Hepatic Artery Infusion Catheter Implantation without Embolization of the Gastroduodenal Artery in Cases of Retrograde Blood Flow

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Between January 2007 and January 2008, a port/catheter system for hepatic arterial infusion chemotherapy was implanted in seven patients with retrograde blood flow in the gastroduodenal artery (GDA). The GDA was not coil-embolized when the catheter tip was positioned in the right gastroepiploic artery. In all cases, implantation of the port/catheter system was successful, and there were no complications. Interventionalists can economize on expensive microcoils by using this simple and time-saving method.

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Abbreviation: GDA = gastroduodenal artery

HEPATIC arterial infusion chemotherapy via an indwelling port/catheter system has been considered as a last-resort treatment of unresectable metastatic colorectal cancer (1,2). When such a port/catheter system is implanted by an interventional radiologic procedure, implantation by the fixed catheter tip method is advantageous in terms of preventing catheter dislocation and hepatic artery obstruction (3,4). Glues or microcoils are generally used to fix the catheter tip to the gastroduodenal artery (GDA) (5). In some clinical situations, the hepatic blood flow is diverted from the superior mesenteric artery through the pancreaticoduodenal arcades, resulting in retrograde flow through the GDA (6–8). We performed this retrospective analysis to evaluate the safety and feasibility of hepatic arterial infusion catheter implantation without embolization of the GDA in cases of retrograde blood flow when the tip of the infusion catheter is positioned in the right gastroepiploic artery.

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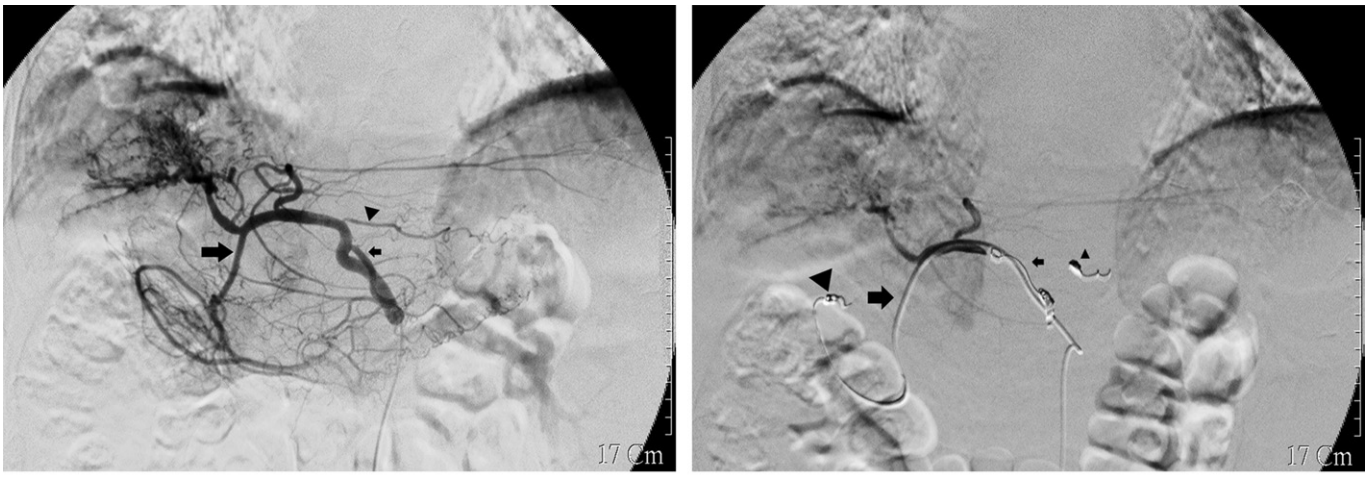
MATERIALS AND METHODS

Patients

Approval for this retrospective analysis of imaging and medical records was obtained from the institutional review board at our hospital. Between January 2007 and January 2008, a port/catheter system was implanted in seven patients (all men; age range, 38–77 years; mean age, 59 years) without embolization of the GDA when there was retrograde flow in this vessel. The decision to proceed with hepatic artery infusion therapy was made at a multidisciplinary conference. Patients satisfied either of the following criteria: (i) antegrade blood flow of the GDA demonstrated initially on angiography but flow reversed to the retrograde direction after indwelling catheter implantation ($n = 1$) or after coil migration, resulting in segmental occlusion of the common hepatic artery ($n = 1$; **Fig 1**); or (ii) retrograde blood flow of the GDA demonstrated before and after indwelling catheter implantation ($n = 5$; **Fig 2**).

