BRITISH MEDICAL JOURNAL

LONDON: SATURDAY, DECEMBER 19th, 1936

THE METABOLIC FACTOR IN CHRONIC RHEUMATISM WITH SPECIAL REFERENCE TO FIBROSITIS

BY

R. G. GORDON, M.D., D.Sc., F.R.C.P.Ed.

PHYSICIAN, ROYAL UNITED HOSPITAL, BATH

In recent years a great deal of attention has rightly been paid to the infective factor in chronic rheumatism, but the vision of some observers has been narrowed too much, and they have entirely neglected the metabolic factor.

The very proper differentiation of gout from the rheumatic group led to a revulsion against the hybrid term "rheumatic gout," as used by Dyce Duckworth and his contemporaries. The tendency was to place gout, on the one side, as an essentially metabolic disease, and the chronic rheumatic diseases, on the other, as essentially infective conditions, and to lose sight of the fact that gout may be associated with one or other of the "rheumatic" conditions in the same patient.

Varieties of Rheumatic Disease

Nowadays it is customary to recognize that arthritis may be divided into two main groups: the rheumatoid type, which is infective in origin and shows a definite increase in the sedimentation rate of the erythrocytes; and the osteo-arthritic type, which is not fundamentally infective in origin and in which the sedimentation rate is not increased.

RHEUMATOID TYPE

This, however, is but a rough-and-ready classification, for the first group can be further separated into:

1. *The Specific Infective Arthritis*.—In this the infective agent is known, as in gonococcal, dysenteric, and typhoid arthritis, to which perhaps may be added the true acute rheumatic arthritis and tuberculous and syphilitic arthritis.

2. *Spondylitis Ankylopoietica*.—One of the two forms of arthritis of the spine described by Buckley, this is closely allied to true rheumatoid arthritis, but presents certain differences of clinical behaviour and localization. It is probably of streptococcal origin, possibly under the influence of a co-operative virus.

3. *True Rheumatoid Arthritis*.—Certainly of infective, probably of streptococcal, origin, and possibly with a co-operative virus, this is specially characterized by a general lowering of the resistance of the patient, with a profound disturbance of the function of the autonomic nervous system and certain metabolic changes such as alterations in the sugar metabolism.

THE OSTEO-ARTHRITIC TYPE

The osteo-arthritic group may likewise be subdivided into:

1. *True Osteo-arthritis*.—This is a degenerative condition associated with local and/or general vascular inefficiency, showing no very definite connexion with infection, but occurring fairly frequently as a terminal stage in

arthritis of undoubtedly infective origin. There are some who still insist that osteo-arthritis is of infective origin, and perhaps it would be a confession of ignorance and inexperience to state too dogmatically that it is not, or never can be, the direct result of infection, but the evidence is on the whole against this theory. To infer an infective origin for osteo-arthritis or, indeed, for any chronic rheumatic condition simply on the grounds that they may be benefited by vaccine therapy may be fallacious, for vaccines given in large doses, as used to be done, frequently act like protein shock as a metabolic alternative, and their effect when administered in very small doses, as is the more usual modern practice, is not yet sufficiently understood. There would seem to be little doubt that minute or even diminishing doses of vaccine are effective in many of these conditions, but this hardly corresponds to the general theory of vaccine therapy, and may point to some sort of allergic action on the part of the vaccine.

3. *Climacteric or Metabolic Arthritis*.—This is a dry synovitis with an accompanying bursitis seen particularly in the knees of middle-aged subthyroidic women. Many people regard this condition as an early stage of osteo-arthritis, but there can be no doubt that, whereas osteo-arthritis is a frequent terminal condition in untreated or imperfectly treated cases, this condition does show reasonably definite clinical features, and can be treated sufficiently successfully to prevent the development of osteo-arthritis and to induce considerable clinical improvement, even though it may not be possible to restore completely perfect function to the knee-joints of these elderly and generally sedentary people. In such cases there is no indication of infection and every indication of metabolic pathogenesis. The blood picture is normal, the sedimentation rate is unchanged, and the patients are of a florid type and generally over weight. On the other hand, they usually show the signs of inefficient thyroid secretion—namely, increased weight, sluggish circulation, coarse skin, absence of sweating, flatulent dyspepsia with mild constipation, and falling hair with depilation in the outer segments of the eyebrows. Vaccine treatment does not improve such cases, whereas adequate thyroid medication, a reduction of carbohydrates in the diet, and appropriate measures to increase the vascularity of the affected joints produce marked improvement.

