

A case of pancreatic cyst successfully treated by abdominal section and bandage / by G. Newton Pitt and W.H.A. Jacobson.

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A C A S E

OF

PANCREATIC CYST

SUCCESSFULLY TREATED BY ABDOMINAL SECTION
AND BANDAGE.

BY

G. NEWTON PITT, M.D.,

AND

W. H. A. JACOBSON, M.CH.

Read June 9th, 1891.

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1891.



A CASE OF PANCREATIC CYST

SUCCESSFULLY TREATED BY ABDOMINAL SECTION AND DRAINAGE.

BY

G. NEWTON PITT, M.D.,

AND

W. H. A. JACOBSON, M.CH.

Received March 10th—Read June 9th, 1891.

BENJAMIN MCG—, æt. 21, a slater, was admitted into Guy's Hospital under Dr. Perry with jaundice and epigastric pain on May 29th, 1889. A sister in the previous year had had an attack of jaundice, which had lasted for a short time, for which no very obvious cause was found. He has been a free drinker of beer and spirits.

Three years ago he received a kick in the abdomen, which caused him severe pain and sickness, confining him to bed for three weeks. There was no external bruising, no hæmatemesis, and no melæna. Ever since the accident he has been liable to attacks of pain, which last from a few hours to a week. The attacks have no relation to food, they are often more severe in the night, and at times are accompanied with sickness.

In 1888 he had an attack of jaundice, which lasted for two or three days. Three weeks previous to his admission he became jaundiced, and its intensity has increased

gradually. His skin has itched severely; his abdominal pain at the present time is not more severe than usual. He has been sick on several occasions, and his appetite has been bad.

Condition on admission.—A sparely built man, with very thin limbs, which condition he says is of recent date. He is markedly jaundiced; the skin is covered with scratch marks. There are no evidences of syphilis; his fingers are very slightly clubbed.

His bowels are constipated, his appetite is bad, there is a constant feeling of nausea, and when the pain is severe, he is sick.

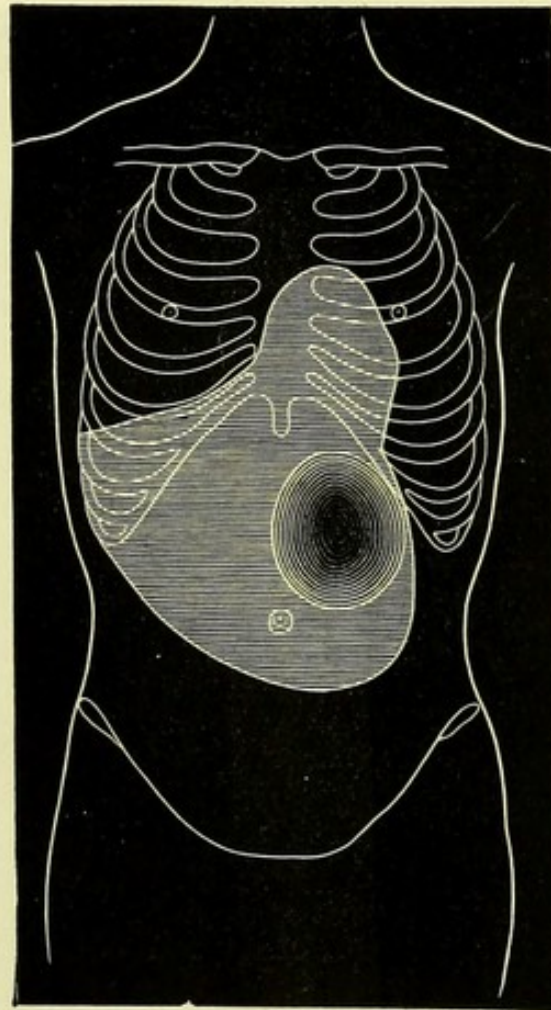
The abdomen moves normally; the muscles in the epigastric region are rigid. On percussion, there is dulness in the middle line, from the xiphoid cartilage to half an inch below the umbilicus; on the left it extends rather lower down, and outwards as far as the border of the rectus. Towards the right the area of dulness curves upwards to the margin of the ribs. In the left portion of the epigastric and umbilical regions an elastic, ovoid mass can be felt, with a well-defined edge, moving with the liver in respiration. It is tender, and there is a continuous pain. No fluctuation can be made out.

He has also attacks of pain of a much more severe character, always localised in the same area, of a dull aching character, usually worse at night. The pain has none of the characters of hepatic colic, never radiating to other parts; it is never sufficiently violent to double him up. He has had no rigors; the spleen is not palpable. The respiratory, circulatory, and nervous systems are normal. The urine is of sp. gr. 1022, acid in reaction, dark brown in colour. It contains bile-pigment, but is free from albumen and sugar.

June 3rd.—The amount of pain has been very variable, but was more severe last night. The note on percussion has quite altered to-day. Over the swelling, and towards the right, the note is hollow and of a boxy character, though duller here than in the epigastrium. On bobbing the finger

down suddenly on to the abdominal swelling, air and fluid are displaced with a sudden gurgle from over the swelling, and less markedly from over the right side. The edge of the liver is still palpable. The patient took iodide of potassium, with hyoscyamus at night when necessary, and belladonna was applied locally.

FIG. 1.



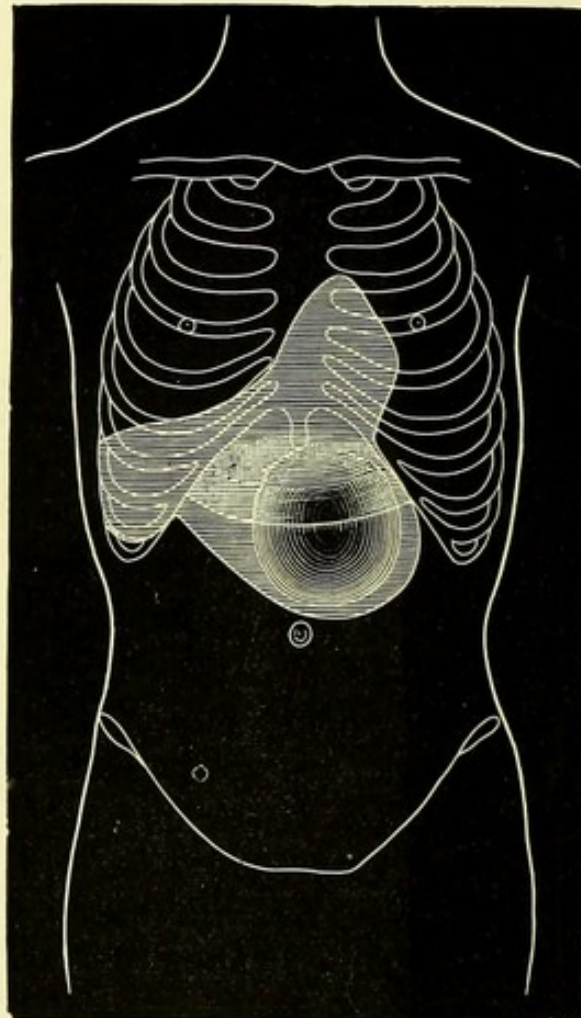
The area which, early in June, 1889, was dull on percussion, is shaded with horizontal lines. The projecting mass of the tumour is also indicated.

