INDUCED HYPERAEMIA AS A MEANS OF TREATMENT,

WITH SPECIAL REFERENCE TO TUBERCULOUS
JOINT DISEASE AND STIFFENED JOINTS.*

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THERE was a time when the use of poultices, fomentations, and various hot applications was the only means commonly employed by which the treatment of inflammation, by causing a determination of blood to the part, was carried out. In contradistinction to this, a method also in common use was the attempt to arrest inflammation by the application of cold in the shape of the icebag, Leiter's tubes, and other plans. Both of these methods are obviously crude and haphazard. It is therefore only fitting to these days of scientific precision that some more manageable means of producing the desired effects in matters of this kind should have been devised. As a result the treatment by induced hyperaemia commonly associated with the name of Professor Bier has been formulated, and it is this method which I am deputed to submit for your discussion this evening. In case there may be present some who are not already familiar with the treatment, I may be, perhaps, allowed to occupy a few minutes in briefly describing what it is.

Professor Bier holds that local inflammation is not in itself a disease, but a protective process designed to fight bacterial invasion; it therefore follows, if this contention is accepted as correct, that the arrest of inflammation is wrong in principle, as if the fight is successful it merely aids the cause of the invading bacteria, since it removes the main obstacle to their progress. Hence it is clear that the use of the icebag and other means of applying cold in the early stages of inflammation must be wrong. The proper course, on the contrary, being to encourage the "redness, swelling, and heat," with a view to increasing the kindly hyperaemia which is necessary in the struggle between the body tissues and the invading bacteria. The spontaneous disappearance of an inflammation should be held to mean the defeat of the bacterial host by the increased healthy blood current surging through the parts at the onset of the change.

This helpful hyperaemia can be advantageously fostered by increasing the amount of blood in the part; but it is essential that this should be circulating blood, blood stoppage (stasis) being incompatible with the object in view.

MEANS OF INDUCING HYPERAEMIA.

The hyperaemia producible is of two kinds: (1) Obstructive—that is, passive or venous hyperaemia; and (2) arterial or active. The former is produced by the use of the elastic bandage, in the case of the head, testicles, and extremities, and by specially devised cupping glasses, or some other kind of vacuum creating mechanism for the trunk, and any other part in which the bandage is not applicable. The latter is brought about by the local application of heat, preferably in the form of the hot-air or radiant-heat bath. This, of course, being a similar form of hyperaemia to that produced by the usual hot applications—poultices, fomentations, and the like.

DETAILS OF THE METHOD.

The object of the obstructive method is to charge the affected part with blood by retarding the efferent flow without producing stasis; in other words, the venous circulation must be obstructed to the necessary degree whilst the arteries are left free to pump in their blood stream. Hence, for example, when the elastic bandage is used the pressure must not be enough to affect the pulse on its distal side.

The degree of pressure exercised is a matter of much moment. Using Bier's own words, "The degree of obstructive hyperaemia is a correct one if the patient is not in the least distressed by the pressure of the bandage."

*Introductory remarks made in opening a discussion upon the hyperaemic treatment at a meeting of the Westminster Division of the Metropolitan Counties Branch (see SUPPLEMENT of November 14th, p. 260).

If too tightly applied pain will be felt. The whole essence of successful application is the production of hyperaemia without pain. If pain is felt immediately or remotely, the constricting medium is too tight.

When properly applied, the parts beyond the bandage become congested and bluish, or bluish-red, in colour, and to the touch they are warm, not cold. Cyanosis with absence of pulse is a sign of danger, and should lead to immediate removal of the bandage.

If the obstruction be continued sufficiently long oedema will naturally ensue, but this is of no consequence if it subsides completely after the removal of the bandage. Persistent oedema is to be avoided, since it favours bacterial invasion; intermittent oedema is free from this danger, provided that the parts in the intervals return to the normal condition. Indeed, oedematous swelling, so long as it is painless and the pulse is not affected, is a favourable factor; but when the obstruction is repeated at intervals, sufficient time should be allowed between the applications to permit of complete subsidence of the oedema. It is a singular fact, and one of considerable importance, as I shall presently show, that it is not easy to produce an obstructive hyperaemia with much increase of heat in a normal limb or in the parts about a tuberculous joint; areas, however, involved in acute or sub-acute inflammation soon show marked increase of local temperature.

