Cholangioscopic appearance after radiofrequency ablation of cholangiocarcinoma

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An estimated 39,000 cases of cholangiocarcinoma (CC) were diagnosed in the United States in 2016.[1] Of the patients with diagnoses of CC, two-thirds are unable to undergo surgical resection and require locoregional therapy.[2,3] Given the ever-rising prevalence of this condition and the intimate involvement of the advanced endoscopist in the care of these patients, intraductal therapies have arisen, which may serve an important role in the care of CC.

One such technology is an intraductal radiofrequency ablation (RFA) device, which uses an 8F, 180-cm wire-guided catheter with 2 stainless steel electrodes covering 25 mm of the treatment site (Fig. 1). This technology allows for the delivery of RF energy within the biliary tree for the treatment of CC.

An 81-year-old man with unresectable CC (due to multilobar disease), who had undergone 1 cycle of chemotherapy, presented for ERCP with stent exchange. His medical history included chronic obstructive pulmonary disease and coronary artery disease. His initial liver function values were minimally elevated, with an aspartate aminotransferase of 56 U/L, alanine aminotransferase of 62 U/L, total bilirubin of 2.1 mg/dL, and alkaline phosphatase of 286 U/L.

The patient received a diagnosis of a 4.4 × 5.9 cm hyperintense mass with central enhancement, and a pronounced peripheral rim in the caudate lobe and mass in the left hepatic duct (Fig. 2).

An ERCP demonstrated a prominent biliary tumor in the left main hepatic duct. Biopsy of the tumor was performed with intraductal forceps (Fig. 3). Additionally, during this procedure the patient underwent placement of a plastic biliary stent during the wait for the diagnosis (Fig. 4). Examination of these biopsy specimens later confirmed the diagnosis of CC.

The patient was seen by medical and surgical oncologists during a multidisciplinary tumor board, and the plan was to give chemotherapy with concomitant locoregional therapy, using intraductal RFA to allow for maximal palliative effect and prolong the interval for stent exchange.

During chemotherapy, the patient returned for ERCP, for which a 10F × 15 cm plastic stent was placed.

After the completion of 1 cycle of chemotherapy, CT was then performed for staging purpose and revealed an interval increased enhancement of the left biliary ductal segment and a 2.7 × 2.6 caudate lobe liver lesion (Fig. 5). This interval decrease in tumor size was likely due to the systemic effects of his chemotherapy.

The patient returned for ERCP with locoregional RFA after his imaging results were obtained (Video 1, available online at www.VideoGIE.org). After stent removal, wire-guided cannulation was performed with a standard bowing sphincterotome and a 0.035 × 260 cm wire. A cholangiogram then demonstrated persistent stenosis of the left hepatic duct. The duct was swept in an attempt to clear

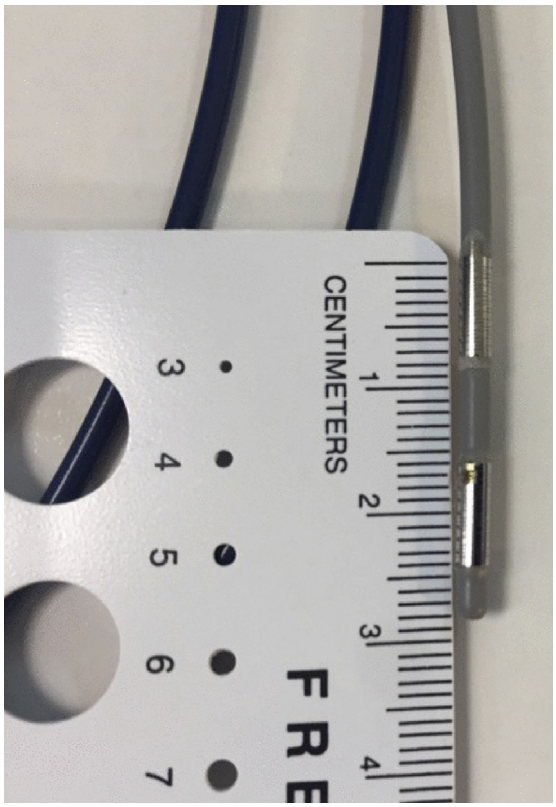

Figure 1. To-scale view of intraductal radiofrequency ablation device showing an 8F, 180-cm, wire-guided catheter with 2 stainless steel electrodes covering 25 mm of intraductal space.