13th.—Mr. Symonds aspirated the swelling this afternoon, drawing off ten ounces of opaque greenish fluid, alkaline in reaction, sp. gr. 1015, containing abundant albumen, but no bile. Under the microscope red blood-cells and a few pus-cells were visible, but no echinococcus

hooklets. The swelling was much reduced in size. After the tapping the patient had increased pain, which was relieved by a morphia injection.

14th.—The patient is much freer from pain this morning, the jaundice is less marked, and the lower limit of the dulness has receded two inches.

FIG. 2.



The area which is shaded with horizontal lines was dull on percussion in August, 1889. The prominent portion of the tumour is also indicated.

16th.—The pain has again increased considerably, and the region of the swelling is very tender. The pain together with the jaundice and the swelling gradually diminished, so that on the 26th the patient was able to go home, there being only a slight amount of jaundice.

At the end of July the pain returned; it was continuous and increased in severity. The patient was readmitted under Dr. Newton Pitt on August 12th, it having been noticed that the swelling had returned a week previously. He was still jaundiced.

Condition on readmission.—There is a deep-seated tumour in the upper part of the abdomen, which pushes forward the abdominal walls in the epigastric and umbilical regions from one to one and a half inches, extending further to the left than to the right of the middle line. The left flank is the fuller; the umbilicus is depressed. On palpation the swelling is found to extend for some distance transversely, especially to the left.

The surface is convex and uniform, except for an ill-defined transverse rounded ridge across its most prominent part. The rounded swelling can be felt reaching from below the tip of the ensiform cartilage to just above the umbilicus, and laterally to near the tip of the eleventh rib, especially on the left side. The right rectus is more tense than the left, but the abdominal walls are rather flaccid. The tumour moves down freely on inspiration, otherwise it possesses little or no mobility, and gives the impression of being attached to some deep-seated structure. There is a transmitted impulse synchronous with the pulse, but the impulse is not expansile. The tumour feels hard and firm, no fluctuation can be made out. On pressure just below the ensiform cartilage, gurgling can be made out. No other abdominal tumour can be felt.

Measurements.—The tumour measures vertically five inches, and transversely seven and a half.

	Inches.
From the umbilicus to the ensiform cartilage is . . .	5 $\frac{1}{4}$
„ „ „ pubes . . .	5 $\frac{3}{4}$
„ right anterior superior spine to the ensiform cartilage	10
„ left „ „ „	9 $\frac{1}{2}$
The left half-circumference from the umbilicus to the spine is	13
The right „ „ „	13
The left half-circumference from ensiform cartilage to the spine is	14 $\frac{1}{4}$
The right „ „ „	15 $\frac{1}{8}$

On percussion there is dulness over the most prominent part of the tumour, and around this an area of tympanitic resonance. To the right the dulness merges into that of the liver; on the left the stomach resonance is normal, except near the middle line, where it is encroached upon by the tumour dulness; the tympanitic note here not being quite so clear as normally. There is tympanitic resonance between the tumour and the margin of the ribs on the left side. The resonance over the lower part of the abdomen is normal, except for a slight deficiency in the left flank. The liver dulness is normal, and there is no evidence that the margin extends beyond the ribs.

The splenic dulness is normal. No hydatid thrill can be made out.

The bowels are constipated. The urine is of a sp. gr. of 1015, acid, free from deposit, sugar, and albumen. It is dark-coloured from the presence of bile-pigment, and contains 3 per cent. of urea.

August 14th.—The physical signs have changed considerably to-day. On palpation the tumour was found to be less superficial, and could not be traced over as large an area as that of yesterday. To-day in front of the tumour there is a sac containing fluid, which by bobbing suddenly can be made to gurgle and splash. On light percussion there was tympanitic resonance over the surface of the tumour, with an occasional succussion sound. The stomach resonance extended from its normal confines over the surface of the tumour, reaching nearly to the right limit of the epigastrium.

Again to-day the same changes in the physical signs were observed. Before food the tumour dulness was extensive and superficial; after food there was every evidence that the stomach lay between the tumour and the abdominal wall.

16th.—When the stomach was empty, and the tumour gave a dull note on percussion, a seidlitz powder was administered in two parts in order to distend the viscus with gas. Succussion could now be readily obtained over

the tumour area, and the note on percussion was tympanitic. It was, therefore, clearly proved that the stomach lay in front of the tumour.

17th.—The patient was kept without food in the morning, and in the afternoon a trocar and canula (one sixteenth of an inch in diameter) were passed into the tumour near the seat of the old puncture, and eight ounces of fluid drawn off. The canula was withdrawn before the fluid had quite ceased to flow.

The fluid was alkaline, sage-green in colour, sp. gr. 1013, containing 11 grams per litre of albumen. It contained no copper-reducing substance, and fuming nitric acid gave no bile reaction. When the fluid had settled for twelve hours, numerous small white particles had gravitated to the bottom, but the fluid still remained turbid.

Under the microscope the turbidity was found to be due to innumerable collections of globular masses and of scattered crystals. The crystals were colourless, acicular, and somewhat curved. Most of them were aggregated into globular masses, but some were arranged in bundles.

