Pathol. Oncol. Res. (2011) 17:159–165
DOI 10.1007/s12253-010-9285-3

Monolobar Hepatobiliary Fibropolycystic Disease

Tadashi Terada · Toshiaki Moriki

Received: 8 February 2010 / Accepted: 19 May 2010 / Published online: 30 May 2010

Abstract We herein report a case of monolobar hepatobiliary fibropolycystic disease. A 75-year-old woman presented with heartburn. Imaging modalities including US, CT, and MRI revealed marked atrophy and multiple biliary cysts of the hepatic left lobe. The hepatic right lobe was normal. ERCP and bile duct endoscopy revealed anomalous pancreaticobiliary union, choledochal dilation, dilation of left intrahepatic bile ducts, and small choledochal non-invasive adenocarcinoma. Polycystic kidney diseases were absent. The patient underwent pancreatico-duodenectomy and extended hepatic left lobectomy. Grossly, the hepatic left lobe was markedly atrophic, and studded with numerous biliary cysts. The left intrahepatic bile ducts were dilated (Caroli's disease) and the common bile duct showed type I choledochal dilation. The right hepatic lobe was normal. Histologically, the hepatic left lobe was replaced by fibroelastosis. The intrahepatic bile ducts showed ductal plate malformation such as irregular contours, invaginations, and protrusions. The numerous biliary cysts also showed ductal plate malformation. There were numerous persistent ductal plates and microhamartomas. Many hyalinized destructive biliary cysts and ductal plates were recognized. The liver parenchyma was scant and free of hepatocellular malformations. The portal veins showed old obliterative portal thrombosis. The right hepatic lobe was normal. Immunohistochemically, the biliary cells were positive for cytokeratin 7, 8, 18 and 19, and MUC6 and CD10, but negative for MUC2 and MUC5AC. The biliary cysts, persistent ductal plate, and microhamartomas were positive for fetal apomucin antigen MUC1.

Keywords Caroli's disease · Polycystic liver · Monolobar disease · Persistent ductal plate · Portal thrombi · Intrahepatic bile duct development

T. Terada (✉) · T. Moriki
Department of Pathology, Shizuoka City Shimizu Hospital,
Miyakami 1231,
Shizuoka 424-8636, Japan
e-mail: piyo0111jp@yahoo.co.jp

Introduction

The ductal plate is a double-layered cylindrical structure present in early fetal life [1, 2]. It is a precursor structure of future intrahepatic bile ducts and intrahepatic peribiliary glands [3]. The ductal plate undergoes remodeling by apoptosis and cell proliferation [4], leading to immature bile ducts in late fetal life [4]. Intrahepatic peribiliary glands [3] also arise from the ductal plate [5]. The remodeling of the ductal plate is modulated by various molecules including matrix proteinases, tissue inhibitor of matrix metaloproteinases, trypsinogen, cathepsin [6], apoptosis-related molecules such as bcl-2, Levis Y and c-myc [4], pancreatic digestive enzymes [7], glycoproteins [8], tenascin, type IV collagen, laminin [9], TGF-α, TGF-α receptor [10], MET, C-erbB2 [11], E-cadherin, catenins (α, β, and γ) [12], pancreatic alpha-amylase [13], PKR [14], midkine [15], truncated midkine [16], and MUC apomucins [17]. Peribiliary capillary plexus also plays an important role in the ductal plate remodeling [18]. The impairment of these molecules may lead to persistent ductal plate in adult livers [19].

Ductal plate malformation [1, 2, 19] is a persistent fetal ductal plate in the postnatal livers [1, 2, 19]. Congenital biliary diseases include congenital intrahepatic bile ducts dilations (Caroli's disease), congenital hepatic fibrosis, infantile polycystic disease, adult polycystic disease, microhamartomas (von-Meyenburg complexes), and choledochal

cyst. Desmet [2] considered that these congenital biliary diseases may be derived from abnormal development at different levels of the biliary tree, and named these diseases "ductal plate malformation". In contrast, Summerfield et al. [20] proposed the term "hepatobiliary fibropolycystic disease" for these congenital biliary diseases because they overlap relatively frequently.

Herein reported is a case of ductal plate malformation or hepatobiliary fibropolycystic disease of unknown etiology characterized by monolobar hepatic disease, Caroli's disease with ductal plate features, biliary cysts of ductal plate features, microhamartomas, monolobar marked atrophy, marked loss of liver parenchyma, obliterative portal venopathy, type I choledochal cyst, and anomalous pancreaticobiliary junction.

Case Study

A 75-year-old woman complained of severe heartburn, and was admitted to our hospital. Imaging modalities including US, CT and MRI revealed marked atrophy and multiple biliary cysts of the hepatic left lobe (Fig. 1). The hepatic right lobe was normal. Polycystic kidney and pancreatic diseases were absent. No familiar history of polycystic disease of the kidney and liver was recognized. ERCP and bile duct endoscopy revealed an anomalous pancreaticobiliary union, choledochal dilation, dilation of left intrahepatic bile ducts, dilation of the right hepatic duct, and very small slightly elevated lesions of the common bile duct (Fig. 2). The common duct of the pancreaticobiliary maljunction was 20 mm in length. The right intrahepatic bile ducts were normal by ERCP. A blood laboratory test showed no significant changes. A biopsy obtained from the common bile duct revealed a well-differentiated adenocarcinoma. Therefore, the patient underwent pancreaticoduodenectomy and extended hepatic left lobectomy.

