but the lower part from the umbilicus downwards was retracted. The margin of the liver was visible during respiration. The liver dullness in the mammary line measured $5\frac{1}{2}$ in., extending from the upper border of the third rib to $2\frac{1}{2}$ in. below the costal margin, behind it measured 6 in., and in the axillary line $6\frac{1}{2}$ in., extending from the fourth rib downwards. The circumference at the costal margin was $23\frac{1}{2}$ in., at the umbilicus it was $19\frac{1}{2}$ in. The margin of the lung expanded about an inch on inspiration over the dull area. Breath sounds were weak over the dull area in the axilla, elsewhere fairly marked vocal resonance and fremitus conducted. Heart normal, impulse fourth space in left nipple line. Respiration rapid, averaging 32 to minute. Temperature 100° at night. On palpating the liver there was distinct but regular enlargement of this organ below the ribs, but nothing like a cyst could be made out. The conclusion came to was that there was probably a hydatid in the liver pushing the lung upwards. An exploring needle introduced by Dr. Macalister two or three days later drew off pus.

Operation.—On August 7th, 1900, the patient being under chloroform, I put a large needle through the eighth interspace in the mid-axillary line and got clear yellow fluid, which had a foul smell. I again put the needle through the ninth interspace, with a similar result. I therefore cut down upon and removed a piece of the ninth rib in this region, and opened the chest. The lung which was healthy at once retracted, and the wall of a cyst bulged up at the lower part of the wound. I aspirated the cyst, and obtained fluid of the same character as before. Having drawn about 8 oz. off, I caught the cyst wall with forceps, and drew it up into the wound, sewing it to the soft parts so as to shut off the cavity of the chest. On opening the cyst freely a large quantity of fluid escaped and numbers of cysts of all sizes, some containing pus, and all being abominably fetid. I was now able to get away the whole lining of the cyst in one piece, and having washed out the cavity I put in a full-sized drainage tube, and packed it around with gauze. The girl stood the operation well.

Progress.—The temperature, which at the time of operation was 99.6° , ran up to 102° at the night of operation. The pulse was 120, and the respirations 64. For several days I was very anxious about her on account of the quick respiration and pulse, though her temperature kept low, but everything gradually quieted down, and she made a perfect recovery, leaving the hospital at the end of November with the wound soundly healed and with normal physical signs on the affected side of the chest. The discharge from the wound for many weeks was bile-stained and most profuse.

CASE II.—Abscess of the Liver opened through the Chest Wall.

History.—James McC., aged 37, a fireman, was admitted to the Royal Southern Hospital on December 4th, 1901, and placed under the care of Dr. Macalister. The history he gave was that in February, 1901, he had an attack of malarial or swamp fever in India, but no previous illnesses. There was also a doubtful history of dysentery. Eight days before admission he was seized with pain in the right side of the chest, low down, which had been getting steadily worse, and in addition to this he had a troublesome cough.

State on Admission.—There was slight tenderness over the right side of the chest, with impairment of movement. Wooden dullness, extending upwards to a level with the right nipple. The breath sounds were diminished, and almost inaudible, and vocal resonance and fremitus were also diminished laterally and behind. In front there was skodaic resonance at the right apex, and the breath sounds were somewhat bronchial and cavernous; pectoriloquy was present. The left lung was normal. The apex beat was outside, and on a level with the left nipple, evidently being pushed over by fluid in the right side. The pulse was 120, irregular, of small volume, and low tension. Bowels were constipated. Urine acid 1020 , and the temperature varied between 99° and 101.5° . The patient lay on his right side, and was sweating profusely. An exploring needle gave a negative result. On December 6th I saw the patient with Dr. Macalister. He looked white and ill; the right side of the chest was dull, and there was an absence of breath sounds; friction could be heard at the upper level of the dullness, and also when the patient turned on to his right side from his back, but this movement was attended by a good deal of pain. The liver could be felt below the ribs, and was somewhat tender and enlarged, but there was no sign of deep fluctuation, and it gave one the impression of being pushed down from above. The heart's apex was displaced, upwards and outwards. There was distinct tenderness on deep pressure in the interspaces over the right side of the chest below, and oedema with some bulging of the chest wall. The man had a bad cough, attended by profuse expectoration.