Fibrositis: Its Association with other Rheumatic Conditions

While fibrositis is sometimes associated with the infective group of arthritis, its presence is of minor importance in practically all cases, and it is not usual to pay much attention to it in the treatment of these conditions, though if a little more notice were sometimes taken of this intervening malady the comfort of the patient might be

increased and he might be relieved of a certain degree of unnecessary pain. In the osteo-arthritis group, however, fibrositis is present in every case, and is frequently of marked importance. Not only is it widely distributed, but it is often found that a great deal of the pain, stiffness, and coincident discomfort is due to the fibrositis rather than to the arthritis. Since treatment of fibrositis is much more easy and rapid than that of the arthritis, the patient is likely to be grateful for attention to this part of his or her malady.

Pathogenesis of Fibrositis

In my opinion fibrositis is in the majority of cases metabolic rather than infective in origin, and frequently due to the same sort of factors as in the osteo-arthritis group—namely, strain and trauma, poor vascularity, and inefficient circulation and elimination.

I would not like it to be held that I think that no case of fibrositis is infective in origin, for some certainly improve after infections round the teeth, in the tonsils, appendix, gall-bladder, cervix uteri, and prostate have been removed, and others are benefited by vaccine therapy. On the other hand, there is no doubt that such infections may upset the metabolism, and, as has already been remarked, we cannot always be sure how vaccine therapy produces its effects. Moreover, it is remarkable how often the removal of septic foci or vaccine therapy alone is disappointing in its results, whereas some treatment involving metabolic change may make the difference. The following case illustrates this:

A female, aged 39, complained of severe chronic muscular pain in neck, shoulders, ribs, and hips. This was sufficient to prevent her playing games and to interfere with sleep. At this time she was suffering from very severe anxiety neurosis with very poor emotional adjustment. It was discovered that her tonsils were septic, and the aural surgeon gave a confident prognosis that not only her fibrositis but also the emotional instability would be cured by the tonsillectomy. This, however, was not borne out by the result, and for eighteen months there was no improvement whatever in the rheumatic and very little in the emotional condition. After this time, when it could hardly be maintained that the tonsillectomy could have much effect, her environmental circumstances altered somewhat and she was able to make a better adjustment. With this there was an undoubted improvement in her general health and metabolism, and the rheumatic pains began to diminish, until they ceased to trouble her to any extent.

It would seem in this case that it was the cessation of emotional disturbance, with the consequent amelioration in autonomic and metabolic balance, which allowed the fibrositis to improve. She had had three courses of localized treatment, such as will be described presently, during the period of emotional instability, but these were unavailing until the general health began to improve.

Aetiology of Fibrositis

Although acute fibrositis may occur at all ages it is relatively more common in young people; the chronic form is much more common in middle age and early old age, the period when circulation is failing to maintain its full standard of efficiency, and elimination, particularly by the skin, is becoming lessened by the adoption of a more sedentary habit and by the diminishing activity of the thyroid. In young people I believe that two factors may operate. The first is a relative inefficiency of the thyroid secretion not amounting to anything like myxoedema but interfering with efficient circulation and elimination by the skin. The following case exemplifies this type:

An otherwise healthy young woman of 26 suffered from very severe headaches which seriously interfered with her profession of teaching. Her eyes were practically normal; glasses had

been given to her, but had made no difference. The ear, nose, and throat had been pronounced normal. The headaches were chiefly occipital and worse in the morning. She was slightly constipated, easily got tired, and practically never perspired. Her blood pressure was 130/74. The periods were slightly irregular and late. The skin was sallow and rather coarse; hair was somewhat thin and came out easily. On examination her neck muscles were hard and hypertonic, with tender nodules right up to the occipital ridge and in the scalp above it. There was no indication of infection in teeth, antra, tonsils, abdomen, or pelvis. The blood count and sedimentation rate were perfectly normal.

As the patient had to go back to work immediately it was not possible to undertake a proper course of treatment at the time, and therefore she was put on ext. thyroid, 3 grains daily, until the next holidays. With this treatment alone she had a much more bearable term, and her headaches were not nearly so persistent. Three months later she undertook a course of massage and hot baths and was immensely improved, and her skin began to sweat freely. It will probably be wise for her to continue with intermittent courses of thyroid for another year and possibly undergo another course of physical therapy, but already her outlook on life has quite changed.

