equipped hospitals, where such a complication as perforation is likely to be recognized at the earliest possible moment, and immediate arrangements made for operation is eminently favourable to surgical success.

2. It is very desirable to operate as rapidly as possible, and to avoid all unnecessary handling and exposure of intestine. These patients are totally unable to bear much manipulation.

3. The quickest way to find the perforation is to go straight for the ileo-caecal valve and trace the ileum upwards. It will rarely be necessary to handle more than 2 to 3 ft. of bowel.

4. All sutures should be of catgut, as silk or linen is almost certain to become infected and give rise to a troublesome sinus. The catgut I use is prepared by boiling in absolute alcohol for thirty minutes, and stored in tincture of iodine one part, proof spirit ten parts.

5. These patients bear the Fowler position and continuous rectal saline quite well.

6. Coliuria being a very likely complication, it appears wise to put these patients at once on alkaline treatment. Whether as a result of this procedure or not, my last two cases showed no sign of this troublesome ailment.

Success in the cases here recorded was chiefly due to the promptness with which Dr. Gardner Robb recognized the complication and made arrangements for operation; and in a very large measure also to the care and attention bestowed on the patients by the resident officers, Drs. Kevin, Glass, and Millar.

OPERATION FOR INTUSSUSCEPTION COMPLICATED BY MEASLES AND BRONCHOPNEUMONIA.

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ABOUT 2 a.m. on February 22nd, 1913, I was asked by Dr. Robert Boyd to operate on an infant which he had just seen.

The patient was a bottle-fed male infant, aged 3 months, previously healthy, living in a small kitchen house in the east end of Belfast. At 3 p.m. on the previous day the child appeared suddenly in pain, vomited, and passed a normal motion. Some time later a little blood-stained mucus came away by the rectum. When Dr. Boyd saw the child just before midnight he found it breathing 40 to the minute, the temperature 101.2° F., the pulse 120, an intermittent cough, and a profuse eruption indicative of measles covering the body. On examination of the chest numerous patches of bronchopneumonia were detected on both sides, but especially on the right. An elongated tumour, easily palpable, lay on the left side of the abdomen opposite the umbilicus. The rash had appeared the previous morning.

The diagnosis was obvious, and the normal course for a purely surgical affection would have been to send the child to the Ulster Hospital. This, however, was precluded by the infective fever; the pneumonia added additional risk to any exposure to night air in view of a general anaesthetic. On the other hand, without operation death must follow. Therefore, though the surroundings were anything but promising either for the operation itself or for the subsequent nursing, it was decided to operate in the house.

Operation.

About an hour later I opened the abdomen, Dr. Boyd administering chloroform. I had taken the precaution to bring all my instruments ready sterilized, in addition to the usual dressings, towels, etc. Disinfection of the skin was carried out by washing with soap and water, spirit, and drying with ether. Tincture of iodine (B.P.) was then twice painted over the front of the abdomen. Rubber gloves were worn. The incision was through the right rectus. An ileo-caecal intussusception of large size was found. Reduction was fairly easy, but the last portion could only be extruded after withdrawal of the tumour outside the abdominal wound. The appendix was removed for two reasons: (1) It was very much swollen, even for such a case, where some swelling is characteristic, and it was kinked in two places at an acute angle; and (2) it was the last part to be reduced, therefore probably the first to enter, and therefore may have had something to do with the causation of the invagination. The abdomen was closed in layers. Van Horn No. 2 thirty-day catgut was used for the buried, and silk-worm gut for the musculo-cutaneous and cutaneous sutures. The child was back in bed in forty-five minutes, and did not seem to have suffered much from the surgical intervention. Ten minims of compound tincture of camphor were given after recovery from the anaesthetic.

After-History.

For three days the temperature remained at 101° F., and there was distressing cough which threatened to tear the wound open, more especially as some suppuration as the result of the rash might have been expected. Neither of these untoward results occurred and the further progress of the case was uneventful. The nursing from first to last was carried out by the mother, and when the silkworm stitches were removed on the eighth day healing was perfect.

