GELATINIFORM DEGENERATION OF HYDATID CYSTS.

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THE patient was a man of about forty, by trade a licensed victualler. He first came under the care of Dr. Mitchell Bruce in September, 1890, for "rheumatic" pains in several of his joints, muscles, and nerve-sheaths. At this time a small patch of fine crepitations was discovered in the right mammary region, which was referred to an associated local pleurisy. He was much benefited by a visit to Droitwich, but was seen again some six weeks later for occasional appearances of blood in the sputa, hepatic derangement, and an albuminous, bilious condition of the urine.

In the following May (1891) Mr. Berrill, of South Woodford, discovered that the patient was suffering from

hydatid of the right lobe of the liver, and at a careful investigation of the case on May 12th we determined the physical signs represented on the accompanying diagram (fig. 1). It now became practically certain that the patch

FIG. 1.

of adhesive pleurisy, close above the right wing of the diaphragm, was associated with the hepatic disease, and had been the first evidence of its existence. Pain in the lower part of the right chest and right hypochondrium had become a prominent symptom. It was resolved to watch the case carefully for a month.

On June 9th the physical signs represented in the diagrams (figs. 2 and 3) were elicited. The liver proved to have increased considerably in size within the month. It had risen half an interspace, so that its upper border passed exactly through the right nipple; the percussion

Fig. 3.

Fig. 2.

Dull border
moves 1 in. in
respiration.

Percussion
border.

Palpable
border in deep
inspiration.

dulness in the right vertical nipple line had increased from $6\frac{1}{2}$ inches to $7\frac{1}{2}$ inches; and the inferior border was now readily palpable close above the umbilicus. The cartilages of the seventh, eighth, and ninth right ribs, and the right half of the epigastrium bulged markedly, constituting a well-defined considerable tumour, obviously connected with the liver. There was no increase of the pleuritic signs about the mamma, the upper limit of the tumour dulness moving an inch in respiration. Another evidence of the abdominal situation was the outline of the upper border of the dull area, which was arched or convex, as represented in the charts. By this time also the left lobe had considerably increased in size, and the heart was displaced somewhat upwards.

The characteristics of the swelling being those of hydatid cyst, exploratory puncture was decided upon. This was performed on June 23rd. A fine and clean aspirator needle was introduced to a considerable depth, but no fluid escaped, and no sensation was experienced of a cavity having been entered. A stilette was repeatedly passed, and this allowed a few small beads of a tough gelatinous material to escape. On withdrawing the canula, its barrel was found to be blocked with the same material. The gelatinous substance was strongly saline to the taste, and so like that commonly obtained from a colloid cancer, that we were at the time disposed to think that the original diagnosis was erroneous. Mr. Berrill prepared some microscopical specimens of the material, and on inspecting them the next day the characteristic hooklets of hydatids were evidently and certainly present, placing the diagnosis beyond doubt. No ill effects followed the puncture.

As the cyst had progressively enlarged, and was causing severe attacks of pain and great discomfort, it was considered very necessary to remove it; and as its contents were too solid to escape through a canula, abdominal section seemed the only feasible proceeding. The conditions and risks having been explained to the

patient, he decided upon having the operation performed, and it was carried out on the 30th of June. Dr. Bruce was present, Dr. Frederic Hewitt administered ether, and Mr. Berrill gave valuable and efficient assistance.