Operation.—On December 10th, the patient being under ether, I introduced a big needle between the ninth and tenth ribs in the mid-axillary line, and at once got pus. I next exposed and removed $2\frac{1}{2}$ in. of the ninth rib and opened the pleural cavity. It was now evident that there was a large abscess in the liver, and the tension in the abscess cavity was so great that pus was escaping by the side of the needle. I therefore packed some gauze around so as to shut off the pleural cavity, and after allowing a good deal of pus to escape through the needle I freely incised the abscess wall, catching it with forceps and pulling it up into the wound. After allowing most of the contents to escape, I plugged the opening into the abscess cavity with a sponge and sewed the margins to the parietal pleura and chest wall, thus shutting off the cavity of the chest. I left the silk ligatures with which I did this long so that I could remove them easily when loose. In a previous case of hydatid opened in this way I cut the ligatures short, and one of them not separating kept the sinus open for a long time. I was now able to explore the abscess cavity, which was of large size, occupying the upper surface of the liver. It contained about a pint of chocolate-coloured pus, not offensive in character, and was lined by a soft pyogenic membrane. After gently scraping the walls of the cavity with a lithotomy scoop, I inserted a large double-barrelled drainage tube, and washed out freely with boracic lotion.

Progress.—The patient was rather collapsed for some hours after operation, but he rallied well, and the cavity was washed out daily. The symptom which gave him most trouble was the cough, probably due to the interference with his diaphragm. His pulse and temperature both dropped after the operation, and remained down until December 26th, when his temperature rose to 100° , and he was rather ill for about a fortnight. There was some pneumothorax, and as this complication occurred just after the removal of one of the six big silk ligatures holding the parts together, I think it possible that air entered through the aperture left by the ligature or by a minute separation of the edges of the wound. However, this cleared up gradually, the man put on flesh, his cough subsided, and he was discharged on February 6th perfectly well, and remained so when last seen some three months after operation. There was never any bile in the discharge from the wound nor was he at

any time jaundiced, so that it is probable that the abscess was situated between the capsule and upper surface of the liver.

The diagnosis in this case rested upon the fact that from the temperature, pulse, sweating, and oedema there was evidently pus either in the chest or liver. The tenderness on deep pressure in the intercostal spaces over the liver, and on that organ below the ribs, the bulging of the side of the chest, but not so much of the intercostal spaces, together with the aggravated pain on movement, made us suspect that the pus was in the liver, though of this one could not be certain.

The point which struck me was the danger of putting an exploring needle into a tense cavity like this without being prepared to open up freely or empty the cavity for the time being with the aspirator. If this had not been done in this instance, I am sure that the tension in the abscess cavity would have forced pus through the needle track into the pleural cavity, producing an empyema. The withdrawal of a portion of the contents before incising allowed the abscess wall to come well up into the wound, and thus avoided the necessity of a preliminary stitching of the adjoining pleural surfaces, and a more prolonged operation. Both of these cases were described at a meeting of the North Wales Branch of the British Medical Association, and both were transferred to me by my colleague, Dr. Macalister.

CASE OF LIVER ABSCESS IN A CHILD AGED TWO AND A-HALF YEARS.

By W. J. J. ARNOTT, B.A., M.B.,
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Abscess of the liver in childhood is almost unknown—it is said by Manson in his *Tropical Diseases* not to occur. Given, however, a predisposing condition, debility, and the same exciting cause as in adult life—namely, dysentery and its associated organism—there is no obvious reason why the disease should not occur, even if only rarely, in a child.

It was this view of the matter which led me to diagnose an abscess in the above case.

The child was admitted to the Civil Hospital on April 16th, 1902, with a history of a neglected attack of dysentery. The stools were typically dysenteric in character. In addition to dysentery the signs of commencing tubercle in the lung were present. The general aspect was tuberculous, complexion very pale, and somewhat waxy in hue, and the mucous membranes extremely anaemic. There was at no time any appearance of jaundice.

Treatment was carried out in the open air, and both the bowel lesion and lung affection rapidly improved, all dysenteric symptoms disappearing in little over a week.

