Why HPB-surgeon has to be aware about anastomoses between major hepatic arteries?

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Background

The capability of anastomoses between major hepatic arteries are underestimated and usually not used by HPB surgeons. It is generally supposed that this is only theoretical knowledge

Aim To show the importance of this knowledge to practical purposes

Patients and Methods Analysis of 7 cases of liver survival due to communicating interlobar artery after major pancreatic and gastric resections and hepatic artery embolization, accompanied by dearterialization of one of the liver lobes. Monitoring of liver arterial supply intraoperatively was carried out by US Doppler of liver parenchyma, and after surgery - by CT angiography(CTA) and angiography.

Case 1. Distal pancreatectomy with celiac (CA) and gastroduodenal artery resection (Michels IV)

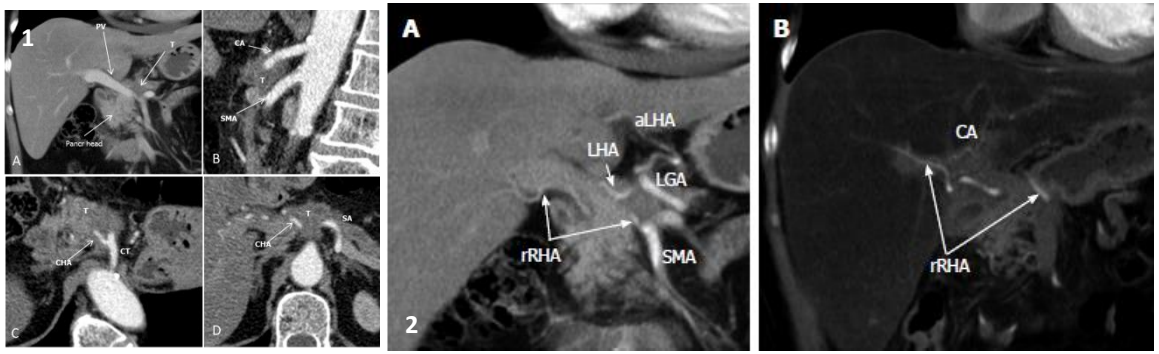
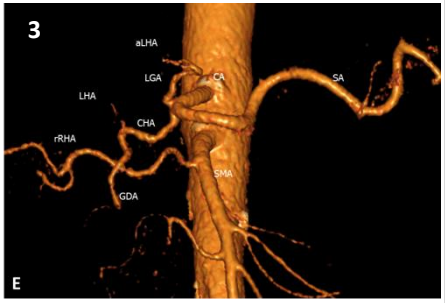


Fig.1. Computed tomography prior to operation. A: Axial view. Venous phase. Hypovascular tumor of pancreatic neck (T) is shown to abut portal vein (PV) trunk. Pancreatic head is demonstrated to be intact; B: Sagittal view. Arterial phase. Circumferential encasement of celiac artery (CA) by hypovascular tumor of pancreatic body and the latter's adherence to anterior aspect of superior mesenteric artery (SMA); C, D: Axial image. Arterial phase. Circumferential contiguity of tumor to CA along with common hepatic (CHA) and splenic (SA), both arising from the former, is visualized. CT: Celiac trunk.



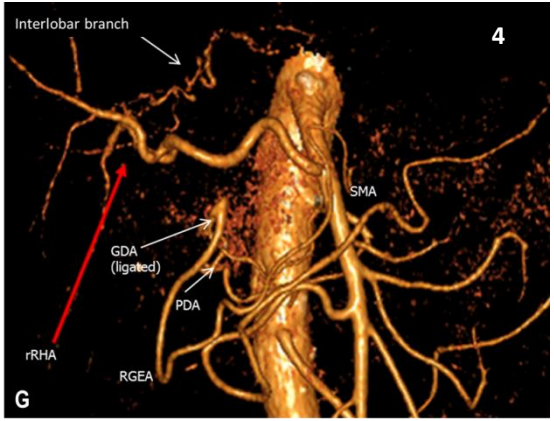
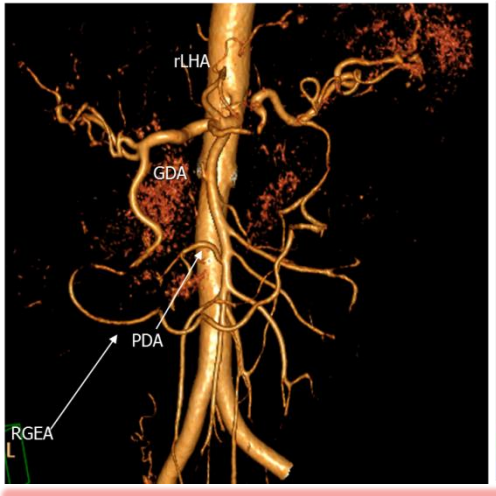