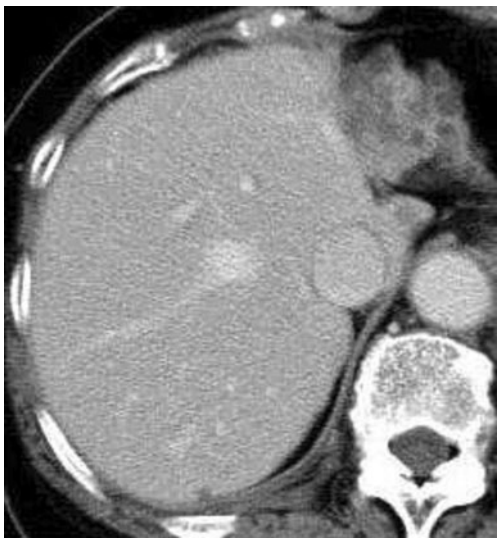

Fig. 1 Hepatic CT. The hepatic left lobe is markedly atrophic. Numerous cysts are recognized in the left lobe. The right lobe is normal

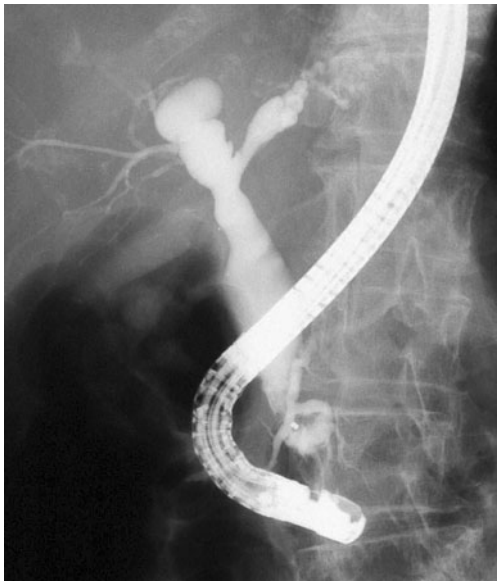

Fig. 2 ERCP. Pancreaticobiliary maljunction, choledochal dilation, right hepatic duct dilation, and diffuse dilations of left intrahepatic bile duct are recognized

Macroscopically, the hepatic left lobe was markedly atrophic, and studded with numerous biliary cysts (Fig. 3). The cut surfaces of the hepatic left lobe revealed numerous biliary cysts, intrahepatic bile ducts dilations (Caroli's disease), and marked loss of liver parenchyma (Fig. 4). The right area of the resected liver contained right hepatic lobe, which showed no significant changes (Fig. 3). The common bile duct showed type I choledochal dilation or cyst (Fig. 5). An elevated lesion was recognized in the common bile duct. Pancreaticobiliary maljunction was present. The gall bladder showed no significant alterations.

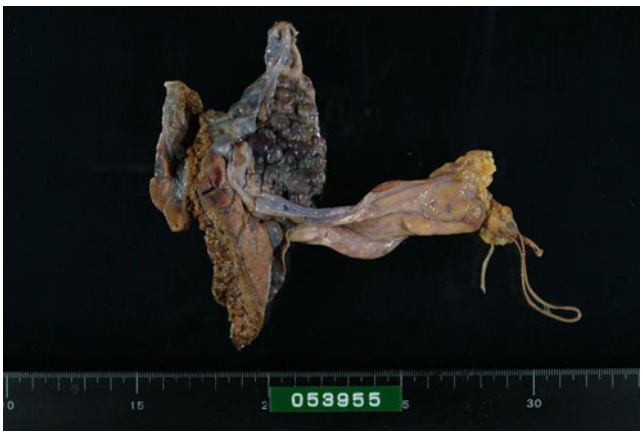

Fig. 3 Resected hepatic left lobe. The left lobe is very atrophic, and numerous cysts are present. The right hepatic lobe attached (left) was free of diseases

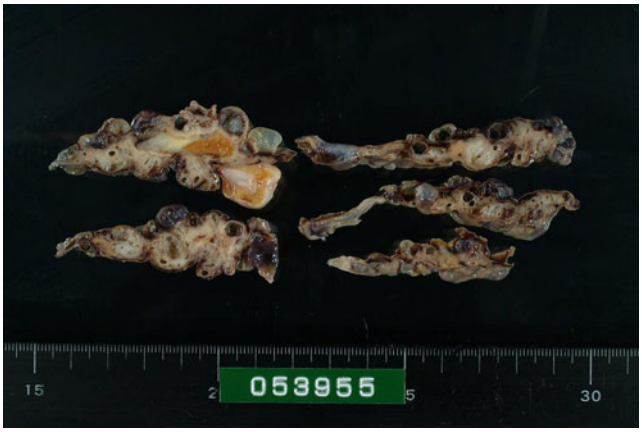

Fig. 4 Some cut surfaces of the hepatic left lobe. There are numerous cysts Liver parenchyma is almost lost