When treated with H_2SO_4 and Fe_2Cl_6 the purple reaction of tyrosin was obtained. The crystals were those of tyrosin; no leucin could be detected either by chemical reaction or by the microscope. When the fluid had been allowed to stand in a warm place for twenty-four hours with some starch, it contained a copper-reducing substance. On decomposition the fluid gave off abundance of H_2S , but even after four days the red blood-cells retained their form. At this time decomposition bacteria abounded. From the position of the stomach as mapped out by percussion during different stages of distension it was clear that the trocar had passed through both its walls to reach the tumour; this was also corroborated by its site at the time of the operation. No food was given by the mouth for twenty-four hours, but the patient was fed by nutrient enemata. During the succeeding twenty-four hours the pain was very severe, necessitating subcutaneous injections of morphia.

19th.—The tumour has partially refilled, and is tense.

21st.—The tumour is as large as on admission.

Mr. Jacobson saw the patient in consultation with Dr. Pitt, and it was agreed that the tumour was a pancreatic cyst, which was rapidly becoming so tense and painful that it was desirable to drain it as soon as possible. The necessity for the operation and its dangers having been placed before the patient, he was desirous that it should be performed.

These cysts have several times been correctly diagnosed, either from their site or from the character of the fluid obtained by aspiration. In this case, the evidence that the tumour was a pancreatic cyst appeared to be conclusive. The nature of the fluid contents (amylolytic and containing tyrosin) and the symptoms agree with those which have been met with in undoubted pancreatic cysts, and the tumour was situated behind the stomach in the region of the pancreas.

Further evidence appeared unnecessary, and could only have been furnished by a post-mortem examination.

22nd.—The patient has steadily emaciated since his admission, although even then he was very thin. He has more or less constant severe abdominal pain, with frequent exacerbations. He is jaundiced, and is most seriously ill; there can be no doubt that surgical interference offers him the only chance of recovery. The tumour is more prominent, and occupies a larger area than on admission. Over the tumour there is complete dulness, which extends more to the right than to the left, and is continuous with that of the liver. At 2 p.m. Mr. Jacobson opened the abdomen, using the carbolic spray. A longitudinal incision three inches long was made one and a half inches to the left of the middle line, extending to within an inch of the umbilicus. The parietal layer of the peritoneum was divided and attached to the skin round the cut edge, by means of sutures at intervals of one third to half an inch, care being taken that no muscle intervened between the two surfaces that it was desired to unite. This was rather difficult to accomplish, as there was great tension owing to the size and

bulging forward of the cyst. At the upper part of the opening the lower edge of the liver could be seen moving with the respiration. Below this, covering the tumour, was a smooth, reddish, vascular surface, which bulged strongly forwards.

Taking this to be the part of the cyst which had been ascertained before the operation to be dull on percussion, Mr. Jacobson intended to leave this for twenty-four hours, to become adherent before it was incised. The result showed that if this had been done the scalpel would have passed through the walls of the stomach. The surface of the cyst being again scrutinised Mr. Jacobson thought that he found evidence of involuntary muscular fibre, which threw doubt upon the swelling being pancreatic. The wall of the supposed cyst being examined between the fingers, proved to be the empty stomach stretched tightly and smoothly over the subjacent cyst. To explore this the stomach was drawn upwards, so that it might be packed away above under the liver. But then arose an embarrassing difficulty. As the stomach, which was tightly jammed between the bulging cyst behind and the abdominal wall in front, was raised, the omentum came up into the wound in front of the cyst. The tension of the parts was so great, owing to the rapid increase in the cyst, that there was no room above in which to pack away the omentum. Pushing this to either side, regions already fully occupied, pulled the stomach down again over the cyst. The greater part of the omentum was accordingly drawn out of the wound. Some of it was tied with gut and cut away, but much of it was left heaped up on the abdominal wall on either side of the incision. One or two catgut sutures retained this in position. The two layers of omentum which (just below the stomach) still lay in front of the cyst were next scraped through, exposing the surface of the cyst for a space the size of a shilling. This was very vascular, and so extremely tense that it was not thought advisable to put in a guiding suture. Thus there was a somewhat conical passage leading from the abdominal incision, through a mass of omentum,

down to the anterior surface of the cyst. Iodoform having been dusted on, dry sal-alembroth dressings were applied.

It is easy to see now, after the event, that with so large a cyst, and one that made tension and displacing pressure upon its very important surroundings, it would have been better surgery to have emptied the cyst at once, either by means of a large trocar and tubing, or by opening the cyst freely, seizing the cut edges with Spencer Wells' forceps, and thus holding the cyst well forwards, while the patient was turned on his side. The cyst would then have been sutured to the parietal incision in the usual way. This course would have prevented the very grave risk which befell the patient a little later.

23rd.—The patient was fed every three hours with nutrient enemata, and only a very little iced water was allowed by the mouth. At midnight he was very collapsed and in great pain, in spite of a subcutaneous injection, at 6 p.m., of a third of a grain of morphia. His pulse was 130, and was feeble. The injection of morphia was repeated, but his pulse became more rapid, reaching 163 at 2 a.m. At 3 a.m. his condition was so precarious that Mr. Jacobson let out with a hydrocele canula twelve ounces of fluid, which had been pent up under such high tension in the cyst as to spring forwards for several feet. The rest of the fluid was removed through a large canula, the sac was incised, and a large drainage-tube was inserted. The adhesions of the omentum to the abdominal wall were but slight. Sal-alembroth dressings were reapplied. The urine contained albumen and a trace of sugar.

24th.—The urine is acid, sp. gr. 1027; it contains neither casts nor sugar, and only a trace of albumen. The fluid evacuated from the sac is dark port wine in colour, sp. gr. 1029, and gives a spectrum of methæmoglobin. The fluid becomes solid on boiling. Under the microscope there are leucocytes, red blood-cells, and large epithelioid cells, with many fat granules visible. The patient's condition is better to-day, his pulse is 160; his temperature in the

morning was 100° , but it became normal in the evening. In addition to the rectal nourishment, he has taken by the mouth two drachms of brandy and half an ounce of champagne alternately every half-hour. He has had morphia both subcutaneously and in a suppository.

25th.—During the past twenty-four hours he has improved considerably, his pulse has become stronger, the rate has decreased to 116, and the jaundice is less marked. The morning temperature reached 100° , and he still feels depressed. He has taken by the mouth brandy, port wine, and half a pint of milk.