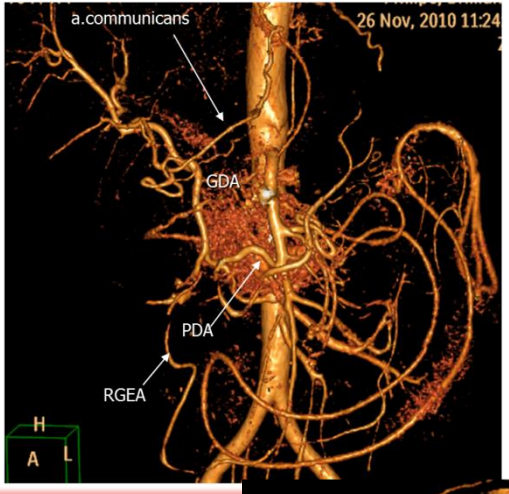
Fig.2 CT. Coronal image. Arterial phase. A: Previous to surgery. Aberrant arterial vasculature (Michels, type Ⅷb): replaced right hepatic artery (rRHA) stemming from superior mesenteric artery (SMA), the left gastric artery (LGA) giving rise to accessorial left hepatic artery (aLHA). No interlobar collateral is detectable; B: Distal pancreatectomy with excision of celiac artery (CA), LGA, common hepatic (CHA) and left hepatic (LHA) arteries. Increased blood flow *via* rRHA is displayed and extraparenchymal hilar interlobar collateral transmitting blood supply to left hepatic lobe became visible.

Fig 3. Three-dimensional computed tomography angiography before surgery. Variant arterial anatomy: replaced right hepatic artery (rRHA) originating
from superior mesenteric artery (SMA), accessory left hepatic (aLHA) - from left gastric (LGA) (Michels, type Ⅷb). CA: Celiac artery; LHA: Left hepatic artery; SA: Splenic artery; GDA: Gastroduodenal artery; CHA: Common hepatic.

Fig. 4 Figure 11 Three-dimensional computed tomography angiography subsequent to distal pancreatectomy with excision of celiac artery, left gastric, common hepatic and left hepatic arteries. Blood supply to right hepatic lobe is provided by superior mesenteric artery (SMA) through the replaced right hepatic artery (rRHA) and that to left hepatic lobe - *via* interlobar collateral anastomosing with rRHA. Stomach is supplied from SMA *via* pancreaticoduodenal artery (PDA) and, thereafter, through gastroduodenal artery (GDA) and right gastro-epiploic artery (RGEA).

Case 2 Modified Appleby procedure with Michels II arterial anatomy without arterial reconstruction





A. communicans as a main source of blood supply for the left liver lobe after resection of the replaced left hepatic artery originating from the left gastric

Case 3. Total pancreatectomy with Michels IV arterial anatomy without arterial reconstruction

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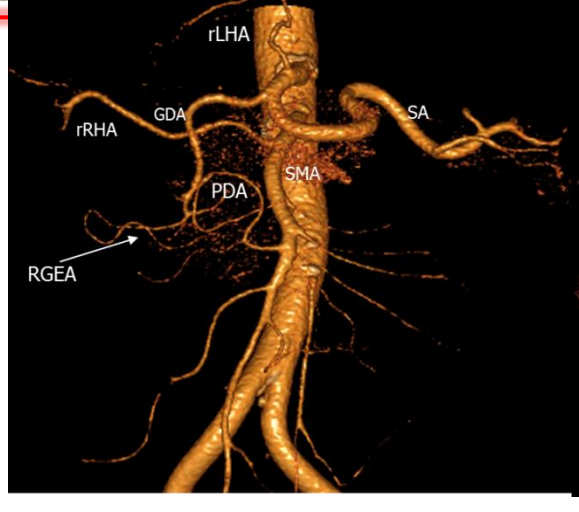
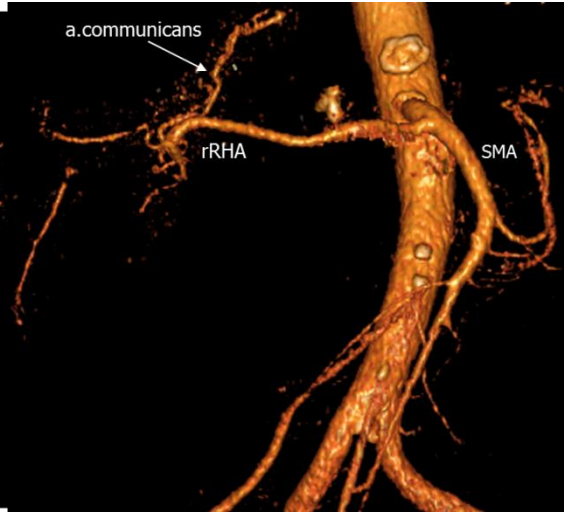