Written transcript of the video audio is available online at www.VideoGIE.org.

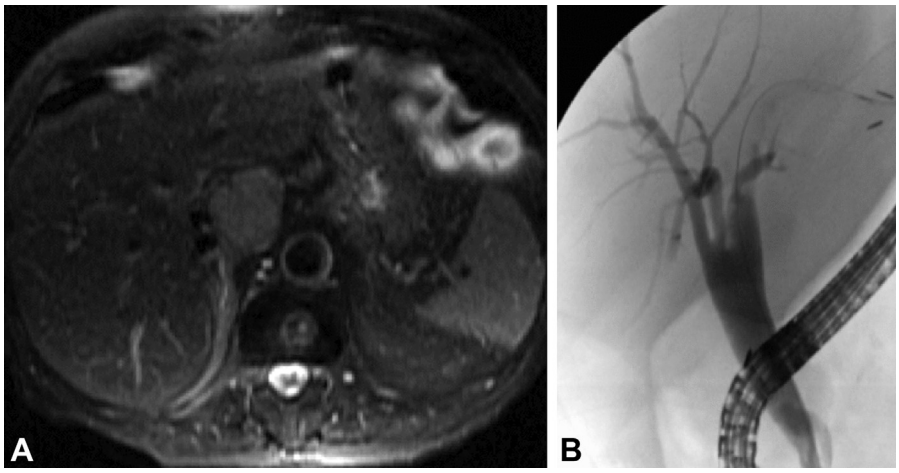

Figure 2. A, MRI view before RFA showing 4.4 × 4.2 × 5.9 cm hyperintense mass with central enhancement and pronounced peripheral rim in the caudate lobe and mass in left hepatic duct. **B,** Cholangiographic view before RFA showing left hepatic ductal stenosis. *RFA*, radiofrequency ablation.

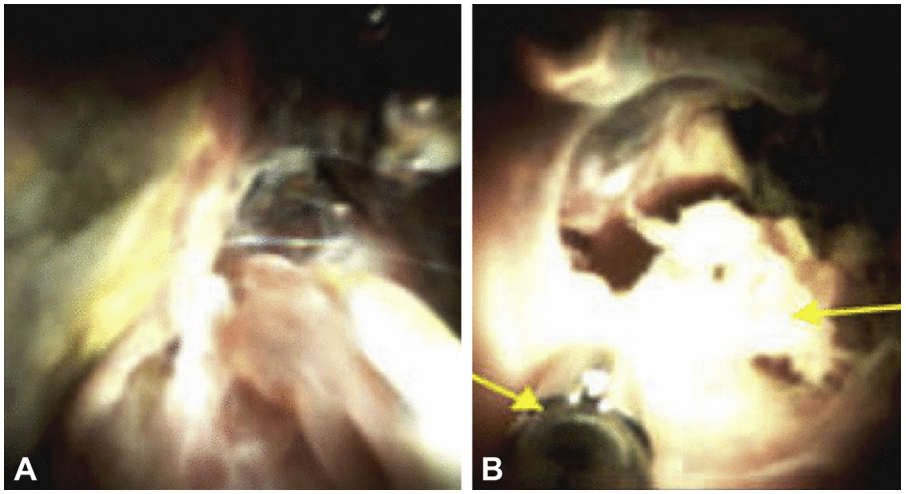

Figure 3. Cholangioscopic views before radiofrequency ablation showing **A,** a prominent biliary tumor in the left main hepatic duct, and **B,** biopsy of tumor with intraductal forceps.

