Clinical Lecture

ON A

CASE OF HYDATID DISEASE OF THE LIVER
REQUIRING OPERATION;WITH REMARKS ON THE MODES OF MIGRATION
OF EMBRYOS.

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GENTLEMEN,—Most of you have seen with me in the ward upstairs a patient who was the subject of hydatid disease of the liver. By this is meant a condition in which the liver is the seat of a cyst or cysts in which are found echinococcus vesicles floating in fluid, these vesicles being the immature form of a parasite known as the *tænia echinococcus*. I will give you briefly the history of the case.

Edward S—, aged twenty-seven, an iron-roller from Middlesborough, was admitted into the Newcastle Infirmary on Oct. 30th, 1882, complaining of pain and a sense of fullness over the region of the liver. He is unmarried, and was a healthy man until two years and a half ago, when he began to feel pain in the right chest and a sense of weight in the right hypochondrium. He has never partaken of raw meat, but has eaten largely of pork and pork sausages. He is a great dog-fancier; at the present time there are five dogs at his home. The supply of drinking-water to his house is direct from the main, and there are no wells in the immediate neighbourhood of his dwelling. The patient has a peculiar sallow look, and has lost considerably in weight. He is the subject of extreme constipation, but has never suffered from epistaxis or hæmorrhage from the bowel. He says that he had jaundice in boyhood, and that it lasted a very long time. Some time before the bulging appeared in the right hypochondrium he was obliged to seek medical advice on account of pain which he felt there. As the bulging increased, shortness of breathing came on, and he had distinct rigors. In the early part of October he was tapped by Dr. Hedley of Middlesborough, and sixty ounces of clear serum withdrawn. For a few days he was somewhat prostrated, but the bulging disappeared. Three weeks after the tapping rigors set in and the swelling returned, accompanied by a feeling of pain. On admission his abdomen was somewhat prominent and resistant to the touch, while the sides were rather bulging. From the level of the right nipple down to the lower margin of the lowest rib an absolutely dull percussion note was heard; a similar area of dullness was detected on the left side. Both were continuous in front, so that hepatic, cardiac, and splenic areas seemed to run into each other. The area of dull percussion measured eight inches vertically. The bulging affected particularly the right hypochondrium, for it measured one inch more than the left. Pain was more or less a constant symptom; it was increased on pressure over the epigastric and hypochondriac regions. A well-marked wave of fluctuation was detected over the right lobe of the liver. His urine, which was amber-coloured and acid, had a sp. gr. of 1032, and contained just a trace of sugar. On examination, the chest above the level already mentioned exhibited nothing abnormal. Posteriorly, however, it was noticed that the dullness did not begin for at least two or three inches below the line noticed in front. Over the lower part of the right lung there was detected small moist crepitation; the same was noticed over the base of the left; otherwise the respiratory sounds were normal. The cardiac sounds were healthy. —On Nov. 8th, ninety-two ounces of a greenish-yellow fluid, having a sp. gr. of 1012, of alkaline reaction, and containing a large quantity of albumen, was removed from the right lobe of the liver by means of the aspirator. In this we found numerous hooklets, broken-down cells, and fat globules. The removal of the fluid was attended by a good deal of pain, and was followed by a feeling of prostration and a sense of coldness. A few days after the operation the patient felt remarkably well; the large area of dull percussion over the hepatic region had undergone

