I have seen so many varieties and also so many cases in which no rash appeared that I do not consider the presence or absence of a rash any aid to diagnosis.

Tenderness or even pain over the gall bladder is a common symptom. There is often an initial enlargement of the spleen but seldom of the liver.

By the end of the first week the headache is relieved and there is marked improvement in the general condition of the patient; this is in marked contrast to the case of true typhoid. Although the fever continues a few days the patient feels quite well, and is anxious for an increase of diet or even to be allowed to get up.

Complications and Sequelae.

A relapse is fairly common, and usually begins within seven to ten days after the cessation of the initial attack, but seldom runs the full course, lasting five to seven days. Haemorrhage is rare, but blood-tinged mucus is sometimes passed. Perforation is extremely rare, but has been recorded. Phlebitis and cholecystitis appear to be the most common complications, the former occurring more often than in typhoid.

The mortality is very low, and is generally placed at 1 per cent., but even this figure is, I think, too high.

Convalescence is slow; considering the comparatively short duration of the fever there is marked debility and anaemia.

Treatment.

The case should be isolated and treated on general lines, as a case of typhoid.

Beyond relieving the headache and constipation little can be done except careful nursing. For the relief of the headache small doses of aspirin are useful, and for the first night or two hypnotics may be used. An initial dose of castor oil should be administered if the case is seen early; if not enemata should be given. The pain over the gall bladder is seldom excessive, and can generally be relieved by hot fomentations.

The diet should consist entirely of milk or milk- whey during the fever and be very gradually increased. Too early feeding is, in my opinion, the cause of most cases of relapse.

Diagnosis.

Little reliance can be placed on Widal's reaction as an aid to diagnosis, as the agglutinins are very feeble—seldom higher than in a dilution of 1 to 40 during the disease, and are frequently entirely absent.² They appear to be highest at about the twenty-second day of the disease, by which time the patient is convalescent. The most rapid and satisfactory method of arriving at a diagnosis is by blood culture, but it is essential that the blood should be drawn within the first five or six days of the disease. I have recovered the bacillus from the blood as late as the ninth day, but this is uncommon. A bottle containing 20 c.cm. of sterile ox bile should be inoculated with 5 c.cm. of blood from the vein. This is best done with an all-glass syringe which has been sterilized by dry heat or hot oil at a temperature of 140°C. The syringe should not be sterilized with antiseptics. The further stages in the isolation of the organism must be carried out by an experienced bacteriologist. Failing isolation from the blood, the urine and faeces should be daily examined. The disease varies considerably in intensity from the ambulatory type, which is fairly common, to the typhoid type. The fever in this type lasts three or four weeks, but even in this severe type the "typhoid state" is seldom, if ever, seen.

An intermittent type of temperature sometimes occurs.

REFERENCES.

¹Grattan and Wood, *Journal of the Royal Army Medical Corps*, August, 1911; Bainbridge, *Lancet*, March 16th, 1912. ²Grattan and Harvey, *Journal of the Royal Army Medical Corps*, January, 1911.

THE Pan-American Medical Congress, at its seventh meeting, held in San Francisco in June, passed a resolution requesting the president to organize a Pan-American Committee on Medical Education to include one representative from each American country. The committee is to investigate the status of medical education and medical practice in the different countries; and to consider the feasibility of a system of exchange professorships between American universities. Its report is to be communicated to the national medical organizations of the countries represented, and a final report is to be submitted to the eighth Pan-American Medical Congress.

THE TREATMENT OF AMOEBIC DYSENTERY.

BY

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RECENTLY many cases of dysentery have been coming home to England from Gallipoli and other places abroad, and as a result people who have little or no experience of this symptom-complex of disease are called upon suddenly to treat them. Naturally the results in many instances are not very satisfactory, and, in the hopes that some information on the subject may help any practitioners so situated in the future, I propose to give a brief account of the up-to-date treatment of one of the commonest forms of this disease. Since Rogers proposed the use of emetine for amoebic dysentery I have treated many cases, both in private and in the Seamen's Hospital, by this drug, and the method of administration now given is therefore based on actual experience and is one that will be found useful and efficacious in actual practice. Other ways of giving the drug I have no doubt may prove equally successful—at any rate, in the hands of experts—but there are certain points that must be carefully followed if success is to be obtained.

