CASE REPORT

Heterotopic pancreatic tissue associated with type 1 choledochal cyst, cystolithiasis and gall bladder stones: a rare entity with review of literature

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SUMMARY

Choledochal cyst is a rare congenital malformation, particularly when associated with stones in cyst (cystolithiasis), gallstones and heterotopic pancreatic tissue within the cyst wall. The current case represents a 5-year-old boy with abdominal pain, pale colored stools, and jaundice. Magnetic resonance cholangiopancreatography showed a cystic lesion, arising from common bile duct with cystolithiasis and cholelithiasis. He underwent excision of choledochal cyst and gallbladder with Roux-en-Y hepaticojejunostomy. Microscopic examination showed a cyst wall composed of fibrocollagenous tissue lined by cuboidal to low columnar epithelium. The subserosal layer of cyst wall showed presence of heterotopic exocrine pancreatic tissue comprising of pancreatic acinar cells and ducts. We report the first case of heterotopic pancreatic tissue associated with choledochal cyst and cystolithiasis and cholelithiasis occurring at the same time.

BACKGROUND

Heterotopic pancreas is defined as pancreatic tissue that is not found in direct continuity with the main pancreas.[1–3] It lacks any vascular continuity with the main pancreatic tissue. In majority of the cases, anomalous fetal development of pancreas is the most common aetiology.[1] Its presence is usually found incidentally at the time of autopsy or surgery.[1–4] It is commonly found in the stomach, duodenum, jejunum, Meckel's diverticulum, colon and ampulla of Vater.[1–5] Rarely, it has also been found in the liver, gall bladder and biliary tract.[5] However, heterotopic pancreatic tissue present on the wall of choledochal cyst is a very rare entity. Choledochal cysts are rare congenital malformations, seen more commonly in females. We describe a case of heterotopic pancreas in a 5-year-old boy who suffered from type 1 choledochal cyst. To the best of our knowledge, this is the first case report in the literature that shows choledochal cyst is associated with four distinct entities (choledochal cyst, cystolithiasis, gall bladder stones and heterotopic pancreatic tissue in cyst wall) and the third case of choledochal cyst with heterotopic pancreatic tissue in its wall.

Case presentation

A 5-year-old boy was admitted with complaints of intermittent vomiting, abdominal pain, pale-coloured stools and jaundice. Liver function tests were performed. Laboratory tests revealed deranged liver function test (bilirubin: 4.7 mg/dL; aspartate aminotransferase: 213 U/L; alanine aminotransferase: 155 U/L; amylase: 23 U/L; alkaline phosphatase: 1136 U/L).

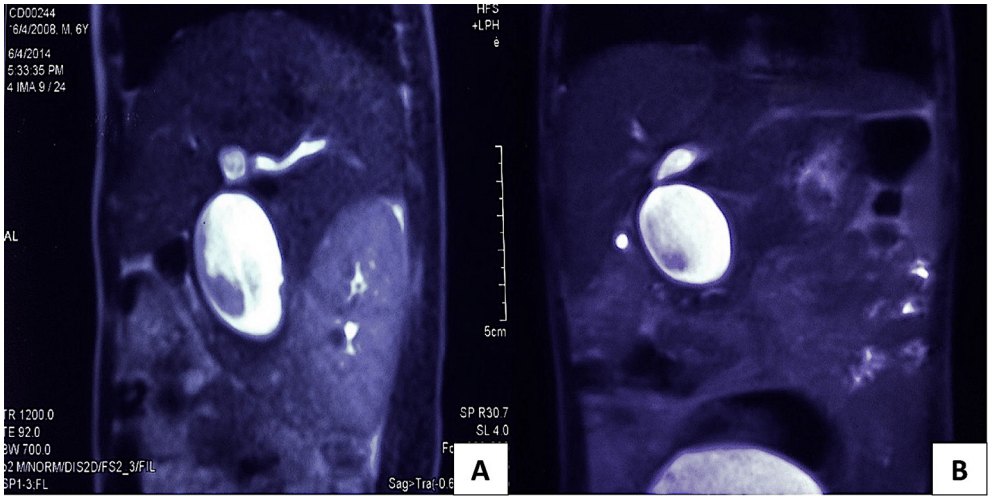

Figure 1 Magnetic resonance cholangiopancreatography T2-weighted (**A**) sagittal section and (**B**) coronal section image showing hypointense filling defects within the lumen of cystically dilated common bile duct lying cranial to the gall bladder. Gall bladder also shows hypointense filling defects within its lumen suggestive of cholilithiasis and Todani type 1 choledochal cyst with cystolithiasis.