26th.—From this time he steadily improved, the jaundice gradually disappeared, the temperature remained normal, and he was almost free from pain.

29th.—The abdomen is dressed twice daily, the discharge consists of about a drachm of dark treacly fluid. The urine is normal.

September 4th.—The irritation set up by the discharge has produced a vesicular eruption round the incision.

12th.—The discharge has become serous.

20th.—The drainage-tube was removed, leaving a sinus one and a quarter inches long. He has a pain in the hypochondrium after drinking.

22nd.—He was up for the first time; the sinus is practically closed, only a few drops of fluid exuding. The omentum had by this time shrunk and shrivelled away, having merged in the granulations round the wound. He went home shortly afterwards with the sinus completely closed. He felt well and had regained flesh.

There are several features of interest in this case.

In the first place it is the only instance in Great Britain, with the exception of Prof. Annandale's case, in which a pancreatic cyst has been correctly diagnosed previous to drainage.

The formation of the cyst was attributed to a kick in the abdomen, which the patient had received three years previous to admission, since which time he has been liable to attacks of pain. When admitted, he was emaciated and

jaundiced, and there was also a history of a temporary attack of jaundice in 1888.

Among the recorded cases, jaundice was noticed three times, pain eight times, emaciation five times, a history of injury three times.

The nature of the fluid which was removed in June was similar to that usually found in pancreatic cysts; its alkaline, turbid, albuminous nature excluded the possibility of its origin from a hydatid, an omental, or a supra-renal cyst, or from a localised peritoneal collection.

When the patient was readmitted in August, 1889, it was clear that there was a globular tense cyst lying behind the stomach, and the fluid which was obtained from the second tapping was so characteristic that there was no doubt as to the diagnosis.

This fluid was alkaline, sage-green in colour, sp. gr. 1013, and turbid. It contained 1.1 per cent. of albumen, also tyrosin crystals in abundance, and a few pus-cells. It was free from sugar and bile-pigment, but contained a sugar ferment.

The intermittent character of the jaundice indicates that the cyst arose from the central portion of the pancreas, and when the cyst became tense it caused the jaundice by pressing upon the head of the pancreas and the common duct.

One of the most noteworthy features in the case was the almost fatal condition of collapse and cardiac failure which ensued thirty hours after the cyst was attached to the abdominal wall. This fixation necessarily caused some traction upon the solar and other nerve plexuses which lay behind the tumour, and the consequent nerve disturbance produced great cardiac depression. Within a few hours the patient was profoundly collapsed, with a very feeble pulse, over 160 per minute, and suffering intense abdominal pain. It was only by tapping the extremely distended cyst thirty-six hours after the operation that a fatal termination was warded off, and for many hours the patient's life hung in the balance.

Aspiration may be desirable in these cases for the purpose of diagnosis, but there is no evidence that it can ever be curative. With care there is not a great risk, but there is always the possibility, as has already happened in some cases, that the puncture may continue to ooze, and necessitate laparotomy at once.

Attempts to remove the cysts completely have with two exceptions proved fatal; while abdominal section, with drainage of the cyst, has been successful in nearly 90 per cent.

It is clear, therefore, that incision and drainage of the cyst is the treatment to be recommended.

We venture to submit to the Society the following points for discussion :

1. The mode of origin of cysts of the pancreas.
2. The diagnosis of these cysts, which since the publication of Professor Senn's papers have been proved to be far less uncommon than was previously thought.
3. The liability of hæmorrhage to take place into them, causing very grave and urgent symptoms as in our case.
4. The question of the advisability of puncturing them from the front.
5. The best site for opening and draining these cysts.

1. Mode of Origin of Pancreatic Cysts.

Injury has been a prominent feature in the history far too frequently to be neglected. Thus this was clear and marked in the cases of Kulenkampf, Fenger, Senn, Karewsky (two cases), Riegner, Treiberg, Cathcart, and our own. There was also an injury, but less clearly connected with the formation of the cyst, in the cases of Steele and Küster. The injury, even in so well protected a viscus as the pancreas, probably produces some laceration and extravasation. With the latter is mixed the constantly increasing fluid from a torn duct. As pointed out by Cathcart (l. c.), this collection of fluid probably becomes irritating, and thus excites the formation of a capsule about it.

Of the facility with which hæmorrhage may occur into such a cyst we have spoken later. Other theories, ingenious but as yet wanting in proof, have been put forward by Gussenbauer and Salzer. According to them these cysts originate in some digestive or corrosive action of the pancreatic juice upon the tissue of a previously diseased pancreas. A cystic pouch is thus formed, into which hæmorrhage may easily take place, either from a vessel on the wall of the cyst, or from one lying in an intra-cystic partition which has given way.

Finally Dr. Boeckel, of Strasbourg ('Des Kystes pancréatiques,' Paris, 1891), suggests that the relations of the pancreas, especially its head, with the duodenum, establishes a direct connection between the inflammations of the intestines and the origin of pancreatic cysts, the inflammation being propagated from the intestine to the gland by the pancreatic duct. Inflammation of the duct wall brings about its contraction, and thus an accumulation of fluid, and finally the formation of a cyst.

2. *The Diagnosis of Pancreatic Cysts.*

Since attention was directed to these cysts by Senn, in the 'International Journal of the Medical Sciences' in 1886 and 1887, when he grouped together the main symptoms and physical signs, correct diagnoses have been made in six cases before 1889, and in as many more since (Wölffler, Bull, Lardy, Tremaine, Karewsky [two cases], Riegner, Annandale, Senn, Küster, Filipow, and the present case).

In the first six cases an accurate diagnosis was made without an exploratory puncture.

In other instances the following diagnoses were made :

Thiersch, *Abscess of the Abdominal Wall.*

Gussenbauer, *Retro-peritoneal Cyst.*

Steele, *Cyst of the Peritoneum.*

Hahn and Kulenkampf, *Hydatid Cyst of Liver.*

Bozeman, Riedel, Koatz, Salzer, Zukowsky, and Martin,
Ovarian Cyst.

Treves, *Sarcoma.*

In Kulenkampf's case exploratory puncture had withdrawn "a litre of fluid, as clear as limpid water. It contained no echinococci, but was rich in albumen, very alkaline, but free from succinic acid, which may be present in hydatid fluid."