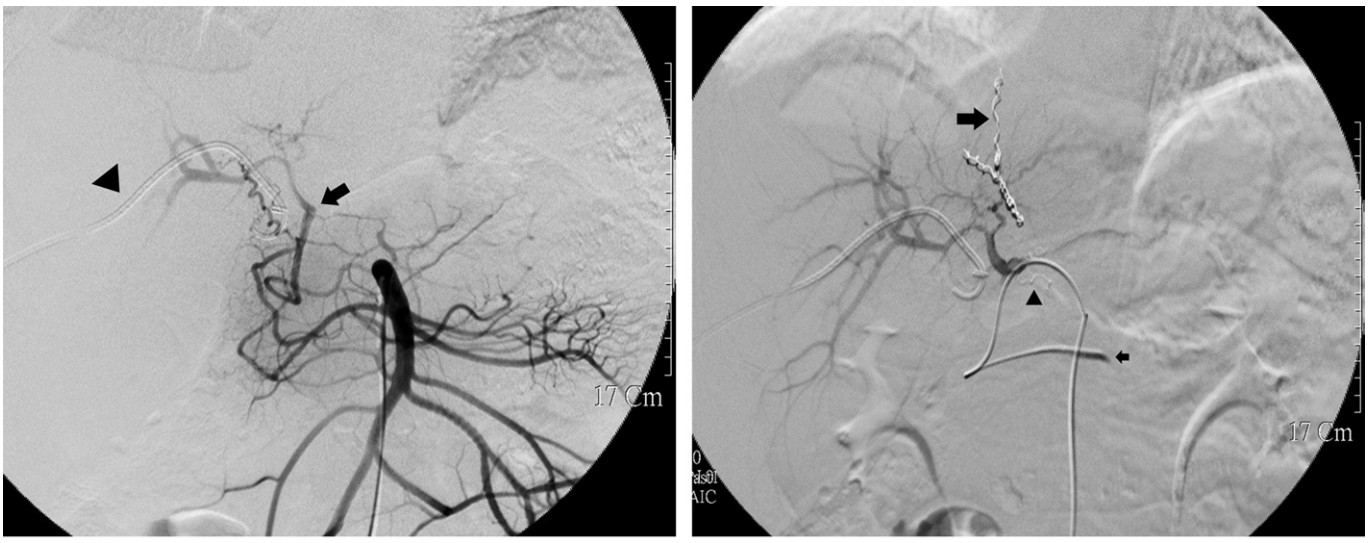
Technical Description

After femoral puncture by the Seldinger method, a 4-F angiographic catheter was advanced into the target vessels and visceral arteriography was performed to assess the arterial supply of the liver. In preparation for port/catheter implantation, a 2.7-F microcatheter (Progreat; Terumo, Tokyo, Japan) was inserted coaxially and several visceral arteries (eg, right gastric artery and right inferior phrenic artery) were embolized, if technically feasible, with microcoils (MicroNester/embolization coil; William Cook Europe, Bjaeverskov, Denmark) to prevent infusion of anticancer drugs into the stomach during hepatic arterial infusion chemotherapy and allow redistribution of the hepatic arterial flow. A side hole was made with scissors in an infusion catheter (hook- or



a. b.

Figure 1. Images in a 72-year-old man with hepatocellular carcinoma. **(a)** Arteriogram shows that the left gastric artery (arrowhead) and the pancreatic artery (small arrow) arise from the middle segment of the common hepatic artery and antegrade flow direction of the GDA (large arrow) initially. **(b)** Arteriogram obtained via the port after embolization of the left gastric artery (small arrowhead) and the pancreatic artery (small arrow) with microcoil migration to the common hepatic artery shows good hepatic perfusion and no opacification of the GDA (large arrow) resulting from retrograde flow direction of the GDA. Note that the catheter tip positioned in the right gastroepiploic artery was closed with microcoils (large arrowhead).



a. b.

Figure 2. Images in a 42-year-old man with cholangiocarcinoma. **(a)** Superior mesenteric arteriogram shows retrograde blood flow direction of the GDA (arrow) through the pancreaticoduodenal arteries before infusion catheter implantation. Note that there is no retrograde flow in the common hepatic artery and therefore the celiac and splenic arteries are not visualized. The percutaneous transhepatic bile drainage tube (arrowhead) is also noted. **(b)** Arteriogram obtained via the port after embolization of the right gastric artery (arrowhead) and right inferior phrenic artery (large arrow) shows good hepatic perfusion and no opacification of the GDA resulting from retrograde flow direction of the GDA. Note that the right gastroepiploic artery beyond the end hole of the catheter tip is not visualized, and therefore the catheter tip is not closed with microcoils (small arrow).

Cobra-type 5-F heparin-coated polyurethane catheter; Anthron P-U catheter; Toray, Tokyo, Japan) that was to be located in the common hepatic artery close to the origin of the proper hepatic artery. The location of the side hole could generally be ascertained easily as a result of to the marks on the catheter every 5 cm. This hole needs to be large enough (usually 3–4 mm long and 1–1.5 mm wide) for a 2.7-F microcatheter to pass through. The infusion catheter was then placed in the right gastroepiploic artery via a catheter exchange method over a guide wire. Closing the catheter tip involved placing a coil mainly into the gastroepiploic artery, leaving approximately 2–3 cm of the coil in the catheter tip by coaxial insertion of the microcatheter. The infusion catheter was subsequently connected through a