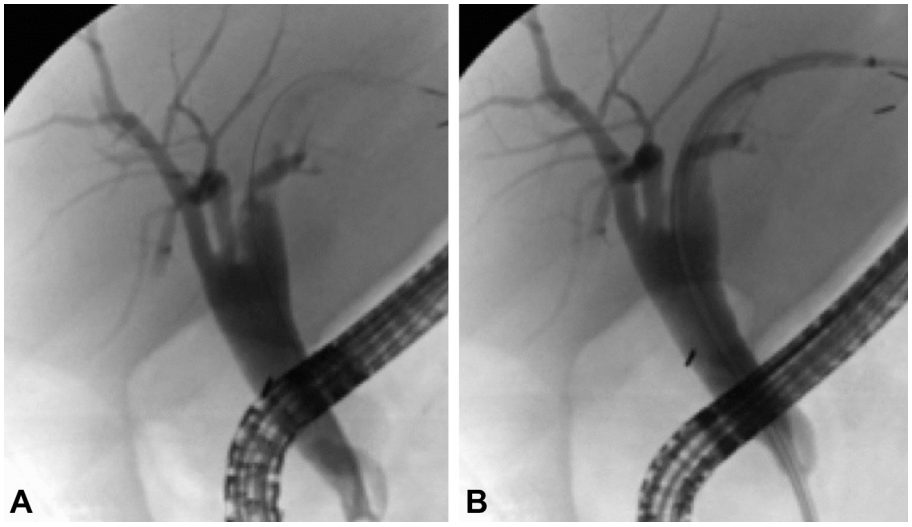

Figure 4. Cholangiographic views during chemotherapy showing **A,** persistent left hepatic ductal stenosis and **B,** plastic stent replaced into left hepatic ductal system.

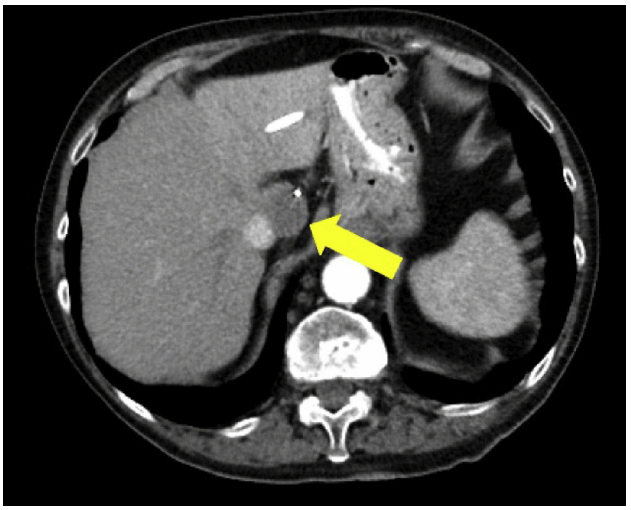

Figure 5. CT view before radiofrequency ablation showing 2.7 × 2.6 caudate lobe liver lesion.

debris, which may have been causing the residual stenosis. However, several sweeps demonstrated no visible debris.

After the balloon sweep, a cholangioscope was inserted into the biliary system, revealing papillary irregularities and localized intraductal narrowing in the left main hepatic duct.

The cholangioscope was then withdrawn, and the intraductal RFA (IDRFA) probe was inserted through the biliary orifice up into the left main hepatic duct above the area of stenosis. Using a bipolar setting effect 8 at 7 watts, we performed ablation for a total of 90 seconds. This ablation setting is recommended for left and right ductal therapy as opposed to effect 8 at 10 watts for common ductal therapy (Fig. 6). After the probe was held for 60 seconds after the first treatment, the probe was then moved distally toward the main hepatic duct, allowing for overlap of the initial site of locoregional therapy, and a second treatment of RFA was applied (Fig. 7).