In Treves' case the growth had been rapid. It felt elastic, but did not fluctuate. The idea of a cyst was never entertained; the mass appeared to be solid and heavy.

The essential symptoms to be considered in diagnosing a pancreatic cyst are the presence of a smooth, globular, retro-peritoneal tumour, moving slightly with respiration, in the upper part of the abdomen towards the left side, lying behind the stomach and the transverse colon, and below the former.

The relation of the tumour to the stomach and to the transverse colon may be made out more definitely by distending them with gas, or the colon with water. We would lay especial stress on the great value of this method in the diagnosis of these cases. By the recognition of the stomach in front of the tumour we are able to exclude tumours in connection with the liver, the spleen, and those within the main peritoneal cavity. No renal tumours, unless of enormous size, lie behind the stomach, and these tumours are related to a lateral, and not to a transverse coil of the colon. The diagnosis of ovarian tumour is the most common error; this has arisen rather from the frequency of ovarian cysts than from the difficulty of differentiation. In future, if the relation of the stomach to the tumour is borne in mind, the mistake should be avoided. Some mesenteric cysts, some retro-peritoneal, and occasionally other tumours may present some of the physical signs of pancreatic cysts. In rare cases, therefore, it may be impossible to arrive at a certain diagnosis from the data afforded solely by the situation of the tumour. In any case of doubt the question can be decided, if it is

thought necessary, by means of aspiration, as the fluid which is drawn off is pathognomonic. In the four cases in which incorrect conclusions were formed the examination of the fluid appears to have been incomplete.

As the tension of the tumour increases, pain more or less constant, with associated paroxysmal attacks, becomes a marked symptom; frequently the patient becomes extremely emaciated, and in some instances jaundiced. There is often a history of traumatism.

The fluid which is obtained by aspiration is of a sp. gr. between 1010 and 1020, alkaline, containing 1·5 to 3 per cent. of albumen (with the exception of one case, where the amount was only ·3 per cent.). It is usually turbid, greenish or brownish in colour, but occasionally clear or opalescent and white. It usually, if not always, contains mucin and a sugar ferment; and in some cases tyrosin, blood-pigment, and a trace of urea. It may emulsify fats, and often contains but a small amount of cell-products.

3. *The Liability of Hæmorrhage to take place into Pancreatic Cysts, causing very Grave and Urgent Symptoms, as in our Case.*

In this case the very urgent symptoms, which for a few hours on the night of August 23rd, thirty hours after exploration by abdominal section, so gravely threatened life, were clearly due to hæmorrhage into the cyst, the bleeding being probably due first and foremost to the very vascular surroundings which must always be present with pancreatic cysts; secondly, to the great tension which was so marked a feature in this case; and thirdly, to the inflammatory softening which no doubt was set up by the first operation.

This liability of pancreatic cysts to hæmorrhage is of importance not only in rendering the completion of the operation urgently needed, as in our case, but in explaining certain obscure causes of death. The following cases illustrate the above points. The history of injury in the first and of straining in the second is of interest.

Anger ('Bull. de la Soc. Anat. de Paris,' 1865, 2me série, t. x, p. 192) reports a case of hæmorrhage into a cyst of the pancreas in a man, æt. 72, who had some years before fractured several ribs on the left side, from which injury he recovered completely after three months' treatment in a hospital. Five months previous to admission the lower limbs became œdematous, and for the last six weeks ascites has been present.

On admission into the Beaujon Hospital the following conditions were noticed:—œdema of the lower extremities, ascites, difficult and stertorous breathing, râles over the left side of the chest, with effusion on the opposite side. The diaphragm was pushed up, the pulse was 100, irregular, and intermittent. Diarrhœa, loss of appetite, and albuminous urine were noted, but no delirium. Two days after his admission the patient died, the pulse having been for a time extremely intermittent and feeble.

Autopsy.—Pleuritic effusion on the right side, bronchitis, the liver somewhat contracted but not cirrhotic. A tumour the size of a foetal head was found in front of, and on the same level as, the left kidney. The tumour was bounded in front by the stomach and the transverse colon, above by the diaphragm, below by the descending colon, behind by the kidney, towards the middle by the pancreas, and on the outside and above by the spleen. It was loosely joined to the kidney and spleen by connective tissue, in which the vessels of those organs could be distinctly seen. The vessels of the spleen were intimately connected with the posterior surface, and were not easily isolated. The tumour was evidently connected with the pancreas. The external surface was irregular and nodulated, the anterior wall of variable thickness. Fluctuation in the tumour was distinct. On careful inspection the lobules of the pancreas could be separated from the tumour, but the walls of the cyst contained a tissue which resembled glandular structure (*vide infra*). Upon opening the cyst, a considerable quantity of dark fluid blood escaped, which contained a number of unadherent coagula; the inner surface of the cyst was uneven and reticulated, *i. e.* resem-

bling in appearance the interior of the right ventricle. Diverticula could be seen, which were in free communication with the principal cyst. Microscopical sections of the cyst wall showed cells resembling the pancreas ; acinous groups of glandular tissue were also found. M. Anger came to the conclusion that the tumour was a cyst in the tail of the pancreas. The presence of the blood was explained by the supposition that during the progressive dilatation of the cyst some of the vessels in the connective-tissue reticulum had given way. What symptoms the tumour had produced could not be ascertained, as the patient was being treated for heart disease, and the tumour was not recognised during life.

The following case was observed by Störck ('Arch. Gén. de Méd.,' May and July, 1836). The patient was attacked during a menstrual period with vomiting, which was followed by coldness of the extremities, palpitation of the heart, and dyspnœa. Soon after, a pulsating tumour, causing considerable pain, was noticed in the epigastric region. The patient also suffered from attacks of vomiting. She died three and a half months after the first attack. At the autopsy the entire pancreas was found enormously dilated, and weighed with its contents thirteen and a half pounds. It was found filled with coagulated blood, the hæmorrhage having apparently occurred at intervals. The weight of the tumour had caused injurious pressure on other organs. M. Le Dentu believed that the hæmorrhage was caused by the act of vomiting, and had taken place into a pre-existing cyst of the pancreas.

