upper muscles occurred, and no contraction. The case was one of severe muscular fibrositis, so severe as to mimic a fixation of the joints.

In such a case the muscles are sensitive to pressure as well as to contraction. There may be some spontaneous aching in the severe degree, but this is trifling compared with the induced pain. It is, indeed, not easy for a patient thus suffering to avoid the induction of pain in any posture, sitting or lying. Even in bed it is almost impossible to prevent some tension on the muscles, or some compression, which causes pain, and thus the pain may seem to be spontaneous when it is not really so.

Such severe brachial fibrositis may spread, just as sometimes does the lumbo-sacral form. It may reach the nerve sheaths of the arm, and in them set up a secondary brachial neuritis with all its consequences, tenderness of the nerves, pain along their course and in their distribution, oedema of the hand, and even muscular wasting or impaired sensation. These two symptoms are, however, rare in this secondary neuritis. Sometimes the nerve sheaths seem to suffer simultaneously with the muscles; from the first, even when the affection is slight, we may have evidence that both are involved. Remember that in all forms of unilateral neuritis the affection is primarily of the nerve sheaths. Indeed, this form may be accurately termed nerve fibrositis. It is quite different from the bilateral, symmetrical, toxic forms. In these the nerve elements suffer first and chiefly, and the connective tissue hardly at all, far less than the symptoms would suggest.

In other cases extension to the capsules of the joints may occur, especially to the shoulder-joint, the tenderness of which, with local pain on movement, distinctly in it, is the most prominent symptom. The finger-joints seldom suffer unless there is neuritis, or there is an independent tendency to arthritis. All these rheumatic affections are closely allied, and slight variations on the causal blood state seem to determine the special predominance of muscular, articular, or nerve symptoms.

This brachial fibrositis is met with in various degrees of severity and in any part of the arm, in the muscles of the shoulder girdle, the upper arm, or forearm, but those moving the shoulder-joint seem most prone to suffer—the deltoid, scapular muscles, and pectoralis, sometimes the trapezius; the triceps, and the biceps. Usually one arm only is affected, but I have known the malady to be bilateral, even in severe degree. It is then absolutely disabling, even when limited to the muscles. The pain produced by movement has an absolutely inhibitory effect, such as to simulate paralysis. But it is only a simulation; when limited to the muscles their motor nerves seem not to suffer, and there is no marked change in electric irritability, faradic or voltaic.

I doubt not that much of what I have said is familiar to you, but my chief object is to impress on you the features of this brachial form, because its nature is often mistaken. It is regarded as neuritis, even when there is no indication that the nerves are involved. In some cases, just as in the lumbar region, the tendinous attachments of the muscles suffer especially, and the local character of the pain may then be puzzling. It may be limited, for instance, to the insertion of the deltoid. But it is still induced by tension, and felt only when the muscles contract.

You know full well how common elsewhere, in trifling degree, is this condition of the muscles. Many varieties you are familiar with. It constitutes the familiar stiff-neck, and a similar condition of the muscles of the pharynx often results from cold. The act of swallowing is painful, from the muscles, not the mucous membrane. The well-known pleurodynia is, I believe, really intercostal fibrositis, and

pain attends the contraction of these muscles, which is symmetrical and felt on both sides of the thorax. The same morbid state in the tendinous attachments of the diaphragm is a very distressing affection, each respiratory movement causing pain around the thorax at their level. In the leg such fibrositis is less common, except as the result of strain, to which I shall recur presently.

This rheumatic fibrositis is seldom strictly symmetrical. Even in the lumbar and sacral tissues, in which its tendency to affect both sides is greatest, it is generally more on one side than on the other, and manifests its predominance by spreading to the sciatic nerve only on the side on which it is more severe. In the arm it is rare for the muscles on both sides to suffer, and when they do it is very seldom in equal degree.

I need hardly remind you that muscular rheumatism is more common in the second half of life than in the first, while the opposite is true of the acute articular form. It is currently associated with gout, and the truth of the belief is soon impressed on the practitioner. But it is "gout with a difference." It may occur in those who are gouty in the common sense of the word, but some of the most severe cases I have seen, especially of the brachial form, have been in those who have inherited the tendency to gout but have not merited its development. The patients have been elderly ladies of blameless habits and elderly abstemious clergymen, members of conspicuously gouty families. You know the distinction that has been drawn by Mr. Hutchinson and others in the constitutional forms assumed by the diathesis. But all are connected. One notable link between these varied affections is that most cases of rheumatic fever in the young are in the children of gouty parents. If you have not already noted this you will be surprised to find how often it is true.