Microscopically, the hepatic left lobe was almost replaced by fibroelastosis. The intrahepatic bile ducts were dilated (Caroli's disease), and showed ductal plate malformation such as irregular contours, invaginations, and protrusions (Fig. 6). The numerous biliary cysts also showed ductal plate malformation (Fig. 7). There were numerous persistent ductal plates (Fig. 8a, b, c, and d) and microhamartomas (von-Meyenburg complexes) (Fig. 9). Many hyalinized destructive biliary cysts and ductal plates were recognized (Fig. 10). The liver parenchyma was scant and free of hepatocellular malformations. The portal veins showed old obliterative thrombosis (Fig. 11) from the hepatic hilus to the peripheral branches. The hepatic arteries were condensed, but were free of significant pathologic changes. A mild ascending cholangitis was recognized. The common bile duct elevated lesion was a small, non-invasive, well-differentiated adenocarcinoma measuring 7×8 mm. No common bile duct obstruction by the carcinoma was found. The hepatic right lobe was free of significant pathologic changes.

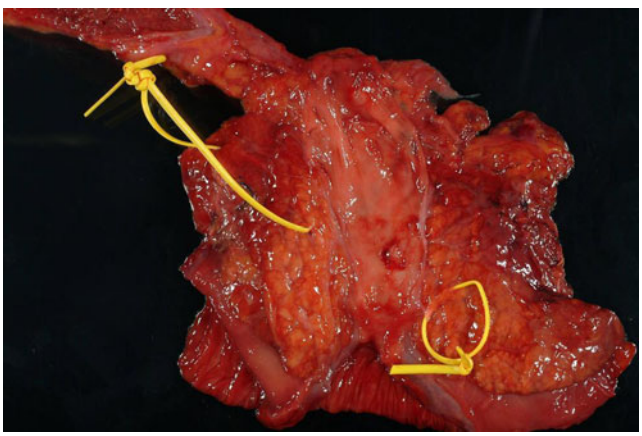

Fig. 5 The extrahepatic bile duct. It shows choledochal dilation. A minute elevated focus of non-invasive adenocarcinoma is seen

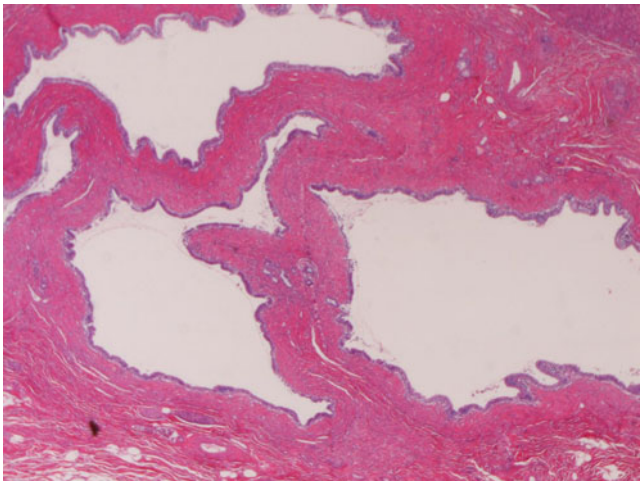

Fig. 6 Left intrahepatic bile ducts. The intrahepatic bile ducts are dilated, and show ductal plate features such as irregular contours, infoldings, and outporchings, HE, x20

We performed an immunohistochemical study with the use of Dako's Envision method (Dako Corp. Glostrup, Denmark), as previously described [21–25]. The antibodies used were as follows: pancytokeratin (AE1/3, Dako), pancytokeratin (CAM5.2, Becton-Dickinson, CA, USA), cytokeratin (CK) 7 (OV-TL, Dako), CK8 (35BH11, Dako), CK18 (DC10, Dako), CK19 (Progen Bio., Heidelberg, Germany), MUC1 (MA695, Novocastra, New Castle Upon Tyne, UK), MUC2 (CcP58, Novocastra), MUC5AC (CLH2, Novocastra), MUC6 (CHL5, Novocastra), and CD10 (56C6, Novocastra). All the biliary epithelial types of the liver showed positive reactions for AE1/3, CAM5.2, CK7, CK8, CK18, CK19, MUC6, and CD10 (Fig. 12a), and negative reactions for MUC2 and MUC5AC. The biliary cysts, persistent ductal plate, and microhamartomas were positive for fetal apomucin antigen MUC1 (Fig. 12b).