The second type is that in which there is an imbalance in the autonomic system, with consequent inefficiency of circulation and elimination. This type is not either vagotonic or sympathetotonic, but exhibits symptoms explicable only on the basis of an incoordinated and spasmodic activity of both autonomic divisions. The following case illustrates this type:

A young married woman of 25, "highly strung," had been subject to considerable emotional stress since her husband was in the Air Force. She complained of severe pain "all over her," and marked stiffness of neck, arms, and back. There was no swelling of the joints, and no true limitation of movements, but tender nodules could be found in almost every muscle of the body. No organic disease could be detected on examination, and blood and sedimentation rate were normal. She was, however, subject to irregularities of autonomic function—namely, attacks of palpitation, sweats quite unrelated to exercise or external heat, attacks of constipation and diarrhoea without adequate cause, a migrainous type of headache without ocular phenomena, and at times cold, dead extremities.

Massage, coupled with measures to regulate the circulation in the form of belladonna and hyoscine, together with carefully regulated contrast douches, eventually cleared up her acute fibrositis—at any rate for the time, for in such cases it is, in my view, the autonomic imbalance, which owes something to a constitutional factor, that is really responsible for the fibrositis, and the former cannot be permanently cured.

In the middle-aged and elderly the second type occurs but is not nearly so common as the first, and it seems scarcely necessary to quote a particular case to illustrate this clinical picture, which must be familiar to every practitioner: the florid, fat, subthyroidic person of somewhat sedentary habits—or at any rate whose habits are much more sedentary than they had been fifteen years previously—who complains of pain and stiffness in any or every part of his anatomy, and whose life has become a burden because of an almost constant consciousness of his body's refusal to answer smoothly and painlessly to his will.

Semeiology of Metabolic Fibrositis

As I see it the natural history of metabolic fibrositis is somewhat as follows. In an individual of either sex the efficiency of whose circulation and elimination is reduced by reason of either thyroid deficiency or autonomic imbalance, there tends to be an accumulation of metabolites in the least vascular tissue of the body—namely, the fibrous tissue. This occurs in normal fibrous tissue, but still more in such scar tissue as may be present as the result of a wound or, more commonly, of the organization of blood clot after deep bruising. Hence the

frequency of fibrositis as a late sequela of injury. Since these metabolites will be more plentiful the more muscular activity has taken place, fibrositis will tend to be specially localized in those areas subjected to strain, such as the backs of gardeners, the shoulders of miners, etc. Such a condition, which may be likened to a fire whose ashes are never raked out of the grate, is the soil on which the clinical manifestations of fibrositis are founded. The patient may complain of very little—an occasional twinge of pain or a slight stiffness on rising from a sitting or lying position maintained for some hours—yet by careful palpation it is possible to discover many nodules, plaques, or strands of hardened, inelastic fibrous tissue which are more or less tender to deep pressure. I believe these to be protective barriers laid down by the body to delimit the irritating metabolites.

Such being present, I believe that there is a threshold of accumulation and reactive irritation which may be reached suddenly or gradually. Once this threshold has been passed the clinical manifestations of pain and stiffness develop. If the accumulation of irritative metabolites has taken place in the capsules of joints the reactive barriers which are of the nature of scar tissue will tend to contract and produce real limitation of movement and perhaps deformity. (Compare the peri-arthritis of the fingers in "Jaccoud's disease," which is quite easily distinguishable from the intra-articular rheumatoid arthritis.) If the reaction occurs in muscles then there will be aching and stiffness and possibly acute pain on moving the muscle, but no true limitation of passive movement. If the reaction occurs in nerve sheaths then neuronic sensory fibres may be caught up and neuritic pains may be experienced, and if motor fibres are involved then a certain amount of wasting may result.

In many of the elderly patients the threshold of clinical manifestation is reached gradually and there is no dramatic onset of the illness, the patient only imperceptibly realizing how aching and stiff he is getting and how painful certain movements are, especially after prolonged immobility. In other cases there is a sudden onset and a discoverable precipitating agency, be this chill, indiscretion in diet, or intercurrent infection such as influenza, tonsillitis, etc. Admittedly it is difficult to ascertain the exact mode of action of such precipitating cause, but it must be that the general metabolism is so rapidly altered that the threshold of clinical manifestation is passed and a more or less acute onset results—and occasionally this onset is most astonishingly acute.

General Treatment

From these considerations it follows that the management and treatment called for in a case of fibrositis will be somewhat as follows.

I would deprecate an abandonment of the orthodox search for a focus of infection, but I would suggest that if such is found the immediate reference to the dentist, the surgeon, and the preparer of vaccines is not the sole duty of the physician. It would appear that to some there is an insidious temptation in the facility of the preparation and administration of vaccines. There is never any difficulty in finding a streptococcus somewhere in the body from which astronomical numbers of micro-organisms may be grown and confined in that rubber-capped bottle which appears so impressive to the patient. I have known such a person to visit a specialist who has no doubt impressively and expensively inserted a hypodermic needle once a week for one, two, and even three years without making the slightest difference to the patient's fibrositis. Such a victim is rightly named "patient."