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great diminution. Over the area under the right nipple, where previously a dull percussion note was audible, there was clear percussion, and the breath sounds were distinctly heard, accompanied at the end of inspiration by small crepitation. On November 15th it is reported that the patient had suffered a good deal from pain in the abdomen and from headache. The temperature on the previous evening had reached 103.4°, and in the morning had fallen to 102.4°. There had been slight rigors during the night. His pulse was 120, skin hot, tongue coated, and his lips dry. His respiration was 36 per minute, and he complained of shortness of breath, but there was no stitch-like pain in the chest or abdomen. There was a degree of tympanitic distension of the abdomen, and the area of percussion dullness was carried somewhat upwards. Under the administration of small doses of opium, effervescing mixture, and the application of poultices, the patient somewhat improved. The temperature fell to 100.4° and the pulse to 104; the breathing improved, but he still complained of feeling chilly. From this time onward the temperature oscillated between 100° and 103.4°. The pain in great part disappeared, but the dull area of hepatic percussion increased in all directions. Fluctuation was easily detected from right to left, or *vice versa*, and a coarse friction sound could be heard on auscultation over the region of the liver. Pressure of the stethoscope gave rise to great pain. It was noticed that the patient lay with his knees drawn upwards, and that he was gradually getting thinner, and was beginning to look haggard. By Dec. 4th the patient was suffering very severely from pain in the right side, extending round to the spine. The dullness on the right side extended from the second intercostal space down to an inch above the level of the umbilicus, and on the left from the third intercostal space to near the level of the crest of the ilium. Fluctuation was distinct, and there was marked bulging of each costal arch. There was evidently fluid in the peritoneum. The heart was felt beating almost in the left axilla, three inches above and two inches external to its normal situation. Bronchial râles were heard over the upper part of each side of the chest. It was now decided to cut down upon the liver and give free exit to its contents. Accordingly, two days after this, my colleague, Dr. Hume, performed the operation of abdominal section, with incision of the liver, taking care to stitch together the walls of the cyst and abdomen. A small quantity of serum escaped from the peritoneum. On incision of the cyst, which was partly adherent, seven pints and eight ounces of a thick purulent fluid escaped, in which we noticed shreds of a delicate membrane. While the fluid drained away the heart could be seen returning to its normal position. A drop of this fluid submitted to microscopical examination was found to consist of pus cells and a few rod-like bodies of a brownish colour and with bulbar extremities; the membrane exhibited delicate lines running across a granular matrix. The operation was performed under antiseptic precautions, and for some time after similar care was given to the dressings. Beyond suffering from a little bronchitis the patient did remarkably well, nothing occurring worthy of note until Dec. 28th. On this and the preceding day thick pieces of membrane were discharged through the abdominal opening, particularly on coughing. About six ounces came away, evidently portions of the cyst-wall. It appeared to the naked eye to be composed of three layers—two outer, white and seemingly fibrous, and between these a brownish-yellow gelatinous substance. It had an offensive odour. Its surface was studded with small whitish nodules, varying in size from a pea upwards, the contents of which exactly resembled semi-coagulated albumen. Portions of this membrane placed under the microscope exhibited a well-marked stratified arrangement, not unlike fibro-elastic tissue. From this date onward nothing occurred, save an occasional attack of bronchitis, to mar the convalescence. Ere the abdominal opening contracted to the extent which you see it now, I had an opportunity of exploring the interior of the cyst by means of the electric light endoscope, and of observing that a granular condition existed similar to that which is seen in the healing of large external wounds. No bad effects followed the illumination. The patient is about to leave the infirmary cured of the hydatid disease of the liver.

Those of you who have had a course of lectures on zoology will readily understand the meaning of the term "alternation of generation"; it is reserved for a feature in the life-history of many of the hydrozoa and entozoa, in which you have a condition of matters something like this. An organism, to start with, contains male and female organs, and

as a result ova are developed within it. These ova, when liberated, develop into sexless forms of life, entirely unlike the organisms from which they sprang. Although sexless they are yet capable of bringing into existence, by a process of budding, myriads of organisms like themselves, and these, again, by a process of budding extend the chain. A time comes, however, in the history of these immature forms when they change their character. They revert to the original bisexual type, and in this way exactly resemble the organism which started the chain. Such is the life-history of the echinococci which cause hydatid disease. They are the immature sexless brood of a parasitic worm known as the *tænia echinococcus*, and, like the sexless brood to which I have referred, they are capable of perpetuating themselves for a time by a process of gemmation.

