The report presents a rare case of carcinoid tumor in a 17 year female who presented with epigastric pain of one week duration. She was diagnosed to have type I choledochal cyst on abdominal ultrasound and MRI. She underwent total excision of choledochal cyst with roux-en-Y hepaticojejunostomy. Histopathological examination revealed a neuroendocrine tumor within choledochal cyst which was immunoreactive for Chromogranin A. Patient is well at 6 months of follow up. These tumors are characteristically slow-growing, therefore awareness of its presence preoperatively can facilitate optimal management by performing surgical resection with negative margins which offers the best chance of long-term survival.

**Key words:** neuroendocrine tumor; carcinoid tumor; choledochal cyst

Carcinoid tumors renamed recently as neuroendocrine tumors (NET) (1) are contemplated to originate from embryonal neural crest cells (Argentaffin or Kulchitsky cells), which migrate to bronchopulmonary and gastrointestinal tracts during development. These cells are located at the base of Lieberkuhn crypts in the intestine. Scarcity of these cells in the biliary tree explains the rarity of this tumor at this site (2, 3). Primary carcinoid tumor of extrahepatic bile duct (EHBD) accounts only for 0.2-2% of all gastrointestinal carcinoids (3-6).

Literature search reveals that first case of EHBD NET was reported in 1959 (7) and since then less than 60 cases have been reported. Herein we are reporting a case of NET in choledochal cyst.

**CASE REPORT**

A 17 year female presented with epigastric pain of a week’s duration. She was well and on examination there was no icterus. On abdominal examination there was no mass palpable in the right hypochondrium. Physical examination of all other systems revealed no abnormality. Biochemistry revealed slight elevation of alkaline phosphatase [261(53-141) u/l] with normal serum bilirubin and transaminases. Ultrasound showed a dilated common bile duct. Magnetic resonance imaging (MRI) confirmed it to be type I choledochal cyst (fig. 1).

She was listed for elective surgery and on surgical exploration a choledochal cyst of about 12 x 8 cm in size was identified which was not separable from the gall-bladder. Choledochal cyst...
cyst was excised completely and Roux-en-Y hepaticojejunostomy was performed. Her post-operative period was uneventful. She is currently well at 6 months of follow up.

Pathological findings

Gross examination of the cyst revealed inflammation of the mucosa and the wall thickness was measured to be 15 mm with an area of polypoid growth measuring about 6 mm in diameter. Microscopic examination confirmed a choledochal cyst with ulceration of the lining epithelium. The polypoidal region showed papillomatous hyperplasia of epithelium, with islands of mildly pleomorphic cells. Tumor cells were arranged in cords and possessed abundant eosinophilic cytoplasm. There was infiltration of muscularis propria but without lymphovascular permeation or perineural invasion (fig. 2 a, b, c). Immunohistochemistry was positive for Chromogranin A within the infiltrating cell clusters (fig. 3) but negative for Synaptophysin. Final histological diagnosis based on WHO classification was that of a well-differentiated neuroendocrine carcinoma within choledochal cyst with low malignant potential (class II).

DISCUSSION

EHBD remains to be the rarest primary site for NET (0.2%) in published series of 3468 and 13,715 patients by Carriaga and Henson (5) and by Modilin et al. (6) respectively. The rarity of these tumors at this site is due to paucity of Kulchitsky cells (2, 3). Carcinoids may develop within the bile duct whenever there is chronic inflammation resulting in intestinal metaplasia of biliary epithelium, associated with an increase in the number of endocrine cells, which are the precursors for the development of NET (8).

EHBD NET occur within the common bile duct (CBD) in 58%, perihilar region in 28%, cystic duct in 11%, and common hepatic duct (CHD) 3% (3). The first case of carcinoid tumor in the wall of a choledochal cyst was published in 1992 (9) and to the best of our knowledge our patient is the second. Tonnhofer et al. (10) reported a NET of the distal CBD causing dilatation of proximal biliary tree, mimicking a type I choledochal cyst preoperatively.

Biliary NETs occur more frequently in women at a young age. It is difficult to diagnose and distinguish preoperatively from cholangiocarcinoma because commonly they are non-functional. There has been only one case report of functional tumor has been described (3). Little is known about the clinical features and natural history of these tumors and there may be a possible association with MEN-I and von Hippel-Lindau syndrome (11). Final diagnosis is usually confirmed on immunohistochemistry. They are immunoreactive for chromogranin...
A. They may reveal positive staining for somatostatin, serotonin and gastrin (3).

Clinicopathologic behaviour of these tumors plays a role in determining the outcome of these patients. Even though local invasion is rare, lymphatic or hemogenous metastasis is present in 36.4% of patients (3, 12). Tumor size is not a definitive predictor for the development of metastasis. EHBD NET invade ductal wall in 100%, had perineural invasion in 57% and lymphovascular invasion in 29% of patients (13).

Commonly NETs have an indolent course, complete surgical resection with negative histological margins offers long life expectancy (7 to 9.5 years) even in the presence of hepatic metastasis (7, 14, 15, 16). Five year survival of 60-100% has been reported in patients with localised tumor (6, 16). Maximum disease free survival of 11 years has been reported after curative resection of a bile duct NET (17). Role of adjuvant chemo or radiotherapy is investigational.

In conclusion, NETs of EHBD, are rare slow growing tumors with low malignant potential. These favourable biologic characteristics make them amenable to aggressive surgical resection. Rarity of these tumors and their non-functionality at the time of presentation makes it challenging to diagnose preoperatively.

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