The case illustrates one or two important points—namely: (1) That measles, even with a profuse rash at the operation site, need not deter the surgeon from an otherwise urgent or desirable operation; (2) the value of iodine as an efficient and convenient method of skin disinfection; (3) that successful nursing of cases as serious as abdominal section can be carried out in mean surroundings and without the aid of specially acquired skill—a point lately emphasized by Mr. Andrew Fullerton and others in connexion with operations in the out-patient departments of general and more especially of children's hospitals.

TRUE TOTAL ENUCLEATION OF TWO HYDATID CYSTS FROM THE SAME LIVER.*

BY

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THE following are some notes on a case upon which I operated at the Salford Royal Hospital at the beginning of March, 1912, and which is, I think, of some interest.

I saw A. M., a girl aged 13 years, in the out-patient department. She was complaining of a swelling in the epigastrium, which caused her no discomfort except a slight tenderness over the most prominent part of the swelling, where it came into closest contact with her clothing. She would not have sought medical advice when she did had it not been that the swelling had become evident to casual inspection. On abdominal examination a swelling could be seen and felt in the epigastrium, its most prominent part being situated slightly to the left of the mid-line. The tumour moved slightly with respiration, and could be displaced by the hand for a distance of about three inches from the costal margin, leaving a tympanitic area between tumour and costal margin, and could be retained there quite easily during inspiration and expiration. The tumour was rounded, fluctuant, and intra-abdominal. Careful and systematic abdominal palpation revealed a second tumour, corresponding exactly to the position of the right kidney.

The tumours seemed obviously to be cysts, but one was not quite satisfied as to their exact situation before the operation, since the left was more mobile than one would expect a tumour of the liver to be, and the right one could be so definitely palpated bimanually in the region of the right kidney.

Operation.

The girl was admitted subsequently to the hospital. Under chloroform anaesthesia, after a cystoscopic examination had been made, in order to ascertain whether there was any information to be obtained regarding the nature of the right tumour by a view of the orifice of the right ureter, with negative result, the abdomen was opened by an incision through the left rectus muscle. The left tumour presented in the wound, and was at once seen to be a cyst in the left lobe of the liver, a portion of the fibrous cyst wall being visible, uncovered by liver tissue for an area about the size of a shilling. The left lobe of the liver was much more movable than normal, and this accounted for the somewhat free mobility of the tumour found before opening the abdomen. Passing the hand to the right kidney region, the second tumour was felt, and was found lying directly on the right kidney and embedded in the right lobe of the liver, near its lower free sharp margin. The epigastric tumour was the larger, and after removal was found to be somewhat larger than a tennis ball, while the right tumour was somewhat smaller than a tennis ball. Seeing the moderate size and accessibility of these cysts, I was much tempted to attempt a total enucleation—that is to say, a removal of the fibrous ectocyst as well as of the germinal layer. I decided to make the attempt on the smaller of the two cysts first.

I made a second incision on the right side of the abdomen from the costal margin at the tip of the tenth rib downwards for about three inches. My assistant then passed his hand from the epigastric incision towards the right, and caused the right tumour by pressure to present into the wound on the right side. In the same way as in the case of the left tumour, a portion of the fibrous ectocyst was visible, uncovered by liver substance and showing as a white area about the size of a sixpence. Working with the sharp edge of a scalpel from the uncovered area concentrically, I separated the liver substance from the fibrous cyst wall for a distance of about half an inch

* A paper read before the Manchester Clinical Society.

all round. I then by blunt dissection completed the enucleation of the cyst from the right lobe without opening the cyst. About three fibrous strands were found running from fibrous cyst wall to liver substance. These I ligatured before cutting. A cavity was left lined by apparently unaltered liver substance, which slightly oozed blood. This cavity I lightly packed with gauze whilst I turned my attention to the larger cyst in the left lobe. This I enucleated in an exactly similar manner, with the exception that just as I was completing the enucleation the pressure necessary to enucleate the deepest part of the cyst caused a rupture of the fibrous coat, and the fluid contents of the cyst, together with the germinal endocyst, were expelled through the rent in the ectocyst. There was practically no oozing of blood from this the left cavity. As the abdominal cavity had been previously protected by gauze packing, I have reason to believe that none of the cyst contents reached the abdominal cavity. Having no previous knowledge from practical experience of enucleation of the whole cyst, having learnt by reading only that dangerous haemorrhage was likely to occur on removal of the ectocyst, and taking into consideration the fact that the cavity left by enucleation of the smaller cyst was still oozing slightly, and that bile diminishes the coagulability of the blood, I considered it advisable to adopt the following course. I packed the cavity in the right lobe with gauze, closing the right abdominal wound sufficiently to just leave room to allow the end of the gauze packing to protrude externally. I closed the cavity in the left lobe as completely as possible with catgut sutures, and left a small-bore rubber drainage tube extending from the small cavity, which was left, to the outside, in order that, should any recurrent haemorrhage take place, it would be at once visible on the dressings, instead of being allowed to discharge itself into the abdominal cavity.