Another definite form of fibrositis is the traumatic, induced by sudden violent tension on tendinous and ligamentous structures, much less frequently by tension on the muscles. Examples of this are common in many situations. I lately saw a woman who had strained her back severely during the overturning of a tramcar three months before. Ever since the accident there had been extreme sensitiveness of the tendinous attachments of the dorsal muscles to the iliac bone. The slightest tension on these, especially that which was caused by contraction of the muscles in the effort to keep the spine erect, or even to steady the contraction of the opponents, as on sitting up in bed, or on an attempt to turn in bed, caused acute pain, limited to this situation and to such movements. Remember always that every muscular movement involves contraction of the opponents as well as of the muscles which cause the movement. Were it not so we should be indeed wobbly beings. No steady motion would be possible; every motion would be overdone, first in one direction and then in another. But the muscles which are oversensitive, or their tendons, may be those that act secondarily, and then we have pain in them on the action of their opponents. It is important to keep this fact in mind, in order to unravel these muscular and tendinous pains.

While any structure may suffer from overstrain, the fibrous attachments of the muscles to the back of the sacrum are especially prone to such traumatic derangement. Some sensitiveness to pressure usually coexists, but it is far less in degree than that to tension. We meet with a like condition also in ligaments. A violent strain on the spinal ligaments may be followed by enduring susceptibility to pain on any tension, a condition often met with after railway accidents and other injuries. Like other subjective symptoms, it is open to forensic depreciation, but its peculiar relation to tension clearly establishes its genuine character. Other mechanical causes besides sudden strain may co-operate in producing fibrositis. Habitual posture, or the constant slight strain of habitual exertion such as riding, seems often to induce fibrous pain in those who are otherwise disposed to it. The familiar contraction of the palmar fascia seems to be the result of a peculiar form of fibrositis. It is usually painless, and clearly due to habitual postural use of the hand. But it is seldom met with apart from a gouty diathesis, a fact that is instructive with regard to our present subject.

To return to pain felt after strain. It may or may not be right to regard this persistent hypersensitiveness after strain as inflammatory. We cannot indeed distinguish it from inflammation, and yet we need much more pathological study before we can confidently assert its nature. These firm fibrous

structures consist of compact supporting tissue and of nerves and nerve endings. The enduring sensitiveness after injury is certain evidence of changes in the latter. We may safely assume that they are at first due to organic damage, with secondary inflammation, as all effects of injury seem to be. But the after-state which lasts so long may be a residual effect rather than a persistent active process. We have not such proof of activity as is afforded by the extension of rheumatic sacral fibrositis to the sciatic nerve, and we must therefore regard the condition which persists for long, for many months, as still uncertain. But the absence of spontaneous pain seems a definite distinction from that which we term "neuralgia."

While the slighter forms of muscular fibrositis, such as lumbago or "stiff-neck," are usually brief in duration, that which involves the tendinous structures may last for many weeks, and when due to injury often continues for months. Indeed, the duration of muscular fibrositis seems proportioned to the slowness of its onset, perhaps in part because the slighter pain does not compel the needful rest, of which I shall speak in a moment. The affection of the arm is often prolonged; when it has become severe it generally lasts for months, and the pain produced by every movement of the arm, with the interference with sleep due to the difficulty of securing any easy posture, wears down the patient's strength, lessens the power of endurance, and induces a dreadful expectation of pain which actually increases the degree of suffering. Pain which is both expected and feared is positively felt more than pain which is mentally resisted, and unhappily the power of resistance inevitably fails before constant suffering.

The general treatment of these forms of rheumatic fibrositis is, I doubt not, sufficiently familiar to you. But there are two measures the beneficial influence of which I am sure is not so generally recognized as they should be. One is diaphoresis, the other is rest. The value of free perspiration has some popular recognition. There is a strong impression that muscular rheumatism may be cut short at its onset by active exercise. The usual result of acting on the belief is a serious increase in the affection, but there are some cases in which it does good. They are cases in which the exercise does not involve much use of the affected muscles, and in which it causes copious perspiration. This seems to relieve the condition of the blood, and at the very onset may enable the morbid state quickly to pass away. If the pain of commencing lumbago is not felt on standing or walking, and if a long walk is taken in a thick overcoat, any chill being avoided, the lumbago may be gone next day. A Turkish bath is equally beneficial and safer. But it is only at the onset that this relief to the blood state is effective. Even after two or three days the muscular fibrositis seems to become so established that it cannot be speedily influenced by diaphoresis.