Dr. Parsons ('Brit. Med. Journal,' June, 1857) reports a case where hæmorrhage into a pre-existing cyst proved fatal after the latter had ruptured into the intestinal tract. The patient, æt. 60, had suffered from vague dyspeptic symptoms for an indefinite length of time. A fluctuating tumour, the size of an orange, could be felt in the epigastrium, just below the greater curvature of the stomach. Emaciation progressed rapidly, one day the tumour disappeared suddenly, and at the same time a viscid, dirty-

white fluid was discharged by the bowels. The tumour reappeared in a short time, and ruptured a second time into the intestines, followed by hæmorrhage into the ruptured cyst, which proved fatal. At the *autopsy* the pancreas was found excavated into a wide canal, which at either extremity was converted into a cyst. The walls of the cyst were of the firmness of cartilage, and the organ was adherent to the stomach, kidney, and colon; coagulated blood was found in the dilated duct and cysts.

The following explanations of these cases are suggested by Dr. Senn :

1. Hæmorrhage into a pre-existing pancreatic cyst.
2. Parenchymatous hæmorrhage producing a cyst, followed by hæmorrhage from the cyst wall.
3. The hæmorrhagic cyst may originate in a dilatation of one of the vessels of the pancreas.

4. *Question of the Safety of the Preliminary Puncture from the Front.*

While this step is often the only one, short of an exploratory incision, which will clear up the obscurity of these cases, it is evidently attended with risk. Thus in our case the stomach was certainly traversed by the aspirator needle once, if not twice. The same thing, with like harmlessness, happened in Karewsky's case.

In that case, as in ours, when the abdomen was opened the stomach was found tensely flattened out over the cyst. Not being able to raise the stomach and thus get at the cyst, Karewsky exposed the latter by turning down a flap, making a second incision perpendicular to the first, which was a curved one lying a finger's breadth below the left costal margin.

In some cases, such as Lardy's and Küster's, the preliminary puncture has been followed by evidence of peritonitis; in others (Tremaine) grave collapse has immediately followed. In Cathcart's case rupture of the

cyst, followed by grave collapse, speedily ensued after puncture with a hypodermic needle and withdrawal of about half a drachm of a transparent reddish fluid. Almost immediately after the needle was withdrawn, the patient screamed and writhed with pain. This at first was localised to the point of puncture, but soon spread all over the abdomen. In about half an hour there was flattening where the tumour had existed, with slight bulging in the flanks. The temperature rapidly fell from normal to 97.2° . In about an hour, vomiting of greenish matter came on, and a state of great collapse supervened. Mr. Cathcart determined to open the abdomen at once, but it was not until five hours after the puncture that consent could be obtained. About 40 oz. of dark-coloured, bloody fluid exuded when the peritoneum was opened. By working between the transverse colon and the stomach, the lesser sac of the peritoneum was opened, and a cyst was discovered lying partially collapsed behind the stomach. The cyst was freely opened, when more fluid escaped. As the collapsed cyst could not be easily drawn into the abdominal wound, and as the original opening in the cyst was not to be found, Mr. Cathcart decided to drain it from behind the peritoneum. With this object he explored the cyst's cavity with his finger, and found that below and behind the point of the twelfth rib on the left side, the finger inside the cyst could be pressed directly out against the skin. At this point, therefore, a counter opening was made, and a large drainage-tube passed into the cyst from behind. The cyst and the general peritoneal cavity were then washed out with warm boracic acid solution. A good recovery followed.

Yet another possible risk must be remembered when these cysts are punctured from the front—the presence of the transverse colon. Thus in Lardy's case this bowel was stretched tightly over the cyst. In Rokitsky's case, during an unsuccessful attempt to extirpate the cyst, the transverse colon, which was adherent in front, was torn through. In a case of Billroth's reported by Salzer (l. c.)

the transverse colon masked very completely the lower part of the cyst.

The above interesting case of Mr. Cathcart's leads up to the last point :

5. *The Best Mode of exploring and opening these Cysts.*

While the tenseness with which these cysts bulge against the anterior abdominal wall invites attack from this aspect, and while the great success which has followed treatment of these cysts after opening the peritoneal cavity here (whether by one or two stages) fully justifies a continued use of this method, we think that after Mr. Cathcart's case, and the risks which we have pointed out as following from puncturing in front, an examination should always be made of the infra-costal region behind. If fluctuation is present in this region, or if a thrill can be obtained from the front, the needle should be introduced here, and if the result be successful the cyst should be cut down upon and drained also from this side.

Eleven cases, Nos. 1—11, of pancreatic cyst which had been operated upon are collected in the papers by Senn in the 'International Journal of the Medical Sciences' for 1885 and 1887. It may be convenient to summarise the cases Nos. 12—17, which have been reported in foreign journals.

1. SENN.—Internat. Journal of the Med. Sciences, vol. lxxxix, p. 17.
2. KULENKAMPF.—Berliner klin. Woch., February 13th, 1882.
3. GUSSENBAUER.—Arch. für klin. Chir., vol. xxix, p. 333.
4. BOZEMAN.—New York Medical Record, January 14th, 1872.
5. ROKITANSKY.—Wien. med. Presse, November 15th, 1881.
6. SALZER.—Zeit. für Heilk., Prag, vol. vii, p. 11, 1886.
7. RIEDEL.—Arch. für klin. Chir., Berlin, vol. xxxii, p. 994, 1885.

8. KRAMER and HAHN.—Zeit. für Heilk., Prag, vol. vii, p. 25, 1886.
9. DIXON.—New York Medical Record, March 13th, 1884.
10. LUECKE.—Virch. Arch., vol. xli, p. 9.
11. THIERSCH.—Berlin. klin. Woch., No. 40, 1881.
12. ZUKOWSKI.—Wien. med. Presse, No. 45, 1881.
13. LARDY.—Corr. Blatt für Schweizer Aertze, vol. xviii, p. 279, 1888.
14. BULL.—New York Med. Journal, vol. xlvi, p. 376.
15. SUBOTIC.—All. Wien. med. Zeit., vol. xxxii, p. 279, 1887.
16. KÜSTER.—Deutsche med. Woch., Leipzig, vol. xiii, p. 189, 1887.
17. WÖLFFLER.—Zeit. für Heilk., Prag, vol. ix, p. 119, 1888.
18. ANNANDALE.—Brit. Med. Journ., vol. i, p. 1291, 1889.
19. CATHCART.—Edinburgh Medical Journal, July, 1890.
20. TREVES.—Lancet, vol. ii, p. 655, 1890.