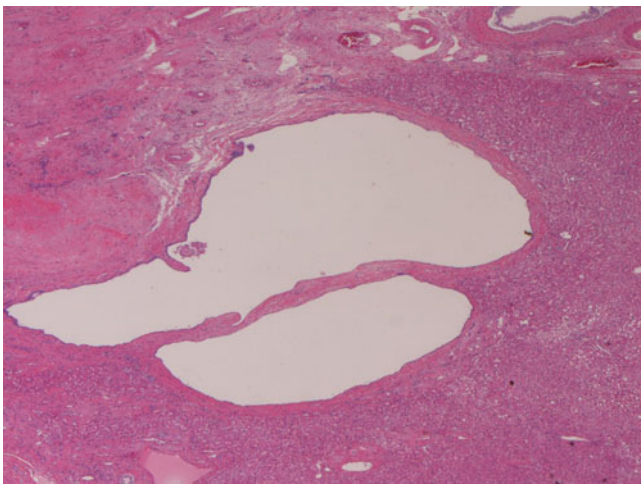

Fig. 7 Biliary cysts. They are composed of multiple cysts with irregular contours and ductal plate features such as bridge formations and infoldings. HE, x40

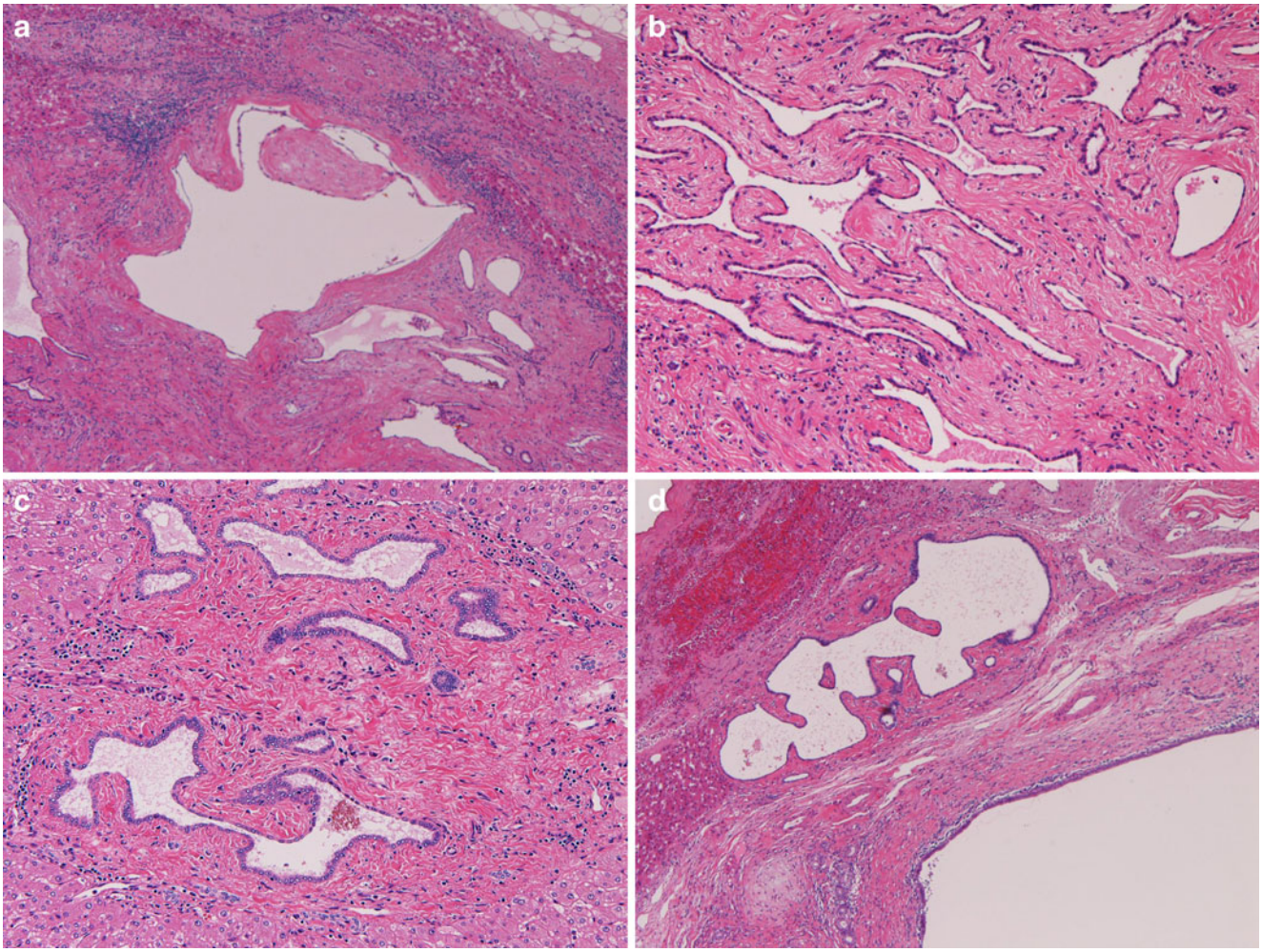

Fig. 8 Several features of ductal plate malformation. **a**: A ductal plate malformation and tubular ductal plate are seen. HE, x40. **b**: Slit-like ductal plates are present. HE x100. **c**: Several typical persistent ductal plates are seen. HE, x100. **d**: A typical ductal plate is present next to a biliary cyst. HE, x40

Discussion

We herein reported a strange case of with multiple biliary abnormalities. To the best of our knowledge, such a case has not been reported in the literature. All of the biliary abnormalities in the present study resemble the human fetal ductal plate, suggesting that the present case is caused by persistence of the fetal ductal plate. We demonstrated immunohistochemically the presence of MUC1 apomucin, which is absent in adult biliary elements but present in human fetal biliary elements including the ductal plate [17], strongly suggesting that the biliary abnormalities in the present study are composed of true fetal ductal plate. The biliary cysts of the present study are different from peribiliary cysts, which are important cystic lesions and are present in portal venopathy, cirrhosis, and hepatolithiasis [26–33]. Peribiliary cysts are considered to be derived from cystic dilations of intrahepatic biliary glands or cystic changes of microhamartomas, and lack ductal plate features

