

RHEUMATOID ARTHRITIS.*

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By rheumatoid arthritis I mean the condition which, as a rule, comes on slowly, progresses intermittently, and affects chiefly the adult or middle-aged, and is characterized by swelling of many joints, frequently symmetrical, commencing in the small joints and gradually extending to the larger ones; associated with it are general symptoms.

I need not detail the characteristic appearances which are so well known, but will simply remark that in the early stages the joints are swollen, and the capsule when felt through the skin gives a similar impression to that which is derived from parchment paper when it is indented, that is, it is thickened and the joint contains fluid. Later there is apparently absorption of the articular surfaces and general destruction of the cartilages of the joint; in the larger joints, however, there appears to be a greater tendency to destruction with fixation without much fluid, and in these cases the chief characteristic is limitation of movement. Coincident with these changes we find atrophy of muscular tissue, of skin and of nails, sweating at the distal parts and general wasting. In some cases there is enlargement of the glands and spleen. Finally, the disease ceases to progress, and the patient is left partially or completely crippled. This affection is to be distinguished from osteo-arthritis, in which joints are affected progressively with the deposition of new bone and calcified tissue; it arises, as a rule, in older patients and frequently at the site of an injury.

If we remember the etiology of this condition as taught when we were students, we shall come to the conclusion that it was very indefinite. Such conditions as heredity, hygienic surroundings, worry, damp, localized anaemia, malnutrition, excessive use of saccharine food, dissolute life, venereal disease, were considered by some to be causes, while others assigned a nervous origin to the affection, basing their arguments on the symmetry of the distribution, similarity of the lesions to those occurring in locomotor ataxy, syringomyelia, etc., and on the atrophic conditions associated with those diseases, and on the importance of mental exhaustion, shock, etc. Following these came the theory of the infective origin of the disease, supported by the fact that micro-organisms had been found in the tissues, that an acute onset occurred in a small proportion of cases, that it occasionally followed an acute affection, and that in some cases the spleen and lymphatic glands were enlarged.

If we turn to the treatment recommended in those times, we generally find that this is headed by the statement that rheumatoid arthritis is incurable, but that sometimes the progress is arrested. The treatment consisted in attention to the digestion, and placing the patient in the best hygienic surroundings. Prolonged treatment at watering places, consisting, as a rule, in baths, massage, and copious libations, were recommended, while locally heat, in the form of hot air, sand baths, etc., was prescribed. It was admitted that iodide, iron, and arsenic were useful, but that the salicylates were only effective as a temporary measure and with the object of relieving pain. Later, guaiacol carbonate obtained a reputation for success in a certain number of cases, but it was admittedly useless in a large number. Some success has more recently been attributed to the consumption of certain vegetables in large quantity. However, none of these measures have proved successful to any great extent.

With the growth of knowledge, based largely on bacteriology, our thoughts have turned to the question of whether these conditions owe their origin to bacterial infection. In the earlier days the general opinion was that the organisms must be present, in order to cause a lesion, and failure to find the organisms in the blood, synovial fluid, or tissues surrounding the joint tended to put this suggestion out of court. Further, those who found the same organisms in each case were not believed. Latterly it has been recognized that lesions may result from the toxins of the organisms, the latter remaining at a distance and not producing septicaemia. If this view be

accepted—and I think clinical evidence points to its correctness—it is obvious that the site of the original infection may be various and not always patent. The different sites of a primary lesion may also explain the varied results of treatment.

Turning now to the clinical side, there is sound evidence to show that there is a condition of acute rheumatoid arthritis which simulates acute rheumatism in many particulars. Thus there may be a sudden onset, with general febrile symptoms, a multiplicity of joints involved, and a high temperature; but it differs from acute rheumatism in that the heart is not affected, the tongue has not the typical coating, there is much less sweating, and salicylates do not produce the classical improvement. These points indicate a marked difference, and, whether or no the diseases are actually different, it is quite possible to prophesy correctly whether salicylates are going to produce a satisfactory action. I think a good working hypothesis for these two conditions is that acute rheumatism is an intestinal toxæmia, while acute rheumatoid arthritis is a toxæmia derived from another source. Salicylic acid is a derivative of carbolic acid, and has strong antiseptic properties; it, therefore, should have considerable effect on organisms inhabiting the alimentary tract, but little on an infection elsewhere. In either case the pain is diminished by this drug, but in acute rheumatism the temperature is rapidly reduced to normal; whereas in acute rheumatoid arthritis the relief is less, and the temperature not affected. The cases of acute rheumatoid arthritis which I have seen have shown the best results when some septic focus has been removed. Thus, in the case of a man 43 years of age, who had been treated with salicylates for six weeks without any effect, and who in addition to a temperature varying between 101° and 103.5°, gradually developed pleurisy with effusion and some ascites, the temperature fell to normal, and the fluid in the various synovial sacs began to be absorbed promptly after the extraction of a number of septic stumps. Other cases of that condition which I have myself seen have been due to oral sepsis, but the histories of still other cases, where an acute onset had been described, point to such conditions as pus in the antrum of Highmore, infection of the urinary tract and closing of a discharging sinus, as being capable of producing a similarly acute attack. The association of arthritis with the gonorrhoeal infection also comes readily to mind. I think, therefore, there is ample evidence to show that acute symptoms may arise in the course of a chronic infection not localized to the part infected.

