

the tissue of that area is devitalized or even infected, so radical amputation is not justifiable in such cases.

A mild case of gas gangrene of the arm with gas involving the trunk, associated with septicaemia responded to oxygen, plasma transfusion, sulphamylamide and x-ray.

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PANCREATIC CYST TREATED BY PRIMARY ANASTOMOSIS TO THE STOMACH

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THE accepted treatment of cysts of the pancreas has been either removal when possible, or marsupialization by suturing the cyst wall to the anterior abdominal wall, with evacuation and drainage. The former is not often practicable because of the extensive adhesions to vital parts, and because of the large blood vessels in and around the cyst. Cysts in the tail of the pancreas are occasionally suitable for complete extirpation. Consequently, except in a few cases, marsupialization has been the operation of choice. It was first performed in 1882 by Gussenbauer, a pupil of Billroth. He devised a method of drainage whereby he sewed the parietal peritoneum to the skin, and the walls of the cyst to the parietal peritoneum. Marsupialization thereafter became and has remained a standard surgical procedure (Judd *et al.*, 1931). The object of this paper is to show that the best treatment may be primary anastomosis to the stomach, duodenum or jejunum, and that this is usually possible. The operation of marsupialization has several disadvantages, and consequently should, in the opinion of writer, give place to this procedure of primary anastomosis to the stomach, duodenum or jejunum.

Case report

K. R., male Hindu, aged 30 years, a carpenter, was admitted on 1st June, 1942, with a moderately large and obvious epigastric swelling. The trouble started quite suddenly during a meal 20 days before admission. There was epigastric pain shooting to the back; and a sensation as if a swelling was appearing in the epigastrium. The patient vomited, but the pain persisted for a week, by which time he noticed the swelling. He also noticed that after that, the swelling disappeared every 3 or 4 days, only to reappear again. He became very constipated and the appetite became poor.

Examination showed a tense, elastic, cystic swelling in the epigastrium, extending from the xyphisternum to just above the umbilicus, and from the rectus border on one side to the rectus border on the other, freely moving with respiration, moving from side to side as well as from above downwards, dull to percussion and tender to palpation. The tumour dullness was not continuous with liver dullness. There was no free fluid in the abdomen. The next day (2nd June, 1942) the tumour disappeared quite completely. The epigastric region however was tender, and the patient was distinctly uncomfortable. There was no question of the tumour being masked by a tense abdominal wall, because the area was now quite resonant. Within the next 3 days the tumour became evident, and in another 3 days (8th June, 1942) had become very large and tense, even larger than before. The next day (9th June, 1942) it disappeared again and the patient felt more ill, and had audible gurgling sounds and epigastric tenderness. The tumour reappeared in another 3 days (12th June, 1942) to disappear again (16th June, 1942). It again became obvious in another 4 days, and in the course of a week reached the big size already noted. Thereafter it persisted.

PLATE XIV
PANCREATIC CYST TREATED BY PRIMARY ANASTOMOSIS TO THE STOMACH :
R. MAHADEVAN



Fig. 1.

Showing typical filling defect of stomach due to extra-mural pressure; barium meal pictures at 5 minutes' and 1½ hours' interval.

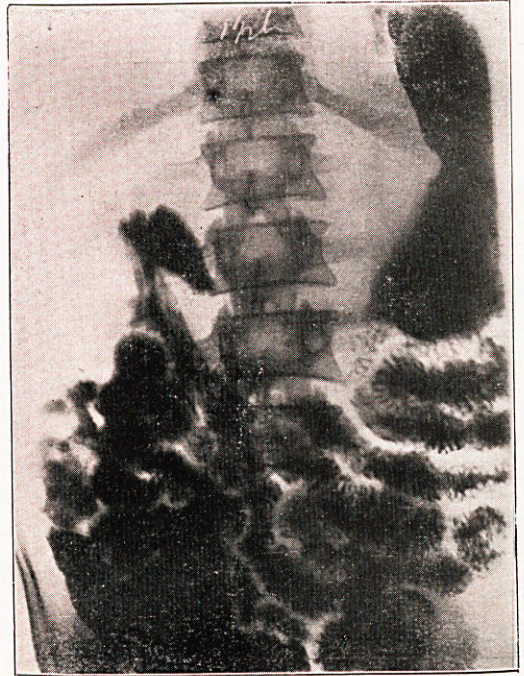


Fig. 2.