If septic teeth are discovered one may be removed, and if there is a reaction in the form of general malaise or

increase in local pains then others may be carefully and judiciously dealt with. In many such cases, however, little or no effect on the fibrositis may ensue, and extractions should be done on grounds of general health rather than with any expectation of dramatic improvement in the fibrositic symptoms. Infection of the tonsils requires still more careful consideration, and, in my experience, if the patient is over 35 tonsillectomy will seldom, if ever, make any difference to the fibrositis, and in older patients it is a definitely severe operation. It should only be undertaken, therefore, on grounds other than that of the rheumatism. The same applies to the surgical treatment of abdominal and pelvic inflammation, though on account of its metabolic implications such a condition as cholecystitis should certainly be treated on medical and dietetic lines.

Diet and Drugs

The next consideration may well be one of diet. There is no specific diet for fibrositis, but none the less eupepsia is important, and it is necessary to regulate the patient's diet to this end. There seems no particular reason to consider the protein factor except in so far as that elderly people of sedentary habit do not require so much as active adolescents and young adults, and since there is a gouty factor in many of these cases purines had better be reduced. Fats may have to be reduced if there is any intolerance, such as occurs so often in those with inefficient livers, but if the patient likes and can eat eggs without indigestion it is usually quite safe to allow him fats as he wants them. Carbohydrates are generally more important, as many of the subthyroidic type of patient are over weight and suffer from flatulent dyspepsia. The starches are therefore better cut down, but a certain amount of sugar to give a relatively assimilable energy producer is usually permissible. Fruit and vegetables are in almost every case indicated, except where there is any individual idiosyncrasy to a particular article. The main dietetic rule, however, is that whatever the patient can digest easily is permissible, and anything which gives him indigestion had better not be taken or the form in which it is ingested modified.

The bowels must be regulated, but drastic purgation is to be avoided. The use of intestinal douches is not indicated, except perhaps a preliminary clearing or for diagnostic purposes. I believe that a small dose of saline in the morning is of real use, helped, if necessary, by such mild and easily regulated laxatives as paraffin, petrolagar, taxol, and the like overnight.

The next problem is the endocrine one, and in most cases this is simple, for thyroid is what is lacking. Large doses are not required, and in my experience 2 to 3 grains daily for a considerable period, with three weeks' intermission every three months, keeps the patient reasonably well balanced.

The problem of the type with autonomic imbalance is a much more difficult one, and each case must be judged on its merits, but the three most useful drugs in such cases seem to be: atropine, if the vagus is too active; ephedrine, in cases of low blood pressure; and hyoscine. The latter may be somewhat unorthodox, but one of the actions of this drug would seem to be to damp down afferent impulses, and I believe it may have this action in respect of the autonomic as well as of the central nervous system, and is therefore useful. Apart from this, drugs only have a place in so far as analgesics are required, and for this aspirin and tab. empirin co. are the best, unless there is a definite gouty factor, when the following pill is useful:

R.	Ext. colchic. ...	...	...	...	gr. 1
	Guaiacol carb. ...	...	...	...	gr. $\frac{1}{2}$
	Sulphur. pp.				

Local Treatment

Finally, the specific local treatment must be directed: (1) to free the tissues from the scar-like natural barriers to the irritating metabolites; and (2) to improve the circulation and eliminative functions, especially that of the skin, to remove these metabolites. For this purpose many recommend short-wave diathermy, and so far as I have had experience of it it would seem to be a satisfactory and successful method of treatment; but naturally my own experience lies in hydrotherapeutic measures, and I have found possibilities of successful treatment in these which have not tempted me to use any others.

I believe in a combination of massage and deep baths with an undercurrent douche. An hour's massage is given on alternate days three times weekly, and the baths on intervening days. In my experience this is quite sufficiently strenuous treatment for most people, and that to try to concentrate it further is likely to do more harm than good. As a rule the first week's treatment tends to stir up the pains; a fortnight's treatment is therefore the least time that should be expended, and for most cases three to four weeks is advisable.

