LETTER / Gastrointestinal imaging

Two-way gastroduodenal artery

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Clinical case

Following a multidisciplinary consultative meeting, radio-embolisation treatment with Yttrium-90 had been proposed to a 74-year-old male patient for palliative treatment of non-resectable hepatic metastases of a colorectal cancer. The hepatic angiogram produced during the preparatory phase (Fig. 1) showed that the anatomy was normal as regards to the main vascular routes. The coeliac trunk trifurcated into a splenic artery, a left gastric artery and a common hepatic artery. The hepatic artery proper is relatively short, bifurcating into a left and a right branch. The right gastric artery (or pyloric artery) was clearly seen, arising from the first segment of the left branch of the hepatic artery. A few special features and anatomical variants from the normal were nevertheless seen:

- the dorsal pancreatic artery arose from the first third of the common hepatic artery (and not from the splenic artery);
- the cystic artery arose from an arterial branch to segment IV and arose from the right hepatic branch;
- the gastroduodenal artery (GDA) was very short, with early bifurcation into an anterior—superior pancreaticoduodenal trunk and a posterior—superior pancreaticoduodenal trunk.

The image produced after microcatheterisation of the common hepatic artery (Fig. 2) showed intermittent opacification of the anterior pancreaticoduodenal arcade, unlike the posterior arcade which remained correctly opacified. A retrograde flow only present in the anterior pancreaticoduodenal arcade was later confirmed on the angiographic image of the superior mesenteric artery. Under these conditions, preventive embolisation was undertaken only of the posterior pancreaticoduodenal arcade (Fig. 3). The injection of Yttrium-90 microspheres was possible later under normal conditions by positioning the microcatheter after catheterization of the coeliac trunk in the hepatic artery proper. There were no complications, particularly duodenal or pancreatic, in the mid to long term, related to the procedure.

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Discussion

Splanchnic vascular anatomy can present many variations. Michels’ classification, published in 1953 and extended by Hiatt in 1994 from surgical data from 1000 patients who had undergone a liver transplant, is internationally recognized for describing the variants of the coeliac trunk and hepatic artery [1,2]. Other, sometimes very old, studies have concentrated on anatomical variants affecting the smaller caliber arterial axes of the hepatic hilum, such as the cystic, right gastric, retroduodenal, supraduodenal or falciform arteries [3,4].

The increase in recent years of new complex hepatic endovascular treatments, such as radio-embolisation or fitting implantable hepatic arterial ports, requires the interventional oncology radiologist to be familiar with the many anatomical variants of the hepatic arterial bed. In the case of Yttrium-90 radio-embolisation treatment, not recognizing an arterial variation or a collateral vessel may result in serious complications such as ulceration or gastroduodenal perforation, acute pancreatitis, acute cholecystitis or

Figure 1. Coeliac artery angiogram. The coeliac trunk trifurcates into a left gastric artery, a splenic artery and a common hepatic artery (CHA). The dorsal pancreatic artery (black arrowhead) arises from the first third of the common hepatic artery. After the origin of the gastroduodenal artery, a short hepatic artery proper (HAP) divides into left and right hepatic branches. The right gastric (or pyloric) artery is clearly visible (black arrows) arising from the first segment of the left branch of the hepatic artery (on the angiographic image crossing the hepatic artery and the gastroduodenal artery (GDA)); the cystic artery (white arrow), also clearly visible, arises from a branch of segment IV. The gastroduodenal artery is short, bifurcating early on into the pancreaticoduodenal arteries.

Figure 2. Hepatic artery angiogram showing intermittent opacification of the anterior—superior pancreaticoduodenal artery (black arrows) due to retrograde flow in the anterior pancreaticoduodenal arcade issuing from the superior mesenteric artery. Gastroduodenal artery (GDA) (white arrowhead). Posterior—superior pancreaticoduodenal artery (white arrow).

Figure 3. Superior mesenteric angiogram (SMA) produced after embolisation of the right gastric artery (black arrows), the cystic artery (white arrow) and the anterior pancreaticoduodenal arcade (white arrowheads). The posterior pancreaticoduodenal arcade is not embolised, participating in provision of the hepatic circulation.

Yttrium-90 radio-embolisation requires the interventional radiologist to be familiar with the many anatomical variants of the hepatic arterial bed. Recognizing an arterial variation or a collateral vessel may result in serious complications such as ulceration or gastroduodenal perforation, acute pancreatitis, acute cholecystitis or
necrosis of the skin. To prevent the risk of complications, radio-embolisation treatment is preceded by a first angiography session, the purpose of which is to occlude digestive arteries arising from the hepatic artery (GDA, right gastric artery etc.) and to ensure that any parasitic vessels which are participating in supplying the tumor (the right diaphragmatic artery, right adrenal artery, right internal thoracic artery etc.) are embolised. The embolisation performed is definitive, generally using coils or vascular occlusion plugs, particularly for the gastroduodenal artery [5]. When angiography shows a GDA with reversed flow, either because of stenosis of the coeliac trunk or due to increased superior mesenteric artery flow, its occlusion may be avoided as long as the necessary precautions are taken during the therapeutic injection (monitoring vascular stasis and injection downstream of the origin of the GDA) [6]. The example of our patient illustrates the therapeutic traps that vascular anatomical variants can represent. Because of their resolution, hepatic CT angiography and MRA provide a reliable map of the main splanchnic arterial axes. However, they cannot be substituted for digital angiography, which not only provides much more precise information concerning the small and medium caliber arterial network, but also the functional information necessary, by allowing flow characteristics to be assessed.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References