After-History.

I dressed the case the following day, and as no drainage had taken place except a small quantity of bile-stained serum, I removed the drainage tube. On the next day following I removed the gauze packing from the right cavity under ethylchloride anaesthesia. The packing was slightly blood-stained, such as would occur from slight oozing. Beyond a post-anaesthetic vomiting rather longer than usual, namely, for about forty-eight hours, and a temperature up to 99.5° C. for the first two days, nothing of any note occurred, and the patient was discharged from hospital in twenty-five days, the abdominal wounds being soundly healed and the patient feeling perfectly well. Since the vomiting had ceased synchronously with the removal of the gauze packing from the right cavity, I think that the resistance of this packing probably caused greater pressure on the adjacent duodenum than the more resilient cyst had done, and that this, coupled with the anaesthetic, accounted for the somewhat prolonged period of vomiting.

At the time of writing, some thirteen months after the date of operation, the child is in perfectly good health.

As I have said, the right and left cysts were respectively somewhat smaller and somewhat larger than a tennis ball. They contained no daughter cysts. The inner surface of the endocyst was irregularly covered by a granular film of red material, resembling small quantities of extravasated blood. On microscopical examination, these patches were found to consist of blood corpuscles, among which were large quantities of scolices. In a specimen of the hydatid fluid which I drew from the unopened cyst after the operation I was unable to find any scolices or hooklets; this fact serves to show that the absence of hooklets in fluid drawn for diagnostic purposes from a cyst is by no means a conclusive proof that the cyst in question is not a hydatid cyst.

The ectocyst had a smooth external surface, and, except where it was connected by the few fibrous strands previously mentioned with the liver substance, was very easily separable from the liver.

It is essential, in speaking of a total enucleation of a hydatid cyst, to come in one's own mind to some definite conclusion as to whether the ectocyst is derived from the hydatid embryo as originally deposited in an organ or whether it is derived from a fibrous degeneration of the special cells of the organ in which it has been deposited. From a consideration of the operation which

I have described, and from an examination of the cysts obtained, I have formed the opinion that the ectocyst is in its first stages of development purely an essential part of the hydatid cyst; that as the cyst grows larger this fibrous coat grows more definite; that at the same time a fibrous degeneration begins to take place in the cells of the organ most adjacent to the cyst; and that gradually a fusion takes place between the original ectocyst and the accessory fibrous coat subsequently developed from the cells of the containing organ. It seems only natural that when the body which develops into the cyst is deposited by the blood stream in the liver, it should already have a fibrous protective outer coat. It also seems natural that as the cyst enlarges this coat should also increase in ratio. We know that when a foreign body of any kind is deposited in a tissue an enclosing fibrous sheath is developed at the expense of the surrounding tissues. This process will naturally take place in the case of a hydatid cyst. It is only to be expected that when two fibrous layers are in contact they should become more and more intimately united. If definite intracystic or pericystic inflammation has taken place, the development of the accessory ectocyst will be more pronounced and the fusion between accessory or false and essential or true ectocyst will be

more definite. I look upon the few fibrous strands which I had to cut in the removal of these cysts as demonstrating an early stage of this fusion of essential ectocyst with the fibrous material derived from altered true liver substance. The ectocyst which I removed in my case I look upon as being entirely essential ectocyst, since it was so easily separable from the liver substance, while the adventitious ectocyst was practically absent, since the walls of the cavities left in the liver after removal of the cysts appeared to consist of unaltered liver tissue.