Turning now to the subacute variety with slow onset and gradual progress, I have seen cases in which there was a chronic affection of the mouth (pyorrhoea), antrum of Highmore, urinary system, vagina, bronchiectasis, and have met others in which the process has been brought to a standstill by the constant administration of intestinal antiseptics. Others are recorded in association with chronic proctitis. From the appearance of the lesions it is not possible to exclude gonococcal infection—that is to say, there is nothing absolutely characteristic of arthritis due to the gonococcus affecting many joints subacutely. There are two points as regards the subacute cases which are, I think, of considerable interest. First, the preliminary symptoms are very definite. Of these the most characteristic are feelings of numbness in the extremities with stiffness, chiefly complained of in the morning, and associated with weakness of muscular power. The fingers also go dead—pale usually, sometimes cyanosed. At this stage there is no atrophy of muscles; there are also general symptoms referable to the anaemia, occasionally some enlargement of the thyroid, spleen, and lymphatic glands; the blood pressure is also low.

In connexion with thyroid enlargement I might mention the case of a nurse who developed an enlargement of the thyroid gland, tremor, rapid pulse, low blood pressure, and some general symptoms suggesting a condition of exophthalmic goitre. She was considered to be an early case of this condition, and before being put to bed for a long rest was sent to the dentist to have her mouth put in order. Several teeth were stopped and three bad ones removed. She was then put to bed, but at the end of a fortnight all her symptoms had disappeared; she resumed her duty and during the past three years has had no recurrence of symptoms of a similar kind.

The second point of interest is that, as far as clinical history can determine, the joint condition does not come

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on simultaneously with the commencement of the infection. Apparently there is always an interval of at least a year or eighteen months before the joints begin to swell. Two severe cases of this condition occurred in patients one of whom had had a discharging maxillary antrum for thirty-five years, and the other of whom did not know of any site of infection. In this case, however, the urine was always cloudy, even a catheter specimen (the patient was a girl), and microscopical examination and cultural methods showed that this cloudiness was due to staphylococci in large quantities.

There must, of course, be some other factor at work besides infection. Probably the toxin has to be absorbed rapidly and in large quantities in a short time. Some of the worse cases have occurred in patients who had pyorrhoea beneath a dental plate or teeth on which gold caps had been placed in the usual manner—that is, so as to project below the free margin of the gum—which would in either case produce local irritation with increased areas of vascular granulation tissue. The latter is a frequent device of the American dentist, and has been copied in this country, whereas the former condition is not uncommon in patients who have been to some quack dental operator where payment is made in proportion to the number of teeth supplied. To these cases the operator naturally wishes to supply a full set, and, “to prevent the shape of the mouth falling away,” breaks off the crowns of all the remaining sound teeth, and leaves the roots *in situ*. These decay, and the pus is found exuding from the sockets from within and without the root. This condition may frequently be seen in the out-patient department. It is a remarkable, and from the patient's point of view unfortunate, clinical fact that these patients assert that they do not know what toothache is. To illustrate these points it may be worth while to give one or two cases more fully.

CASE I.

H. B., aged 23 years. *History*: She was first seen by me in November, 1909; two years previously she had been for seven weeks an in-patient in hospital, suffering from typical rheumatoid arthritis, affecting hands, feet, wrists, and elbows. Under general treatment she improved, and was able to do her work until May, 1909. At this time her left knee began to swell, the right got painful, her neck became stiff, and the movement of her jaw was limited. The right wrist and hand were also affected, and the joints swollen and painful. Examination showed that all these joints were distended with fluid, that there were in addition two septic stumps and a small amount of diffusely scattered pyorrhoea. The stumps were removed and the pyorrhoea treated. This was followed by general improvement, so that two months later the only trouble complained of was the left knee, which still contained fluid, but it was noticeable that the synovial membrane, instead of being distended, was now quite slack. This was painted with iodine and bandaged, and a month afterwards the swelling had completely disappeared. Two months after this she returned again with swelling of the joint. Inspection showed that, while pyorrhoea was not extensive, there was a sinus between the two front teeth in the lower jaw. As she had a particularly good set of teeth, and as the retention of these teeth was important to her, she being a mannikin, a culture was made, and a vaccine, obtained from the streptococcus cultivated, was injected. She now turns up, at periods varying from six weeks to two months, for an injection, coming as soon as there is any symptom of swelling or pain. Her joints, with the exception of these occasional recurrences, are perfectly natural.