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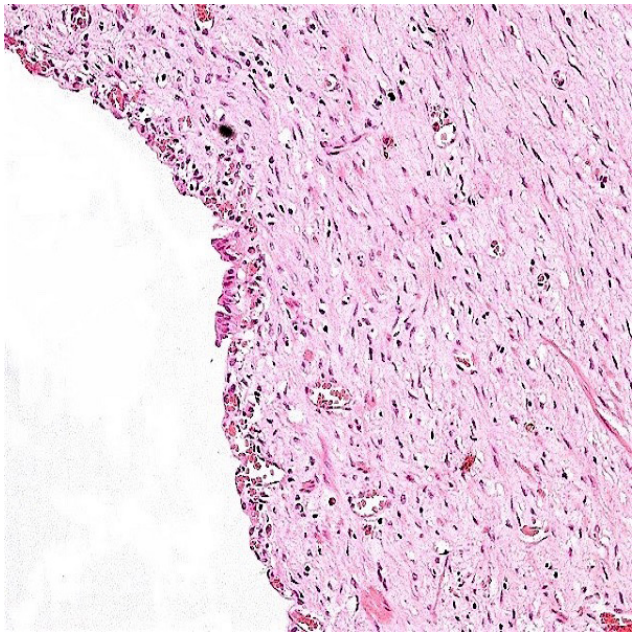

Figure 2 Microphotograph showing cyst wall lined by partly denuded simple columnar to cuboidal epithelium (H&E stain, magnification ×400).

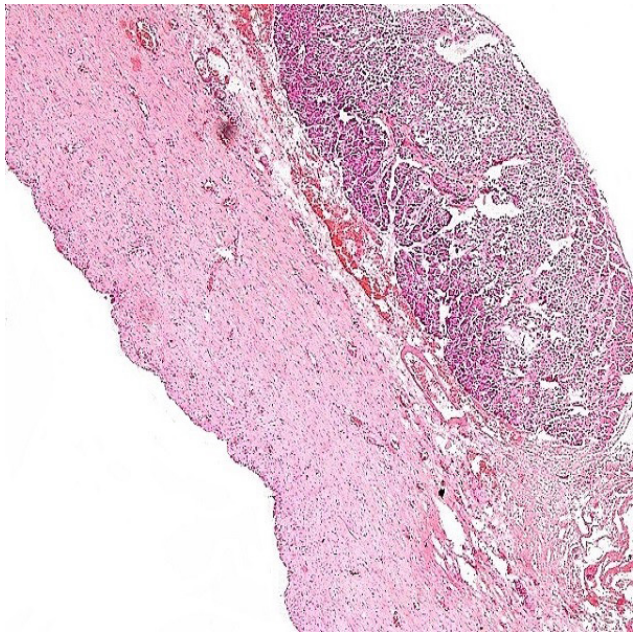

Figure 3 Microphotograph showing cyst wall composed of fibrocollagenous tissue. The subserosa showed presence of unremarkable heterotopic pancreatic tissue (H&E stain, magnification ×100).

Investigations

Ultrasound of the whole abdomen and magnetic resonance cholangiopancreatography showed a cystic dilatation measuring 3.2×2.7 cm arising from common bile duct with hypointense filling defects within the lumen of the cyst and multiple hypointense filling defects in the gall bladder, suggestive of Todani type 1 choledochal cyst with cystolithiasis, and cholelithiasis (figure 1). There was no evidence of portal hypertension. Viral markers for hepatitis were negative.

Treatment

The patient was taken up for surgery and underwent cholecystectomy and total excision of choledochal cyst with Roux-en-Y hepaticojejunostomy. Intraoperatively, the choledochal cyst was anatomically distinct from the pancreas. Grossly, a fusiform dilatation of the bile duct was seen measuring 3 cm in maximum dimension and 3 mm wall thickness with small calculus in the cyst. The outer and the luminal surface of the cyst were unremarkable. The outer surface of the gall bladder was partly congested and the lumen was filled with multiple mixed stones. Resected tissue was fixed in 10% neutral buffered formalin. Appropriate sections were taken, routinely processed and stained with H&E. Microscopic examination showed a cyst wall composed of fibrocollagenous tissue lined by partly denuded cuboidal to low columnar epithelium (figure 2). The subserosal layer of cyst wall showed presence of unremarkable heterotopic pancreatic tissue comprising pancreatic acinar cells and ducts (figures 3 and 4). No pancreatic islets of Langerhans were identified. Chromogranin A and synaptophysin immunohistochemistry studies were performed with appropriate positive controls. Both of these were negative, confirming the absence of pancreatic islets.

Outcome and follow-up

Postoperative period was uneventful. The patient was doing well without any complications after 24 months of follow-up.