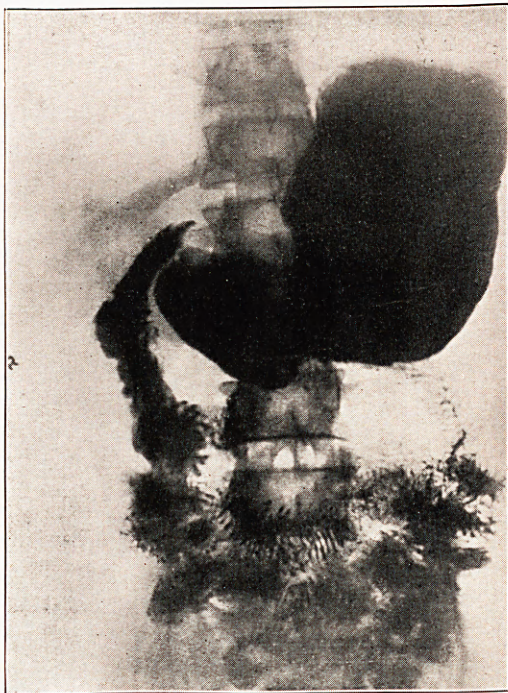


Fig. 3.

Showing barium meal picture of stomach after operation, at 5 minutes' and 1½ hours' interval. Note that the filling defect has now completely disappeared.



Fig. 4.

One interesting feature was that the tumour was at a higher level when he was in the erect posture than when he was recumbent. This is quite contrary to the usual finding.

The patient was fairly well nourished, of thin build, and weighed 80 lb. The urine contained no albumin or sugar. The diastase test showed 100 units. The stool showed no ova or cysts, and no undigested muscle fibre. The fat in the stools was normal. The hæmoglobin was 80 per cent; the R.B.C. count was 6,285,000; the W.B.C. count was 4,200; the Van den Berg test, direct delayed positive and indirect positive; the plasma bilirubin was 1.8 units; and the Wassermann reaction was negative. The barium-meal picture showed a big and typical filling defect due to extramural pressure (see table XIV, figures 1 and 2). Fractional test meal curves are shown in figures 5, 6 and 7. A pyelogram showed normal kidneys and pelves.

Fractional test meal curve.

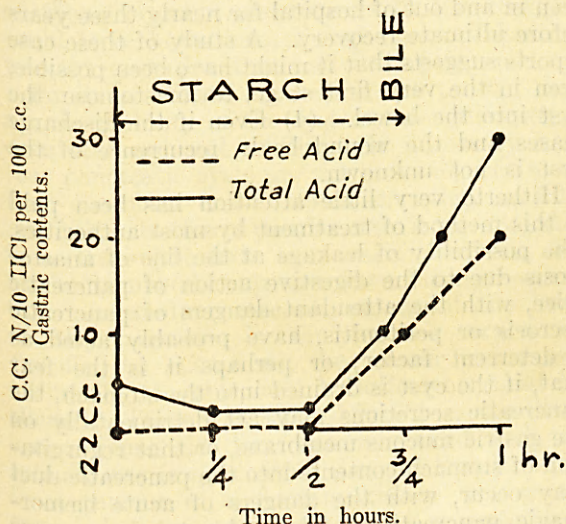


Fig. 5.—Pre-operative curve. 11-6-42.