The skin of the abdomen, the hands of the operator, and all the instruments were carefully cleaned in carbolic lotion, but no germicides were employed during the operation. An incision was made about four inches long, oblique in direction, from above downwards towards the right, about two inches from the left lower rib cartilages. This incision was planned to expose the more prominent part of the tumour. The tissues, including the greater part of the rectus abdominis muscle, were divided down to the peritoneum without the aid of a director. The abdominal walls were very muscular and vascular, many vessels requiring ligature. When all the bleeding had been arrested, the peritoneum was divided to the extent of the original wound. We had expected to find the cyst wall in close contiguity with the parietal peritoneum, but in this we were disappointed; neither by palpation of the exposed liver was it possible to obtain any evidence of fluctuation. An exploring trocar and canula was now passed into the liver, but it was not until this instrument had penetrated to the depth of three inches that the cyst was reached. The canula was passed in various directions, hoping to reach some fluid, and so reduce the bulk of the contents of the cyst; but nothing escaped save a few beads of the same tough, jelly-like material. The canula being left *in situ* as a guide, sponges were packed all round between the liver and the abdominal wall, and an attempt was made to reach the cyst by cutting through the liver substance with a scalpel. The bleeding was, however, so profuse that had this been persevered in, the patient would have lost much blood, and the peritoneal cavity would certainly not have remained free of clot and serum.

Fortunately the Pacquelin's cauterizer was at hand; and with the knife blade of this at a dull heat, an incision was

carried through the liver substance until the cavity of the cyst was reached. The bleeding was even now free, but easily controllable by sponge pressure. Two strong "stay" silk ligatures were passed through the walls of the cyst, the liver, and the abdominal parietes on either side. Owing to the depth of the cyst, and the thickness of the abdominal wall, this was not effected without much difficulty. The liver was by this means brought close to the abdominal wall, and the escape of the contents of the cyst guarded against during evacuation of its cavity. The second stage of the operation, that of emptying the cyst, was now commenced, and this was efficiently done with a common table-spoon, as recommended by Tait. The cyst may truly be said to have been solidified throughout. In the centre there was a tendency towards diffuence, but still there was no distinct accumulation of fluid. The material scooped out by the spoon was gelatinous and firm in consistence like ordinary jelly. It was opaque, of a pale green tint, and intimately mingled with myriads of secondary cysts. These varied in dimensions; some were the size of a small apple, others about the size of grapes, but the majority appeared to be unusually small. Most of them seemed to be in an active state of life, as evidenced by their containing pellucid fluid, and possessing laminated capsules. The cysts and the firm jelly in which they were situated filled a large wash-hand basin to the brim. As much as possible of the laminated membrane of the "mother cyst" was removed, and its extent determined. It was of very large size. Above, it seriously thinned the diaphragm, and encroached upon the thorax; below, it extended to the lumbar vertebræ; behind, it lay in contact with the spine and great vessels. The wall of the cyst was so thin in some places, that much exploration was not deemed advisable. The great cavity was now repeatedly flushed out with a powerful stream of hot water; and lastly, the liver was more intimately attached to the margins of the abdominal wound. The sponges were removed one by one; and well soaked fishing-gut sutures

were passed through the liver and cyst on the one hand, and the peritoneum and abdominal parietes on the other. The insertion of these was again very difficult, owing to the thickness of the abdominal wall and the depth of the cyst. When the suturing was concluded the liver seemed to be well attached. A large tube was inserted into the cavity, and extensive dressings of iodoform, sal alembroth wool, and wood wool were applied. The operation, from the commencement to the termination of the dressing, lasted one hour and ten minutes. There was no marked shock at its conclusion. A small portion of the gelatinous material was further examined on the same evening. It coagulated firmly with heat and nitric acid, and on being shaken up with distilled water gave a copious precipitate of chlorides with nitrate of silver. Under the microscope it was perfectly amorphous, and "hooklets" were sparsely distributed through its substance.

The after progress of the case may be summarised: The patient rallied well from the operation. The temperature rose on the second day to 101° , and then fell. There was no abdominal pain or tenderness, and the wound did well. About the third day, however, mild delirium came on, and this increased to violence, having all the characters, such as delusions and tremor, associated with the delirium of alcoholism. Finally, the patient refused nourishment; and despite all efforts on the part of Mr. Berrill to sustain his strength, he died on the eighth day. The treatment employed was daily dressing of the wound, washing out the cyst with warm and dilute iodine and water, and the free supporting of the strength by nutrient enemata containing laudanum. The discharge was a little bile-stained and quite free from fœtor, and there was evidence that the cyst had greatly contracted. A complete post-mortem examination was refused, but Mr. Berrill informed us in a note that the cyst and abdominal wound had intimately united, that the wound looked healthy, and that there was no peritonitis. The local conditions were therefore all that one

could desire, and we are inclined to attribute the unfortunate termination to the previous alcoholic condition of the patient.

