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Case Report

Recurrent Cholangitis Secondary to a Traumatic Biliary Neuroma

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Keywords
Biliary neuroma · Cholangitis · Obstructive jaundice

Abstract
Biliary amputation neuroma is rare and difficult to diagnose preoperatively due to diversity of clinical presentation and a lack of awareness among healthcare providers. We present a case of biliary neuroma arising from a recent laparoscopic cholecystectomy, complicated by bile leak and recurrent cholangitis. An extensive review of the literature was performed, closely examining related etiology, trends in age, clinical symptomology, and time to presentation. The role of surgery compared to an endoscopic approach in diagnosis has been reviewed. Physicians are urged to remain mindful of malignant biliary strictures as they may easily mimic and misguide the diagnosis of a traumatic biliary neuroma.

Introduction

A traumatic neuroma, also known as an amputation neuroma, is a lump of unorganized axon fibers and non-neural tissue growth that develops as an injured nerve begins to heal in an uncontrolled manner [1]. Despite its misleading name and behavior, however, it is not considered to be a true neoplasm. As first described in 1928 by Husseinoff [2], traumatic biliary neuroma is a rare but well-recognized complication of hepatobiliary surgery. With a few cases previously described in the literature, they remain highly underestimated. It was reported that traumatic neuromas were found in autopsies of up to 10% of patients who

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underwent prior cholecystectomy [3]. This could be due to the fact that their diagnosis remains challenging preoperatively and that it is often delayed due to a lack of specific clinical or radiological features. Often, traumatic neuromas present as obstructive jaundice after open cholecystectomy more than 2 years from the initial insult [4]. We present an unusual case of a biliary tract neuroma appearing 10 months after laparoscopic cholecystectomy and that was admitted to the emergency department as a case of cholangitis. A final pathological diagnosis was made during open bile duct exploration and hepaticojejunostomy after failure of endoscopic therapy.

Case Report

A 72-year-old female patient presented to the emergency department at the Jordan University Hospital with right upper quadrant (RUQ) abdominal pain 5 days following laparoscopic cholecystectomy. Her operative report was remarkable for cystic duct tear that was closed by clips and stitches intraoperatively. Magnetic resonance cholangio-pancreatography demonstrated a decompressed biliary tree with subhepatic and intraperitoneal fluid collection with concomitant nonspecific liver function test derangement consistent with bile leak. This was further supported by an HIDA scan. Subsequently, she underwent endoscopic retrograde cholangio-pancreatography (ERCP) which confirmed cystic duct leak. This was followed by sphincterotomy and plastic stent placement. Her hospital course was complicated by mild acute pancreatitis for which she was treated and discharged 3 days later without complaint. The stent was then extracted 4 weeks later without complications. The patient presented 4 months later with an episode of RUQ pain, fever, and jaundice. Abdominal examination was remarkable for RUQ tenderness. Liver function test (LFT) revealed evidence of cholestasis with total bilirubin of 4.2 mg/dL, direct 3.2 mg/dL, alkaline phosphatase 326 (normal <120), GGT 542 (normal <60). She was diagnosed with cholangitis and was started on antibiotics. Magnetic resonance cholangio-pancreatography revealed evidence of mild intrahepatic duct prominence, with a common bile duct (CBD) diameter of 8 mm. She underwent an ERCP that revealed a small CBD stone that was extracted without stent placement. The CBD and common hepatic duct were reported to be normal. Six months later, the patient presented with a sudden onset of colicky epigastric pain, bilious vomiting, chills, and jaundice. She was hypotensive and tachycardic. Laboratory findings were significant for elevated liver enzymes and hyperbilirubinemia (ALT: 558, AST: 517, alkaline phosphatase: 255, GGT: 396, total bilirubin: 8.2 mg/dL, and direct 6.6 mg/dL). Additionally, abdominal ultrasound showed few intraluminal echogenic foci, seen in the proximal hepatic duct. The patient was admitted as a case of cholangitis and received imipenem-cilastatin during her stay. She underwent an emergent ERCP that revealed evidence of a small CBD stone that was extracted with purulent discharge consistent with acute suppurative cholangitis. A stent was put in place. The patient did well and was discharged on metronidazole 500 mg and levofloxacin 500 mg for 7 days. The patient was readmitted electively 6 weeks later for stent removal and assessment of the biliary tree. A repeat ERCP revealed a short 1 cm tight stricture located 2 cm below the bifurcation of hepatic ducts and with a small stone located proximal to the stricture (Shown in Fig. 1). The old plastic stent was removed, and the common hepatic duct was dilated using a 6–8-mm hurricane balloon followed by placement of two 10 F × 9 cm plastic stents. Eight weeks later, the two stents were removed, and a few small stones were extracted. Brush cytology and biopsy were performed across the stricture which was not felt to be draining well and remained tight. A stent was replaced. Brush cytology and biopsy were negative for malignant cells. After failure of endoscopic therapy, the patient was referred to surgery due to suspicion of underlying malignancy and underwent a hepaticojejunostomy with bile duct resection. The final pathological report revealed traumatic biliary neuroma with no evidence of epithelial dysplasia or malignancy.