Above all things, rest is that which these painful muscles need. However this sensitiveness is produced, it is certainly maintained by every influence which excites pain. We can understand this; all irritation of the sensory nerves increases the vascular disturbance which we must assume in the early stage and the sensitiveness of the nerve endings is maintained by their stimulation. In the brachial form, adequate rest to the muscles is very seldom secured early, when its importance is so great. Slight movements may entail only a little pain, but doing so they inevitably increase the morbid state. In every case of the kind the arm should be carried in a sling and the clothes should be arranged to make dressing and undressing easy. Ladies should be sternly forbidden to "do up their back hair," a process which seems to involve peculiar strain on the shoulder muscles, which is kept up for some time in a form to which they are unaccustomed. The use of a sling is seldom adopted early enough. It has advantages beyond the direct rest to the arm and the support to the upper arm which it affords, in the obtrusive evidence of enforced rest which it presents. This saves the patient from many undesirable movements. In the early stage frequent hot fomentations are certainly useful, and so is encasement in a thin layer of cotton wool or lint, over which oiled silk or some light impermeable material is placed. It seems to do good by keeping the skin warm and moist. Neither massage nor electricity should be used at the beginning; afterwards very gentle upward massage is good, but it should never be such as to cause discomfort. In the later stage, if any spontaneous aching is felt, it may often be relieved by extremely gentle applications of electricity. A high-frequency current may be used, or, what

answers even better and is much simpler, a rapidly-interrupted faradic current, so weak as to be felt only as a sensation of vibration, and not as pain or pricking. If it is strong enough to cause any muscular contraction, it does harm. Liniments are most suited to the later period, though at first a little may be sprinkled on the lint that is applied. Belladonna and chloroform liniments, mixed in equal parts, answer best. Not even passive movement should be employed until it causes no pain, and then it should be most gentle. The avoidance of pain should be made the standard for all local measures.

Aperients are of the first importance in all rheumatic and pseudo-gouty cases, and nothing is of so much value as salines. They free the system of bile far more than the so-called "chologogues." Taken into an empty stomach, they seem not to be absorbed, but to pass on, into and through the intestine, augmented by the exosmosis they excite, and they carry away the bile they find in the bowel. This has done what digestive work it had to do, and much of it would simply pass back into the blood, through the liver, and increase the amount of harmful matter in the general circulation. At least, this is how I understand the fact that salines do remove bile abundantly, and improve the general state. But if a saline is taken when the stomach contains food, it seems simply to mix with this and to be absorbed, and its valuable "flushing out" action is not obtained. Moreover, it seems to pass through the stomach more readily, and to excite osmosis and peristalsis in the bowel more effectively, if concentrated than if dilute; and thus the stronger aperient waters act better than those that are dilute. I may add, parenthetically, that what I have said is quite consistent with the mild aperient influence obtained by some persons from a glass of plain water in the early morning. That which differs in any way from the normal character of the intestinal contents may have a similar effect: that which is more dilute may act like that which is less dilute, just as the bladder is irritated by watery urine as well as by that which is concentrated.

The medicinal agents which have most effect on articular rheumatism seem to have far less influence on rheumatic muscular fibrositis. The salicylates, for instance, seem to do little good, except in the most acute forms. In this it is very difficult to discern with precision the effect of any therapeutical measure. We cannot try experiments in severe suffering. We can very seldom secure the essential condition for observation, namely, that the agent to be tested shall be used with no other change in the influences to which the patient is exposed, that no other attempt to do good shall be made at the same time. Hence doubt must attach to many of our records of apparent good, and they need to be confirmed by subsequent observations before they possess weight. I mention this because this morbid state is one of those in which the opportunity for increasing and making sure our therapeutic knowledge comes chiefly to the general practitioner. But we may give the salicylates, or salicin, or aspirin. The salicylate of potash or lithia seems a more reasonable salt to use than the more common salicylate of soda. The salicylates have the disadvantage that we cannot obtain, in combination with them, the diuretic influence of nitrous ether. I think that most good is obtained in the early stage from nitrous ether, citrate of lithia, and colchicum, with which small doses of perchloride of mercury may be combined if the affection is of considerable intensity.