The temperature in the evening had ranged to about 100° for the first ten days after admission; it then remained about normal for the next nine days. At the end of that time it rose to 100° , two days later to 102° , and for the ensuing fortnight the morning and evening temperature ranged irregularly between 101° and 104° . There was nothing in the chest to account for this rise of temperature, as now, three weeks after admission, all signs of pulmonary disease had disappeared. The abdomen was distended, and with a little pressure to displace the bowel the liver could be felt to be enlarged about two fingerbreadths below the ribs, and to about the same extent in an upward direction. On inspection there was a slight fullness in the contour on the right side in the hepatic region, which was absent on the left side. The respiration was almost altogether of the thoracic type, and there was a certain amount of "catch" in, and acceleration of, the breathing, with nothing in the lung to account for it. Beyond this slight respiratory embarrassment the child did not appear to suffer pain. The pulse was weak and rapid, ranging generally between 120 and 130. Vomiting now became a very troublesome symptom, the child being only able to retain very small quantities of nourishment, and exhaustion was clearly threatened. The pressure of an enlarged liver was regarded as the cause of this vomiting, and on May 17th an exploring trocar and cannula were inserted in the tenth interspace in the anterior axillary line. Pus escaped through the cannula at the first puncture. The skin was frozen with ether, and an incision was immediately made over the spot in the intercostal space; a drainage tube was inserted, about 12 oz. of pus being discharged through the tube. Next day the temperature had dropped from 103° to 99° , the vomiting had ceased, the child was much relieved and slept well. During the next four days the evening temperature was below 100° , the pulse was quiet, the abdominal distension had dis-

appeared, and the liver could not be felt below the ribs. At this stage a slight convergent strabismus was noticed for two days. Its ominous significance was not at once apparent; a day later, however, a hydrocephalic cry announced the presence of tuberculous meningitis. This was followed by convulsions, which lasted with intermissions till death took place thirty hours later, and six days after the abscess had been opened.

Though the ending to this case was disappointing, seeing that incising the abscess had afforded such marked relief, nevertheless, on account of the early age of the patient, I think it one worth recording.

NOTE ON A NEW METHOD OF PRODUCING HAEMOLYSINS.

BY

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By experiment we have found that if urine of a healthy man be injected two or three times subcutaneously into a rabbit, the serum of this rabbit acquires a marked haemolytic action on human red blood corpuscles.

When such serum is added to human red blood corpuscles, haemolysis occurs very rapidly. The following experiments illustrate our meaning.

First Tube contains ... { 15 drops of rabbit's serum. (This rabbit had received 3 injections of human urine.)
2 drops of washed human red corpuscles.
Result.—Haemolysis beginning after three minutes; complete in five minutes.

Second Tube contains ... { 5 drops of the same serum.
10 drops of salt solution at 7 per cent.
2 drops of washed human red corpuscles.
Result.—Complete haemolysis in eight minutes.

Third Tube contains ... { 1 drop of same serum.
14 drops of salt solution at 7 per cent.
2 drops of washed human red corpuscles.
Result.—Complete haemolysis in twenty-six minutes.

Fourth Tube contains ... { 5 drops of a 10 per cent. solution of same serum in normal salt solution (7 per cent.)
10 drops of 7 per cent. salt solution.
2 drops of washed human red blood corpuscles.
Result.—Complete haemolysis in forty-six minutes.

Fifth Tube contains { 2 drops of the same solution of serum as in the preceding experiment.
13 drops of 7 per cent. salt solution.
2 drops of washed human red blood corpuscles.
Result.—Complete haemolysis after fifteen hours.

Sixth Tube contains { 1 drop of the same solution of serum as in the preceding experiment.
14 drops of 7 per cent. salt solution.
2 drops of washed human red blood corpuscles.
Result.—Complete haemolysis after fifteen hours.

Seventh Tube contains { 1 drop of a 5 per cent. solution of serum prepared as before.
14 drops of 7 per cent. salt solution.
2 drops of washed human red blood corpuscles.
Result.—No haemolysis after fifteen hours.

A 0.66 per cent. solution of this serum, therefore, still possesses a fairly marked haemolytic action.

The serum heated to 56° C. during half an hour retains its haemolytic properties, though the appearance of this phenomenon is somewhat delayed.

The action of heat (56° C.) must be allowed to continue for five hours and a-half in order to completely destroy the haemolytic properties of some serums. If when the haemolytic properties have disappeared some serum of a normal animal be added, the serum regains haemolytic properties, though its action is still somewhat delayed.