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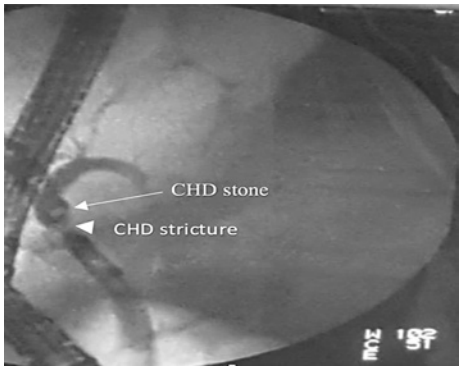

Fig. 1. ERCP cholangiogram with short CHD stricture (arrow head), CHD stone (long arrow), with upstream dilatation of the intrahepatic ducts. CHD, common hepatic duct.

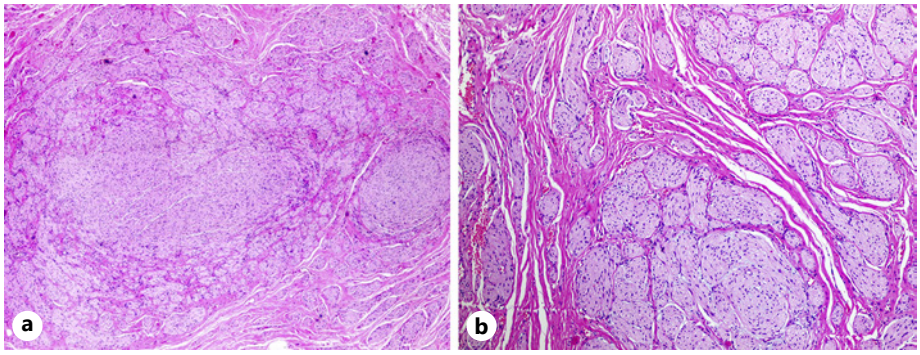

Fig. 2. a Low power microscopic view showing the tumor-like nerve bundles with no evidence of atypia, mitosis, or necrosis (hematoxylin and eosin ×200). **b** Higher microscopic view showing the nerve bundles in clusters compressing in between the fibrovascular tissue (hematoxylin and eosin ×400).

One specimen was received fixed in formalin and was labeled "common bile duct stricture." It consisted of a portion of the CBD measuring 3 × 1.4 × 1.2 cm. The specimen was previously opened with a longitudinal incision. The serosa appeared mildly congested, and the maximum wall thickness was 1.3 cm. The mucosa appeared normal. Submitted in the same container was a single lymph node measuring 2 × 1.2 × 1.4 cm. The specimen was totally submitted in 11 cassettes. The histological sections revealed an intact bile duct lumina with associated acute and chronic inflammation and focal ulceration with reactive cellular changes. The whole specimen was examined revealing no evidence of epithelial dysplasia or malignancy. However, numerous nerve bundles are noted in the submucosal area forming a tumor-like mass. This tumor-like mass appears unencapsulated with nerve bundles arranged in a haphazard pattern microscopically measuring 7 × 6 mm (Shown in Fig. 2a, b). The cells of the nerve bundles are completely mature with no evidence of atypia, significant nuclear pleomorphism, necrosis, or increased mitosis. A well-controlled S100 immunohistochemical stain highlighted these nerve bundles which appear to compress the bile duct (Shown in Fig. 3). The final diagnosis was CBD neuroma, mostly traumatic in nature.

Discussion

Extrahepatic bile duct strictures in an adult are likely malignant until proven otherwise. However, benign causes can rarely be encountered and may account for approximately 6% of all biliary tumors [4]. This could be secondary to traumatic injury or anastomotic ischemia,

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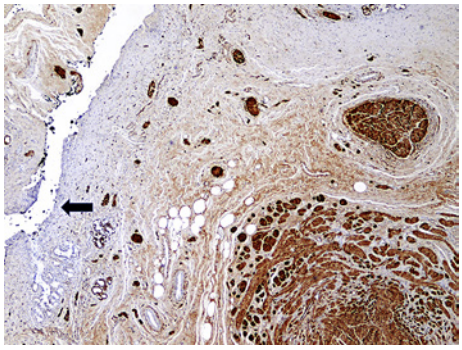

Fig. 3. Immunohistochemical stain for S100 revealing strong immunoreactivity of the tumor cell and showing histological evidence of compression of the CBD epithelium (arrow).

nonmalignant and infectious hilar lymphadenopathy, primary sclerosing cholangitis, autoimmune cholangitis, and chronic pancreatitis to mention a few. Patients often present with a wide variety of clinical pictures and complaints that may range from completely asymptomatic with abnormal imaging, to painless jaundice with liver enzyme abnormalities, or to recurrent cholangitis. Others may present with recurrent RUQ pain post cholecystectomy [5, 6].