The developed brachial form is extremely obstinate, especially when the fibrositis has spread to the nerves or joints. It is often difficult to perceive that any treatment has a marked effect if the opportunity of the early stage has been allowed to pass. The malady lessens, and passes away in time, leaving only such lasting effects as neuritis or arthritis may have caused. Good is certainly done by superheated air, but the applications have to be continued for weeks, and the accessory incidental disturbance seems to lessen the benefit derived.

The traumatic form of tendinous fibrositis, when it settles down to a stationary condition, with pain on any tension, and often some tenderness on pressure, resists almost all treatment. It also passes away in time, but unfortunately the time is long before the tendency to subside manifests itself. If any constitutional condition seems to co-operate in perpetuating the effects of injury, this of course should be treated. It is chiefly to be discerned when fibrositis is set up by slight habitual strain. Rest is important, but is not easy to maintain for an adequate time.

Counter-irritation sometimes lessens the pain, and the actual cautery is certainly the most effective form. A local measure that often does good is the deep hypodermic injection of cocaine, repeated daily for two or three weeks. It unquestionably promotes the subsidence of the sensitiveness, provided the ease obtained is not abused by increased exertion. Probably eucaine would be equally effective.

At present we are without any direct evidence of the real nature of these affections, such as can only be furnished by the microscope and modern methods of discerning that which it reveals. We cannot wonder at our ignorance, still less complain of it, for it is only quite recently that the minute structure of the sensory elements of muscle and tendon has been clearly perceived, and much of the normal structure still remains obscure. It is one of the departments of pathology in which the recognition of the changes that attend disease has to come long after the full discernment of the normal structure. We must therefore be content to wait, and content also meanwhile to rely on the apparent meaning of the symptoms of disease, as far as that meaning can be made out. Opportunities for pathological research are rare. Possibly it would be more true to say that they are rarely seized. They are not uncommon, but need to be watched for to be found. These diseases have little gravity, so far as concerns the mechanisms by which life is ended. The processes that cause death absorb attention, and minor maladies which coexist are naturally disregarded. I shall be indeed glad if what I have said to-day should lead you to look for and to take advantage of opportunities which others may use, if you cannot do so yourselves.

NOTE.—The recent investigations of Cattaneo, Sherrington, Ruffini, Batten, Horsley, and others have added much to our knowledge of the structure of the muscle spindles, but leave their physiology still in the realm of conjecture. Still more is this true of what may be called their clinical pathology, the attempt to discern the part they play in disease. The suggestions made above are, I think, as much as is at present justified—that their normal function may be described as that of "muscle meters." One other remarkable fact may be referred to. It has been definitely ascertained that when all the fibres of a muscle perish in consequence of division of its nerve, or of atrophic disease due to changes in the spinal cord, those that are contained in the muscle spindle remain undegenerated. It is so, even when the nerves within the spindle perish in consequence of their separation from the posterior ganglia. The intrafusal muscle fibres (as those within the spindle are termed) clearly possess some independent vitality. We can only associate this with the remarkable mass of nuclei which occupy the fibres in the middle ("equatorial") region of the spindle. There, for a short space, they seem to replace the transverse striation, which reappears beyond them. Wherever we can trace the element on which vitality depends, it is a nucleus with protoplasm around it. The only reason we can conceive for the presence of these nuclei in the muscular protoplasm, is to secure independent vitality, and it is the only mechanism we can at present perceive by which their nutrition is maintained when all other muscular fibres perish. Far as the retina is removed from these structures, we seem to have in it a peripheral vital centre. Its ganglion cells are believed to control the nutrition of its elements and of the fibres of the optic nerve. But a ganglion cell is simply a nucleus surrounded by circumscribed protoplasm, and a vital influence may be equally exerted by nuclei whose individual protoplasm is not thus limited. The most important researches regarding the muscle spindles are contained in *Brain*, vol. xxvii, 1898, and to Dr. Batten's valuable paper, references to earlier writings are appended.

THE MEDICAL PROFESSION IN AUSTRIA.—According to the Austrian *Medizinalkalender* for 1904 the total number of medical practitioners in the Austrian Empire at present is 11,689. The number last year was 11,339. They are distributed in the several provinces as follows: Lower Austria, 3,454; Upper Austria, 396; Salzburg, 133; Styria, 692; Carinthia, 151; Carniola, 109; Coastland, 352; Tyrol and Vorarlberg, 598; Bohemia, 2,905; Moravia, 955; Silesia, 240; Galicia, 1,413; Bukowina, 146; Dalmatia, 145. In Bosnia and the Herzegovina there are 108 practitioners. In the principal cities they are distributed as follows: Vienna, 2,721; Linz, 63; Salzburg, 44; Graz, 274; Klagenfurt, 41; Laibach, 41; Trieste, 188; Innsbruck, 70; Prague, 580; Brünn, 186; Troppau, 39; Lemberg, 312; Czernowitz, 60; Zara, 20.

