SURGERY

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TREATMENT OF TROPICAL ABSCESS OF THE LIVER*

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The title of this paper should be more correctly stated as "The Treatment of Amebic Abscess of the Liver," but the word tropical is used advisedly in this connection for the reason that we wish to bring out with emphasis the incorrect usage of the term. It has been quite conclusively proven beyond a question of argument that the so-called tropical abscess of the liver is due to amebic infection, although Koch's postulate has not been conformed to. The parasitic ameba of man is found to be distributed it is true more uniformly in the tropical and sub-tropical climates; but it is quite widespread throughout the temperate zones. In the United States particularly, it has been found in practically every state in the Union. Therefore, its almost universal distribution must be recognized, and its presence should be sought for in all cases where there is dysenteric or diarrheic disturbances.

The discovery of the parasitic ameba of man dates back to its first investigator, Lambi, of Prague, who described organisms appearing in the feces of a child in 1860, which he interpreted as ameba, although he attached no great importance to their presence. "Careful study of this report, however, shows clearly that he had a suspicion that the organisms were the cause of the diarrhea of the child." In 1875, a really accurate description of the ameba occurring in man was made by Loesch, of St. Petersburg, who had a patient suffering from dysentery and in whose feces numerous ameboid organisms were constantly found. These organisms were undoubtedly pathogenic in nature, and unquestionably he was studying the

Entameba histolytica, the same pathogenic species which Schaudinn afterward described.

It was Schaudinn who first placed the study of the parasitic ameba of man upon a firm scientific basis. His publication appeared in 1903, in which he showed a specific difference between the pathogenic and non-pathogenic ameba of man, and gave us the classification which practically holds good today. To the harmless ameba he gave the name of *Entameba coli*, and to the disease-producing ameba, *Entameba histolytica*. "Schaudinn's work was first doubted, but recent zoologists such as Luhe, Braun, Hartmann, Minchin, and Stiles, Wenyon, Doflein, and Calkins, have given it complete recognition." We also owe much to Craig for original work in this field.

The parasitic amebæ of man, both pathogenic and non-pathogenic, possess morphological and biological characteristics by which they are distinguished and recognized quite readily and, as stated above, are quite universally distributed. In the tropical and sub-tropical countries they are frequently found upon green vegetables, especially upon salad vegetables, and occur in all probability in all green produce where contamination with human dejecta is possible.

We shall not undertake to describe the morphology and biology of the parasite. This question, however, should be quite closely studied by clinicians, and it undoubtedly offers a wide field for numerous discoveries.

We might state that the parasitic ameba within the intestines, or within the body of man, is not so easily destroyed as it is outside the body. Ipecac, not de-emeticized, kills the cultured ameba in dilutions of 1 to 50,000 in twenty-four hours; emetin, 1 to 100,000; quinin, 1 to 200,000; and silver nitrate, 1 to 300,000. These experiments were carried out by Vedder. These results have not been applied, however, to the parasitic ameba of man.

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Regarding the classification and nomenclature as stated above, Schaudinn brought out, in 1903, the fact that the intestines of man may be infested with two distinct species of amebæ, the *Entameba coli* which is non-pathogenic and the *Entameba histolytica* which is pathogenic.

"Stiles later wrote an exhaustive summary regarding the nomenclature of the amebæ of man in a very clear manner. For those who believe there is but one species of ameba, and that it is not congeneric with fresh water ameba, the correct name to use is *Entameba coli*, while for those who believe in a harmless and pathogenic species, the correct zoological names are *Entameba coli* and *Entameba histolytica*."

We have therefore the genus *Entameba* and the species *Entameba coli* and *Entameba histolytica*. There have been numerous other species described, some of which perhaps are of questionable value.

There is little doubt as to the causal relation between the *Entameba histolytica* and liver abscess of the tropical variety among those who are experienced in the observation of this disease. It must be admitted, however, that there is such a thing as bacterial infection and consequent abscess of the liver separate and apart from amebic infection, and that in most cases where the ameba is the primary cause of the liver abscess, there is also a bacterial infection. It has been proven that the ameba of man carries with it pyogenic organisms that might be in the blood stream and find lodgement in the area of lessened resistance of the liver due to the presence of ameba.

"Such authority as Councilman and La Fleur believe that the ameba alone causes the abscess, while Kruse, Pasquale and others believe that other organisms associated with the ameba cooperate in producing the abscess."

Webb states that

"the ameba alone can produce abscess of the liver, and that the sterile abscesses, sterile except for the ameba, can be carried for months or years with few symptoms or physical signs, and at some later time the abscess may become infected with pyogenic organisms. This would account for the prolonged history of these cases, with the absence of marked symptoms and physical signs, the absence of a decided leucocytosis and other septic symptoms in the cases of mixed infections."

