Radiation-induced stricture of the common bile duct

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Abstract

This 62-year-old female patient presented to surgical outpatients with features of obstructive jaundice ten years following radiotherapy for renal cell carcinoma. Investigations demonstrated an apparently benign mid common bile duct (CBD) stenosis. The lesion was stented giving temporary relief but subsequent blockage necessitated a hepaticojejunostomy with Roux-en-Y. Pathological examination of the excised CBD showed the presence of widespread chronic inflammation and fibrosis most likely secondary to radiation. No malignancy was found. Reports of these fibrotic stenoses remain rare in the literature; we discuss the investigation and management of these difficult diagnostic challenges.

INTRODUCTION

Causes of non-malignant strictures of the extra-hepatic biliary system include inflammatory processes such as sclerosing cholangitis and secondary strictures as in pancreatitis. Cholecystectomy is by far the most common iatrogenic cause of injury. This case report outlines the investigation and management of fibrotic stricturing in the CBD secondary to external beam radiation. This is a very rare occurrence with few documented cases since the 1960s following review of the literature. The importance of the correct identification of these lesions will be discussed in the report.

CASE HISTORY

This 62-year-old female presented to the surgical outpatients with a three week history of pruritis and progressive jaundice. Ten years prior to this presentation she had been diagnosed with inoperable renal cell carcinoma of the right kidney. CT examination demonstrated invasion to the inferior aspect of the right lobe of liver, right psoas muscle and inferior vena cava with para-aortic adenopathy (Figure 1). This malignancy was treated with external beam radiotherapy to the right anterior and posterior abdomen.

Figure 1

Figure 1: CT scan showing large right-sided renal cell carcinoma prior to radiotherapy



On this occasion, liver function tests were obstructive and ultrasound showed intrahepatic biliary duct dilatation and dilation of the CBD. ERCP demonstrated a tight stricture in the mid CBD in addition to narrowing of the second part of duodenum. At ERCP a stent was inserted and brush cytology specimens were taken. Alpha fetoprotein, CA 19-9 and CEA were within normal limits and brush cytology did not show evidence of malignancy.

The patient initially enjoyed good symptomatic relief post stenting but presented two months later with recurrent jaundice. Investigation confirmed duct dilatation and stent blockage. As malignancy could not be definitively excluded yet open surgical exploration was performed. This confirmed a dense fibrous stricture below the level of the confluence. The common bile duct was excised and a hepaticojejunostomy performed, with Roux-en-Y anastomosis. Histopathological analysis of the common bile duct showed widespread chronic inflammatory changes and fibrosis with mucosal ulceration (Figure 2). There was no evidence of primary or secondary malignant disease in the common bile duct. This patient remains under follow-up but is well to this day with no return of symptoms.

Figure 2

Figure 2: Histopathology specimen of the CBD showing widespread chronic inflammation and fibrosis. The luminal surface is severely ulcerated (arrowed), in keeping with recent stent insertion.



DISCUSSION

The majority of benign biliary strictures occur as a result of iatrogenic bile duct injury during cholecystectomy1. Other less common causes include pancreatitis, inflammatory conditions of the biliary tree and trauma. Benign extrahepatic biliary strictures resulting from external beam radiation have been documented. They are a rare cause of progressive biliary fibrosis and result in obstructive jaundice often years after initial treatment.

Radiation-induced hepatitis is more commonly reported2,.3, presenting as an acute condition resulting in jaundice, ascites and hepatomegally4. A chronic form also occurs where the liver parenchyma atrophies coupled with portal fibrosis, the severity being dose-dependant5. Several experimental studies have investigated radiation-induced biliary strictures. Todorokia8 showed fibrosis and atrophy of hilar bile ducts when subjecting a rabbit model to a single dose of 3000 rad electrons. Sindelar9 also showed stricturing 6 weeks after radiation treatment in the canine model. The extent of injury again was dose-dependant.

Clinical evidence would suggest that the period between initial treatment and the development of obstructive jaundice is latent, in the order of 12 years2,3,10. Consistent with sporadic reports from the literature the latent interval was 10 years in this case. The investigation of radiation-induced biliary strictures should follow the same basic protocol as for any patient with obstructive jaundice. Strictures can be difficult to differentiate from primary sclerosing cholangitis, cholangiocarcinoma and secondary mailgnancy. Emphasis should be aimed at the exclusion of malignant disease in this high-risk group.

Investigative techniques again follow the usual algorithm; including percutaneous and/or endoscopic brush cytology; CT-guided FNA and open surgical exploration with biopsy.

The treatment of choice will usually depend on the level of the biliary stricture. Commonly, the middle portion of the CBD is the most severely affected due to its relatively poor blood supply9,11. Until recently, open surgical bypass was the mainstay of treatment with Roux-en-Y cholecdochojejunostomy being the most commonly employed procedure. This method offers excellent long-term results but in order to exclude secondary malignant spread, biopsies should be taken from the stricture site. With the advent of expandable metal stents, endoscopic management of radiation-induced biliary strictures has been successfully employed12. Metallic stents are usually reserved for malignant disease as occlusion rates (0-11%) because of epithelial hyperplasia restrict their application in benign disease13,14.

The optimal therapy for benign disease is open surgery with resection. This has the advantage of providing an accurate diagnosis and offering the best long-term outcome. Endoprosthesis may be employed temporarily to restore biliary drainage, permitting patient recovery prior to definitive surgery12.

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