This range of presentation may be as early as 6 months to 2 years especially in cases related to biliary ischemia post-transplant surgery [7]. Traumatic neuromas usually present after 2 years of surgery, although delayed presentations past 10 and up to 46 years have been reported as [4, 8–11] well (Table 1) [4, 8–11]. Open cholecystectomy seems to pose a higher risk in the development of neuroma when compared to the laparoscopic approach [12]. Cases of biliary neuroma following blunt abdominal trauma with no prior history of surgery have also been reported [20] [13].

The formulation of a precise preoperative diagnosis of traumatic biliary neuroma can be difficult as cases tend to present years after surgery with nonspecific symptoms such as jaundice, abdominal pain, or pruritus as the chief complaint. Abnormal radiological imaging studies with an elevated CA19-9 laboratory result are highly suggestive of and mimic a malignant biliary stricture.

Endoscopic ultrasound with fine needle aspiration may aid in the preoperative diagnosis of this entity with an accuracy of 68–91% [21]. However, surgery remains the superior intervention in the establishment of a definitive diagnosis, especially in symptomatic patients. Per oral cholangioscopy has been reported to be effective in traumatic neuroma [22]. Needless extended resections are always performed, which can be avoided by frozen section examination with intraductal cholangioscopy and biopsies [22]. In conclusion, traumatic biliary neuroma remains a rare entity. Recognition and awareness among health care professionals is vital in patients presenting with late-onset jaundice following any type of hepatobiliary procedure, as this may aid in preoperative work up. Surgical resection remains the recommended approach to rule out possible underlying cholangiocarcinoma.

Statement of Ethics

This study protocol was reviewed and the need for approval was waived by the IRB Committee of the Jordan University Hospital. A written and informed consent was obtained from the patient for publication of the information presented in this manuscript.

Conflict of Interests Statement

Authors have no conflicts of interest to declare.

Table 1. Published case reports of known traumatic neuromas over the last 20 years, from 2002 to 2021

Case report	Year of publication	Initial surgery	Presentation	Time to presentation
"Nechi et al. [6]"	2021	Open cholecystectomy	Obstructive jaundice	1 year
"Yang et al. [7]"	2020	Left hemihepatectomy	Obstructive jaundice	8 years
"Fernandez-Luque et al. [8]"	2019	Open cholecystectomy	Obstructive jaundice	6 months
"Lalchanadi et al. [4]"	2019	Open cholecystectomy	Acute cholangitis	10 years
"Sleiman et al. [9]"	2017	Open cholecystectomy	Obstructive jaundice	8 years
"Toyonaga et al. [10]"	2017	Open cholecystectomy	Bile duct nodule	46 years
"Terzi et al. [15]"	2017	Orthotopic liver transplant	Abnormal liver function tests	7 months
"Elkhatib et al. [16]"	2016	Cholecystectomy + ERCP w/sphincterotomy	RUQ and epigastric pain	Several decades
"Paquette et al. [10]"	2009	Open cholecystectomy	Obstructive jaundice + mass in CBD	45 years
"Herrera et al. [17]"	2009	Transplant	Obstructive jaundice (80%); abnormal LFTs (13.3%); incidental (6.6%)	4[a]
"Koh et al. [15]"	2008	Open cholecystectomy + choledochojejunostomy	Polypoid mass in CBD	12 years
"Cimaschi et al. [16]"	2006	Laparoscopic cholecystectomy then converted laparotomy	Obstructive jaundice	5 years
"Hotta et al. [17]"	2004	Open cholecystectomy w/CBD exploration	Obstructive jaundice	17 years
"Iannelli et al.[18]"	2003	Open cholecystectomy	Obstructive jaundice	12 years
"Hyman et al. [19]"	2003	Open cholecystectomy	Obstructive jaundice	3 years
"Katsinelos et al. [20]"	2002	Abdominal trauma	Obstructive jaundice + itching	8 years

[a]Average of 15 cases reported.

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Author Contributions

Nadin Y. Rayyan: collected the clinical data and drafted and revised the manuscript, with substantial contribution to the conception and final approval of the submitted version. Razan N. Aburumman and Luma Altaweel: collected the clinical data and revised the draft, with contribution to the conception and approval of the final submitted version. Nadwa Albustami: collected the clinical data, revised the manuscript, with contribution of pathology slides, and approved the final submitted version. Mousa A. Alabbadi: prepared the pathology slides, drafted the pathology section, revised the entire manuscript, and approved the final

submitted version. Yaser M. Rayyan: substantial contribution to the conception, drafting, and revising of the manuscript and final approval of the submitted version.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to corresponding author.

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