

FIBROSITIS OF MUSCLES

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Interest in the rheumatic diseases has much increased during the last ten or twelve years. Articular rheumatism has, however, received more attention than the non-articular forms, because the former may take a more dramatic course and often result in disablement.

Fibrositis is a term applied to several different kinds of rheumatism in the soft tissues; we are in doubt as to the cause of many of them, but we know that it is not a single illness. From a prognostic and therapeutic point of view it is very interesting and useful to try to differentiate the kind of rheumatism that may be hiding behind the name fibrositis.

Fibrositis from Overwork

In this paper I have tried to distinguish a form of fibrositis of the muscles caused by overwork, and have attempted to explain its appearance and why the empirical forms of treatment help. There is nothing remarkable in the fact that muscles are often affected through overwork, since they make up 43 per cent. of the weight of the body and have important functions in metabolism, in carriage, in walking, and in movements of all kinds. I have left out of consideration infectious diseases of the muscles that can be verified by microscopical demonstration of the presence of Aschoff's or Klinge's nodules, or of other symptoms of specific rheumatic disease. I have also left out of consideration nodular fibrositis at the tendinous insertions, and fatty herniations in the fascia. I have considered only tender fibrositis in the muscle—the German “Hartspann”—that may be recognized in overworked musculature by means of palpation.

When this condition is being investigated the technique of palpation is of great importance. The patient should be completely relaxed, and palpation should be done symmetrically, with the skin well greased so that friction is completely eliminated. Plenty of time should be taken: it is important not to hurry.

When a muscle is trained sufficiently slowly it will undergo hypertrophy, and, on account of an increase of the sarcoplasm, each cell will grow larger; the number of fibres will be more or less unchanged. When a muscle is working, the capacity of its capillaries increases, and by hard work it may increase up to fifty times its resting capacity. When in activity the muscle contracts and is altered in shape, compressing the capillaries which have to supply it with blood. Thus the afflux

is reduced, and instead of getting more blood the muscle will get less. If the contraction is prolonged for more than a certain time, it will thus work more or less anaerobically. In a working muscle there will always be a certain degree of ischaemia and also a certain number of fibres forced to work anaerobically.

Another reason why the muscles under certain circumstances work more or less anaerobically is that the pressure of the intramuscular tissue fluids increases by working. By hard work it may increase up to 200 or 300 mm. Hg; that is to say, it is higher than the systolic pressure and will consequently compress the capillaries.

The stronger the contraction, and the longer it continues, that is to say, when the work is chiefly static, the more do these circumstances assert themselves.

Under anaerobic working conditions glycogen is decomposed into lactic acid, which, on account of the ischaemia already mentioned, will remain where it is produced, that is, in the working muscle. By prolonged hyperfunction a change of consistency will appear here—not only during the period of restitution but also afterwards—this is what we in Denmark call “myosis”. This form of fibrositis can be verified by palpation; it is local and must not be mistaken for the more diffused increase in consistency which is due to acute simple *hypertrofia e labore*. In English it is often called “fibrositis of the muscles”, “myalgia” or, less correctly, “spasm”; in German it is “Myogelose” or “Hartspann”. The terms “spasm” and “Hartspann” involve stimulation, as distinct from the terms “fibrositis” and “Myogelose”, which express a change of consistency only.

By means of electromyography it is now possible to separate these conditions and to distinguish between a real “spasticity”, that is a relatively permanent stimulation of the muscle, and a mere change of consistency.

Buchtal's Work

According to Buchtal (1940), it is probable that the double refractive substance of the myofibrils consists of flexible chains of molecules, in which molecules or parts of molecules are mutually connected by fairly firm valences. When a muscle fibre is extended passively, the molecules assume a longitudinal orientation, returning to a less tense state when the exterior forces cease to exert an influence. In the equilibrium state these firmly connected chains of molecules lie almost completely folded up. In uninnervated resting fibre these molecule chains are not in their equilibrium state, but are more or less straightened out. Buchtal assumes that the forces causing this orientation are due to the presence of an electric field. In resting fibre the condition of molecular aggregates, the micellae, is thus determined by the result of certain elastic and electric forces and corresponds to arrangement of the molecules in a somewhat extended rubber cord. Buchtal's experiments were performed on frog-muscles, but were later confirmed by Höncke (1947) on warm-blooded musculature. According to Buchtal, it seems as if electron microscopy may open new working-hypotheses regarding the mode of action of high elastic substances, and so the picture shown in the diagram would be altered.

Explanation of Overwork-Fibrositis

The explanation of the kind of fibrositis here spoken of may be that the molecule-chains of the part of the muscle in question have joined—with increase in stiffness of the muscle—and the muscle-cell does not respond to the stimulation of the motor end-plates, this corresponding to the state of clinical fibrositis. The consistency of this fibrositis is pasty, viscous, and stiff, that is, in myosis the elastic qualities alter. The changed condition of this fibrositis will persist in general anaesthesia. It may be thought that the linked molecule-chains are due to insufficient regeneration of the stretching forces—electric or other—a fact which is due to oxidation or to an accumulation of metabolic products.

As mentioned before, some of the muscle fibres work anaerobically, owing to compression of the vessels with decreased supply of oxygen.