DISCUSSION

Pancreas arises from the endoderm as a bud dorsal and ventral to the duodenum, which fuse together to form a single organ. Although the exact aetiology of heterotopic pancreas is not known, it has been proposed that it results from separation of pancreatic tissue at the time of rotation of intestine during the embryonic period. It may also be an atavistic phenomenon, as lower animals contain pancreatic tissue at other locations. The major sites described in the literature include gastric antrum, duodenum, jejunum, colon, ampulla of Vater, liver, mesentery, spleen, mediastinum, and very rarely biliary tract and gall

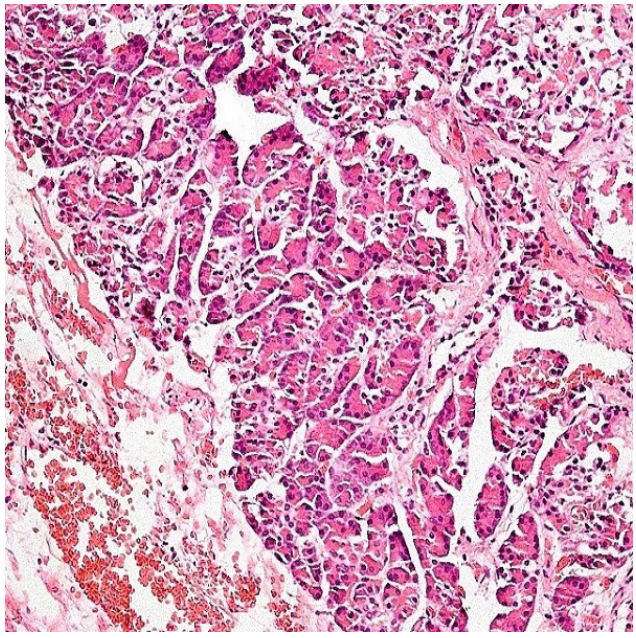

Figure 4 Microphotograph showing unremarkable heterotopic pancreatic tissue (H&E stain, magnification ×400).

Table 1 Management of heterotopic pancreas in association with choledochal cyst in various studies

Authors	Cases	Age/sex	Spectrum of disease	Treatment	Outcome
Suzuki *et al*[1] (1999)	1	36 years/F	Intrahepatic and extrahepatic choledochal cysts + heterotopic pancreas in intrahepatic and extrahepatic biliary tracts + anomalous pancreatobiliary duct system	Left hepatic lobectomy and resection of the gall bladder and the common bile duct with a Roux-en-Y biliary jejunostomy	Uneventful
Prasad *et al*[2]* (2001)	2	3 months/F; 3 months/M	Type 1 choledochal cyst + solitary lesion (2×1.5 cm) of heterotopic pancreas 10 cm distal to duodenojejunal junction; extrahepatic biliary atresia + lesion of heterotopic pancreas 10 cm distal to duodenojejunal junction	Roux-en-Y hepaticojejunostomy + local excision of lesion + restoration of bowel continuity; Kasai's portoenterostomy + liver biopsy + excision of lesion + restoration of bowel continuity	Not reported
Bahadir *et al*[3] (2006)	1	15 days/M	Multiseptate gall bladder + type 1 choledochal cyst + heterotopic pancreatic tissue on cyst wall	Total excision of type I choledochal cyst and gall bladder with Roux-en-Y anastomosis, and a wedge biopsy from the liver	Uneventful
Present case	1	6 years/M	Type 1 choledochal cyst + heterotopic pancreatic tissue in cyst wall + stone in choledochal cyst + gall bladder stones	Cholecystectomy + total excision of choledochal cyst with Roux-en-Y hepaticojejunostomy	Uneventful

*Heterotopic pancreatic tissue was not located in choledochal cyst wall.
F, female; M, male.

bladder.[1–5] It is difficult to explain embryologically the association of heterotopic pancreatic tissue on the wall of choledochal cyst. The possible hypothesis is that there is fetal migration of pancreatic cells into biliary tree, followed by release of pancreatic enzymes from the heterotopic rest present on the wall, which may result in damage and dissolution of the wall leading to dilatation.[1] Majority of the patients with heterotopic pancreas are asymptomatic. However, there may be symptoms resulting from acute and chronic pancreatitis, haemorrhage, hyperinsulinism, intussusception or biliary obstruction.[6] Patients may present with nausea, vomiting, abdominal pain and jaundice. Apart from this, pancreatic islet cell tumours, pancreatic intraepithelial neoplasia and adenocarcinoma may also arise rarely.[7] Hence, these lesions must be excised if recognised intraoperatively. Heterotopic pancreatic tissue may vary from a grossly visible lesion (yellowish-white) to only a microscopically evident focus. Histologically, it may consist entirely of exocrine component (ducts and acini), or sometimes it may contain endocrine (islets of Langerhans) components in one third of cases.[4] This case represents an example displaying histological features of exocrine pancreas only.