Notwithstanding the unfavourable result of the treatment of this case, we have thought right to bring it before the profession, because it is an example of a condition of hydatid cyst obviously fraught with much clinical importance, and because it adds another item to the surgery of an important viscus.

It will be convenient to first draw attention to the subject of solidification of hydatid cysts in general, and to gelatiniform degeneration in particular, mentioning its clinical and pathological aspects. We propose to conclude by shortly referring to the surgical measures adopted in this, and advisable in similar cases.

Doubtless the best known and most common cause of solidification of hydatid cyst is caseation of the contents, followed by calcification and shrinkage. This degenerative process, a kind of spontaneous cure, is treated of by many authors, and is in the experience of all who have been much engaged in practical pathology; we need not further allude to it.

The next variety of solidified hydatid to which we wish to refer has not received the general attention which it deserves. Its clinical symptoms are misleading during life, and even post mortem its true nature is sometimes misunderstood. We refer to that variety of hydatid disease known as "*echinococcus multilocularis*." A distinct tumour is formed, with a fibrous capsule and a tough stroma. In the interstices of this stroma is a gelatinous material, so that the appearance, to the naked eye, is much like alveolar cancer. Only microscopical examination and minute inspection determine the true nature of the disease. Much discussion has arisen whether the cysts are developed along the lymphatics or the blood-vessels; possibly both conditions occur. Among the writers who have given good accounts of this important variety of hydatid may be especially mentioned

Niemeyer,¹ Frerichs,² and Leuckart.³ It may be especially pointed out that no fluid would be obtained on aspiration, and that the removal of the tumour would be peculiarly difficult owing to the infiltrating nature of the hydatid growth.⁴

We have ventured to apply the term *gelatiniform degeneration* to the peculiar condition exemplified in the case which we have now related. We may preface our remarks by saying that this degeneration must either be rare, or that it has been disregarded by pathologists. We have carefully looked through the scattered literature of hydatid disease, and, with a few exceptions, we do not find any marked allusion to this condition. Gardner, in his well-known article on the treatment of hydatid disease in Australia, does not mention it, though he tabulates forty-two cases, and his experience is undoubtedly large.⁵ Graham, whose experience was also obtained in Australia, does not formally draw attention to the condition. He has, however, obviously seen it, for he states that the contents of dead cysts are sometimes tough, tenacious, and colloidal, so that they will not flow through a canula.⁶

Perhaps there is no more valuable information to be obtained regarding hydatid disease in this country than that found in the Thesis of Dr. Balding.⁷ He tabulates all the cases of hydatid published in this country by the leading authors, as Harley and Murchison, and from the principal medical journals for the previous fourteen years. He collects the large number of 258 cases. In 198 of these express particulars are given of the nature of the fluids evacuated. In two instances the contents of the

¹ Niemeyer's 'Practical Medicine,' p. 673.

² Frerichs' 'Clinical Treatise on Diseases of the Liver,' vol. ii, p. 271.

³ 'The Parasites of Man,' by Leuckart. Translated, &c., p. 624.

⁴ See also Graham, 'Hydatid Disease in its Clinical Aspects,' p. 63.

⁵ 'Glasgow Med. Journal,' 1886, p. 368.

⁶ 'Hydatid Disease in its Clinical Aspects,' by James Graham, M.D., p. 48.