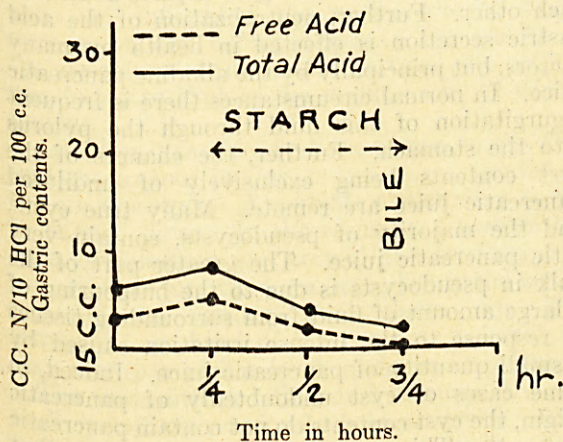


Fig. 6.—Post-operative curve. 28-8-42.

Operation findings

Operation performed on 30 June, 1942, under spinal anæsthesia, by a median supra-umbilical incision, revealed a tense cystic swelling extending from the under surface of the liver to well below the transverse colon. The lesser omentum, stomach, transverse colon and its mesocolon were stretched out in front of it, the stomach being

spread out in front of the mid-portion of the cyst. Further examination was possible only after tapping the cyst, when 17 oz. of slightly blood-stained fluid were withdrawn. The cyst was now found to be adherent to the under surface of the liver, the posterior part of the stomach, and the transverse mesocolon. The pancreas could be felt behind the cyst, to which it was very adherent, and felt hard and somewhat nodular. There was a small calcareous plaque in the anterior wall of the cyst. The gall-bladder was normal in size, and could be emptied easily; no stones were felt. Its wall was slightly opaque.

After carefully packing off the general peritoneal cavity, an incision was made in the long axis and on the anterior surface of the stomach and to the left of the pyloric part, in front of which the cyst was protruding most. In a convenient area surrounded by a purse string suture, a small nick was made into the anterior wall of the cyst. By introducing the index finger through this opening, an area where the cyst was adherent to the posterior stomach wall and free from big blood vessels was evaginated towards the incision in the anterior stomach wall. With a long artery forceps guided along the finger, this area was kept taut, a 3- to 4-inch incision was made with the diathermy knife through the thickness of the tissues, and the cyst was laid open into the stomach. The margins of this opening in the cyst and posterior stomach wall were sutured together to ensure that they would not tear apart when allowed to fall back into place. During this process, about 3 ounces of fluid escaped into the stomach. The openings in the stomach wall and cyst were closed, and the area of the incision in the cyst was covered over with omentum. A 'stab' drain was drawn through the left loin

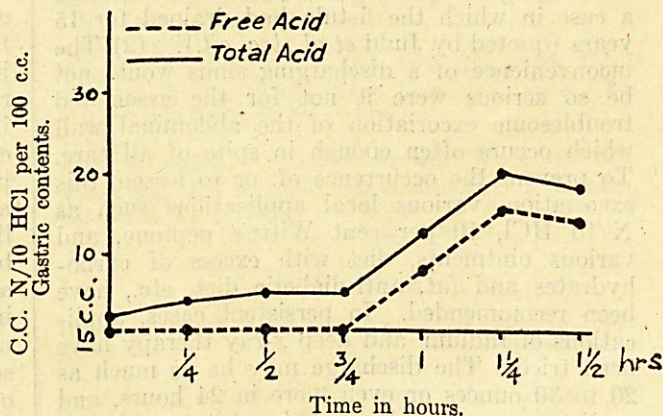


Fig. 7.—Post-operative curve. 11-9-42.

from the area of the general peritoneal cavity surrounding the cyst, so as to drain away any fluid that leaked through.

The patient made an uneventful recovery, and was discharged on 30th July, 1942. Since operation, the condition of the patient has remained excellent. He has had no pain whatever, has a good appetite, and has put on 17 lb. in weight

in 6 months. There is no evidence so far of any recurrence of the swelling, and he is back at his work. The condition of the stomach after operation is shown in the barium-meal skiagrams (plate XIV, figures 3 and 4), where the filling defect is now completely absent and the stomach appears normal. Fractional test meal curves before and after operation are also appended (see figures 5, 6, and 7) and these show that the operation has not seriously affected the condition of the stomach.

