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Improved Microcatheter Technology Enhances Navigation of Tortuous Vasculature

Terumo Progreat Omega Coaxial Microcatheter System and Glidewire GT

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There are a variety of interventional methods used for the management of hepatocellular carcinoma. With the advent of radiofrequency ablation, we perform chemoembolization less often; however, it remains a valuable technique in circumstances when radiofrequency ablation cannot be performed. We routinely use microcatheters to selectively embolize segmental hepatic arteries. Newer-technology microcatheters allow easier subselective catheterization and embolization.

CASE REPORT

A 57-year-old man with hepatitis C underwent a routine follow-up CT scan, which demonstrated a hyperenhancing lesion in the anterior segment of the right hepatic lobe near the gallbladder fossa measuring 3.4 X 3.2 cm. Multiple adjacent satellite lesions were also noted. Also seen was a 1.1- X 1-cm hyperenhancing lesion in the posterior segment of the right hepatic lobe near the hepatic dome. Nonenhancing thrombus in the portal vein branch adjacent to the larger lesion was also present.

The alpha fetoprotein was elevated. The patient did not have varices or ascites related to underlying cirrhosis. A diagnosis of hepatocellular carcinoma was made based on the imaging and laboratory findings.

Because the largest lesion was adjacent to the gallbladder and colon, percutaneous radiofrequency ablation was not recommended. Given the multiplicity of the lesions in the right lobe, it was decided to perform transarterial chemoembolization.

Materials and Methods

For initial access to the right femoral artery, we used a 21-gauge micropuncture system (Cook Medical, Bloomington, IL) and placed a 6-F Pinnacle Introducer sheath (Terumo Interventional Systems, Somerset, NJ). A 5-F Omni Flush catheter (AngioDynamics, Inc., Queensbury, NY) was advanced over a 3-mm J-wire (Cook Medical) and positioned at T12, the lowest vertebra of the thoracic spine. An aortogram was obtained, which showed conventional

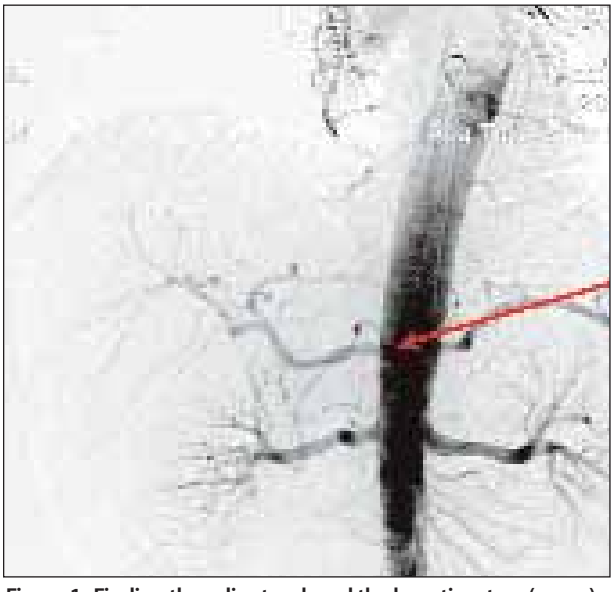

Figure 1. Finding the celiac trunk and the hepatic artery (arrow).

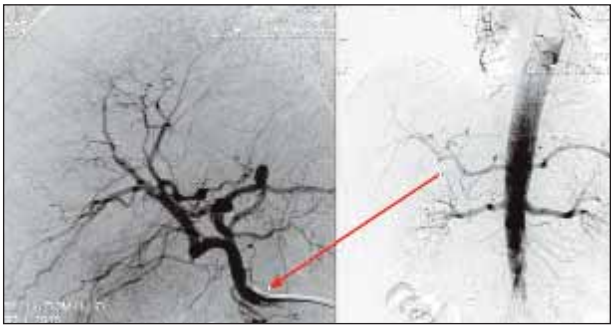

Figure 2. Selecting the hepatic artery with a 5-F Terumo Glidecath.

hepatic arterial anatomy (Figure 1). The celiac artery was catheterized using a 5-F Sos Omni catheter (AngioDynamics, Inc.) and a .035-inch Glidewire Hydrophilic Coated Guidewire (Terumo Interventional Systems). The Omni Flush catheter was then exchanged for a 5-F Glidecath Hydrophilic Coated Catheter with an angled tip (Terumo Interventional Systems). The Glidecath was advanced over the .035-inch Glidewire into the proper hepatic artery, which arises from the common hepatic artery.