Case 4 37-year-old man with firearm (submashine gun wounds) liver injury, false aneurysms of the left hepatic artery and hemobilia

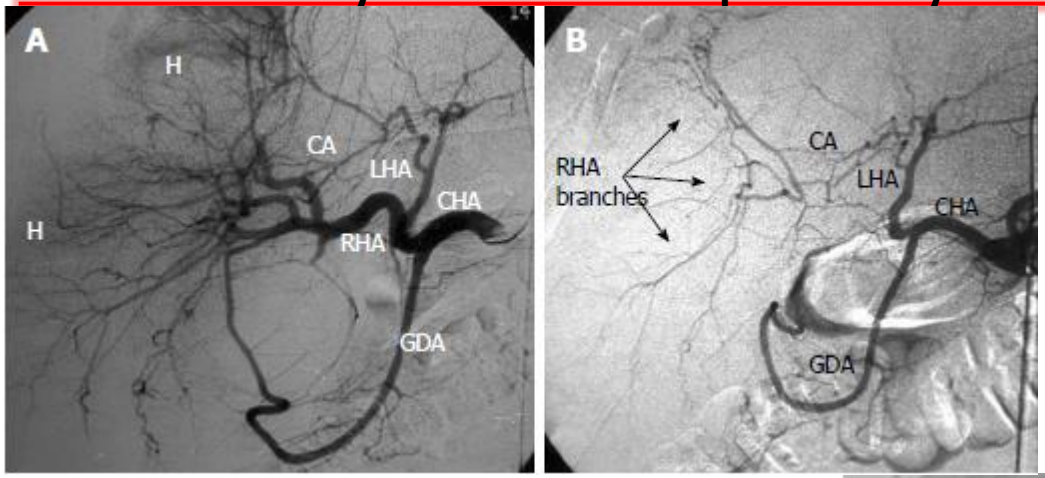


Fig.1 Selective celiacography A: Classical arterial architecture (Michels, type 1). There is communicating interlobar artery (CA) connecting right and left hepatic arteries (RHA and LHA). Turbulent blood flow is seen in areas of pulsative hematomas (H); B: Control of hemorrhage was achieved with RHA occlusion but arterial branches of right hepatic lobe keep being filled owing to CA-conveyed blood transit from the left hepatic artery (LHA). GDA: Gastroduodenal artery; PHA: Proper hepatic artery; CHA: Common hepatic artery; RGEA: Right gastroepiploic artery.

Case 5 Chemoempolisation for hepatocellular cance in 64-year-old man

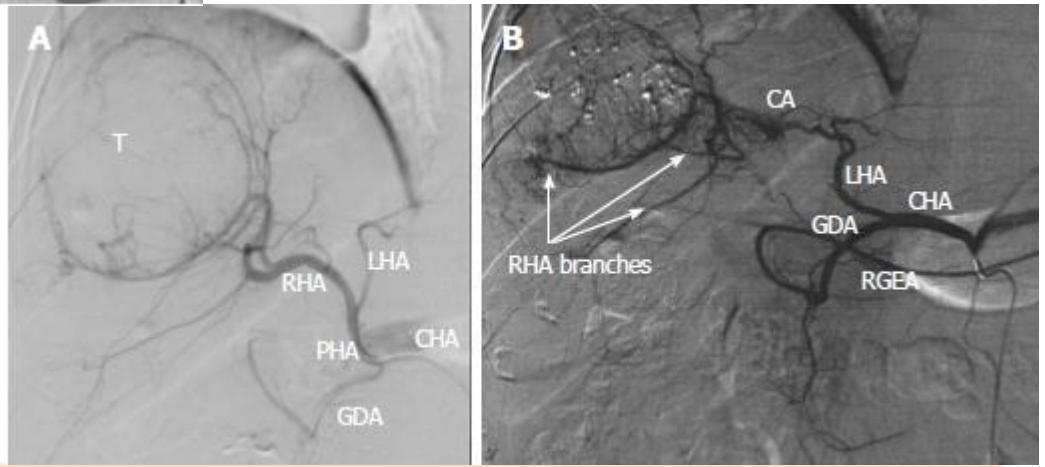
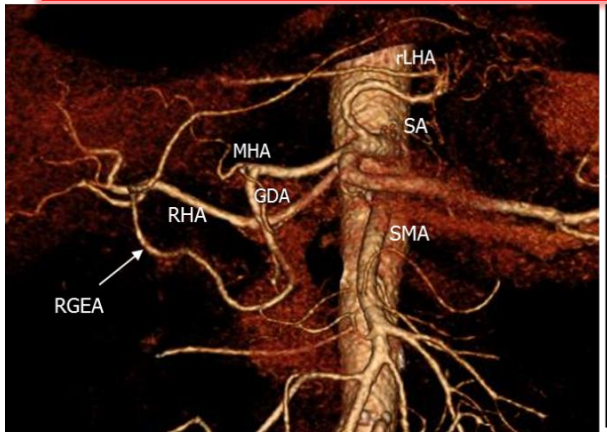
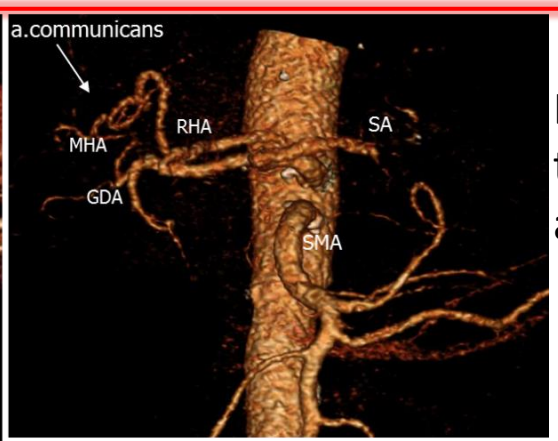