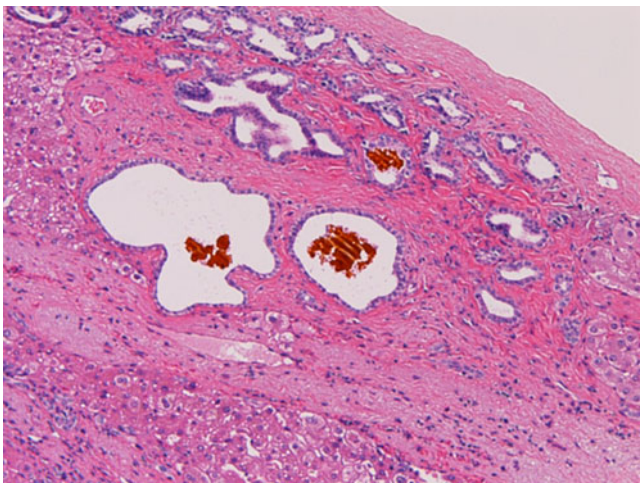

Fig. 9 Hepatic microhamartoma (von-Meyenburg complex). HE, x100

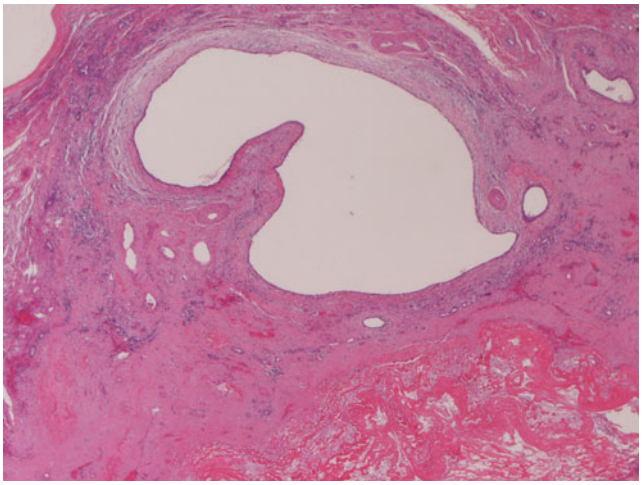

Fig. 10 Destructive ductal plate is replaced by characteristic hyarlnization (lower). The upper cyst shows features of ductal plate. HE, x20

[26–34]. Taken together, we consider that the present case is a congenital biliary disorder composed of fetal ductal plates. The normal hepatic right lobe in the present study indicates that the disease affected only the hepatic left lobe.

The present study demonstrated marked atrophy of the left hepatic lobe. The present case is characterized by monolobar involvement. The present case was different monolobar or segmental Caroli's disease [35–37], a very rare disease. In monolobar Caroli's disease, there has been no description of ductal plate malformation and polycystic biliary changes [35–37]; therefore the present case is different from monolobar or segmental Caroli's disease.

The etiology and pathogenesis of the present case is only speculative. We consider that the present case with biliary abnormalities is congenital in origin. However, a report showed that microhamartomas and biliary cysts can be caused by ligation of hepatic arteries and are present in patients with polyarteritis nodosa [38]. In the present case,

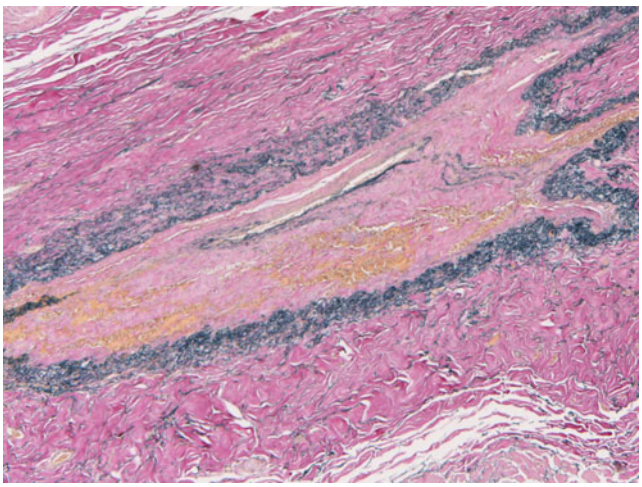

Fig. 11 Portal veins. The major portal vein shows obliterative phlebosclerosis and intraluminal old thrombi. Elastica van Gieson, x20