CASE 12 (Zukowski).—A woman, æt. 36, had suffered with cardialgia and an epigastric tumour for two years and three quarters. A diagnosis of an ovarian tumour was made by Spencer Wells and by Rokitansky.

A partial extirpation was attempted, but the patient died with peritonitis ten days later.

CASE 13 (Lardy).—A man, æt. 37, had a year previously been seized with a sudden attack of abdominal pain, which lasted for some hours. After a second attack he noticed a fulness in the epigastrium. He wasted greatly.

In November, 1887, under chloroform, a smooth cyst was punctured above the umbilicus, and a dark red bloody fluid, containing large fatty cells, cholesterin, and red blood-cells, was evacuated. When the stomach and colon were distended with gas, they were shown to be in front of the tumour. The diagnosis of a pancreatic cyst was made. The abdomen was opened and the cyst attached to the abdominal wall and drained, ten litres of fluid being evacuated. The patient recovered.

CASE 14 (Bull).—A man, æt. 45, had ten months previously an attack of colic with jaundice. Four weeks later a tumour appeared above the umbilicus, and for ten weeks increased in size. After an attack of abdominal pain and diarrhœa the swelling disappeared; three weeks later it reappeared.

The abdomen, except at the epigastrium and in the right iliac fossa, was dull.

When the stomach was distended with a seidlitz powder its resonant area lay in front of the tumour. A fluid thrill could be obtained across the tumour. The fluid was aspirated with a syringe, and shortly afterwards abdominal section was performed. The cyst wall, which was from half to three eighths of an inch thick, was sewn to the abdominal wall, and opened with a cautery seven days later; 118 oz. of fluid were evacuated. He gained 13 lbs. in a few weeks, but a fistula remained. He died from diabetes two months later. After the tapping a diagnosis of a pancreatic cyst was made. The fluid was of sp. gr. 1010, viscid, and dichroic; being dark greenish brown by reflected, and a dull reddish brown by transmitted light. The deposit was a dark greenish brown. It contained $2\frac{1}{2}$ per cent. of serum-albumen, 2.7 per cent. of glucose, and some mucin. It was diastatic and peptic, and crystals of ammonio-magnesian phosphate were present. It emulsified oil. It was free from urea, peptones, glycogen, bile-pigment, and fat.

CASE 15 (Subotic).—A man æt. 20, whose occupation was an arduous one, was seized with attacks of colic and vomiting. An abdominal tumour had been noticed two years previous to his admission, and for one year he had had frequent attacks of vomiting. Œdema of his eyelids and ankles had been present for six months.

On admission the patient was anæmic and emaciated. There was a tumour the size of a child's head, which extended two fingers' breadth below the umbilicus. The upper margin was sharply defined; the surface was smooth,

and covered by the stomach in front, while towards the left the resonance was impaired. Fluctuation could be obtained; the tumour was fixed, did not move with respiration, and transmitted aortic pulsation. The urine contained albumen; the diagnosis was a pancreatic cyst.

March 21st.—The abdomen was opened, and the cyst was attached to the abdominal wall; four days later the cyst wall, which was half an inch thick, was divided with a thermocautery, and two litres of a turbid, brownish, alkaline fluid were let out. It contained fatty nucleated cells, and changed blood-cells. Sugar was present. The albuminuria persisted for some time. The patient completely recovered.

CASE 16 (Küster).—A man, æt. 46, had been thrown from a waggon eight years previously and severely shaken. For four months an abdominal tumour had been observed. The cyst was drained, and the evacuated fluid was of a light yellow colour, sp. gr. 1016, and contained 3 per cent. of albumen.

CASE 17 (Wölffler).—A girl, æt. 21, with acute gastritis, gave a history of jaundice two years previously, followed by an abdominal tumour. There was no history of injury. She was very feeble, and the tumour occupied both hypochondria; there was tympanitic resonance above due to the stomach, below due to the colon, and between the tumour and the liver due to the duodenum. There was no fat or undigested muscle in the fæces. A pancreatic cyst was diagnosed.

The abdomen was opened and the cyst was drained, the fluid spurting out two feet when the cyst was tapped. Twenty-four hours later the pulse was 140; there was general cyanosis, but no peritonitis. On the fifth day the cyst wall sloughed; on the fourteenth a gangrenous mass of cyst wall the size of a hand was removed. The patient recovered in nine weeks.

The fluid from the cyst was brown, turbid, sp. gr. 1023, and amounted to 2700 c.c. It contained seralbumen, methæmoglobin, a trace of peptone, a sugar ferment, and 1·5 per cent. of albumen. It was free from mucin, metalbumen, bile-pigment, fatty acids, acetone, fat, leucin, and tyrosin. Cholesterin, chlorides, sulphates, and a trace of phosphates were present.

Microscopically there were white and red blood-cells, elliptical endothelial cells with fat drops, and abundant cholesterin crystals.

APPENDIX (*July*, 1891).

To the above cases may be added the following :

21. KOATZ.—Operation einer Pancreascyst, Dissertation, Marburg, 1886.
22. FENGER.—Chicago Medical Journal, February, 1888.
23. STEELE.—Chicago Medical Journal, April, 1888.
24. TREMAINE.—Transactions of the American Surgeons' Association, vol. vi, p. 557, 1888.
25. OCHSNER.—Arch. für clin. Chir., vol. xxxix, p. 442.
- 26 and 27. KAREWSKY.—Deutsche med. Woch., No. 46, 1890.
28. FILIPOW.—St. Petersburg Med. Woch., No. 9, 1890.
29. RIEGNER.—Berliner klin. Woch., No. 42, 1890.
30. MARTIN.—Virch. Arch., vol. cxx, 1890.

CASE 21 (Koatz).—A woman, æt. 36, developed a large abdominal cyst, which on puncture yielded a brown liquid, sp. gr. 1020. The abdomen was opened in 1885, but extirpation appearing impossible, nothing further was done. In 1886 a partial extirpation was attempted; the patient died seven weeks later with pericarditis and pyelo-nephritis.

CASE 22 (Fenger).—A boy, æt. 8, fell from a horse and bruised his abdomen. For eight weeks he had intermittent

abdominal pain ; three weeks after his accident a tumour, which has slowly increased in size, appeared in the epigastric region. Aspiration evacuated a turbid, alkaline, yellowish fluid.