⁷ 'Hydatid Disease of the Liver, its Diagnosis and Treatment,' by Mortimer Balding, M.D., 1880.

cyst are said to be gelatinous. We think this good evidence of the infrequency of gelatiniform degeneration. One of the instances above mentioned is obtained from Harley's well-known table in the Society's 'Transactions,'¹ A hydatid tumour burst spontaneously near the umbilicus of a woman, and a pailful of a peculiar gelatinous material escaped. In the second instance Dr. Andrew relates in the 'Lancet' for 1875,² that the fluid was glairy and gelatinous. As upwards of an ounce of fluid escaped through the aspirator, the contents of the cyst could scarcely be considered as purely gelatinous in this case.

Dr. James Barrett, of Melbourne, relates a case in the 'Australian Medical Journal'³ which is of great importance, and to which we will briefly allude. A man aged twenty-seven had a large swelling in the left hypochondrium, which presented all the characteristics of hydatid disease. It had previously been tapped, but nothing had escaped. The swelling was now again tapped, but nothing "came out." A fine stilette of whalebone was passed down the canula. Still no fluid was obtained. The patient died a few days afterwards with rigors, vomiting, pain, and fever. At the autopsy the diagnosis was verified. There were two hydatid cysts: a superior one containing decomposing fluid, and being on the point of bursting; an inferior cyst into which the trocar had penetrated. This lower cyst was full of secondary cysts undergoing gelatinoid degeneration. In an article in the 'Medical Times and Gazette'⁴ Dr. Barrett refers to this case. "No one could understand," he says, "why no fluid came away from a distinct cyst, and why the stilette was not even moistened. However, the gelatinoid degeneration explained it." In the same article he refers to another case where the change had just begun.

There seem to be gradations in the process, from fluid

¹ 'Med.-Chir. Trans.,' vol. xlix, p. 144, 1866.

² 'Lancet,' p. 799, December 4th, 1875.

³ 'Australian Med. Journal,' June 15th, 1883.

⁴ 'Med. Times and Gazette,' 1883, vol. ii, p. 680.

which is glairy and colloidal, to complete gelatinous solidity. We regret that a detailed chemical examination was not made of the material in our case. From the characters already related, and especially from its highly albuminous nature, we are disposed to look upon it as produced by a colloidal degeneration of the capsules of the secondary cyst, brought about by their mutual pressure. The faint greenish colour may be due to the admixture of biliary fluids, or of the mucus from the bile-ducts. Looking upon the process as a degeneration, it is possible that death of the entire parasite may ensue, with caseation and subsequent shrinkage. In appearance the substance resembled mucin, but its highly albuminous character negatived the view that it possessed this composition. It is possible, however, that the material may have been formed by mucin from the bile-ducts mingled with albuminous substances from other sources, such as the walls of the secondary cysts.

The case which we have related, and the few similar cases to which we have been able to refer, illustrate the clinical importance of the condition. It is evident that no fluid can be obtained from a cyst of this nature, and hence the diagnosis may be dubious or misunderstood. It is obvious that the treatment of gelatinous cyst is beset with graver risks than is the treatment of the ordinary hydatid containing abundant fluid.

The general operative treatment of hydatid of the liver has been fully discussed in Gardner's article;¹ in the 'Australian Medical Journal';² by Graham;³ and by Davies Thomas. A very complete account of the operative treatment of echinococcus cysts is given in an article by the last-named in the 'Transactions of the Intercolonial Medical Congress of Australasia.'⁴ In all the cases treated

¹ 'Glasgow Med. Journal,' 1886.

² 'Australian Med. Journal,' 1888.

³ 'Hydatid Disease in its Clinical Aspects,' p. 145.