Choledochal cysts are rare congenital cystic dilatations of the biliary tract, most commonly presenting in infancy and childhood.[8] Currently there are five types of choledochal cyst.[8] The classification is based on the site of biliary tract involved, cholangiographic findings and the number of intrahepatic and extrahepatic cysts. In our case, it was Todani type 1 choledochal cyst. The aetiology of choledochal cyst in this case appears to be a congenital developmental anomaly. The most common aetiology behind the development of choledochal cyst is anomalous arrangement of the pancreaticobiliary junction.[8] However, heterotopic pancreatic tissue present on the wall of choledochal cyst is a very rare entity. The symptoms of the patient in this case can either be due to heterotopic pancreas or choledochal cyst or both along with stones. There have been only three case reports in the literature where the authors have reported the presence of heterotopic pancreas along with choledochal cyst, which are summarised in table 1. Cystolithiasis, cholangitis, cholelithiasis, choledocholithiasis, biliary cirrhosis, portal hypertension and malignancy are the various reported complications of choledochal cysts.[9 10] The main microscopic histological features of choledochal cysts are inflammatory reaction with some amount of mural fibrosis, followed by the presence of simple columnar epithelium, epithelial proliferation and goblet cell metaplasia.[1–5] Treatment of type 1 choledochal cyst includes Roux-en-Y hepaticojejunostomy with complete excision of the cyst, as performed in this case. Even complete cyst removal is not preventive against possible subsequent malignancy because it may arise elsewhere along the biliary tract.

Learning points

- Despite the development of modern diagnostic modalities, the preoperative diagnosis of heterotopic pancreas remains challenging.
- Heterotopic pancreas should be considered in the differential diagnosis in children with abdominal pain and jaundice, but its definitive diagnosis can be reached by histopathological examination only.
- Choledochal cyst with heterotopic pancreatic tissue present on its wall with cystolithiasis and cholelithiasis can be managed by cholecystectomy and total excision of choledochal cyst with Roux-en-Y hepaticojejunostomy.
- Although prognosis is excellent, long-term follow-up is necessary even after complete excision of the cyst because of the increased risk of development of malignancy.

Contributors AA: planning, conduct, reporting, conception and design, acquisition of data or analysis. PS: conduct, reporting, conception and design, interpretation of data. NA: review of literature, manuscript writing. NH: supervision, review of literature, analysis of data.

Competing interests None declared.

Patient consent Obtained.

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REFERENCES

1 Suzuki K, Uchida T, Nakayama H, *et al*. Heterotopic pancreatic tissue associated with intra- and extrahepatic choledochal cysts. *Pathol Int* 1999;49:759–62.
2 Prasad TR, Gupta SD, Bhatnagar V. Ectopic pancreas associated with a choledochal cyst and extrahepatic biliary atresia. *Pediatr Surg Int* 2001;17:552–4.
3 Bahadir B, Ozdamar SO, Gun BD, *et al*. Ectopic pancreas associated with choledochal cyst and multiseptate gallbladder. *Pediatr Dev Pathol* 2006;9:312–5.
4 Hara M, Tsutsumi Y. Immunohistochemical studies of endocrine cells in heterotopic pancreas. *Virchows Arch A Pathol Anat Histopathol* 1986;408:385–94.

5 Neupert G, Appel P, Braun S, *et al*. [Heterotopic pancreas in the gallbladder. diagnosis, therapy, and course of a rare developmental anomaly of the pancreas]. *Chirurg* 2007;78:261–4.
6 Singh S, Batra A, Sangwaiya A, *et al*. Heterotopic pancreas presenting as ileoileal intussusception. *J Surg Case Rep* 2012;2012:13–16.
7 Song DE, Kwon Y, Kim KR, *et al*. Adenocarcinoma arising in gastric heterotopic pancreas: a case report. *J Korean Med Sci* 2004;19:145–8.
8 Todani T, Watanabe Y, Narusue M, *et al*. Congenital bile duct cysts: classification, operative procedures, and review of thirty-seven cases including cancer arising from choledochal cyst. *Am J Surg* 1977;134:263–9.
9 Levy AD, Rohrmann CA. Biliary cystic disease. *Curr Probl Diagn Radiol* 2003;32:233–63.
10 Barlow B, Tabor E, Blanc WA, *et al*. Choledochal cyst: a review of 19 cases. *J Pediatr* 1976;89:934–40.