The existence of abscess is no bar to the treatment by the obstructive bandage, indeed it is the reverse, but the abscess should be opened in the ordinary way and the bandage subsequently applied. "The knife deals with the pus, the hyperaemia treatment fights the bacterial invasion." So says Professor Bier.

Suction hyperaemia, that is, hyperaemia produced by the use of cupping or exhaustion glasses, is also, ultimately, an obstructive hyperaemia. These means are suitable to parts which cannot be included in the obstructive bandage—for example, the trunk. Here, as in the hyperaemia produced by the bandage, the included area should be red or bluish—never white—since anaemia of the parts means starvation and decreased resistance, instead of over-feeding, such as is required in the fight with the bacterial force. Here, again, also the pressure must not be enough to produce discomfort—the essence of the method is freedom from pain.

In abscesses or sinuses the suction glasses are remarkable for serving a double purpose, the sucking out of the pus and the production of hyperaemia for dealing with the bacterial invasion. Moreover, they may obviate the use of drainage tubes. Their application is made for short periods periodically, all the usual means for obtaining antiseptics or aseptics being used.

HOT AIR HYPERAEMIA: ARTERIAL HYPERAEMIA.

This is, of course, a different type of hyperaemia to that produced by obstruction, as it is the result of an active determination of blood to the part, as opposed to passive or obstructive engorgement.

It is singularly well adapted for the treatment of chronic thickenings, infiltrations, and adhesions when not too old, since the absorption process is much aided by the flushing of the parts with healthy blood which occurs in the process. In certain neuralgic and other pains it is of remarkable although uncertain benefit. Here, as in the cases of the obstructive bandage and the suction method, no pain or discomfort should be caused by the heat, and in this connexion it is most important to bear in mind that with increasing heat the part becomes less and less sensitive; at a heat of 250° or 300° the sensation in a limb is almost nil, hence burns may occur without the patient's knowledge, a fact which does not seem to be too familiar even to those who are in the habit of applying this method of treatment.

It may be well to say here that, as is the case with other methods which become prominent from time to time, there is little that is new either in the conception of or in the means employed for applying this treatment. For example, Ambroise Paré used the obstructive method in fractures by using an elastic band, and about the same time an appliance for the application of hot air was also devised.

It is obvious that it is impossible for me to deal in the short time at my disposal, even in the briefest manner

with a tithe of the conditions which are amenable to a treatment of this kind. I therefore propose to confine my remarks mainly to the results of the treatment in two of the conditions with which I am most familiar, namely, (1) tuberculous disease, and (2) stiffness, of joints.

HYPERAEMIC TREATMENT IN TUBERCULOUS JOINT DISEASE.

I have long since arrived at the conclusion, which I have embodied in my practice, that the immediate immobilization of all joints suspected of being the seat of tuberculosis, often without any stronger reason than that afforded by chronicity, is practically inefficient and in theory unscientific.

Unless absolutely necessary, it is manifest that such a line of treatment should be avoided, since it leads to wasting of the limb generally, including the bone structure—a fact not too generally recognized—as well as the soft parts; and if the joint concerned is the seat of any inflammatory change, it is a distinct incitement to ankylosis, true or false.