⁴ 'Transactions of the Intercolonial Medical Congress of Australasia,' Series ii, p. 352, "The Operative Treatment of Echinococcus Cysts," by Davies Thomas, M.D.; see also an article by Gardner, p. 345.

by direct hepatotomy it seems to be assumed that the cyst itself was exposed by the incision, and the knife used for opening it. No especial mention is made of the fear or treatment of hæmorrhage. Tait, in the cases published in the 'Birmingham Medical Review,'¹ alludes to division of liver substance. He used the knife in all cases to open the cyst. In one instance, liver tissue from a half to three quarters of an inch thick was divided, but there is no special mention of bleeding. In another case he states: "The thickness of liver substance through which I passed was nearly an inch, and I had some little trouble with hæmorrhage, which was, however, completely controlled by pressure." In 1883 Croft attempted to excise a pyriform hydatid of the liver,² and it is stated that the parenchyma of that organ bled so freely that he abandoned the attempt, and had recourse to other measures. Greig Smith, in his well-known work on 'Abdominal Surgery,' makes no great point of the treatment of hæmorrhage in hepatotomy.³ "Bleeding," he says, "may be arrested by a squeeze with pressure forceps, or if this fail, by a continuous suture of not too fine silk." It is obvious, again, that he is considering those cases of cyst or abscess where the layer of liver tissue between the cyst and the operator is insignificant. Jacobson, in his recent work on the 'Operations of Surgery,' follows the practice of Tait in using the knife, plugging the opening thus made with the finger, and subsequently enlarging it by the same means. Hæmorrhage would be arrested by the pressure of the fingers, or by sponge pressure.⁴

The thermo-cautery was used by Rauschoff in 1882 for opening hepatic abscess.⁵ It is stated that about half an inch of liver tissue was divided by this instrument. Treves, in his recent work on 'Operative Surgery,' quotes

¹ 'Birmingham Medical Review,' vol. x, pp. 345—351.

² 'Med. Times,' November 24th, 1883, p. 597.

³ Greig Smith, 'Abdominal Surgery,' p. 584.

⁴ Jacobson, 'The Operations of Surgery,' 2nd edit., p. 844.

⁵ 'New York Medical Record,' vol. xxii, 1882, p. 260.

a case when Tarsini dissected out a hydatid cyst of the liver. Bleeding, which was very considerable, was checked by ligature and temporary pressure, the patient recovering.¹

The point of primary surgical importance in the case related is the question of incising liver substance. Should the cyst be in close proximity to the surface the operation is much simplified, for it may be safely opened with a scalpel. But when some three inches of liver substance have to be divided, it requires considerable hardihood to incise it boldly with a scalpel, with the knowledge that large venous channels may be opened, and that uncontrollable hæmorrhage may ensue. The bleeding seemed to us to closely resemble the hæmorrhage from a wounded kidney; and we cannot but think that exposure, time, and sponge pressure would be equally efficacious in checking bleeding from divided liver as divided renal tissue. A free opening into the cyst is very important. It enables all the contents, and especially the shreds of laminated membrane, to be removed. A very large drainage-tube can also be inserted. This insures the cyst being well washed out, and facilitates the escape of the shreds of membrane which subsequently separate.

This case also illustrates the extreme difficulty of ascertaining the relation of the cyst to the parietes, and shows us that the greater prominence externally does not necessarily correspond to the most superficial part of the cyst internally.

Looking upon gelatiniform hydatid in the light of a degeneration, the surgeon will do well to ascertain whether the cyst is in progressive growth, and causing symptoms grave enough to justify operation, before he advises a proceeding which must be attended with some risk.

We would here enunciate the following propositions:

- (1) That gelatiniform hydatid is rare.
- (2) That when it occurs the diagnosis is difficult, owing to the non-escape of fluid, but that microscopical examina-

¹ Treves, 'Operative Surgery,' vol. ii, p. 457.

tion of the material in the barrel of the aspirator will aid an exact diagnosis.

(3) That supposing the conditions justify it, abdominal section and evacuation of the cyst by operation afford the best chance for recovery.

In conclusion, we venture to hope that this case and paper may add somewhat to our knowledge of the clinical diagnosis of hydatid cysts, and also may be a small but not unimportant addition to hepatic surgery.