A hepatic arteriogram was obtained through the Glidecath (Figure 2), which demonstrated areas of hyperenhancement in the right lobe anteroinferiorly with adjacent satellite nodules (Figure 3). A second large area of hyperenhancement in the superior portion of the right lobe, adjacent to the dome of the diaphragm, represented the second hepatocellular carcinoma. Given the disseminated nature of the lesions, we decided to perform selective chemoembolization using a microcatheter.

Figure 3. Multifocal hyperenhancing hepatocellular carcinomas in the right lobe. Note the satellite lesions in right lobe inferiorly (arrows).

A Tuohy Borst valve was attached to the hub of the Glidecath and a Progreat Omega Coaxial Microcatheter System with a radiopaque marker band (Terumo Interventional Systems) was advanced through the Glidecath. The segmental hepatic arteries feeding the hepatocellular carcinomas were catheterized using this microcatheter and the .021-inch Glidewire GT, which is preloaded in the Progreat Omega Coaxial Microcatheter. Some of the smaller branches feeding the lesion in the inferior right lobe and the lesion in the dome of the liver were very tortuous (Figure 4A). These branches were selectively catheterized using a double-angle .018-inch Glidewire GT, and the microcatheter was advanced into these arteries (Figure 4B, C; Figures 5 and 6).

Chemoembolization of the selected arteries was performed using a combination of doxorubicin, mitomycin, and cisplatin mixed with 10 mL of ethiodol. After completion of the chemoembolization, we completed the vascular occlusion with 700- to 900-µm Bead Block Compressible Microspheres (Terumo Interventional Systems). After embolization, the microcatheter was removed, and a hepatic angiogram was obtained, which showed complete occlusion of the arteries feeding the lesions of the right lobe of the liver. No residual tumor blush was seen (Figure 7).

DISCUSSION

Performing selective chemoembolization of hepatocellular carcinoma allows for the preservation of intervening functional hepatic parenchyma. This procedure is slightly more time-consuming than nonselective chemoembolization from the right or left hepatic arteries; however, it may be beneficial in the preservation of hepatic function, given the underlying cirrhosis that is commonly associated with hepatocellular carcinoma. We have found the Glidecath Hydrophilic-Coated Catheter, the Progreat Omega Coaxial Microcatheter, and the preloaded Glidewire GT with the shapeable tip to be extremely helpful in navigating tortuous vessels and reducing the duration of the procedure.

In this case, the preloaded .021-inch Glidewire GT was swapped out for an .018-inch Glidewire GT with a double angle. The Glidewire GT is a .018-inch wire that has a 25-cm taper with a 2-cm gold coil. The gold coil tip enables easy visualization, and its soft tip minimizes vessel trauma. The long taper of the tip allows good vessel purchase when advancing the microcatheter. The Glidewire GT is 180 cm in

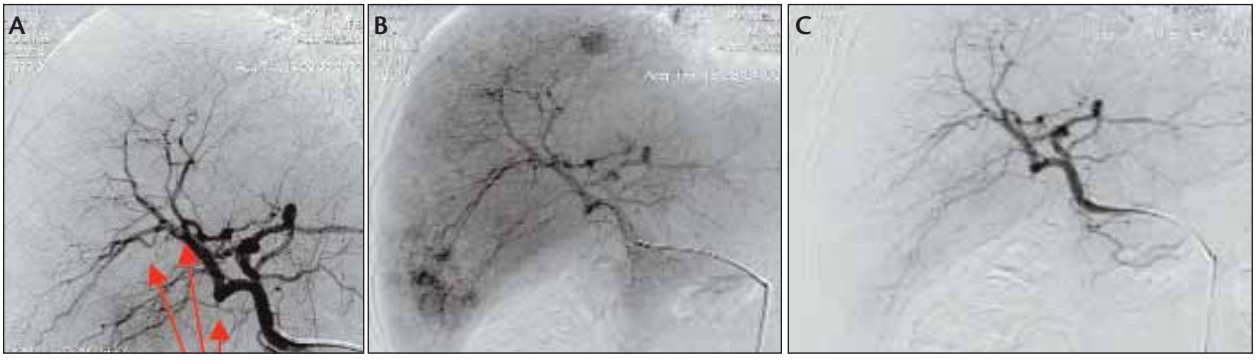

Figure 4. Note that the patient's hepatic artery is extremely tortuous.