CHRONIC CYANOTIC POLYCYTHAEMIA WITH ENLARGED SPLEEN.

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At the meeting of the Association of American Physicians in May, 1903,¹ I called attention to a group of cases characterized by chronic cyanosis, polycythaemia, and enlargement of the spleen. The chief symptoms were constipation, headache, vertigo, and weakness; in some cases the patients were in very good health, in spite of an intense cyanosis. The 3 patients which I have seen present a fairly well-defined clinical entity. I was able to collect from the literature 6 additional cases; of the 9, 6 were males and 3 females. The youngest was 35 years of age. The cyanosis was the most remarkable feature, without, as a rule, any respiratory distress, and without any obvious cause. Advanced emphysema and chronic heart disease could be excluded in all the cases. The blood presented a greatly increased viscosity, an unusually dark colour, and in 8 of the cases the red blood corpuscles were above nine millions per cubic centimetre. The haemoglobin ranged from 120 to 150; the leucocytes showed no special changes.

In 7 of the 9 cases the spleen was enlarged, in 4 reaching nearly to the navel. Pigmentation of the skin was present in 5 cases. The symptoms were chiefly sensations of fullness in the head, headache, vertigo, weakness, and prostration. Constipation was present in 4 cases, attacks of nausea and vomiting in 2. There were necropsies in 3 of the cases. In Case iv (Stockton) the heart was normal. There was moderate emphysema of the lungs, with cyanosis and moderate enlargement of the spleen. In Case vi (Cabot) the patient died comatose, with cerebral haemorrhage. There was passive congestion of all the organs. In Case ix (Satndby and Russell) there was hypertrophy of the left ventricle and great enlargement of the spleen.

The following additional cases may be mentioned: Dr. J. N. Hall² of Denver, reports a very characteristic case in a woman with cyanosis of an extreme grade, dyspnoea, and a blood count of nearly ten millions of red blood corpuscles per cubic centimetre. Türk presented to the Medical Society in Vienna in January, 1902, a woman, aged 40, who had had enlargement of the spleen for about ten years with remarkable cyanosis, and a polycythaemia of nearly ten millions; haemoglobin, 180 per cent. Dr. Joseph Collins reports a case³ of an Irish girl, aged 24, with an extreme degree of cyanosis of the face and extremities, marked constipation, pain in the side, and a blood count of 9,800,000. The spleen was greatly enlarged. In a recent number of the *Mitteilungen aus den Grenzgebieten der Medizin und Chirurgie* (Bd. xi, Heft 4) Dr. Rosengart discusses the question of splenic tumour and hyperglobulism. His patient was a man, aged 41, who complained of stomach troubles, vertigo, and loss of weight. The skin of the face was mottled with yellowish and violet shades, but was lighter than in the ordinary cyanotic discoloration. The hands were of a purple-red colour. The mucous membranes were very dark. The patient had marked dyspnoea. The red blood corpuscles were ten millions, and the haemoglobin up to 190. The spleen was enlarged. There was slight albuminuria. The case is similar to those reported in my paper, but, not aware of this group, Rosengart leans to the belief, based on certain cases reported in the literature, that the condition is one of tuberculosis of the spleen.

Scharold⁴ in 1883 reported a case of miliary tuberculosis of the spleen without infection of other organs. There was no blood count, but the colour of the face is reported to have been between red and deep blue. Rendu and Vidal⁵ report the case of a policeman who had an attack of vomiting without apparent cause, with dyspnoea. The temperature was normal. Red blood corpuscles, 6,200,000; leucocytes, 6,000. This count gradually diminished. On examination, skin sub-icteric, cyanosis of face and hands marked, to a less degree, all over the body. A tumour, evidently the spleen, reaching from diaphragm to iliac crest. Eventually ulcers developed on tongue, and the liver became enlarged. Necropsy: Spleen adherent to diaphragm, fibrous on section, filled with caseous masses.

Collet and Gallavardin⁶ report a case of a man, aged 60, with an enlarged, not painful, spleen of two years' duration, without any cachexia and without any leukaemia or fever. There was also enlargement of the liver. The face was very congested (*très colorée*). The blood from the finger was deeply