Repeated examination in countries where hydatid disease is more or less endemic has caused the dog to be regarded as the victim of the adult worm, or *tænia*. The *tænia*, according to Cobbold, is a small cestode, seldom more than a quarter of an inch in length, and composed of four segments, the foremost of which is capped by a pointed beak and armed with a double row of hooklets. It is the fourth or final segment which is sexual. Mature links of the worm are discharged from the bowel of dogs thus afflicted, and by some means or other the ova find their way to drinking water or come into contact with food. Having reached the human stomach by means of these media, the ova lose their shelly covering and the embryos are set free. With their six hooklets they are said to bore their way into the organs of circulation, and in due time reach the liver, lungs, or brain. Ultimately they become fixed, and immediately thereafter begins the metamorphosis by which these embryos become hydatids. Spherical from the first, the hydatid becomes surrounded by a layer of connective tissue which is derived from the proliferating connective tissue in the neighbourhood—rather that, I think, than a secretion from the hydatid itself. At this period the hydatid can be lifted from its bed of connective tissue. On examination it is found to be composed of a membrane enclosing a granular mass. From this granular mass is formed another membrane, more delicate than the other, and lined by nucleated cells. To these two layers Huxley has applied the term *ectocyst* and *endocyst*. With the outer of these two layers we have little to do; it is structureless, and is formed of a substance not unlike chitine. The endocyst, though only $\frac{1}{2000}$ of an inch in diameter, is very important, for it is from it that all future development proceeds, the first indication of which is seen in the alteration in form which its layer of nucleated cells undergoes. From being flattened they become round, and afterwards elongated, and sooner or later, according to Leuckart, many of them are to be seen as small papillæ projecting into the granular mass. It is to these papillæ, the future scolices, that developmental activity is now transferred, further change in which soon follows upon vacuolation of their contents. A vacuole is detected in their interior, and in time this is found filled with fluid. A stage further on and we find the cavity lined with a delicate cuticular membrane. Beyond this the further steps of development are with difficulty traced. Suffice it to say that each papilla becomes, after an increase in its size and alteration of its form, a true echinococcus head. At times it sacrifices itself, develops an internal germinating membrane similar to the one I have mentioned, from which arise papillæ, and from these again a brood of echinococci. These are the brood capsules that become the daughter vesicles, the parental name being retained for those from which they originated. We have then mother vesicle or original cyst, and daughter vesicles, the larger of which become free and float in the fluid of the mother cyst, while the smaller remain adherent to the wall, and may give rise to a brood of capsules, grand-daughters of the original.

Compared with other countries we see little of the efforts of echinococci. Not more than thirty-four deaths per annum are reported as due to hydatid diseases—a return which Cobbold is inclined to question, four hundred being, in his opinion, nearer the truth. Even with this higher mortality the death-rate is simply nothing compared with that in other countries. In Iceland, for example, where the disease is so frequently met with as to be considered endemic, it is said that one-sixth part of all the inhabitants annually dying fall victims to the echinococcus epidemic. Australia a few years ago gained for itself a reputation for its high death-rate from hydatid disease. None of the inhabitants of that continent seemed to be exempted: the rich suffered equally with the

poor, the shepherds on the plains with the miners underground. As for Iceland, there is something peculiarly unique in its geological conditions which render it a fertile soil for the development of these parasites, especially, too, when taken with the fact that the peasantry of that island maintain a very close intimacy with dogs. Without these animals it is impossible that the disease could be contracted. The possessor of several dogs, the Iceland peasant shares with them his compartment, and allows them to eat off the same plate with himself. Not less than 28 per cent. of these animals are affected. With this relationship maintained between peasant and dog in an island possessing hot springs &c., and with the river-water warm, which is the source of drinking-supply to the inhabitants, who are heedless of sanitary arrangements—with these facts before us we have sufficient explanation as to the prevalence of hydatid diseases in Iceland. One point, too, is of interest, and it is this. According to Schleisner, hydatids are more frequently met with amongst women than men in Iceland, and this can only be explained by the different habits of the sexes. The water which the women use for drinking is obtained from supplies in the immediate neighbourhood of their dwellings, from places to which the dogs have easy access, whereas the men are engaged in fishing or hunting, in pursuits, at least, which take them away from the immediate vicinity in which they live, and, as a consequence, they suffer less.

It is noteworthy that certain organs in the body are affected more frequently than others. Taking my statistics from Cobbold, it appears that out of a total of 700 authenticated cases, the liver has been affected 326 times; the lungs have been affected 62 times; the kidney and bladder, 53 times; the brain has been affected 42 times; the bones have been affected 33 times; and the heart and vessels, 25 times.