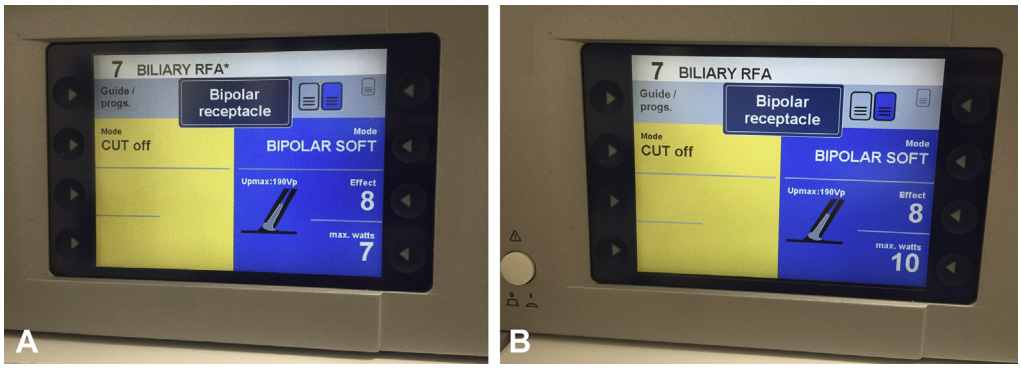

Figure 6. Electrosurgical generator settings for RFA. **A,** For intraductal RFA, effect 8 at 7 watts. **B,** For common ductal RFA, effect 8 at 10 watts. *RFA*, radiofrequency ablation.

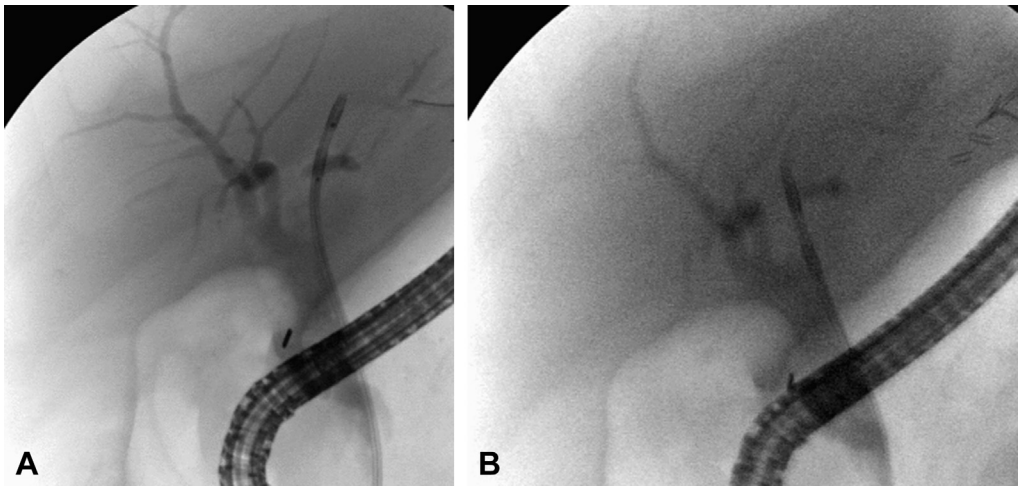

Figure 7. Cholangiographic views with RFA probe. **A,** Proximal-most treatment location with RFA. **B,** Distal-most treatment location with RFA. *RFA*, radiofrequency ablation.