I mention this question regarding the origin and development of the ectocyst because, although in works on pure pathology the ectocyst is usually recognized as having a dual origin, yet in surgical treatises there seems to be a tendency to look upon the ectocyst as being derived solely from the organ in which the hydatid has been deposited. To take an example, I find in

Binnie's *Operative Surgery*¹ the following statement: "Echinococcic cysts are composed of a structureless true capsule or wall. . . . The whole cyst is surrounded by a firm connective tissue capsule developed from the liver itself." Again, in his work *Abdominal Operations*,² Sir Berkeley G. A. Moynihan describes an operation which he calls an "enucleation of the entire cyst," and which consists of opening the cyst, removal of the germinal or endocyst entirely, closure by suture of the gap and wound in the liver, followed by closure without drainage of the abdominal wound. This operation, as he states, was first performed by Knowsley Thornton in 1883; secondly, by Bond in 1891; and thirdly, by Delbet in 1896; although, as he says, Bond's case was not one of hydatid of the liver, but a small cyst, about the size of a Tangerine orange, found in a reflection of peritoneum in the right iliac fossa. If the opinion is correct that the ectocyst is first essentially part of the hydatid, and later consists of essential ectocyst fused more or less intimately with fibrous tissue derived from altered liver substance, then an operation in which only endocyst is removed cannot correctly be described as an enucleation of the entire cyst.

Posadas, the professor of operative medicine at Buenos Aires, who has had a considerable experience in operations upon hydatid cyst in various parts of the body and has contributed an interesting paper on the subject,³ classes enucleations into two groups—"l'extirpation totale," which includes both ectocyst and endocyst, and

A photograph of A. M., taken a year after the operation, showing position of cysts: the scars of the abdominal incisions can be seen.

"l'extirpation de la membrane germinative et la suture de la périkystique." The only case, however, in which he mentions that "l'extirpation totale" was practised was that of a cyst the size of a duck's egg, which he removed from the left orbit. In the 23 cases of liver hydatid where enucleation was performed, the enucleation was in every case of the ectocyst only.

As to the origin of the ectocyst, Posadas states that the hydatid "has developed a fibrous limiting sac, named the pericystic layer, the origin of which is due to the inflammatory reaction and to the process of encystment determined in the tissues by the foreign body." He further states that the fibrous coat is intimately fused with the organ in which the neoplasm rests, since its constitution is due to the proliferation of part of its elements. This intimate fusion certainly was not present in my case.

In reading the article by Posadas I was struck by the fact that, out of the 23 cases in which extirpation of the germinal membrane was practised, 20 were 13 years of age or under, the age of the youngest child being 3 years. In 18 of these cases the cyst was single and located in the right lobe, while in the remaining 5 cases two cysts were present—one in the right lobe and one in the left lobe. In the textbook by Ashby and Wright on *Diseases of Children*⁴ it is stated that "Hydatid cysts are not uncommon in later childhood." My patient was a child of 13 years; but the few cases of hydatid cyst which I have previously seen have all been in adults. The child does indeed seem more likely to be infected than the adult, owing to the want of care of the child in selecting its vegetable food, its indifference as to the absolute cleanliness of the food which it eats, and, more important still, owing to the readiness with which children allow dogs to lick their faces.

In publishing this case I have no wish to appear to be advocating the wholesale total enucleation (as I have described it) of hydatids of the liver. Here let me again emphasize the opinion that no operation should be technically described as total enucleation or enucleation of the entire cyst if the ectocyst is left behind, putting quite out of the question for the moment whether it is ever advisable to attempt the removal of the ectocyst. My primary object is simply to describe a case where the ectocyst was successfully and easily removed and without any "grave hæmorrhage"⁵ occurring. I think I may look upon these cysts as being cysts in a normal condition at a certain stage of development, and therefore may claim that any other similar cysts could have been in a similar manner enucleated.