Briefly, the liver is affected in 46½ per cent. of those who suffer from hydatid disease; the brain in 6 per cent.; and the heart in 3½. These facts are not, I think, satisfactorily explained by the ordinary theories, bearing upon the migration of embryos. Niemeyer and other authors maintain that once the echinococcus ova or embryos have been discharged from the bowel of the dog and have entered the human intestine, the embryos, freed from their capsule, bore their way by means of their six hooklets through the wall of the stomach or intestine, and, wandering further, finally reach the liver, where they develop subsequently into a true hydatid cyst. I do not question the possibility of this occurring. It is mentioned by so many writers of note that it is probably one of the modes of migration. But what are we dealing with? We have a microscopic object armed with six hooklets, and we are told that by means of these it bores its way through the wall of the stomach or intestine, and such a thing as the capsule of the liver. To my mind the difficulties to the progression of the embryos are by this mode so very great that there must be other channels by which they travel. I do not say that this mode of migration is an impossible one; for we know that parasites travel long distances under the skin. All I say is that the establishment of embryos in the various organs is not always due to their own propelling powers. Echinococcus ova or embryos swallowed along with food, or imbibed with drinking-water, having reached the stomach, are therein subjected to the chemical and triturating process of digestion, the immediate effect of which is the dissolution of the envelope, and the liberation of the embryo. The probabilities are that the embryos do not remain in the stomach any length of time. They pass on into the intestine along with the rest of the food. From the stomach, then, the chances are that the embryos do not make their way by boring into the tissues. They leave the stomach along with the chyme and pass on into the intestine. It is in this part of the digestive tract that the food lingers longest, and consequently it is from it that the embryos pass out into the various organs, their progression accomplished not by boring, unless it be into the venous radicles of the intestine, which pour their contents into the *vena portæ*. In this way they may reach the liver. By means of the venous system therefore many echinococcus embryos reach the liver, and there they develop into hydatid cysts. The work of preparing tissues at the College for the class of practical physiology has given me many opportunities of detecting scores of ova of parasites, probably of the distoma or fasciola hepaticum in the villi of the intestines of rabbits; and further examination of the liver in the same animal has shown the deposition of ova in

that organ. I have been struck by what seemed to be a coincident deposition of ova, or what might more accurately be described, because I believe this is what takes place, as a rapid appearance of ova in various parts of the liver while the intestinal villi remained here and there full of them. This, and the additional fact that the liver is in both cases the seat of parasitic selection, lead me to believe that the mode of migration of embryos must be the same. The echinococcus embryos, according to this view, find their way into the intestinal villi in the first instance, thence into the lymphatics, or more properly speaking the lacteals, which run at the base of the villi, and as these pour their contents, interrupted no doubt in many cases by lymphatic glands, into the thoracic duct they easily reach the blood; hence the explanation of hydatid disease of lung, brain, kidney, &c. If their onward course is interrupted by the intervention of a gland, then we have them deposited there, and an explanation of hydatid disease of mesentery. From the intestinal venous radicles into which echinococcus embryos may have got by boring, not an unlikely thing, they easily reach the liver, but I see no reason why they, too, do not reach that organ by means of the lymphatics. Lacteals and lymphatics are continuous, and I see from Quain's Anatomy that the deep lymphatics of the liver join, at the side of the coeliac artery, one of the large lacteal trunks, previous to its terminating in the thoracic duct. If the intestinal villi are the easiest mode of ingress for parasitic ova or embryos, as I think they are, since it does away with the idea of propulsion by their own efforts, then by means of the lymphatic connexion which I have shown, the liver would be the organ first reached, because most of the upper intestinal lymphatics pour their contents into large lacteal vessels, and do not communicate with lymphatic glands. Transference of parasitic ova from the intestine is accomplished through the lymphatics. Such a mode of migration not only explains why the liver is in the largest number of cases the organ affected, but it also explains those other cases of hydatid disease of mesentery, and also through the medium of lymphatics, thoracic duct, and subclavian vein, hydatid disease of lung, brain, and kidney. I fail to see how any amount of boring on the part of echinococcus embryos will explain the fact of the right lobe of the liver being most frequently the seat of the disease, unless it be by boring into venous radicles. Taking everything into consideration, however, I regard the lacteals of the intestinal villi as the medium by which parasitic ova gain admission into the economy.

Another question of interest crops up in the development of hydatids. The drinking of water contaminated by echinococcus ova, or the eating of raw meat infected with these embryos, is in many cases followed by the development of hydatids in man; and in the case of dogs in Iceland, if these hydatid vesicles are eaten the mature worm or tænia is the result. Suppose man, however, should swallow hydatid vesicles, would he develop the mature worm? There is no instance of this recorded, so far as I know; and yet portions of hydatid vesicles must have tainted the food or drinking water of men in countries where the disease is more or less endemic. Kuchenmeister considers it not improbable that echinococci, reaching the bowel of a person in whom hydatids exist, develop tænia. I am not sure that man ever develops the tænia. Our knowledge of his relationship to the parasite is that it is the vesicular condition we meet with. There is no absolute reason why the vesicular stage should not be repeated in man. I quite think with Davaine that the hydatid corresponds to a phase in the development of an animal which lives a certain period and which may be produced a certain number of times under the vesicular form. Reverting to my remarks on alternation of generation, you observe a resemblance to the intermediate phase there spoken of.