CASE II.

B. C., aged 29, a domestic servant, was sent up on account of pain and swelling in hands and feet, and occasionally in other joints. This had started two years previously with stiffness in the fingers and sensations of deadness which were worse in the mornings and gradually passed off with the use of the hands. A year after the onset the joints began to swell, the metacarpal and metacarpophalangeal joints of both hands were distended with fluid, and the synovial membranes were thickened. The feet were painful, but not swollen, the knee-joints were symmetrically distended with fluid, but almost painless. The skin of the hands was moist, and she complained of this as a source of trouble to her in her occupation. She was well developed, but said that she was thinner than previously. Intestinal symptoms were marked—indigestion, flatulence, and constipation. The teeth were good, there was no bacilluria, and there was nothing to point to any disease of the antrum; in fact, nothing to suggest localized infection anywhere. She was treated with purgatives and 5 grains of guaiacol carbonate three times a day, and 1 grain of menthol when there was any symptom of indigestion. At the end of three and a half months the swelling of the joints had disappeared, but the pain still came on in the morning. She was then put on to 15 minims of dilute phosphoric acid, and a minim of creosote three times a day. Under this treatment, to which I shall refer later, the pain disappeared

in the course of a month, and the stiffness in the course of a further month. During the eight months she was under treatment she gained 14 lb. in weight.

CASE III.

This case, to which I have referred earlier, illustrates the long period over which suppuration may last before the onset of symptoms supervenes. Thirty-five years previously the patient had a discharge from his nose, for which he underwent two operations on his antrum, which were unsuccessful in relieving the discharge. In the intervening time he suffered from various pains, but three years ago his joints began to swell, toes, ankles, and knees. Eighteen months ago the following joints were affected, swollen, or deformed: Wrists, ankles, elbows, hands, shoulders, and the knees and jaws were stiff. He was a managing clerk in a good position, intelligent and cheerful. He volunteered the fact that aspirin and the salicylates were quite useless. He had been told to consume large quantities of spinach, but this had had no effect on his pains. He presented a very severe condition of this disease; there was marked ulnar deflection of both hands. The joints of his fingers and wrists were swollen and the capsule thickened; he had no arch to his foot; the ankle-joints were enlarged, distended with fluid, and painful. There was much pain under the balls of his toes, and there was marked restriction of movement at the elbow. The shoulders, elbows, knees, hips, and spinal vertebrae showed various degrees of ankylosis. He was very averse to an operation on his antrum which I urged on him, saying that he had had two previous operations, in both of which he had been promised a cure, and in neither had any such thing happened. I therefore obtained pus from his antrum, which contained streptococci in pure culture, and prepared a vaccine. The injection of this had no effect at all. He obtained six weeks' leave of absence, and was operated on, a radical cure of the antrum being undertaken. This operation proved successful, with the result that the fluid absorbed from the joints, but owing to the disorganization which had taken place, his general condition is certainly no better, probably worse. He has more pain in the ankles, due to pressure as a result of the absorption of the fluid, and is not able to get about as freely as before. He has now been recommended to try artificial supports, but I am afraid the outlook is not very hopeful for him.

CASE IV.

I will quote one more case of rather a different type. A. K. was admitted to the Hospital of St. John and Elizabeth with pain and swelling in the hands and feet. She was a bright girl of 19, who gave a history of the gradual onset of pain in the fingers and feet two years previously, commencing with stiffness and tingling, worse in the morning. She had gradually developed swellings of the metacarpophalangeal joints, first interphalangeal articulations and of the wrists. She had double flatfoot, distension of the ankle-joints, hallux valgus and tenderness under the balls of the toes. Sweating was marked; there was no appreciable atrophy of the muscles. All the other systems were normal, except that she was passing large quantities of cocci in the urine. These on culture proved to be *Staphylococcus aureus*. Attempt was made by the administration of urotropine and other antiseptics, and by washing out the bladder, to get rid of these organisms, but with no success. Bier's treatment to the legs and arms was also tried, but was equally futile. Vaccines were also injected, prepared from the culture obtained from the urine, but beyond producing some temporary relief of pain, did not influence the disease. At the end of a year she was in much the same condition as when first seen except that albumen had appeared in the urine, with epithelial and some fatty casts. She also had occasionally oedema of the ankles. None of the above measures had any effect, and she is passing into a condition of parenchymatous nephritis.