Fig. 2 Selective celiacography A: Before and after chemoembolization through the right hepatic artery; B:
Arterial branches of right hepatic lobe keep being filled owing to communicating interlobar artery (CA)-conveyed blood transit from the left hepatic artery (LHA). GDA:Gastroduodenal artery; CHA: Common hepatic artery; RHA: Right hepatic artery;

Case 6 Total gastrectomy for gastric cancer with resection of rLHA and RHA, originating from celiac artery without reconstruction

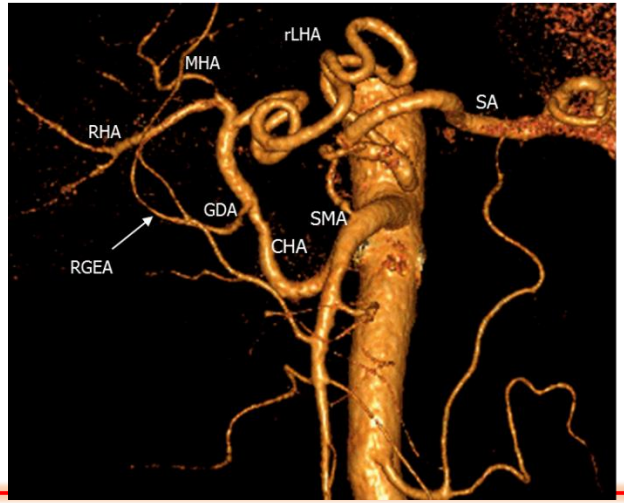


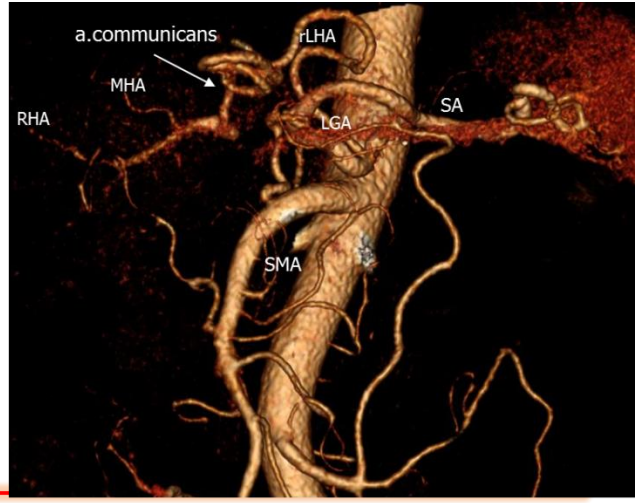


Liver arterial blood supply is going through the median hepatic artery and a.communicans

Case 7 Whipple with common hepatic artery resection (Michels IX) without reconstruction

Liver arterial blood supply is going through the left gastric and a.communicans





Conclusion

The knowledge about the capability of anastomoses between major hepatic arteries allows to resect the main feeding lobar hepatic artery without reconstruction.

In so doing intraoperative monitoring of blood supply must be used, which depending on circumstances, can be ultrasound Doppler or angiography.