First Tube contains ... { 15 drops of rabbit's serum (the same as in the preceding experiments) heated (56° C.) during two hours.
2 drops of washed (twice) human red blood corpuscles.
Result.—Haemolysis complete after forty minutes.

Second Tube contains ... { 15 drops of same rabbit's serum heated (56° C.) during three hours.
2 drops of washed human red blood corpuscles.
Result.—Haemolysis complete after fifteen hours.

Third Tube contains ... { 15 drops of same rabbit's serum heated (56° C.) during five and a-half hours.
2 drops of washed human red blood corpuscles.
Result.—Haemolysis absent after fifteen hours.

Fourth Tube contains ... { 15 drops of same rabbit's serum as in the preceding experiment.
2 drops of washed human red blood corpuscles.
10 drops of serum of normal guinea-pig. (This serum alone having no effect on human red blood corpuscles.)
Result.—Haemolysis complete after eighteen minutes.

Fifth Tube contains ... { 15 drops of same rabbit's serum as in the preceding experiment.
2 drops of washed human red blood corpuscles.
5 drops of serum of normal guinea-pig.
Result.—Complete haemolysis after twenty-five minutes.

Sixth Tube contains ... { 15 drops of same rabbit's serum as in the preceding experiment.
2 drops of washed human red blood corpuscles.
2 drops of serum of normal guinea-pig.
Result.—Complete haemolysis after fifteen hours.

Seventh Tube contains { 15 drops of same rabbit's serum as in the preceding experiment.
2 drops of human red blood corpuscles.
1 drop of serum of normal guinea-pig.
Result.—Haemolysis absent after fifteen hours.

The serum of a normal animal, therefore, does not replace completely the substance lost by heating, which was contained in the serum of the animal previously injected with urine. In another experiment with the serum of another normal guinea-pig the haemolytic properties were regained to a more marked extent, but nevertheless the delay still existed. The same result was obtained with the serum of normal rabbits.

It must be noted, also, that the serum of certain rabbits injected with urine does not show all these properties to so marked a degree, even when scrupulous care had been taken that the conditions of the experiment were exactly the same. Thus, one kind of serum after being kept for twenty-two days in the ice-box retained its haemolytic properties almost completely, whereas another after twelve days' keeping was but slightly haemolytic without the addition of serum of a normal animal. The second serum lost its haemolytic power after being heated to 56° C. for 1½ hours, whereas the first lost the same property only after 5½ hours' heating.

The serum produced by the injection of human urine is not altogether specific for human red blood corpuscles. It has, for instance, some action on the red blood corpuscles of guinea-pigs also, although the intensity of this action again varies greatly, as the following experiments show:

SERUM OF RABBIT A (PREVIOUSLY INJECTED WITH HUMAN URINE). SERUM OF RABBIT B (PREVIOUSLY INJECTED WITH HUMAN URINE).

Experiment 1.
Tube contains 15 drops of serum, 3 drops of red blood corpuscles (washed twice) of normal guinea-pig.
Result.—Haemolysis complete in eight minutes.

Experiment 2.
Tube contains 1 drop of serum diluted in 14 drops of physiological salt solution and 3 drops of red blood corpuscles (washed twice) of normal guinea-pig.
Result.—Haemolysis complete in one hour.

Experiment 3.
Tube contains 5 drops of a 10 per cent. solution of serum in physiological salt solution, 10 drops of physiological salt solution, and 3 drops of red blood corpuscles of guinea-pig.
Result.—Haemolysis in fifteen hours.

Experiment 4.
Tube contains 2 drops of a 10 per cent. solution of serum in physiological salt solution, 13 drops of physiological salt solution, and 3 drops of red blood corpuscles of guinea-pig.
Result.—Slightly haemolysis in fifteen hours.

Experiment 5.
Tube contains 1 drop of a 10 per cent. solution of serum in physiological salt solution, 14 drops of physiological salt solution, and 3 drops of red blood corpuscles of guinea-pig.
Result.—No haemolysis in fifteen hours.

Whereas a 1.3 per cent. solution of serum No. 1 therefore has still some slight haemolytic action on the red blood corpuscles of a guinea-pig, a 3.3 per cent. solution of serum No. 2 has no haemolytic action.

The specificity of these serums is not absolute, and becomes more evident the more they are diluted and the longer they