Personally, my experience tells me that complete immobilization in the earliest stages of joint disease is neither necessary nor, as a routine treatment, wise, in joints which are suitable for other treatment, such as the knee, ankle, elbow and wrist, and I have little doubt that the later complications, which from time to time occur after long fixation in splints, arise mainly from the necessity of adopting the measures which are required to rectify stiffness and wasting, the results of the treatment which has been pursued. I have therefore come to the belief that the rational treatment for the early stages of suspected tuberculous disease in joints of this kind, unless there is reason to suppose that the disease originates in or has involved the bones, is that adopted by most of us, I suppose, in subacute arthritis following injury—namely, massage and bandage pressure, voluntary movements being encouraged so long as no weight is borne upon the limb. In cases of this type the induced hyperaemic treatment has, I think, a double value—therapeutic and diagnostic. Of the comparative rapidity with which obstinate chronic or subacute joint conditions will often recover under the influence of this treatment there is no doubt whatever. I have, for an example, myself seen chronic joint effusion in young people with apparent thickening of the synovial apparatus, extending over very long periods, melt away in a few weeks after the methodical application of the obstructive bandage for periods varying from half an hour to two or three hours once or twice daily, and I have seen in the knee-joint some of the most painful examples of osteo-arthritis with effusion, which have resisted all other treatments, greatly relieved in a comparatively short time by this means.

At the same time, I have seen apparently favourable cases in which the hyperaemic treatment has entirely failed, and in some of these the symptoms which subsequently developed proved conclusively that the disease was tuberculous. This brings me to the point which I am anxious to emphasize. It is notorious that in spite of all laboratory tests the diagnosis of early tuberculous disease of joints is most difficult. It is, in fact, practically impossible to differentiate at a certain stage of the disease between early tuberculosis and ordinary chronic inflammation. Now my experience of the hyperaemic treatment of cases of this type is that whilst it acts often with singular efficacy in chronic joint inflammation, it is less efficacious in cases in which the condition is tuberculous—a fact, if it is a fact, which is in no sense antagonistic to the theory of Bier. It is in this connexion that the diagnostic value of the treatment, in my experience, arises, for it is my belief that in young subjects of the type likely to be suspected of being tuberculous the failure of Bier's method, when properly applied, is a strong diagnostic evidence of the lesion being of that nature. In other words, I very much doubt the curative action of the hyperaemic treatment in tuberculous disease unless it has progressed to the stage of softening with open abscess or sinus, in which the beneficial effect of the treatment is the result of its help in evacuating pus and in dealing with the invasion of various bacteria other than the tubercle bacillus.

It is not, however, as a mere evacuant that the treatment is helpful in cases of this kind, since, so far as I have seen, it actually promotes suppuration, at all events the amount of purulent secretion rapidly increases under its influence, especially in sluggish and inert cases, when the discharges from the sinuses contain very little pus. This is in itself a material advantage, as it is my experience, and I suppose it is the experience of others, that in local manifestations of tuberculosis about the trunk and extremities, particularly when the part involved is a joint, the tendency to cure locally is greater, and the danger of general dissemination less, when suppuration is free, than when the discharges are mainly serous in character—such, in fact, as would come from granulation tissue like that met with in chronic tuberculous disease.

THE HYPERAEMIC TREATMENT OF STIFFENED JOINTS.

It is in connexion with the treatment of stiffened joints that this method has in my experience proved of the greatest use both as a preventive as well as a curative measure. I am strongly inclined to the view, without being certain about the matter until it has been confirmed by further experience, that the tendency to stiffness and to the formation of adhesions in joint affections is less when obstructive hyperaemic treatment is used as an aid to massage or any other treatment which seems desirable, but it certainly will not take the place altogether of the various other means of treatment in vogue at the present time; it must, in fact, be regarded as an adjunct, and an excessively useful adjunct, to other treatment.

It will, however, I am sure, be found that, in acute conditions like gonococcal arthritis, acute rheumatic arthritis, and the like, when the hyperaemic treatment can be borne, as it usually can be, in the arterial, if not in the obstructive form, that the amount of massage and passive movement subsequently required to restore the normal joint functions is considerably less than when the ordinary methods have been alone pursued.