At the annual meeting of the British Medical Association in 1910, Mr. C. MacLaurin, Honorary Surgeon to the Royal Prince Alfred Hospital, Sydney, read a paper on Hydatid Disease of the Liver.⁶ Having expressed his opinion that marsupialization is the operation of choice, he criticizes Delbet's operation—namely, opening the cyst, removing the endocyst and obliteration of the cavity left by sutures, in that it is "excessively difficult—in my experience, usually practically impossible without a large incision," and that "there is the danger of implantation of live scolices into the adjacent liver tissue." Applying this second criticism to the operation which I have described, I may say that if the ideal result is obtained—namely, the removal of the cyst unopened, then all chance of infecting the peritoneal cavity or liver tissue with scolices is absolutely avoided, and thus I should say that, in picked cases, it is superior to Delbet's operation, which would be more correctly described as Knowsley Thornton's operation, or to any other operation, as far as the question of infection is concerned. In my case, as I have said, the second cyst ruptured just as I was completing the enucleation, and thus the ideal result was not obtained. With a little more delicacy in the later stages of the operation, I feel confident that I could have obtained a pair of unopened cysts. I was putting too much reliance on the strength of the ectocyst while I was completing the enucleation, and did not allow for the presence of a weak spot.

If I were asked to formulate rules as to when it is justifiable to attempt this total enucleation, I should say: The cyst should be of moderate size—it is impossible to make dogmatic statements as to its exact size; it should be a cyst in which no obviously active intracystic or pericystic inflammatory changes have taken place; it should be a cyst whose wall at some part comes very near the

liver surface. Regarding this latter point, in the case of a cyst lying deeply in the liver substance the operation would be rendered difficult and the view would be obscured by the hæmorrhage from the liver substance incised to approach the cyst. Again, a moderate sized cyst, lying deeply in the right lobe of the liver, which has given rise to no signs or symptoms beyond some slight enlargement of the lobe, is not likely to be diagnosed as a cyst while it remains of moderate size. The cysts which I met with in my case were cysts typically suitable for enucleation. It seems to me that hydatid cysts met with in children are more likely to be suitable for treatment by the method described in this paper than the larger cysts met with in adults, since the cysts in children are usually smaller, younger, and less frequently altered by acute or chronic inflammatory changes.

MacLaurin, in his paper referred to above, does not mention this method of treatment, and yet among the many cases of hydatid cyst dealt with in Australia one would expect to find occasionally cases similar to mine in which it would be justifiable to practise the true total enucleation. Although textbooks emphasize that "grave hæmorrhage" will occur if the ectocyst be removed, and although such hæmorrhage would occur frequently if cases were taken at random, yet I do not remember having read of a case where the removal of the ectocyst has been attempted, successfully or unsuccessfully, in a case of hydatid cyst of the liver. I should be very much obliged if any one who may read this paper would be kind enough to give me information on this point.

I showed this case for diagnosis before operation at a post-graduate demonstration at the hospital, and some weeks later I showed the case, with the macroscopic and microscopic specimens obtained, at a clinical meeting of this society.

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A METHOD OF OPERATING FOR RADICAL CURE OF INGUINAL HERNIA.*

BY

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IN describing this method of operating for radical cure of hernia, I do not suppose I am inventing a method which has not been followed before, but I am not aware that it is a recognized procedure, and as in my opinion it is easier and in some ways more efficient than some of those generally followed, it may be worth while putting before you.

It is believed by many surgeons that the predisposition to the first occurrence of hernia is due to the fact that there is a slight pouch or dimple of the peritoneum, left at the internal ring at the time of the occlusion of the infundibuliform process, and that a recurrence after operation for radical cure is due to the incomplete occlusion of the sac at the neck, so that a similar pocket or dimple remains.

In order to overcome this, all sorts of different methods have been advocated to deal with this sac and its neck, such as simply pulling it down and tying it, tying the sac and twisting it and turning it up under the aponeurosis, and so on, all of which in many cases may be quite successful in attaining the object aimed at, but are all done without the operator having the opportunity of actually seeing the neck of the sac, and being able to know for certain that he has succeeded in his attempt.

There are many cases, however, in which a condition exists, to those who look for it, which make it obvious that none of these methods will do away with the trouble at the internal ring. In long-standing herniae the ring of peritoneum at the neck of the sac (or at the internal ring) has become thickened and densely adherent to the structures round it, forming quite a firm ring of tissue,

* A paper read before the Witwatersrand Branch of the British Medical Association.