Discussion

Jurasz's two cases (Jurasz, 1931) are possibly among the earliest to be recorded of primary anastomosis of the cyst to the stomach. He did this by incising the anterior stomach wall and passing the cautery through the posterior stomach wall directly into the cyst. The fistula thus made was left draining permanently into the stomach (Rowlands and Turner, 1936). Anastomosis of the cyst to the jejunum or the gall-bladder has been suggested by Karl Meyer for non-perforated cyst (quoted by Koucky *et al.*, 1941). This treatment, primary anastomosis to the stomach (or possibly to the duodenum or jejunum as an alternative), appears applicable to all cases of pancreatic cyst (true and pseudo-cysts included), in which marsupialization has hitherto been the operation of choice. A possible exception may be in the case of hydatid cysts where marsupialization may be the safer procedure.

While it is true that cure fairly often occurs with marsupialization, it has several disadvantages. (1) The period of drainage required before the cyst wall granulates and the space is obliterated is sometimes very long, two years or even more, and there is all the inconvenience of a discharging sinus during this time. Kerr reported a case in which the fistula had drained for 15 years (quoted by Judd *et al.*, *loc. cit.*). (2) The inconvenience of a discharging sinus would not be so serious were it not for the associated troublesome excoriation of the abdominal wall which occurs often enough in spite of all care. To prevent the occurrence of, or to lessen, this excoriation, various local applications such as N/10 HCl, 10 per cent Witte's peptone, and various ointments, diet with excess of carbohydrates and fat, anti-diabetic diet, etc., have been recommended. In persistent cases, applications of radium and deep x-ray therapy have been tried. The discharge may be as much as 20 to 30 ounces or even more in 24 hours, and continuous suction drainage has been employed. The very multiplicity of the methods recommended shows that the disability is real and serious. Even secondary operations such as dissecting up the sinus track and implanting it into the stomach, duodenum, jejunum or gall-bladder have been carried out. Such secondary operations, because of extensive adhesions resulting from the original operation and because of the existence of a long standing sinus, are

likely to be more hazardous than the operation of anastomosis at a single sitting. (3) Sometimes secondary infection of the cyst wall occurs through the drainage track, exposing the patient to the dangers of chronic sepsis and hæmorrhage. The writer has experience of a case in which mild secondary infection occurred, and elaborate arrangements for continuous irrigation and drainage had to be maintained for several weeks before the patient recovered. He became extremely ill and anæmic, and rallied with great difficulty. The literature contains similar cases. In one of these, the discharge became very foul after marsupialization, secondary stones developed in the sinus, and ultimately the patient recovered after the sinus track had been implanted into the jejunum. The patient had been in and out of hospital for nearly three years before ultimate recovery. A study of these case reports suggests that it might have been possible, even in the very first stage, to anastomose the cyst into the bowel. (4) Even if the discharge ceases and the wound heals, recurrence of the cyst is not unknown.

Hitherto very little attention has been paid to this method of treatment by most authorities. The possibility of leakage at the line of anastomosis due to the digestive action of pancreatic juice, with the attendant dangers of pancreatic necrosis or peritonitis, have probably acted as a deterrent factor; or perhaps it is the fear that, if the cyst is drained into the stomach, the pancreatic secretions may act detrimentally on the gastric mucous membrane, or that regurgitation of stomach contents into the pancreatic duct may occur, with the dangers of acute hæmorrhagic pancreatitis. These dangers seem more apparent than real. It is known that equal volumes of pancreatic and gastric juice neutralize each other. Further, neutralization of the acid gastric secretion is effected in health by many factors, but principally by the alkaline pancreatic juice. In normal circumstances there is frequent regurgitation of this fluid through the pylorus into the stomach. Further, the chances of the cyst contents being exclusively of undiluted pancreatic juice are remote. Many true cysts, and the majority of pseudocysts, contain very little pancreatic juice. The greater part of the bulk in pseudocysts is due to the outpouring of a large amount of fluid from surrounding tissues in response to the intense irritation caused by a small quantity of pancreatic juice. Indeed, in some cases of cyst undoubtedly of pancreatic origin, the cyst contents do not contain pancreatic ferments. This may be due to the fact that chronic disease of the gland interferes with its secretory function Turner (Choyce and Beattie, 1923). As for the danger of regurgitation of stomach contents into the pancreatic duct, and of consequent pancreatic necrosis, there is reason to believe that this too is not real. Further, there is often no communication between the cyst wall and the pancreatic duct. Even if it exists, as appeared probable in the case