Webb also suggests

"that since the ameba is an excellent carrier of micro-organisms it incorporates more than it can digest, and can often be seen disgorging them and strewing them along its path as it crosses the field of the microscope, and that this may be

the case when it enters the portal circulation and is carried, conveying pyogenic organisms, to the liver."

The route through which the ameba passes from the colon or the rectum to the liver is conceded to be, we believe, by most authorities, through the portal circulation. This is also in line with the anatomical structure and the physiological functions of the parts under consideration. We believe that in all probability this is the only route taken. The large intestines being drained through the blood vessels into and through the portal circulation, and the absence of a liberal supply of lymphatics of this organ supports this theory. Furthermore, the ameba has been found to lie directly in the capillaries of this region.

The general conception is that the abscess is usually a single one, but the experience of the best observers, however, seems to prove that in about 50 % of the cases the abscesses are multiple. I mention this particularly on account of the fact that it has an important bearing on proper treatment. Where the abscess is solitary it is generally located in the right lobe and usually near the convex surface, and in many instances its dome underneath the diaphragm.

The diagnosis of the presence of amebic abscess, or abscesses of the liver, is quite as important as (and perhaps more so than) the diagnosis of any condition that we may encounter, for it is our conception that the treatment of the disease is surgical, and it necessarily follows that as accurate diagnosis as possible should be made in order to have a proper basis for treatment.

The history of the case is exceedingly important. It should be accurately ascertained whether or not the subject has been affected with dysentery, or a more or less chronic diarrhea, particularly within the last two years, but should that time limit have been extended to six or eight years it should not be considered unimportant. It is quite important to have information about the subject's habits and diet, manner of living as well as climatic environment, for these matters have much importance in determining the possible causation of the disease. A careful examination of the feces should be carried out by a competent and experienced bacteriol-

ogist to determine the presence or absence of the *Entameba histolytica*.

Webb says:

"The classical symptoms are a hectic temperature, and night sweats. Leucocytosis occurs. We note diminished movement of the right half of the diaphragm, pain under the right scapula, dragging sensation on the right side with a fullness and tenderness in the right hypochondrium and rigidity of the right rectus muscle. But many of these symptoms may be absent. The liver has no sensory nerves, so a large abscess may form deep in its substance without causing pain. If the swelling is on the upper surface of the liver it is under the ribs, and not to be felt."

"In such a case we judge the likelihood of an abscess in a patient who has amebic dysentery and shows no plain physical signs of it by noting his general condition. If he is toxemic, losing flesh, with drawn face and a furred tongue, we may safely assume the presence of abscess" (Duckworth).

In some cases returning from the tropics the connection with dysentery is not easily traceable. In such cases the physical signs noted above, especially pain and loss of flesh, are important in the diagnosis. The spleen is not enlarged. Often a palpable tumor may be detected or an area of diffused dullness and tenderness in the right hypochondrium. Such symptoms would justify an exploration of the liver.

The x-ray is a useful aid in diagnosis and in determining the exact location of the abscess. The shadow shows increased density of the abscess wall, with a central area of lesser density than the normal liver tissue.

"Extension of inflammation in the liver to the lung may occur, first, by direct extension through the diaphragm, or second, by embolism of the pulmonary arteries due to the abscess' bursting into the hepatic veins, or into the vena cava" (Thompson).

The symptoms characteristic of pulmonary and pleural involvement are: first, severe pain in the shoulder which may be accompanied by pain and tenderness in the lower part of the chest; second, distressing cough; third, expectoration of chocolate-colored pus. This expectoration may be intermittent or constant. When drainage is good and expectoration fairly constant other symptoms are relieved. Pain and fever occur when expectoration ceases.

It is our personal belief that exploratory puncture with an aspirating needle without exposure of the liver is an unwarranted and dangerous procedure, and has

no place in the diagnosis of this condition. In the first place, the abscess wall is usually more or less thickened due to the inflammatory process which has taken place within it, in which a temporary fibrosis occurs, rendering it difficult to puncture and rendering the needle liable to pass around the abscess unless, perchance, the sharp point of the needle presents squarely against its surface. Secondly, in order to make a successful exploration with the needle it is necessary to anesthetize the patient. In the third place, the contents of the abscess is of such nature, being thick and filled with necrotic masses, that it is almost impossible to get it to flow through an ordinary aspirating needle. In this way one might have the open end of the needle within the abscess and yet its presence escape notice. In the fourth place, there is great danger of spreading the infection. The ameba itself may be drawn into the tissues outside the abscess cavity, or pyogenic bacteria may be deposited along the tract of the exploring needle. This is particularly undesirable where it is necessary to pass the needle either through the pleura or through the peritoneum. There is also danger from hemorrhage from a perforated blood vessel. We would, therefore, particularly urge that this is a dangerous, unnecessary, and unsurgical procedure as a means of diagnosis.