The massage given must not be just any massage. This is not realized by many masseurs and masseuses, and doctors are often disappointed in the results of the treatment ordered simply because the right treatment is not given. The masseuse must first educate her fingers so that she can easily locate the thickened nodules, bands, and plaques in the fibrous tissue of the body. She must at her first contact with the patient explore his body so as to discover the exact position and relations of the thickenings, especially those that are tender and apparently responsible for the particular pain and tenderness complained of by the patient. She must then so arrange the position of the patient that the muscles are sufficiently relaxed to enable her to press the nodules against subjacent bone. She must remember that her object is not to increase the tone of muscle fibre, and that therefore all hacking and slapping, often too much beloved by the masseuse as a spectacular demonstration of her manipulative skill, are harmful and to be eschewed at all costs. Her sole object is painstakingly to discover the nodule and rub it away against the subjacent bone. She must at the time realize that such a process may be intensely painful, at all events for the first two or three treatments, though the tenderness often suddenly diminishes after that. She must not, therefore, dwell too long on any one spot, but move from one area to another as her intuition informs her will allow her patient to derive the maximum benefit from her treatment, without being discouraged by being made to suffer too much pain. Without this intuition the masseuse is not likely to be very successful. Above all, she must keep her patient warm, for both types are abnormally sensitive to cold; she must therefore practise making her manipulations under the bed-clothes, and must work by touch rather than by sight.

The baths I favour are deep immersion baths, which should be given quite hot at a temperature of 102 to 103° F. Fibrositic patients as a rule stand heat well, and there is little risk of heat exhaustion, as is the case with rheumatoid patients. In this bath should be an undercurrent douche given at a temperature of 107° F. and applied at pressure to the areas of pain and stiffness, since the heat and percussion effect of the douche are admirable stimulants to the local circulation.

Given the correctness of the premise that fibrositis is in many, if not most, cases metabolic in origin, this line of treatment would seem to be logical, and in my experience has proved itself valuable in relieving the patient of his symptoms for a period which may in favourable cases extend to many years.

Conclusions

1. The metabolic factor in the genesis of rheumatic diseases has been too much neglected ever since the essentially metabolic disease, gout, was rigidly, perhaps too rigidly, excluded from the group.

2. This especially applies to fibrositis, which in the majority of cases is metabolic in origin.

3. Infective foci, if they exist, may be the direct cause of fibrositis, but may act by upsetting the metabolic balance and thus cause its onset.

4. Fibrositis may occur in those suffering from sub-thyroidism or autonomic imbalance.

5. The characteristic thickenings of fibrositis are due to a fibrous barrier of resistance laid down round irritative metabolites.

6. These thickenings may exist before clinical manifestations show themselves. The latter occur when a threshold of irritation is passed.

7. Treatment consisting in removal of septic foci and administration of vaccines is, as a rule, disappointing.

8. The dietary, endocrine, and autonomic balance must be readjusted, and the thickenings removed by short-wave diathermy or massage and hot baths.

BLOOD EXAMINATIONS IN THE PROGNOSIS AND TREATMENT OF PULMONARY TUBERCULOSIS

BY

L. E. HOUGHTON, M.A., M.D.

SENIOR ASSISTANT MEDICAL OFFICER, COLINDALE HOSPITAL, HENDON

I propose to confine my remarks almost entirely to that branch of laboratory work on which I feel that I am best qualified to speak, namely, certain methods used in the assessment of blood changes in pulmonary tuberculosis and their clinical interpretation.

The criteria commonly relied upon in the investigation of blood changes in pulmonary tuberculosis are the total and differential leucocyte reaction, the Arneth count or one of its modifications, and the sedimentation rate of erythrocytes. I propose first to outline the variations in these reactions which may be expected in health and disease, in order to facilitate subsequent discussion of the clinical significance of those changes which are found in cases of phthisis.

Total and Differential Leucocyte Reaction

Recently the importance in pulmonary tuberculosis of the "three key cells," the neutrophil, the lymphocyte, and the monocyte, has been brought into prominence, and much has been done to elucidate the leucocyte response in different phases of the disease. Sabin¹ and her co-workers in America^{2, 3, 4} believe that the monocyte, or its derivative the epithelioid cell, in which living bacilli appear to thrive, is a "liability rather than an asset to the body." The function of the lymphocytes, on the other hand, is almost certainly that of surrounding the tubercle, cutting it off from the healthy tissue, and perhaps eventually destroying it, or at least facilitating its conversion into fibrous tissue. The differential leucocyte count is therefore regarded as a method of evaluation of the tissue damage which has resulted from infection. In brief, "the monocyte represents tubercle formation, the neutrophil represents tubercle

* Read in opening a discussion in the Section of Tuberculosis at the Annual Meeting of the British Medical Association, Oxford, 1936.