reported here, the operation was followed by no ill consequences. As already mentioned, Jurasz's two cases, in which he drained the cyst into the stomach, did very well. The success of the method in these few reported cases appears to justify further trial. Referring to implantation of fistulæ tracks resulting from marsupialization, Janes (1934) expressed the opinion that, while the implantation of such tracks into stomach, gall-bladder, duodenum, or jejunum has been done, implantation into the stomach would appear to be preferable because of the safety with which it may be carried out.

Pancreatic cysts are not common, but they do appear occasionally for treatment in large institutions. The writer has seen a few cases operated on, and in retrospect feels that, in all of them, primary anastomosis to the stomach could have been done, though marsupialization was the operation that had been performed.

Points of clinical interest in the present case are the mobility of the cyst and its intermittent disappearance and refilling. It is usually held that pancreatic cysts are not movable, but more than one observer has stated that they may be movable. In this particular case, it was movable in a transverse axis to a certain extent, and markedly movable up and down during respiration. In another case of tumour of the head of the pancreas in the writer's experience (verified by operation), the tumour was extraordinarily movable, and ballottement could be elicited. There was some difficulty in the diagnosis. Since the loin was not filled and the tumour was fairly central, the idea that it might be a tumour of a floating kidney was entertained, but this was excluded by a pyelogram. At operation, it was seen that the tumour arose from the head of the pancreas, had a broad base, and had infiltrated the entire gland. There were secondary enlargements of the glands in the mesentery of the small intestine. No pedicle was found to explain the undue mobility of the tumour.

Attention has already been drawn to the fact that the tumour in the present case ascended in the erect posture. A possible explanation seems to be as follows. In the recumbent posture the coils of intestine are around the swelling. In the erect posture they gravitate below the swelling and the tumour mass 'floats' up. The tumour of the head of the pancreas referred to, also rose to a higher level in the erect posture.

The intermittent filling and disappearance of such cysts have previously been observed. Judd *et al.* (*loc. cit.*) noted two cases in their series, with a history of such disappearance, and cited a case of Payr (1898) in which the tumour disappeared and recurred thrice in two months. In some cases, with the disappearance of the cyst, the patient had an attack of diarrhoea. The patient reported here was ordinarily constipated, but had a lax bowel after the disappearance of the cyst. The disappearance of the cyst may possibly be due to a connection with the

pancreatic duct or some part of the alimentary canal. None however could be located at operation. It seemed unlikely that rupture of the cyst had occurred. The fluid contents of the cyst showed only amylase. There was no trypsin or lipase; such findings, in cases of definite pancreatic cyst, are numerous in the literature (Judd *et al.*, *loc. cit.*).

Anastomosis of cysts to other parts of the intestinal tract may be considered. Anastomosis to the duodenum is likely to be more difficult than to the stomach, but, if possible, is ideal. Anastomosis of a fistula to the gall-bladder has been performed, but seems a poor alternative. Reports of cases of fistulæ anastomosed to the stomach have been the most favourable. The gastric route of approach to cysts deserves an extended trial.

Summary and conclusion

A case of pancreatic cyst anastomosed to the stomach is presented, and the advantages of this method of treatment are discussed.

Acknowledgments

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