Trousseau says that the absence of albumen is a distinctive feature of the fluid taken from hydatid cysts. On the first occasion we aspirated S—we removed a thick, greenish, ropy fluid, which contained a very large quantity of albumen. The cyst had previously been tapped by Dr. Hedley, who kindly sent me the patient, and consequently we had to deal with, not the ordinary fluid of a hydatid cyst, but of fluid which was in great part the secretion of a cyst somewhat inflamed.

Of the treatment of hydatid disease of the liver I need say very little. Medicine can do but little good. The removal of the fluid which bathes the vesicles, and probably nourishes them, is the surest mode of destroying them. Frequently

one or two tapplings by means of the aspirator will suffice; when it fails, it may, as it did in this case, set up suppuration of the cyst, and require free incision—a procedure not without danger, although most cases, I think, end favourably.

ON A CASE OF EXPLORATION OF THE KIDNEY.

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AT the present time, when the surgical treatment of kidney affections is attracting much consideration, the case under notice is interesting with reference to the questions of both diagnosis and treatment.

John T—, aged forty-nine, commission agent, admitted into the General Hospital May 15th, 1882. For a number of years patient has consumed a large amount of alcohol; latterly has much diminished the daily allowance. Six years ago he was suddenly seized with pain in the back (the precise position not defined), lasting for some hours. This was followed by a discharge of blood mixed with the urine. He was then told by his medical attendant that he was suffering from a stone in the kidney. Another attack of hæmaturia took place two or three months afterwards, and a recurrence of this symptom has been noted, at varying intervals, down to the present date. The longest period that it was altogether absent has been four months. Of late the frequency of hæmaturia has much increased. On and off the man has been a patient at the hospital for three years and a half. His first visit was to my out-patient room for complete retention of urine and great bladder distension. This, it was found, was caused by the presence of large blood-clots. An examination of the bladder with the sound and bimanually revealed nothing abnormal. In and around the loin no abnormality could be detected. The patient declined to become an inmate of the hospital. From time to time up to admission I saw him, and he was also under the care of my colleague, Dr. Saundby, and various private practitioners. Large doses of perchloride of iron and ergot seemed to control the hæmorrhage better than any other remedies. The patient was taught how to pass a catheter himself, and could generally relieve the bladder when retention of urine occurred. On admission there was marked anæmia, and it was stated that within the last three months the patient had lost flesh rapidly. The body was, however, fairly well nourished. Pain was complained of in the right lumbar region, passing down the course of the ureter. There was marked dulness in this region, and anteriorly a feeling of resistance on palpation was met with. It was said that "matter" was often seen in the water.

Examination of urine: 40 oz. passed daily, sp. gr. 1023; a cloud of albumen, pus and blood-corpuscles, together with crystals of oxalate of lime.—May 17th: A severe attack of hæmaturia occurred, during which it was necessary to resort to catheterism several times daily.—24th: The pelvis of the right kidney was explored, through an oblique lumbar incision four inches long. An aspirating needle passed into the renal pelvis at several points failed to detect any calculus. Smart hæmorrhage followed these punctures. An antiseptic sponge was inserted into the wound, and left in contact with the kidney until evening, when it was removed, and the edges of the incision united. The patient complained of pain in the regions of the stomach and the bladder; the latter viscus was distended, and on the introduction of a catheter 16 oz. of very bloody fluid were withdrawn.—25th: Morning temperature, 99°; evening, 99° 4'. Morning pulse, 102; evening, 112. Antiseptic dressings soaked with bloody serum. Complaints of great thirst and of pain shooting down in the direction of the ureter to the testis of the right side. Urine voided without a catheter.—27th: Urine still bloody; reaction alkaline, sp. gr. 1020, albumen $\frac{1}{20}$; blood-corpuscles and crystals of triple phosphates; marked cystitis. Bladder washed out with weak carbolic lotion. The quantity of urine passed daily for the first week after the operation was 34, 43, 40, 45, 38, 36, and 34 ounces.—June 2nd: Antiseptics discontinued, as the wound is rapidly granulating; by the 5th the more acute bladder symptoms had subsided.—30th: Has had no hæmaturia for three weeks, and is free from pain. The patient went home.—July 15th: Read-