No diagnosis was made. The abdomen was opened, and a pancreatic cyst contained 40 oz. was drained the following week. At the end of three weeks there was only a small fistula.

CASE 23 (Steele).—William J—, æt. 40. At the age of twenty-seven he was crushed between two railway waggons; in the following year a cyst gradually developed in the umbilical region. This was aspirated, and 52 oz. of chocolate-coloured fluid was drawn off. This aspiration was repeated four times during the succeeding ten years.

The patient wasted. The tumour was dull on percussion. He had attacks of colicky pain.

The abdomen was opened, and the cyst was attached to the anterior abdominal wall, and was opened with the cautery later. The wall was three quarters of an inch thick. The fluid evacuated contained albumen, fatty matter, and oxalate of lime, but it could not be shown to possess any digestive properties. After three months the patient's condition was good, but the sac did not close up. It was proposed to drain it further through the loin.

At the time of the operation, examination with a finger showed that the cyst occupied the tail of the pancreas.

CASE 24 (Tremaine).—A man, æt. 30, developed an epigastric cyst, which was punctured. A fluid having the properties of pancreatic fluid was removed ; it had a sp. gr. 1007, with 10 per cent. of albumen, $\frac{1}{2}$ per cent. of sodium chloride, and a trace of sugar. Collapse, due to rupture of the cyst, supervened, the abdomen was opened, the cyst was sutured to the abdominal wall, and the wound closed. The patient recovered ; the wound healed, but soon the cyst refilled. The lower extremity of the cyst was then drained, and the patient was cured in three months.

CASE 25 (Ochsner).—A patient, æt. 24, had for four years noticed a cyst to the left of the umbilicus. Six months after a pregnancy it rapidly increased to the size of a full-term uterus. The cyst was smooth, moveable, and tense, occupying the left hypochondriac region; it was dull on percussion, but at times lay behind intestinal coils. No diagnosis was made.

The abdomen was opened. The omentum and some coils of intestine which presented were pushed up; fourteen litres of fluid were evacuated, and the cyst was attached to the abdominal wall. The drainage-tube was removed at the end of three months, and the wound was closed a month later. At the time of the operation, veins the size of a finger were visible on the cyst wall.

CASE 26 (Karewsky).—A man, æt. 25, injured the left side of his abdomen through a fall, in consequence of which he was confined to his bed with attacks of vomiting.

Four weeks after this an abdominal tumour appeared, and gradually increased in size. On percussion it was dull; it was bounded above and in front by the stomach, below by the colon. A trocar was passed through both walls of the stomach, and 50 c.c. of a brown, alkaline, albuminous fluid was drawn off; it did not possess any diastatic properties.

In eight days the cyst had increased in size, the abdomen was opened, the cyst was incised, and the walls were sutured to the abdomen. Recovery in five weeks.

The sp. gr. of the liquid, which was only faintly alkaline, was 1012; it contained albumen, globulin, and propeptone. It was amylolytic, and digested fibrin.

The fluid from the fistula was strongly alkaline, clear as water; it was amylolytic, but did not digest fibrin; it emulsified fats.

CASE 27 (Karewsky).—A man æt. 58, in consequence of an injury to his left costal margin, developed vomiting and epigastric pain. After three months a tumour appeared

to the left of the epigastrium. Two months later, when examined, the tumour was made out to be a cyst behind the stomach and colon, and was diagnosed as a pancreatic cyst.

The abdomen was opened, but the extreme tension of the cyst rendered it impossible to attach it to the abdominal wall. It was therefore incised and 3 litres of fluid evacuated, part of it escaping into the abdominal cavity.

The cyst rapidly disappeared, but a fistula remained, from which there daily discharged about 500 c.c. of pancreatic fluid, which digested the edges of the wound. This discharge suddenly ceased, and the patient soon recovered. The fluid from the cyst neither peptonised proteid nor emulsified fats, but was strongly amylolytic. The fluid from the fistula possessed all the properties of pancreatic fluid.

CASE 28 (Filipow).—A woman, æt. 65, had noticed for three years an epigastric tumour, which for six months had increased in size, and had caused vomiting, wasting, and paroxysmal pains with slight jaundice. The tumour was a cyst, dull on percussion, situate behind the stomach and separate from the liver and spleen. The diagnosis lay between a pancreatic and a mesenteric cyst, probably the former.

The abdomen was opened; the cyst was partially resected, and sutured to the abdominal wall. The fluid was alkaline and dark brown; the cyst was found to be connected with the head and part of the body of the pancreas. The patient left eighteen days after the operation with a small fistula.

CASE 29 (Riegner).—A girl, æt. 23, fell from a great height, after which she suffered with attacks of abdominal pain. Three years later the pain became more severe, she became slightly jaundiced, and had severe attacks of vomiting. An epigastric swelling which steadily increased in size was observed; this was formed by a dilated stomach over a cyst. The fluid removed by aspiration was alkaline,

brown, emulsifying fats, amylolytic, and containing red and white corpuscles. A pancreatic cyst was diagnosed.

The abdomen was opened; on puncturing the cyst the fluid rushed out with such violence as to inundate the table; 1500 c.c. of fluid were removed. The patient completely recovered.

The fluid removed was of sp. gr. 1009, alkaline, emulsified fats, and was amylolytic, but did not digest proteids. The fluid which drained from the fistula after the operation digested fibrin.

CASE 30 (Martin).—In 1873 Dr. Martin's father attempted to remove what was supposed to be an ovarian cyst from a woman *æt.* 33, but, in consequence of the number of adhesions, the abdominal wound was merely closed. A small tumour to the left of the umbilicus had been noticed after her first confinement twelve years previously. In 1890 the abdomen was enormous, measuring sixty-two inches in circumference. A cyst filled the abdomen, and lay behind the stomach and colon; the patient had not wasted. The abdomen was opened by Dr. Martin, and the cyst detached from the adherent viscera; it was incised, and 15 litres of fluid evacuated. The pedicle, which was very vascular, was ligatured and divided. The patient left the hospital in twenty-seven days. The cyst was connected with the pancreas; the walls were nearly 3 mm. thick; it contained innumerable secondary cysts, lined by cylindrical epithelium. The fluid contained albumen and cholesterin, and, in some cysts, blood.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. iii, p. 169.)