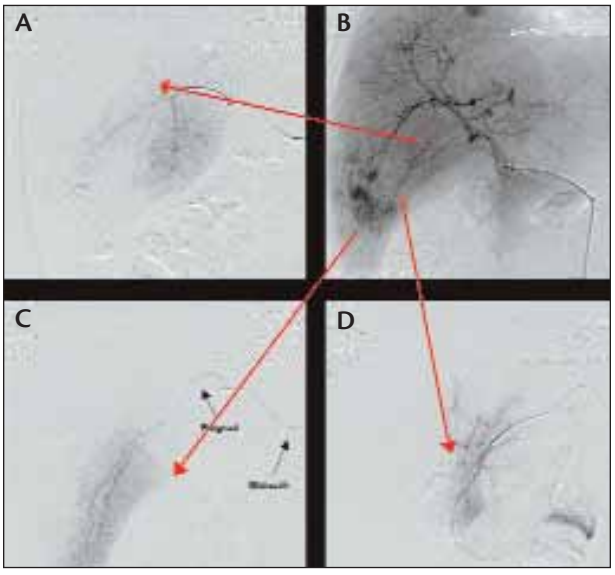

Figure 5. Embolization of the inferior right-lobe hepatocellular carcinoma. Arrows indicate the different nodes. A, C, and D are enlarged versions of B.

length and comes in four tip shapes: 45° angle, shapeable, 90° angle, and double angle. The double-angle Glidewire GT is ideal when negotiating complex tortuous segments and for vasculature that requires super selection of vessels or "hairpin" turns. The Progreat Omega Microcatheter is a single-endhole catheter that is available with either a preloaded .021-inch angled Glidewire GT (called the Progreat Coaxial Microcatheter System) or without a guidewire. It has a .027-inch inner diameter and measures 3 F and tapers to 2.8 F at the tip. It has a very soft, atraumatic distal end that allows the passage of guidewires up to .025 inches in diameter.

CONCLUSION

In our experience, the 2.8-F Progreat Omega Coaxial Microcatheter System and its accompanying Glidewire GT are very effective in catheterizing tortuous arteries because of its trackabililty and kink resistance. The wire comes pre-loaded into the microcatheter and has a fixed torque device at its back end. The fixed position of the torque device is convenient for maneuvering the catheter and avoids the inconvenience of a removable torque device. The improvements in microcatheter and microguidewire technology allow complex vascular procedures to be performed in a safe and expedient fashion. ■

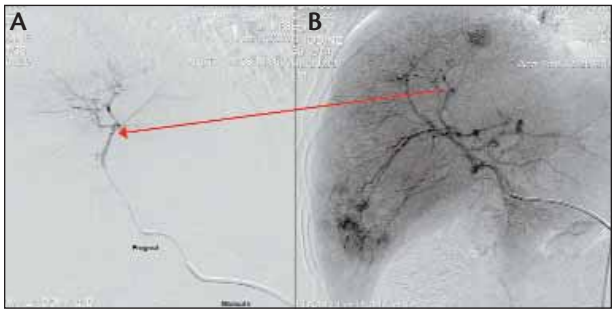

Figure 6. Embolization of the hepatocellular carcinoma at the dome of the liver. A is an enlarged look at B.

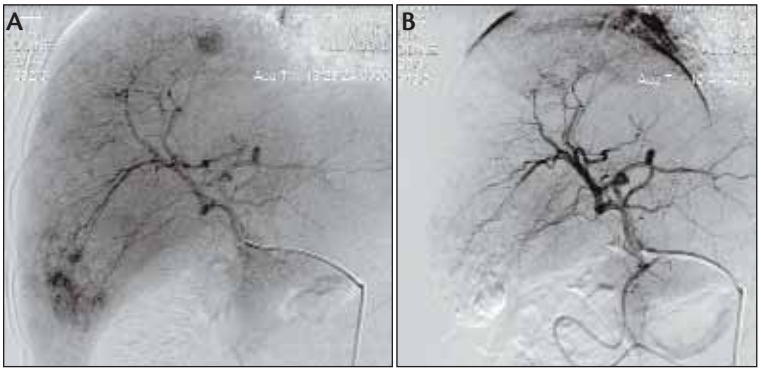

Figure 7. Before chemoembolization (A), after chemoembolization (B).

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