I have seen this happen in another case, and it is interesting as a possible cause of kidney change. These four cases illustrate some of the conditions which may be associated with this sort of joint affection.

If the source of infection in these cases of rheumatoid arthritis can be detected and removed, the condition of the joints does not progress, and providing this is done before deformity has taken place, with local and general treatment, they improve to a considerable extent. Indeed, the joints may so far recover as not to leave any sign of the pre-existing condition. It is a question how much treatment has to do with this improvement. I recently saw the case of a man, 38 years of age, who had had, two years prior to 1908, most of the joints of his hands and fingers swollen and distended for a period of eighteen months. Under no special treatment, either local or general, directed against this condition, they had so far recovered as not to arouse any suspicion of the preceding state. The relief coincided with the removal of bad teeth, and wearing a false set. On the other hand, when disorganization has occurred, removal of the original cause resulting in absorption of the fluid from the affected joints, may leave the patient in a worse condition than before. The roughened ends of the bones press one upon the other, and in such joints as those of the ankle and the

smaller joints of the feet, which have to withstand considerable pressure, the pain may be worse than before, and even produce actual crippling. This was the case in the patient mentioned previously, whose antrum had been discharging for many years. In this patient the disease had advanced to such an extent that the ulna was entirely dislocated from the carpus, and could be moved in any direction away from the radius.

The question next presents itself, Can anything be done to assist in restoring a joint to a better condition where impairment has occurred to only a slight degree? There is, of course, a natural tendency for the joint to revert to its original condition as the fluid absorbs. Care must be taken not to allow any loss of mobility, owing to the repairing process proceeding too far, and for this purpose massage and passive movements are very useful. When the original source of infection has been removed, such treatment as hot sand baths, local hot air baths, and counter-irritants are almost unnecessary. It must, however, be remembered that these patients are frequently wasted and thin and have lost muscular power and subcutaneous fats. Extra diet is therefore advisable and tonics to promote appetite and digestion are also of use. Pains may be relieved by counter-irritation of varying degree, temporary fixation, and anodyne ointments. In connexion with diet and tonics in this disease, the work of M. Joulie, a Frenchman, deserves mention and, I think, considerable praise. This work seems to have escaped notice owing, perhaps, to the fact that M. Joulie is not a medical man, but his principles have been acted on by Dr. Nicolaidi of Paris. My attention was directed to this work through an article by Dr. Watkin, which was published in the *Lancet* of June 20th, 1908, which gives a good account of M. Joulie's work. The principle of the treatment consists in rectifying the condition of the urine in two points—first, the acidity, and, secondly, the quantity of phosphates which are excreted—and is based on the fact that the acidity of the urine is normally due to acid sodium phosphate. Both of these quantities are estimated relatively to the specific gravity of the urine. This appears to be a fair method, because the specific gravity of the urine is dependent on the quantity of solids, and there should be in freshly-passed urine a definite relationship between the acidity, the phosphates (when the acidity is dependent upon acid sodium phosphate), and the total solids.

It should be noticed that by this method it is claimed that the acidity is estimated in relation to the phosphoric acid, which is capable of holding lime in suspension. The French workers take this a step further and claim that the acidity and phosphate excretion in the urine depends on a similar condition in the plasma, and say that urine which is too acid indicates a plasma which is also too acid, and vice versa. Similarly, when the urine contains a quantity of phosphates above the normal, the deduction is that phosphates are circulating in the plasma in excess of the normal. There may be thus several abnormal conditions, three of which will be mentioned here, as bearing on arthritis. The first stage is an increased excretion of both alkaline and earthy phosphates, with no symptoms. When all the phosphates which can be spared have been eliminated, the quantity excreted diminishes, the cells of the body retaining all that is possible, and the deficit is further accentuated by faulty digestion. Then follow the next two stages in which symptoms of pain, etc., are present (a) Both acidity and phosphate output are less than normal, but the acidity is proportionately too high; (b) the acidity is above normal, and the phosphate output is below normal, the acidity again being proportionately high. The acidity is here due to some other acid than the acid sodium phosphate. The alkaline phosphates are more easily excreted than the earthy phosphates. The earthy bases, combined with some other acid, such as oxalic, and insoluble owing to deficient acid phosphate, are carried as sand or gritty particles in the circulation. These settle especially where the circulation is slow—for example, in granulation tissue and inflamed areas—causing pain, etc. This may be an explanation of the deposition of lime in the neighbourhood of these chronically inflamed joints. It may seem strange to suggest that the plasma is acid, but acidity is, after all, a relative term, and is to some extent dependent on the indicator used. For instance, acid sodium carbonate NaHCO_3 is a chemically acid salt, and yet turns red