Space will not permit of a dissertation on all the varieties of dysentery met with. It is sufficient to say here that there are bacillary forms of the disease, protozoal forms, and helminthic. Of these the one termed amoebic comes under the protozoal group, and is caused by a parasite termed the *Entamoeba histolytica*. The cases of dysentery that have recently reached England from the Dardanelles have, at least in the vast majority of cases, been bacillary or of some undetermined type, and certainly have not been amoebic.

The administration of emetine to such is useless, as this drug is only specific for the form of dysentery caused by the *Entamoeba histolytica* just mentioned, and by its improper use in cases not due to such parasites negative results are obtained, and the drug is brought into disrepute. The first thing to do in dealing with a case of dysentery is to determine its type, and for this purpose the faeces must be carefully examined for protozoal and other parasites. To detect pathogenic amoebae is not difficult, at least to the expert, but there are pitfalls the unwary may easily fall into, especially if one has not had sufficient practice in examining stools. *Lambia* cysts, *Blastocystis*, vegetable cells, and desquamated cells from the bowel are easily mistaken, and such mistakes are serious, as they may condemn a patient to a long course of emetine for no purpose whatsoever. Still more difficult, at least in the vegetative stages of the parasites, is the distinction between *Entamoeba coli*, a harmless amoeba, and the *E. histolytica*, the harmful one. In the tropics and abroad generally the former is very common, and there is no reason why mixed infections with both should not occur. The distinction between the two lies in the hands of the expert, but the broad rule generally adopted now is, if a patient is passing blood and mucus—that is, has signs of definite dysentery and has amoebae present—the case may be looked upon as an amoebic one and treated accordingly. Later on, when the case becomes chronic or passes into the stage of the true carrier, cysts appear, and these can be differentiated from each other by their size and the number of their nuclei.

Having then diagnosed the case properly—a most important thing—the next thing is to treat it, and this is done by emetine hydrochloride in varying doses and amounts. The drug may be administered in one of three ways: (1) Intravenously; (2) subcutaneously or intramuscularly; or (3) by the mouth.

As regards intravenous injections, I have had no occasion to use them, but there is no reason why they should not be employed in fulminating or in moribund cases where time is precious. The most usual method of administering emetine is subcutaneously or intramuscularly. Subcutaneous injections often give rise to a considerable amount of pain and stiffness, and to avoid this some give them deep into the muscles similarly to quinine. There seems to be an idiosyncrasy in some individuals, a man I lately treated having considerable trouble—pain and stiffness—after his injections, whether

they were given subcutaneously or intramuscularly. These symptoms did not disappear for several days, and in two injections given in the loose cellular tissue of the abdominal wall slight haemorrhages occurred as well as a considerable amount of redness at the site of the injection. This happened, though every care was taken to sterilize the skin, syringe, and needles, and the ampoules came from the usual source. At the same time as this two other patients had similar injections, both subcutaneously and intramuscularly, without the least trouble. The stiffness and pain in the case just mentioned definitely prevented the patient having full use of his arms for several days, and this possibility must be borne in mind in giving injections to people who are up and about. As a rule now I give the injections intramuscularly, avoiding giving a second one near a place where one has been previously given, until all signs have disappeared. Even with large doses no sickness is produced by the injections.

As regards giving the drug by the mouth, the method has the disadvantage that sickness may be produced. Provided the drug is retained, however, it acts quite as efficiently as by injections, and I know of one case where it did better. When administered by this route one gives it in keratin-coated tablets at night when the patient has gone to bed, taking the same precautions as one used to do with the old *ippecacuanha* treatment. I have tried this method fairly extensively and find that one of three things happens: (1) Either the patient has no sickness at all, (2) he may be sick for a night or two and then get quite accustomed to the drug, or (3) it may make him sick every time.

In acute cases in bed injections are best. In chronic cases with slight local lesions that one does not wish to keep in bed, or for some reason finds it inconvenient to inject, then the mouth method may be employed.