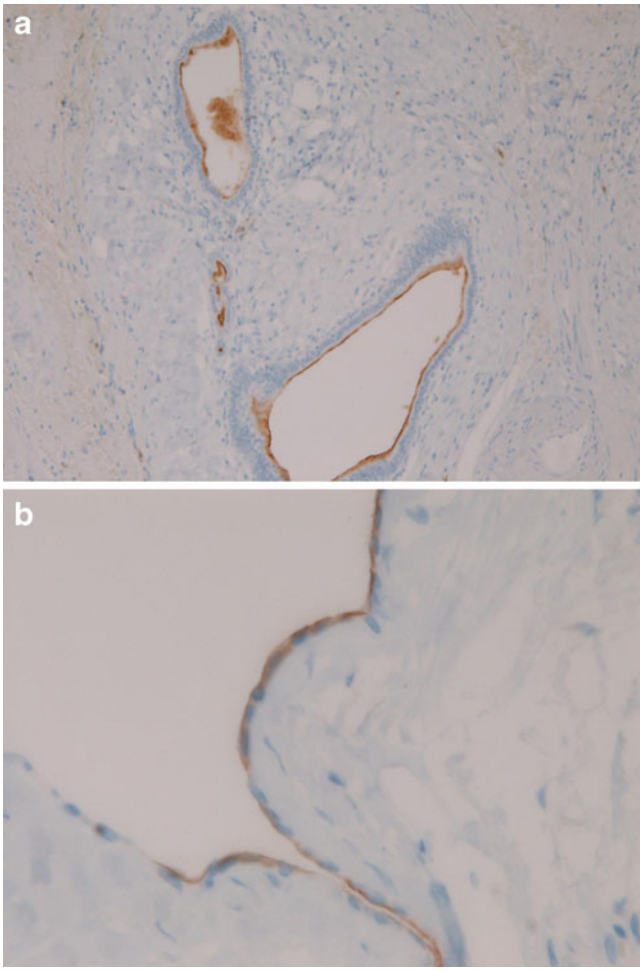

Fig. 12 The ductal plate malformation is characteristically positive for CD10 (**a**) MUC1 (**b**) at the luminal border. Immunostaining for CD10 and MUC1, x200

no abnormalities of hepatic arteries were present, suggesting that the biliary abnormalities were not due to hepatic arterial ischemia. However, the portal veins of the present study were completely obliterated by old thrombi and phlebosclerosis, and therefore, portal venous ischemia may have existed. Therefore, it cannot be ruled out that portal venous ischemia caused the present biliary ductal malformations. Portal obliterative venopathy usually leads to cavernous transformation [39], and does not cause liver atrophy and biliary malformations as seen in the present study [40–43]. Cavernous transformation was absent in the present case. However, we speculate that the portal obliterative venopathy caused severe atrophy of the hepatic left lobe in the present study. The etiology of the portal changes is unclear.

We performed an immunohistochemical analysis to characterize the biliary epithelium. The normal biliary epithelium, including peribiliary glands in adults and ductal plate and bile ducts in fetuses, expresses AE1/3 and CAM5.2 [5] and CK7, CK8, CK18 and CK19 [44]. The ductal plate in human fetuses and ductal plate malformation in adults also express

these cytokeratins [44, 45]. These CK profiles are the same as those of the present study. In the present case, all the biliary epithelial types were positive for MUC6 and CD10, and negative for MUC2 and MUC5AC, indicating that the MUC apomucin profile of the present study was of biliary type [46, 47]. In the present study, MUC1 was characteristically expressed in the ductal plate malformation. It was reported that MUC1 is expressed in fetal ductal plate and bile ducts, but not in postnatal biliary epithelial cells [17]. The present findings that MUC1 apomucin was expressed in the ductal plate malformation suggest that the ductal plate malformation in the present study was an authentic persistent fetal ductal plate. The results also strongly suggest that the present case is congenital in origin. Taken together, we consider that the present monolobar liver disease is a congenital anomaly complicated by portal venopathy.

The anomalous bile duct cells expressed CD10 in the present study. CD10, a microvilli-associated antigen, is well known to be expressed in hepatocytes (canaliculi), not in bile ducts. The reason for positive CD10 in biliary elements in the present study is unclear. Ductal transformation of hepatocytes is unlikely in the present case. It may be fetal biliary antigen. Examination of CD10 in the fetal ductal plate is mandatory.

Our case may somewhat resemble autosomal adult type polycystic kidney and liver disease, a disease caused by mutations of PKD-1 or PKD-2 disease [48–50]. This inherited disease is characterized by polycystic kidney, polycystic liver, and cystic lesions of other organs [48–50]. The liver of this disease showed diffuse involvement [32, 48–50]. Our case differed from this disease because our case involved monolobar liver, no polycystic kidney disease was found, and no inheritance was seen.

Finally, in the present study, anomalous pancreaticobiliary union, small noninvasive choledochal carcinoma, and choledochal dilations were recognized. The association of anomalous pancreaticobiliary junction with biliary carcinomas and choledochal dilation or cyst is well recognized [51–53]. It is considered that regurgitation of pancreatic juice into the biliary tree causes biliary and gall bladder carcinogenesis and choledochal cyst [51–53]. The present study demonstrates that monolobar ductal plate malformation can be associated with choledochal carcinoma and choledochal dilation.