We cannot yet, in fixed specimens, distinguish between a contracted and an uncontracted muscle. There is, therefore, nothing remarkable in the fact that from a pathological-anatomical point of view no difference is found between a normal muscle and a muscle with altered qualities caused by hyperfunction. From a clinical point of view the acute form of this fibrositis is more bulky, pasty, inelastic, and sore, and the chronic form is more fibrous, firm, and atrophic, and less sore. Radiating pains can actually be caused by pressure on, or pull of, the fibrositic muscle, and this fact may sometimes cause confusion with "neuritis" and "neuralgia". Clinically one may distinguish between primary and secondary myosis, and this distinction may be of some value prognostically and therapeutically; but there is no real difference between the two forms of fibrositic muscle.

A secondary fibrositic muscle may appear as the immediate consequence of another disease. For example, spondylosis, prolapsed intervertebral disk, or tubercular spondylitis may cause protracted tension in the muscle; when this tension, or strain, has persisted for some time, it is replaced by a fibrositis. Similarly, as a result of cardiac disease, a fibrositic muscle may be caused by an axone-reflex in the muscles of the chest region. On account of unnatural walking, arthrosis coxae causes fibrositis in lumbar and gluteal muscles.

Primary fibrositis in a muscle is directly caused by too heavy external work; that is to say, the myosis will be the result of forced work without intervals for rest, or of hard unaccustomed work, either because the unaccustomed work is wrongly performed technically or, in the case of nervous people, because they are too strained during their work. The principal cause is thus hyperfunction with ischaemia, but predisposing factors may be neurotic conditions of any kind.

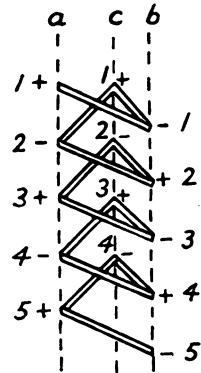


FIGURE.—Model of the minute structure of muscle fibres, according to Buchtal (1942, p. 13). "Spiral", with three series of charges (a, b, and c).

As mentioned above, the appearance of one of the forms of fibrositis of the muscles (myosis) may be due to overwork of the musculature, with a resulting decreased blood supply, deficiency in oxygen, and accumulation of metabolic products, and so we find a good explanation of the effects of the old empirical methods of treatment: rest, together with massage and thermotherapy.

Treatment

According to the above, treatment will be as follows.

Prophylaxis.—The best position in which to work at a convenient pace should be ascertained. Rest periods should be adequate and the work varied. The worker should be allotted to the work for which he is best fitted. Training in relaxation should be given, and psychic friction at the place of work should be avoided.

Therapy.—This should consist in rest. If necessary, different work should be found or the pace reduced. Massage should be given to increase the flow of blood and to remove accumulated metabolic products. (Massage is an art: you have to work “with your brain in your fingers”. Often for early myosis gentle treatment is needed, but myosis of longer standing may need stronger treatment.) Hot packs and short-wave therapy may also be given.

Injections of substances to dilate the circulation may be given (for example, 2-benzyl-4, 5-imidazoloinhydrochloride or for myosis of longer standing a dilute solution of formalin).

In secondary myosis the primary illness must be treated, a prolapsed disk by operation, or spondylosis by *x*-ray treatment or manipulation. Cardiac diseases need treatment of the heart, and flat feet need orthopaedic treatment.

During rest-activity, the state of reflex hyper-irritability (as revealed by electromyography) might be treated in different ways: (1) by increasing the blood-circulation in the muscle; (2) by decreasing the irritability of the motor end-plate by quinine orally or by injection, or by intravenous calcium; (3) by decreasing the irritability of the proprioceptive terminal organs, for example by injecting “novocaine” at the trunks or at the roots; (4) by decreasing central irritability or transmission through the synapsis by means of sedatives.

In the case of neurotic patients, training in relaxation is important for prophylactic as well as for therapeutic purposes.

Rehabilitation.—When the patient is free from pain, light gymnastic exercises should be started. Later, before the patient begins work, heavier exercises can be prescribed in order to strengthen the muscle as much as possible. The patient should go back to his former work slowly and with supervision of his working technique.

Conclusion

Rheumatism in the soft tissues is of great social importance. Physicians ought to take more interest in these diseases in order to avoid leaving such patients in the hands of the quacks.

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Fibrosite des Muscles

RÉSUMÉ

On expose l'importance du rhumatisme musculaire par rapport à celle du rhumatisme articulaire. On distingue entre le rhumatisme musculaire du au surmenage d'un muscle et les autres variétés. On relate son origine, sa base physiologique et ses symptômes. Cette maladie peut être différenciée au moyen de l'électromyographie des spasmes musculaires. On note la possibilité de la confusion avec la neuralgie et la névrite.

Le rhumatisme musculaire peut être reconnu par la palpation. On distingue des altérations musculaires (nommées "myoses") primaires et secondaires. On expose des raisons pour lesquelles les vieilles méthodes empiriques de traitement réussissent.

Reumatismo Muscular

RESUMEN

Se expone la importancia del reumatismo muscular en relación con el reumatismo articular. Se distingue entre el reumatismo muscular debido a la fatiga de un musculo y otras variedades. Se relata su origen, su base fisiológica y sus síntomas. Esta enfermedad puede diferenciarse de los espasmos musculares por medio de la electromiografía. Se nota la posibilidad de confusión con la neuralgia y la neuritis.

El reumatismo muscular puede estar reconocido por medio de la palpación. Se distingue entre las alteraciones musculares (llamadas "miosas") primarias y secundarias. Se expone las razones del éxito de los viejos métodos empíricos de tratamiento.