Another objection has been raised to the keratin coated tablets, and that is that they may not dissolve and may be passed unchanged per rectum. This has not been my experience, but it is a possibility. If there is any suspicion of it, as evidenced by the case not improving as he should, the stools can be washed and the tabloids searched for.

The salt usually employed, as already stated, is emetine hydrochloride. Recently I tried another preparation for Dr. Balfour, made by Burroughs, Wellcome and Co., named methyl emetine. Though larger doses of this can be employed, it does not seem to be any more efficient than the hydrochloride, but one would need to try it on further cases before deciding finally.

The dose of emetine hydrochloride I now usually employ is 1 grain for each injection, two of these being given a day, morning and night, for the first two or three days if the case is a bad one with much blood, mucus, and pain; or if not, only once a day. After that 1-grain injections are administered every night until a total of 12 grains in all has been given. By this time all blood and mucus should have disappeared from the stool, and amoebae should no longer occur. Not uncommonly about the fifth or sixth day of treatment a moderate degree of looseness of the bowels, or in some instances a definite diarrhoeic condition, is met with. This may be due to the emetine itself, similarly to what one got and aimed at in the old *ippecacuanha* treatment, and it does no harm. After the cessation of the drug the stools become solid, of a normal consistence, and no blood or mucus is seen on their surface. They should be carefully searched for amoebae, and if these return or if mucus and blood appear again a second course of emetine will be required. This does not, as a rule, require to be so prolonged as the first, and may be given again in 1-grain doses every night until 6 grains in all have been taken. Third courses are practically never necessary. In my experience larger doses than those mentioned are not required. If all symptoms of dysentery have not disappeared by the time the 12 grains are taken, then the diagnosis is in all probability at fault, and the condition is due to some other cause than the entamoeba. With such doses toxic symptoms do not occur, but it is quite possible that if the drug is given in larger individual doses and kept up over long periods of time such might appear. As has been pointed out, there is no necessity for this, excessive doses not being required. The action of the drug on the vegetative or living stage of the amoebae is very rapid, the parasites quickly disappearing, as do also the

blood, and mucus, and other symptoms. In addition to the emetine treatment, acute cases of dysentery are, of course, kept strictly in bed and on a strict diet. At first only milk or liquid diet in the shape of whey and weak soups are allowed; then, as the symptoms subside, milk puddings may be substituted, these in turn being followed by a further increase until pounded white fish and chicken are reached. No alcohol is permitted at any time. After treatment, during convalescence, and for at least four to six months afterwards, the patient must be kept on a simple white meat diet with plenty of milk, no beef, coarse vegetables, curries, spices, alcohol, or things of that sort being allowed. In addition to diet, chills and wettings must be very carefully guarded against. Relapses of amoebic dysentery, even after very careful treatment, are frequent, and it is only by taking the greatest precautions and care that these may be avoided.

Often chronic cases of amoebic dysentery present themselves for treatment. The symptoms depend upon the amount of bowel involved and the character of the lesions present. Blood and mucus to a certain extent are generally present in the stools, or all that may be found is some looseness of the bowels, with two or three actions a day, or slight diarrhoea. In this latter type of case the only reason for suspecting dysentery is the presence of the specific parasite, often now in the cystic or resting stage. These cases act as true carriers and are dangerous to other people, the cysts being the infective agent that passes the disease on from one person to another. Such cases may require to be isolated. It has been stated that emetine has no effect upon the cysts and does not cause them to disappear. In a case Dr. Wenyon and I recently studied carefully this was not so. Injections of emetine in 1-grain doses daily quickly caused them to vanish, and they have not reappeared again up to date (some months later). The treatment of these chronic cases and carriers is the same as for the acute ones. It may not be necessary to confine them so strictly to bed or even to keep them in bed at all, but they should be put through a similar course of emetine and be dieted in exactly the same way. In addition to amoebic manifestations of the bowel, the liver may be involved and an abscess may threaten to form. Here, again, emetine works in a most miraculous manner, and if applied in the doses mentioned above may completely abort all the symptoms. Since its introduction the chances of averting suppuration have increased enormously, and fewer cases of abscess of the liver now come to the operating table.