Conflict of interest None

References

1. Jorgensen MJ (1977) The ductal plate malformation. Acta Pathol Microbiol Scand Supple 257:1–87
2. Desmet VJ (1992) Congenital disease of intrahepatic bile ducts: variations on the theme “ductal plate malformation”. Hepatology 16:1069–1083
3. Terada T, Nakanuma Y, Ohta G (1987) Glandular elements around the intrahepatic bile ducts in man: their morphology and distribution in normal livers. Liver 7:1–8
4. Terada T, Nakanuma Y (1995) Detection of apoptosis and expression of apoptosis-related proteins during human intrahepatic bile duct development. Am J Pathol 146:67–74
5. Terada T, Nakanuma Y (1993) Development of human intrahepatic peribiliary glands: histological, keratin immunohistochemical and mucus histochemical analyses. Lab Invest 68:261–269
6. Terada T, Okada Y, Nakanuma Y (1995) Expression of matrix proteinases during human intrahepatic bile duct development: a possible role in biliary cell migration. Am J Pathol 147:1207–1213
7. Terada T, Nakanuma Y (1995) Expression of pancreatic enzymes (α-amylase, trypsinogen and lipase) during human liver development and maturation. Gastroenterology 108:1236–1245
8. Terada T, Nakanuma Y (1994) Profiles of expression of carbohydrate chain structures during human intrahepatic bile duct development and maturation: a lectin-histochemical and immunohistochemical study. Hepatology 20:388–397
9. Terada T, Nakanuma Y (1994) Expression of tenascin, type IV collagen and laminin during human intrahepatic bile duct development and in intrahepatic cholangiocarcinoma. Histopathology 25: 143–150
10. Terada T, Ohta T, Nakanuma Y (1994) Expression of transforming growth factor-α and its receptor during human liver development and maturation. Virchows Archiv 424:669–675
11. Terada T, Nakanuma Y, Sirica AE (1998) Immunohistochemical demonstration of MET overexpression in human intrahepatic cholangiocarcinoma and in hepatolithiasis. Hum Pathol 29:175–180
12. Terada T, Ashida K, Kitamura Y, Matsunaga Y, Takashima K, Kato M, Ohta T (1998) Expression of E-cadherin, alpha-catenin and beta-catenin during human intrahepatic bile duct development. J Hepatol 28:263–269
13. Terada T, Kato M, Horie S, Endo K, Kitamura Y (1998) Expression of pancreatic alpha-amylase protein and messenger RNA on hilar primitive bile ducts and hepatocytes during human fetal liver organogenesis: an immunohistochemical and in situ hybridization study. Liver 18:313–319
14. Terada T, Ukita Y, Ueyama J, Ohta T (2000) Protein expression of double-stranded RNA-activated protein kinase (PKR) in intrahepatic bile ducts in normal adult livers, fetal livers, primary biliary cirrhosis, hepatolithiasis and intrahepatic cholangiocarcinoma. Liver 20:450–457
15. Kato M, Shinozawa T, Kato S, Terada T (2000) Divergent expression of midkine in the human fetal liver and kidney: an immunohistochemical analysis of developmental changes in hilar primitive bile ducts and hepatocytes. Liver 20:475–481
16. Kato M, Shinozawa T, Kato S, Terada T (2004) Immunohistochemical localization of truncated midkine in developing human bile ducts. Histol Histopathol 18:129–134
17. Sasaki M, Nakanuma Y, Terada T, Kim YS (1995) Biliary epithelial expression of MUC1, MUC2, MUC3 and MUC5/6 apomucins during intrahepatic bile duct development and maturation. Am J Pathol 147:574–579
18. Terada T, Nakanuma Y (1993) Development of human peribiliary capillary plexus: a lectin-histochemical and immunohistochemical study. Hepatology 18:529–536
19. Terada T, Kitamura Y, Nakanuma Y (1997) Normal and abnormal development of the intrahepatic biliary system: a review Tohoku. J Exp Med 181:19–32
20. Summerfield JA, Nagafuchi Y, Sherlock S, Cadafalch J, Scheuer PJ (1986) Hepatobiliary fibropolycystic disease: a clinical and histological review of 51 patients. J Hepatol 2:141–156
21. Terada T, Kawaguchi M, Furukawa K, Sekido Y, Osamura Y (2002) Minute mixed ductal-endocrine carcinoma of the pancreas with predominant intraductal growth. Pathol Int 52:740–746