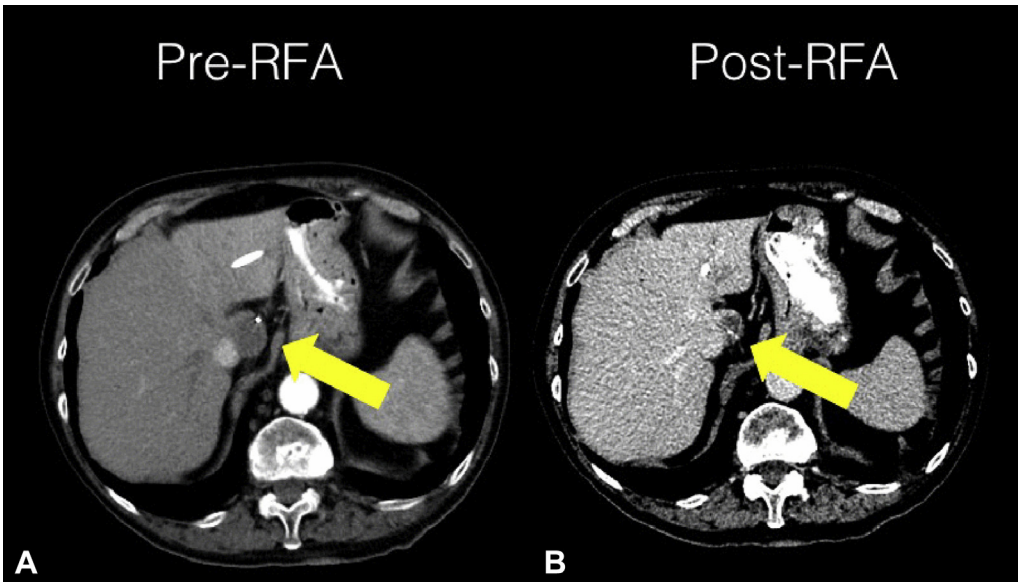

Figure 8. CT views after RFA. **A,** Interval decrease in size of caudate lobe lesion to approximately 1.7 × 2.1 cm, which was previously 2.6 × 2.7 cm. **B,** Post-RFA changes around left hepatic duct, intact stent with pneumobilia. *RFA*, radiofrequency ablation.

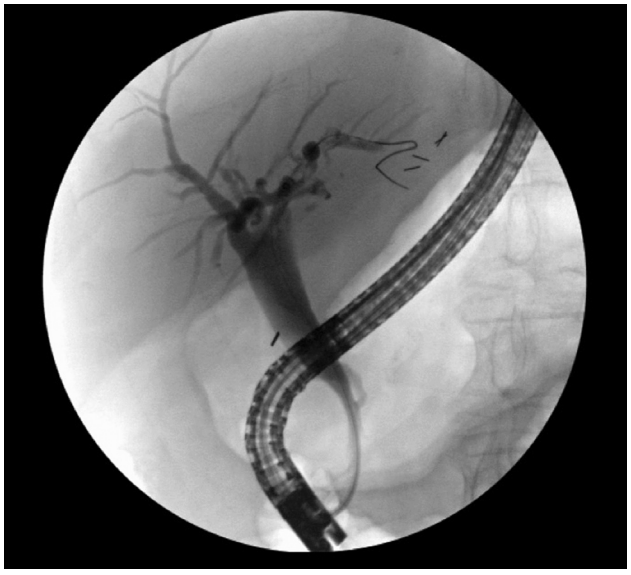

Figure 9. Cholangiographic view at 6-month follow-up visit after radiofrequency ablation, demonstrating improvement in left hepatic ductal stenosis.

The bile duct was then re-explored with the cholangioscope and advanced to the left main hepatic duct, demonstrating interlacing white tissue and absence of papillary changes at the site of treatment. Additionally, there was no evidence of hemorrhage or perforation. The cholangioscope was again removed, and the duct again swept, now revealing an evident tissue cast after RFA.

Finally, a new 10F × 12 cm double-flapped plastic biliary stent was placed, crossing the left hepatic duct.

Six months later, after the patient completed a second cycle of chemotherapy, CT, in comparison with the patient's prior imaging, demonstrated an interval decrease in the size of the caudate lobe lesion to approximately 1.7 × 2.1 cm (previously 2.6 × 2.7 cm), with post-RFA changes around the left hepatic duct and an intact stent with pneumobilia (Fig. 8). This decrease in tumor size was likely due to systemic chemotherapy.

Repeated ERCP was 6 months after the RFA was performed, during which the cholangiogram showed improvement in the left hepatic ductal stenosis (Fig. 9). A cholangioscope was used, the left duct remained patent, and poststenting inflammatory changes were visible. His liver function values remained normal, and he has had no hospitalizations or obstructive biliary adverse events.

Preclinical data in animal models have confirmed the safety and efficacy of RFA in this setting.[3,4] An additional open-labeled study in humans demonstrated clinical safety, leading to subsequent device approval.[5,6] Since the availability of this probe, retrospective series have evaluated its efficacy in biliary neoplasms not amenable to surgery. These retrospective data have alluded to the benefit of RFA in improving stenosis, the duration of stent patency, and survival.[7-11]

In this case, the appearance of postintraductal RFA was an interesting finding as seen by a cobweb appearance on cholangioscopy.

DISCLOSURE

Dr Khara is a consultant for Medtronic-Covidien. Dr Johal is a consultant for Boston Scientific. Dr Diehl is a consultant for Boston Scientific and Olympus. All other authors disclosed no financial relationships relevant to this publication.

Abbreviations: CC, cholangiocarcinoma; RFA, radiofrequency ablation.

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