After the diagnosis has been made we believe that there is no other treatment except surgical that is based upon any certainty of good results. It has been our practice, and we are convinced it has a rational basis, to adopt the open treatment and to affect drainage through the trans-peritoneal route, and we are convinced after a rather large experience with operation upon these cases, that it is always practical.

It is claimed by some that in those cases particularly where the abscess is solitary and situated at the dome of the right lobe, that a rib resection is necessary in order to affect drainage. We have found that these cases are quite easily drained trans-peritoneally and much more safely. If a rib resection is done the bone has to be dealt with, which lends an element of complication. The pleura is oftentimes punctured, which gives an added danger

of infection. Undesirable adhesions of the wounded chest walls are bound to be among the end results in the event the case terminates successfully in so far as the cure of the abscess itself is concerned. Furthermore, in the event of multiple abscesses, an opening through a rib resection can never be large enough to enable one to locate and drain more than one abscess, or possibly two. Complete exploration of the liver is practically impossible through this sort of incision.

It is our conviction that an adequate trans-peritoneal opening should be made through which a complete palpation, and also complete inspection of the liver, can be had. In this manner and no other can an accurate diagnosis be made as to the number and location of the abscesses. It has been our habit to make the Bevan incision, or some modification of it, which gives us the best access to the liver. The liver is then examined by palpation and inspection, and, if necessary, by exploratory punctures after having properly walled off the adjacent organs with gauze pads. Where an exploratory puncture is necessary we use a medium size trocar and canula insertions for the presence of pus. Where the abscess is solitary and situated at the dome, and adhesions have formed between the diaphragm, or the parietal peritoneum and liver, we consider it wise and good practice to separate as many of these adhesions as is necessary to gain approach to the area directly over the abscess. The presence of the abscess, or abscesses, is usually indicated by more or less bulging or thickening of the liver substance and a whitish condition of the surface of the liver capsule. Having been located, they are carefully surrounded with gauze pads and a large size Ochsner gall-bladder trocar with a rubber tube attached is passed slowly and directly into the abscess cavity. The trocar is removed and the pus usually flows through the canula and through the rubber tube and into a receptacle at some distance from the patient, thus avoiding the possibility of contaminating the peritoneum or any part of the wound with the abscess contents. The canula is then carefully withdrawn, the surface of the liver carefully wiped off, a curved Kelly forceps passed gently through the path of the

trocar, the blades gently separated after reaching the cavity, until the opening is so enlarged that moist gauze sponges can be passed into the cavity for thorough cleansing. It is good technique, and in line with proper treatment to moisten these sponges with 1 to 50,000 emetin solution, or 1 to 10,000 solution of quinin; or other amebacidal solution. Then a large rubber tube properly perforated at its end of sufficient size to fit snugly the opening is passed down into the abscess cavity and brought out through the abdominal wall.

If there are multiple abscesses, and they are situated in such a way that the small ones can be drained through the original larger ones, it is a method of choice to drain them in this manner. If they are more accessible through the surface of the liver each one should be treated as above described. The abdominal wall, after removal of the gauze packing, is now closed about the drainage tubes. In this technique there is the smallest possible chance of infecting the peritoneum and the wound surfaces, and being thoroughly drained it gives opportunity to apply amebacidal remedies to the surface of the abscess cavity.

We do not believe it is compatible with good surgery to hunt blindly for these abscesses with an aspirating needle, and when we think we have found them to inject a solution of emetin, quinin, or other amebacidal agents into them. In the first place we are working in the dark and can never know positively when we have reached the abscess cavity. If we have a pyogenic infection, together with amebic infection, we can not hope to destroy it with the anti-amebic remedies. There is also danger of hemorrhage through puncture of an important vessel. If this procedure is carried out, unquestionably it should be done only after the liver itself has been explored through an adequate external opening and injection done directly and only through the liver substance, and under the direction and control of inspection and palpation.

In the treatment of these cases we consider it a very important adjunct to administer hypodermatically emetin hydrochlorid in one-half to two-grain doses daily. It goes without saying that the

patient should have supportive treatment.

In closing I desire to emphasize two or three points which I consider to be important. First, that it is an unnecessary and a bad practice to make exploratory punctures for diagnostic purposes. The diagnosis can be readily made, and quite as certainly, through the other means that have been indicated. Moreover, it is a dangerous practice on account of the fact that the exploring needle will nearly always of necessity have to be passed through a part of the pleural cavity or through the peritoneum, and in this way these cavities are liable to be contaminated with infectious bacteria.

The second point that I wish to impress is that these cases should always be treated by the open method unless there is some contra-indication to operation. And third, that the peritoneal or abdominal route is the safest and best avenue of approach and gives as good opportunity for reaching and draining the abscess as any other and does away with the danger of infecting the pleural cavity or the lung.

Lastly, I believe that local application of amebicidal remedies through the operative wound is an important part of the treatment.

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