22. Terada T, Kawaguchi M (2005) Primary clear cell adenocarcinoma of the peritoneum. Tohoku J Exp Med 271:271–275
23. Terada T, Tanigichi M (2004) Intraductal oncocytic papillary neoplasm of the liver. Pathol Int 54:116–123
24. Terada T (2009) Gastrointestinal stromal tumor of the uterus: a case report with genetic analyses of c-kit and PDGFRA genes. Int J Gynecol Oncol 28:29–34
25. Terada T (2008) Primary multiple extragastrointestinal stromal tumors of the omentum with different mutations of c-kit gene. World J Gastroenterol 14:7256–7259
26. Nakanuma Y, Kurumaya H, Ohta G (1984) Multiple cysts in the hepatic hilum and their pathogenesis: a suggestion of periductal gland origin. Virchows Arch [A] 404:341–350
27. Wanless IR, Zahradnik J, Heathcote EJ (1987) Hepatic cysts of periductal gland origin presenting as obstructive jaundice. Gastroenterology 93:89
28. Terada T, Nakanuma Y (1990) Pathological observations of intrahepatic peribiliary glands in 1000 consecutive autopsy livers: III. Survey of necroinflammation and cystic dilatation Hepatology 12:1229–1233
29. Kida T, Nakanuma Y, Terada T (1992) Cystic dilatation of peribiliary glands in livers with adult polycystic disease and livers with solitary non-parasitic cysts: an autopsy study. Hepatology 16:334–340
30. Terada T, Minato H, Nakanuma Y, Shinozaki K, Kobayashi S, Matsui O (1992) Ultrasound visualization of hepatic peribiliary cysts: a comparison with morphology. Am J Gastroenterol 87:1499–1502
31. Itai Y, Ebihara R, Tohno E, Tsunoda HS, Kurosaki Y, Saida Y, Doy M (1994) Hepatic peribiliary cysts: multiple tiny cysts within the larger portal tract, hepatic hilum, or both. Radiology 191:107–110
32. Terada T, Nakanuma Y (1988) Congenital biliary dilatation in autosomal dominant adult polycystic disease of the liver and kidneys. Arch Pathol Lab Med 112:1113–1116
33. Terada T, Matsushita H, Tashiro J, Sairenji T, Erigichi M, Osada I (2003) Cholesterol hepatolithiasis with peribiliary cysts. Pathol Int 53:716–720
34. Roda E, Sama C, Festi D, Aldini R, Mazzella G, Roda A, Barbara L (1979) Caroli's disease: description of a rare clinical case with monolobar localization. Am J Gastroenterol 71:621–626
35. Boyle MJ, Doyle GD, McNulty JG (1989) Monolobar Caroli's disease. Am J Gastroenterol 84:1437–1444
36. Giovanardi RO (2003) Monolobar Caroli's disease in an adult: case report. Hepatogastroenterology 50:2185–2187
37. Mohan LN, Thomas PG, Kilpadi AB, D'cunha S (1991) Liver atrophy associated with monolobar Caroli's disease. HPB Surg 4:203–206
38. Popovsky MA, Costa JC, Doppman JL (1979) Meyenburg complexes of the liver and bile cysts as a consequence of hepatic ischemia. Hum Pathol 10:425–432
39. Terada T, Takegoshi T, Doishita K, Nakanuma Y (1988) Histological study of intrahepatic cavernous transformation in a patient with primary myelofibrosis and portal venous thrombosis. Virchows Arch [A] 412:339–345
40. Terada T, Ishida F, Nakanuma Y (1989) Vascular plexus around intrahepatic bile ducts in normal livers and portal hypertension. J Hepatol 8:139–149
41. Terada T, Hoso M, Nakanuma Y (1989) Microvasculature in the small portal tracts in idiopathic portal hypertension: a morphological comparison with other hepatic diseases. Virchows Arch [A] 415:61–68
42. Terada T, Nakanuma Y, Hoso M, Obata H (1991) Expression of HLA-DR antigen on hepatic vascular endothelial cells in idiopathic portal hypertension. Clin Exp Immunol 84:303–307
43. Terada T, Nakanuma Y, Obata H (1991) HLA-DR expression on the microvasculature in portal tracts in idiopathic portal hypertension: immunohistochemical characteristics and relation to portal phlebosclerosis. Arch Pathol Lab Med 115:993–997
44. Van Eyken P, Sciot R, Callea F, Van der Steen K, Moerman P, Desmet VJ (1988) The development of the intrahepatic bile ducts in man: a keratin immunohistochemical study. Hepatology 8:1589–1595
45. Awasthi A, Das A, Srinivasan R, Joshi K (2004) Morphological and immunohistochemical analysis of ductal plate malformation: correlation with fetal liver. Histopathology 45:260–267
46. Furukawa T, Kloppel G, Volkan Adsay N et al (2005) Classification of types of intraductal papillary-mucinous neoplasm of the pancreas: a consensus study. Virchows Arch 447:794–799
47. Shibahara H, Tamada S, Higashi M, Goto M, Batra SK, Hollingsworth MA, Imai K, Yonezawa S (2004) MUC4 is a novel prognostic factor of intrahepatic cholangiocarcinoma-mass forming type. Hepatology 39:220–229
48. Torres VE, Harris PC, Pirson Y (2007) Autosomal dominant polycystic kidney disease. Lancet 14:1287–1301
49. Gabow PA (1993) Autosomal dominant polycystic kidney disease. N Eng J Med 332–342
50. Grantham JJ (2008) Clinical practice: autosomal dominant polycystic kidney disease. N Eng J Med 359:1477–1485
51. Young WT, Thomas GV, Blethyn AJ, Lawrie BW (1992) Choledochal cysts and congenital anomalies of the pancreaticobiliary junction: the clinical findings, radiology and outcome in nine cases. Br J Radiol 65:33–38
52. Misra SP, Dwivedi M (1990) Pancreaticobiliary ductal union. Gut 1144–1149
53. Noun R, Sayegh R, Tohme-Noun C, Honein K, Smayra T, Aoun N (2006) Extracystic biliary carcinoma associated with anomalous psancreaticobiliary junction and cysts. J Hepatobiliary Pancreat Surg 13:557–559