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HOW I DO IT

Thermal Bile Duct Protection During Liver Cryoablation

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Cryoablation is increasingly accepted as appropriate treatment of metastatic colon cancer that is confined to the liver but is nevertheless unresectable [1,2]. Cryoablation is particularly useful for lesions near major vessels, because the local warming effect of flowing blood protects the vessel wall. However, cryotherapy for lesions at the confluence of the left and right portal systems remains problematic because of the potential for proximal bile duct injury [3]. We report a novel technique used to protect the hepatic ducts from injury secondary to cryoablation.

Cohen and Miller [4] described a successful technique for protecting the urethra from transmural freezing during prostate cryosurgery. They passed a suprapubic catheter out through the urethra and ran warmed saline through it during cryoablation. Also, in a separate bovine liver model, they showed that the outer surface temperature of the catheter remains above freezing despite freezing of tissue in close proximity.

We applied the same principles to protect the proximal left hepatic duct during cryoablation of a metastatic colon tumor (Fig. 1). With ultrasound guidance, we passed a curved blunt probe proximally through a common bile

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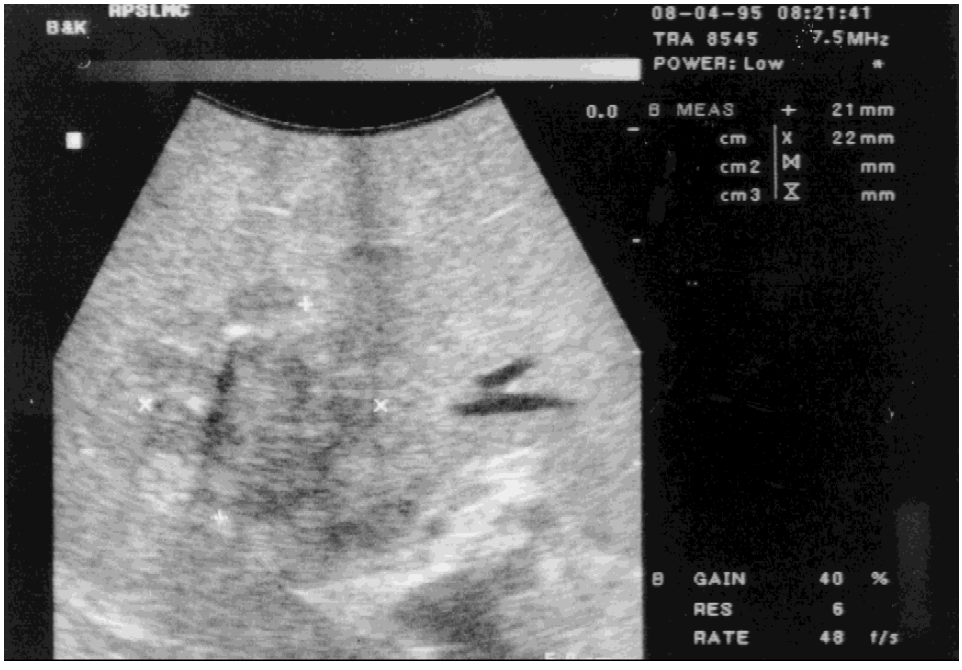

Fig. 1. A 62-year-old man with metastatic colon cancer isolated to the liver. Ultrasound demonstrates close proximity of the tumor to the portal confluence; however, it did not appear to invade the vessels and, therefore, was thought amenable to cryoablation.

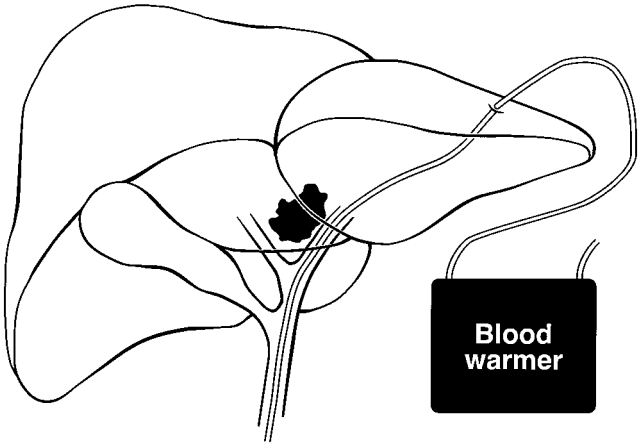

Fig. 2. Drawing demonstrates technique of thermal bile duct protection during liver cryoablation.

duct incision, up the left hepatic duct, and out through the anterior surface of the liver. Over the probe, we pulled a small diameter fenestrated plastic catheter back through the duct system and attached the transhepatic end to a standard saline intravenous line running wide open through a blood warmer (Figs. 2,3). Delayed postoperative cholangiogram revealed normal ductal anatomy and the patient recovered uneventfully.

In this case, we demonstrated successful thermal protection of central bile ducts in very close proximity to cryoablated tissue. This technique may be a useful adjunct to cryoablation of other tumors in this problematic location.

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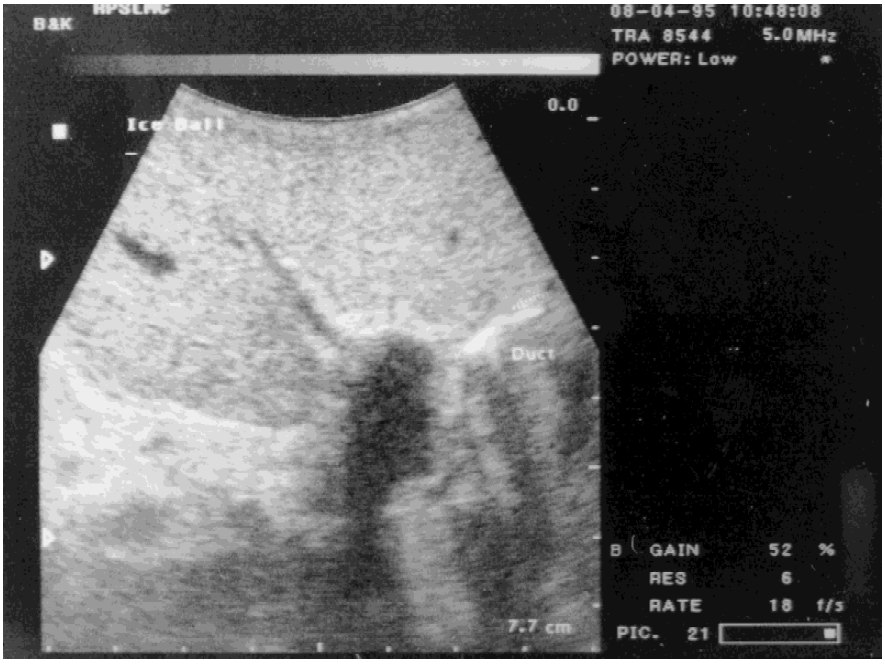

Fig. 3. Ultrasound during cryoablation demonstrates the catheter within the left hepatic duct as a bright echo in close proximity to the dark ice ball.