As an aid in the treatment of joints already stiffened by continued immobilization, or by adhesions in and around the articulation, provided that these have not become too solidly organized, induced hyperaemia is of undoubted value—a fact in which there is nothing new, as I suppose it is the custom of most of us to prepare a stiffened joint for massage by the use of a very hot compress, with a view to what is commonly called “softening the parts,” that is to say, to induce a flow of blood to them. This end is more perfectly attained by the hyperaemic method of Bier than by any other means, but care is necessary in selecting the form of application, obstructive or arterial, which is to be used. Speaking generally, if the part is painful, as, for example, in certain cases of stiffening after acute “rheumatic” arthritis, arterial hyperaemia is more comfortable and efficacious than the obstructive form, especially if there is much thickening of the soft parts about the joint. Similar conditions are suitable for obstructive treatment by the somewhat elaborate exhaustion apparatus invented by Bier for the purpose.

Hyperaemia induced by bandage pressure is by far the most simple and convenient method, and answers well in cases of stiffening of joints without pain, especially if the surrounding induration or oedema is not great. Capital examples of the good results thus obtainable are afforded by cases of stiffness of the fingers (phalangeal joints) so frequently met with after injuries, generally called sprains, but often in reality fractures.

The comparative ease with which in such cases a finger can be manipulated and bent after its base has been encircled by an elastic band for a period varying from fifteen minutes to an hour or more, by which hyperaemia is produced, with the precautions which I have indicated, is often remarkable, although in common fairness it must be admitted that there is no certainty in this result, as in some cases the effect produced seems to be virtually nothing.

The most striking results of this method of hyperaemic induction have been in my experience obtained in stiffness of the knee-joint, a part which is in many ways particularly well adapted for the treatment, in consequence of the ease with which it can be applied and regulated. One of the most inveterate cases of recurrent stiffness of the knee after successive “breakings down” of the joint which

I have seen really showed no hopeful sign of cure until the obstructive hyperaemic method by bandage pressure was adopted, when the tendency to recurrence steadily decreased, and recovery resulted. This case was also remarkable in showing the long period during which obstructive hyperaemia could be tolerated with absolute comfort, five or six hours being a common period, at the end of which general oedema below the bandage was well marked. The application was managed by the patient with much interest.

Of the use of this treatment in suppuration of the knee-joint after an infective wound following upon injury, I have had only one experience, and comparing the case with the others of a similar kind with which I have had to deal, I think I am justified in saying that the course of the case was shorter, its treatment less troublesome, and the result—complete recovery—at least as satisfactory as any of the others.

My acquaintance with the use of localized obstructive hyperaemia produced by modified cupping glasses and similar contrivances is insufficient to justify any useful deductions from it, but judging from the results in the very small number of cases in which suppurating tracts have been thus treated, it is, I think, pretty certain that in this direction, at all events, it has a considerable sphere of usefulness.

I have confined my remarks to these comparatively simple aspects of the treatment because I can speak of them from personal knowledge. Had time permitted I should have liked to say something concerning the relation of the induction of hyperaemia to autoinoculation, an interesting, and possibly a highly important, factor in this method of treatment, which may explain the fact that has been noticed by others, and which occurred in a case of mine, namely, that the treatment of one implicated area by hyperaemia may be followed by improvement in others coexisting, although they may not have been included in the treatment.

CONCLUSIONS.

Reviewing the subject in the light of my own trial of this treatment, I am led to the following conclusions:

1. In Bier's method we have a means of inducing hyperaemia which is more scientific and generally more efficacious than any other plan.

2. If the necessary care and discretion be exercised in its application, the method may be safely, and as a rule with advantage, employed in all cases in which a local engorgement or determination of blood is deemed desirable, provided always that the patient is not the subject of arterio-sclerosis or brittle blood vessels.

3. Whilst there is no reasonable doubt that the hyperaemic treatment is beneficial in certain cases for which it is suitable, it should, in the present state of our knowledge of it, be regarded as an adjunct to, and not a substitute for, the treatment hitherto adopted in the class of case for which it is used.