litmus paper blue, but is neutral to phenolphthalein and wholly alkaline to methyl orange. It is well recognized that carbon dioxide exists in simple solution in the plasma, and it could not do so unless the plasma acted as an acid. In this sense, therefore, the plasma may justly be regarded as an acid of an avidity comparable with that of CO_2 . M. Joulie ascribes these changes to the results of faults of digestion, but it is equally possible that they follow toxic conditions.

There has only been time to give the briefest outline of this work, and many points have been left untouched. This is, of course, only a theory, and is probably too simple to be true, but it forms a working hypothesis. It is certainly possible to modify both the acidity of the urine and the amount of phosphate it contains by the administration of different preparations of phosphoric acid or phosphates. It is also true that the urine in these patients does contain too low a quantity of phosphate and is proportionately high in acidity. After making a large number of observations, I do not feel justified in accepting the French standard of the normal, but the deviations from the normal encountered after a prolonged illness and in cases of arthritis are very great, and certainly fall outside the limits which I find to be compatible with a normal standard. By the administration of phosphoric acid or of different forms of phosphates, as indicated by the estimation, bringing the proportion of these substances—acidity and phosphates in the urine—up to a normal, there is undoubtedly improvement in the general and local condition. I therefore advocate the employment of the various forms of phosphoric acid and phosphates in conditions of chronic arthritis, as relieving pain and producing improvement in the local conditions of the joints and in the general physical condition.

In conclusion I should like to mention one case, which, although not arthritis, indicates the value of this method of treatment.

A girl, aged 23, came to King's College Hospital complaining of a swollen thumb and of the presence of certain yellowish particles which kept appearing, coming to the surface, and then discharging a putty-like material. She gave the history that some two and a half years previously she had run a splinter into this thumb while polishing a table, that the thumb had suppurated, been opened, and then healed, and that subsequently these yellow points had appeared. The thumb was bulbous, and there were five or six yellow spots under the cuticle about the size of the head of a bonnet pin. These on being examined proved to consist of calcium carbonate; there was, in addition, some contracture of the palmar fascia, and marked limitation of pronation in both arms, stiffness and pain in the forearms also being complained of. It was in connexion with this case that I first looked up the French work. An estimation of the urine showed that the acidity was not normal, and this was therefore corrected. This treatment resulted in the prevention of the deposit of further spots, and in the disappearance of the fascial contractions, so that the fingers can now be extended and the arms fully pronated.

It is inviting to suggest that the fascial pains and contractures which were present in this case were due to a deposit of lime in the fascia, and to go further and suggest, following M. Joulie, that the common fascial pains which most of us experience owe their origin to a similar cause.

THE Jeyes' Sanitary Compounds Company has received the warrant of appointment for disinfectants to Queen Alexandra. They also hold the royal warrant to King George.

UNDER the will of the late Lord Swaythling, head of the banking firm of Samuel Montagu and Co., the London Hospital, the Metropolitan Free Hospital, and the Jews' Hospital and Orphan Home, each receive a sum of £500.

THE total number of medical students in the Universities of Germany during the current winter semester is 11,156, being an increase of 31 as compared with the corresponding period of the academic year 1909-1910. Of the number 496 are women. The students are distributed as follows: Berlin, 1,864, of whom 159 are women; Bonn, 452 (including 30 women); Breslau, 438 (19 women); Erlangen, 291 (15 women); Freiburg, 732 (50 women); Giessen, 209 (17 women); Goettingen, 248 (10 women); Greifswald, 212 (2 women); Halle, 308 (7 women); Heidelberg, 509 (52 women); Jena, 305 (11 women); Kiel, 412 (13 women); Koenigsberg, 399 (13 women); Leipzig, 758; Marburg, 328 (6 women); Munich, 2,119 (59 women); Muenster, 162 (4 women); Rostock, 240 (2 women); Strassburg, 318 (7 women); Tuebingen, 333 (12 women); Wuerzburg, 530 (8 women).