Though practically all cases of amoebic dysentery respond quickly to emetine treatment, there is a small residuum—in which there has been no doubt of the correctness of the diagnosis—which does not, symptoms continuing and amoebae, vegetative or cystic, being still found in the stools. Such cases require further careful study to explain this anomaly.

In all the stages of the treatment of the disease it is of fundamental importance that the stools should be carefully looked at every day. There is no other way really of being certain how the drug is acting unless this is done. Where obtainable, flat glass stool dishes will be found very useful. One can examine the faeces then without removing the glass top and so avoid the horrible smell so many of these stools have. In addition to these macroscopic examinations, careful microscopic ones must also be carried out at least every second or third day.

In many instances physicians send samples of such stools to experts for diagnosis. In such a case it is not necessary to send the whole stool, all that is required being a small portion in a small glass bottle. Only practice in the microscopic examination of stools will make perfect. Students who have passed through the tropical schools are now supposed to possess this proficiency, but one must impress upon the home doctor, who has not had similar chances, that the subject is by no means an easy one and that there are many sources of fallacy.

Finally a word of warning as to the significance of flagellates in the faeces. Though this has nothing to do with amoebic dysentery or its treatment, yet in the search for entamoebae in the faeces they are sure to be met with, and as a matter of fact the cystic stages of some of these are often mistaken for amoebae. Three of the commonest intestinal flagellates are *Lambia intestinalis*, inhabiting the small intestine in its upper parts, *Trichomonas*

intestinalis and *Tetramitus mesnili*, inhabiting the large bowel. These, of course, have been known to tropical workers, and not only known but studied for years. Some have suggested that they cause diarrhoea, but on the whole the consensus of opinion is that they are harmless. They certainly are to many individuals, who may harbour them (*Lambia* at least) for long periods of time with no symptoms, but that, of course, does not preclude the possibility of them becoming pathogenic under certain unknown conditions. It is very improbable that they ever produce dysenteric symptoms; in fact, one may say they never do. The fact of them being found in dysenteric stools, as they have been recently, in many instances in cases coming to London from Gallipoli, simply means the patients have had a double infection, the dysentery being due to Shiga's or Flexner's bacillus, paratyphoid bacilli, or other bacterial causes.

It may even be that the flagellates flourish better in a bowel already damaged, but careful examinations of apparently healthy individuals in the tropics would tend to negative this, as sometimes the heaviest infections seem to occur in people with no bowel symptoms whatsoever. If they are harmless there is no special necessity to destroy them by treatment. In a case of *Lambia* infection Dr. Wenyon and I recently studied—the case that had *Entamoeba histolytica* cysts—we tried emetine and other drugs. Emetine had no effect whatsoever, while beta naphthol though causing a diminution of the parasites did not completely destroy them, and after the drug was stopped they became as numerous as ever again. As already emphasized, emetine has no effect on bacillary dysentery. The treatment of this disease is quite a different one, being chiefly carried out by diet, salines and serums, and the diagnosis of this type is purely a bacteriological one, similar to that of typhoid and paratyphoid fever.

ON A CASE OF SEPTICAEMIA TREATED BY INTRAVENOUS INJECTION OF EUSOL.

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Preliminary Note.

In the paper on the antiseptic action of hypochlorous acid which was published in this JOURNAL on July 24th, 1915, by Lorrain Smith, Murray Drennan, Rettie, and Campbell, it was shown that 5 c.cm. of eusol can be injected intravenously into rabbits without harmful effect. In the paper referred to the name "eusol" had been given to an aqueous solution of free hypochlorous acid of 0.5 per cent. strength, prepared by shaking up 25 grams of a mixture of equal parts of chloride of lime and boric acid in 1 litre of water and subsequently filtering. For intravenous injection 8.5 grams of common salt per litre are added. Since July we have made further observations, and find that 25 c.cm. can be injected intravenously in the rabbit without harm, and in one case as much as 45 c.cm. were given—that is, an amount equal to a quarter or half of the total blood volume.