THE medical inspection of school children (says the *Australasian Medical Gazette*) has come to be recognized now as a most important factor in the prevention of the spread of infectious diseases, and of securing the fullest possible amount of benefit for the children from their attendance at school; but it must take some years before the full return of those benefits can be recognized in the community. The report of the Minister for Public Instruction in New South Wales shows that up to the end of last year there were about 1,500 cases in metropolitan schools where medical treatment had been advised by the medical inspector. Of these cases, by far the majority consisted of defective eyesight and nasal obstruction. In addition to such cases, many more pupils were found defective, but, as they were already under the care of medical men or wore suitable glasses, the parents were not notified. At the end of the year about 20 per cent. of the children who received notices from the doctor had acted upon them. According to our contemporary, however, there is good reason to think that many more have since done so. It has been suggested that the cost of medical attendance operates in many cases as a deterrent, but the *Gazette* thinks it more likely to be carelessness and ignorance on the part of the parents, which prevent them from acting on the advice of the school medical inspector.

An Address

ON THE

EARLY DIAGNOSIS OF ORGANIC DISEASE OF THE NERVOUS SYSTEM.

READ BEFORE THE DENBIGH AND FLINT DIVISION OF THE NORTH WALES BRANCH,

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THE recognition of organic disease of the nervous system in its early stages, or when from any reason its indications are slight or equivocal, is one of the most difficult and anxious problems that the physician is called upon to face. In a busy, restless population like that of Lancashire and certain parts of Wales, functional nervous disorders abound, and disorders seated in other systems are apt to take on a nervous aspect, so that the problem of interpreting the significance of nervous symptoms, and of distinguishing between slight but permanent and probably progressive disease on the one hand, and mere functional transitory disturbance on the other, is constantly before us, and is likely to become more pressing as time goes on. Further, as neurologists evolve newer and more delicate indications of organic disease there is the danger that the physician in his anxiety to overlook nothing that is amiss may give too much weight to trifling indications which are not incompatible with a healthy organic state of the nervous system, and may be led to forecast for his patient a life of helplessness or an early death, on inadequate grounds. The principal signs on which we have to rely in making the diagnosis of organic disease of the nervous system in its early stage are not very numerous, and I think that some notice of their value as they have presented themselves to me during my practice as a general physician during more than twenty years may be of some interest and use.

THE KNEE-JERK.

I suppose that in the examination of a patient, no matter how hasty, we all investigate the state of the nervous system so far as to test the knee-jerk, and we may thus gain important information. Entire absence of the knee-jerk is, I believe, always indicative of organic disease. It never happens in hysteria. In a patient who is able to walk about it generally means *tabes dorsalis* or neuritis. If the latter, it is most likely diabetic in origin. The real problem in my experience is to make sure of the absence of the knee-jerk, not in the interpretation of it. Many a time have I been assured that there was no knee-jerk, but by employing the method of reinforcement and other precautions it has been clearly elicited. Mere feebleness of response which is equal and constant is not pathological.

ANKLE CLONUS AND EXAGGERATED KNEE-JERK.

Briskness of the knee-jerks is apt to be looked on as an indication of organic disease, but as an isolated phenomenon it is rarely of serious moment. We have no available standard for the activity of the knee-jerk. Ankle clonus, if sustained, always means organic disease, and may be the only positive indication of it.

Last autumn a widow lady 62 years of age consulted me for severe headache, confusion of thought, and lapses of memory. She had lately returned from a holiday with her daughter in Switzerland, where she had tired herself by trying to see and do too much, and had come home thoroughly knocked up. All her complaints might very well have been due to neurasthenia, but the existence rather to my surprise, of a brisk right ankle clonus indicated some organic disease of the left cerebral hemisphere. I put her on mercury and iodide of potassium, and in a week her headache was quite gone, and in another week she expressed herself as feeling better than she had felt for years. I saw her again lately. The clonus persists, and there are signs of some mental deterioration. I have no doubt that she had a local