

# 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

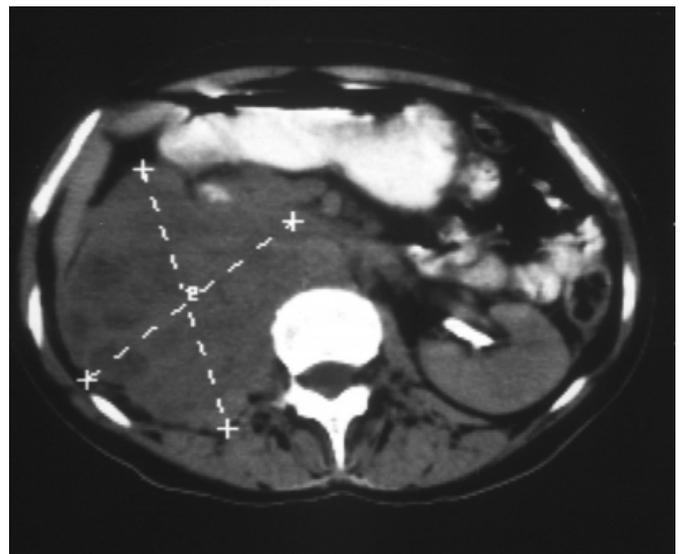
Causes of non-malignant strictures of the extra-hepatic biliary system include inflammatory processes such as sclerosing cholangitis and secondary strictures as in pancreatitis. Cholecystectomy is by far the most common iatrogenic cause of injury. This case report outlines the investigation and management 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



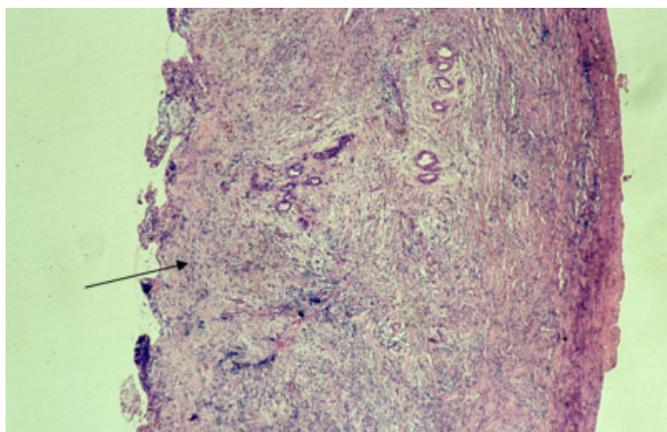
On this occasion, liver function tests were obstructive and ultrasound showed intrahepatic biliary duct dilatation and dilation of the CBD. ERCP demonstrated a tight stricture in the mid CBD in addition to narrowing of the second part of duodenum. At ERCP a stent was inserted and brush cytology specimens 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 cholecystectomy<sup>1</sup>. 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 reported<sup>2,3</sup>, presenting as an acute condition resulting in jaundice, ascites and hepatomegaly<sup>4</sup>. A chronic form also occurs where the liver parenchyma atrophies coupled with portal fibrosis, the severity being dose-dependant<sup>5</sup>. Several experimental studies have investigated radiation-induced biliary strictures. Todorokia<sup>8</sup> showed fibrosis and atrophy of hilar bile ducts when subjecting a rabbit model to a single dose of 3000 rad electrons. Sindelar<sup>9</sup> 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 years<sup>2,3,10</sup>. 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 malignancy. 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 supply<sup>9,11</sup>. Until recently, open surgical bypass was the mainstay of treatment with Roux-en-Y choledochojejunostomy 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 employed<sup>12</sup>. Metallic stents are usually reserved for malignant disease as occlusion rates (0-11%) because of epithelial hyperplasia restrict their application in benign disease<sup>13,14</sup>.

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 surgery<sup>12</sup>.

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## References

1. Lillemoe KD (1997) Benign post-operative bile duct strictures. *Clinical Gastroenterology* 11:749-779
2. Cherqui D et al. (1994) Common bile duct stricture as a complication of upper abdominal radiotherapy. *Journal of*

Hepatology

20:693-697

3. Chandrarasekhara KL, Lyer SK (1984) Obstructive jaundice due to radiation-induced hepatic duct stricture. American Journal of Medicine

77:723-724

4. Schacter L et al. (1986) Fatal radiation hepatitis: a case report and review of the literature. Gynecologic Oncology

24:373-380

5. Ingold JA et al. (1965) Radiation hepatitis. American Journal of Roentgenology, Radium Therapy and Nuclear Medicine

93:200-208

6. Wharton JT et al. (1973) Radiation hepatitis induced by abdominal irradiation with the cobalt 60 moving strip technique. American Journal of Roentgenology, Radium Therapy and Nuclear Medicine

117:73-80

7. Lewin K, Mills RR (1973) Human radiation hepatitis. A morphologic study with emphasis on the late changes. Archives of Pathology and Laboratory Medicine

96:21-26

8. Todoroki T (1978) The late effects of single massive

irradiation with electrons of the liver hilum of rabbits.

Japanese Journal of Gastroenterological Surgery

11:169-177

9. Sindelar WF et al. (1982) Tolerance of bile duct to intraoperative irradiation. Surgery

92:533-540

10. Halvey A et al. (1992) Radiation stricture of the biliary ducts: an emerging new entity? HPB Surgery

5:267-270

11. Todoroki T et al. (1980) Intraoperative radiotherapy for advanced carcinoma of the biliary system. Cancer

46:2179-2184

12. Schmets L et al. (1996) Post radiotherapy benign biliary stricture: successful treatment by self-expandable metallic stent. Gastrointestinal Endoscopy

43:149-152

13. Rozzi P et al. (1990) Recurrent benign biliary strictures: management with self-expanding metallic stents. Radiology

175:661-665

14. Foerster EC et al. (1991) Bridging of benign choledochal stenoses by endoscopic retrograde implantation of mesh stents. Endoscopy

23:133-135

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