Intraductal radiofrequency ablation of tumour ingrowth into an uncovered metal stent used for inoperable cholangiocarcinoma

KL Lui 呂家聯
KK Li 李建綱

A 91-year-old woman diagnosed to have an inoperable cholangiocarcinoma had an uncovered metal stent inserted for palliative drainage. About 1.5 years later, tumour ingrowth into the metal stent caused cholangitis. Intraductal radiofrequency ablation was applied to create local coagulative tumour necrosis and the necrotic tissue was removed via a balloon catheter. A plastic stent was inserted to empirically treat any ensuing potential bile duct injury. The patient was discharged without complication with good palliative drainage. Intraductal radiofrequency ablation is a new technique for the treatment of metal stent occlusion due to tumour ingrowths. This is the first case report of this relatively safe and feasible new technique for the treatment of tumour ingrowth into a metal stent used as palliation for malignant biliary obstruction.

Introduction

Stainless steel self-expandable metal stents (SEMSs) are the standard for palliative relief of malignant biliary obstruction in patients with a life expectancy longer than 3 months. However, problems that limited the durability of SEMSs included tumour ingrowths, biofilm formation, and sludge. Intraductal radiofrequency ablation (RFA) was a new technique for treatment of tumour ingrowth into such SEMSs. The technique has been used to deal with hepatocellular carcinoma–related obstruction for a long time, but there was only very limited experience of its use in malignant biliary obstruction.

Case report

A 91-year-old woman was admitted to the medical unit due to fever about 30 months after she was diagnosed to have cholangiocarcinoma in November 2009. Originally she had presented with painless obstructive jaundice and subsequent endoscopic retrograde cholangiopancreatography (ERCP) showed that there was a 2-cm irregular stricture at the distal common bile duct (CBD) and biopsy confirmed it to be cholangiocarcinoma. Due to her advanced age, the surgical team had opted for conservative management.

About 4 months after her carcinoma was diagnosed, an uncovered metal stent was inserted into the CBD for palliation. The jaundice subsided after the stent insertion and she remained asymptomatic till June 2011. About 15 months later she had an episode of cholangitis and repeat ERCP showed tumour ingrowth at the lower end of the CBD. A plastic stent was therefore inserted for drainage. Since that time she underwent elective plastic stent exchange every 3 months but had no other symptoms till her current admission.

During her latest admission, physical examination revealed that she was febrile and had jaundice. Laboratory tests yielded an elevated serum bilirubin level of 51 μmol/L (reference level, <19 μmol/L) and alkaline phosphatase of 958 U/L (reference range, 56-119 U/L). An ERCP showed that there was tumour ingrowth with sludge, more severe at the lower end of the CBD. The sludge was flushed with normal saline and another plastic stent was inserted for drainage. Since that time she underwent elective plastic stent exchange every 3 months but had no other symptoms till her current admission.

The ERCP was performed using a standard Olympus TJF 260 duodenoscope (Olympus, Hong Kong). The previously inserted plastic stent was removed. At this elective ERCP, a baseline cholangiogram showed that the tumour ingrowth had extended from the mid to the distal CBD, being especially severe at the distal end (Fig 1a). The RFA catheter was put in place with the tumour ingrowth between its two electrodes (Fig 1b). A 10 W electric current was applied to the distal CBD tumour ingrowth for 2.5 minutes and for 90
A 91-year-old patient with intrahepatic cholangiocarcinoma refused surgery and had a metal stent placed to aid drainage. One and a half years later, the tumor cells grew into the metal stent and caused bile duct obstruction. For the patient, a transjugular approach was performed to treat the in situ tumor, then the necrotic tissue was removed using a balloon catheter and a plastic stent was inserted to prevent further complications. The patient had no complications and the bile drainage was good. A biliary stent was successfully inserted 2 months after the RFA, which achieved satisfactory biliary drainage till the patient died half a year later.

**Discussion**

Intraductal RFA can be performed by standard duodenoscopy (with a 3.2-mm working channel). The RFA catheter probe is 1.8 m long, 8 Fr (2.6 mm) in diameter, and allows 0.035-inch guidewires to pass through. There were two ring electrodes at the RFA probe (8 mm apart); the distal electrode was 5 mm from the leading edge. A 2.5-cm length of local coagulative necrosis can be attained. Energy was delivered by a RFA generator that delivered electric energy through the two electrodes at 10 W for 1.5 mins at 400 kHz with a 1-min cool-down period. Some experts advise placing either plastic or metal stents after RFA to empirically treat any resulting bile duct injury. Their use in malignant biliary obstruction was already approved by the US Food and Drug Administration and EU European Conformity guideline.

Sepsis, cholecystitis, and pancreatitis after intraductal RFA have all been reported. It was
postulated that the RFA may cause bile duct injury and increase the risk of bacterial translocation.\textsuperscript{5} Direct electrical injury could be another possibility, since intraductal RFA can cause deeper tissue damage by coagulation necrosis than other luminally (eg in Barrett’s oesophagus), which only gives rise to an approximately 700 nm superficial burn. In the bile duct, the coagulative necrosis can be up to 3 mm but is minimised by the use of two electrodes that spread the energy over a larger area.\textsuperscript{5,6} Thus, RFA does have the potential to cause damage to structures adjacent to the bile duct.

We are unaware of any previous case report describing the use of intraductal RFA in this situation, other than one retrospective study from United Kingdom in 2011.\textsuperscript{5} This UK study described 21 patients with malignant biliary obstruction, in whom RFA was applied and SEMSs introduced thereafter. The median diameter at the strictures improved from 0 mm to 4 mm. All these patients had patent metal stents 30 days after RFA and more than 75\% retained stent patency for more than 90 days. Therefore, repeated RFA procedures may be considered every 1 to 3 months. More prospective studies are necessary, however, to provide longer-term efficacy data and comparison with other modalities of treatment (eg placement of other SEMSs). Notwithstanding these observations, incorporation of this new technique into the standard palliative management of patient with dysfunction SEMSs due to tumour ingrowth appears to be a genuine advance.

References

6. Yao P, Morris DL. Radiofrequency ablation-assisted liver resection: review of the literature and our experience. HPB (Oxford) 2006;8:248-54. \textsuperscript{cross ref}