The possibility of applying this method to generalized septic conditions was offered by a case of puerperal septicaemia which was sent into the Royal Maternity and Simpson Memorial Hospital, Edinburgh. The following is a summary of the clinical account of the case:

Mrs. M., aged 27, 4para, delivered without assistance of a female child on October 5th. When the maternity nurse arrived she found the patient sitting by the fire with the baby in her lap. Placenta had not come away but was expelled naturally shortly afterwards. The progress was normal till the fourth day when, though the patient had not complained, she was found to have a rise of temperature. The pyrexia continued, and on the sixth day had reached 103° F. with a pulse-rate of 126. The breathing was rapid and shallow, with a short suppressed cough and some pain on the right side of the chest. On examination there was a suspicion of bronchial breathing

over a small area in the right base. The patient was removed to the hospital, where a diagnosis of puerperal septicaemia was made, the lung condition being looked on as secondary and slight in extent. On the day following admission the temperature was normal for a few hours, but this was followed by a steady rise till three days later it reached 103.4° F., pulse 145, respirations 38. The patient's condition was looked on as excessively grave and the prognosis hopeless. At Sir Halliday Croom's request we undertook treatment with eusol.

In view of the animal experiments we decided to begin with a dose of 100 c.cm. Dr. R. W. Johnston exposed the median cephalic vein, and we injected with a transfusion apparatus 100 c.cm. of eusol made up in normal saline, and warmed to 37° C.; the injections took five minutes. The temperature was rising at the time of the operation, and continued to rise for an hour thereafter, when it reached 106° F. It then fell continuously for twelve hours till it reached 96° F. Stimulants were administered, and the temperature slowly rose again. When it reached 101°, about twenty-four hours after the first injection, another dose of 100 c.cm. of eusol was injected. The temperature ceased to rise, and continued for four days between 99° and 101°, and then fell to normal, where it remained for five days.

The patient then developed pelvic cellulitis, and the temperature rose again to 102°, and continued to show an evening rise to this point for eight days, after which it fell again to normal. The cellulitis was regarded by Sir Halliday Croom as a purely local condition.

On the day following the second intravenous injection intruterine douching with eusol was applied, and also on the subsequent day. This was the only other treatment employed to combat the septic condition directly.

REVIEW OF THE CASE.

There seems no reason to doubt that this was a typical case of puerperal septicaemia in the ordinary acceptation of the term, and, further, that there was every likelihood of a fatal result, and this was the opinion of Sir Halliday Croom and other members of the staff. Cultures from the interior of the uterus yielded a *Streptococcus pyogenes* which was fatal to mice. Cultures from the blood, however, were sterile, so that in all probability life was threatened mainly by the toxic effects due to absorption from the local foci.

The immediate effect on the temperature due to the injections of eusol may be regarded as evidence of the action of the hypochlorous acid on the circulating toxin. This view of the case is confirmed by the subsequent temperature disturbance caused by the parametric inflammation.

This case is published at the earliest possible moment because of its bearing on the treatment of septicaemia among the wounded soldiers.

The method is obviously a safe one if carried out with caution and on the lines indicated above.

It has not been possible to determine the maximum quantity of eusol which can be injected with safety into the human subject. Since 100 c.cm. is a small fraction of the blood volume we consider that it is possible where repeated doses are given that this amount might be cautiously increased. On the other hand, to judge from our animal experiments, large amounts may diminish the coagulability of the blood and cause haemolysis.

In a case of malignant endocarditis with pneumonia which is still under treatment we have demonstrated that the 80 to 120 c.cm. eusol can be injected without harm.

The success which has followed the treatment of gas gangrene by local applications of eusol in Captain John Fraser's hands, taken along with the above observations, suggests that the method of intravenous injection may be expected to give favourable results in cases of general septic infection in the field, gas gangrene, tetanus, and other kindred conditions characterized by toxæmia.

This case was under the care of Sir Halliday Croom, and we beg to express our thanks to him for permission to publish an account of the clinical observations.

REFERENCE.

BRITISH MEDICAL JOURNAL, October 9th, 1915.

THE first medical congress of Ecuador, organized by the College of Medicine of Guayaquil, was held in that city from October 9th to the 16th. Among the subjects discussed were the climatic conditions of Ecuador, the special features of typhoid and malarial fevers as seen in various parts of that country, the means of preventing the spread of epidemics, the medical botany of Ecuador, a scheme for the compilation of a *Pharmacopœia Ecuatoriana*, and the practice of medicine in Ecuador.