

# Personalized surgery for the splenic flexure cancer: new frontiers

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Dear Editor

Recent improvements in surgical techniques for colonic cancer have focused more on the mesentery than the colon itself<sup>1</sup>. Consequently, the mesenteric vascular anatomy is an area of interest to colorectal cancer surgeons.

For embryological and, therefore, vascular anatomical reasons, patients with splenic flexure cancers present unique challenges. Awareness of the individual vascular anatomy before surgery can help to deliver patient-tailored and oncologically safe surgery. This report describes the detailed vascular anatomy of the splenic flexure. Data sets were derived from 32 preoperative CT images using three-dimensional (3D) reconstruction and 3D printing<sup>2</sup>.

The middle colic artery (MCA) was constantly present, originating from the superior mesenteric artery (SMA) in all but one patient (3.1 per cent), in whom it originated from the inferior mesenteric artery (IMA). There was a wide range of MCA bifurcation positions. These can be classified into three groups: left of the superior mesenteric vein (SMV) (12.1 per cent), in front of the SMV (53.1 per cent), and right of the SMV (34.4 per cent). A longer MCA bifurcated over or right of the SMV, whereas a shorter one bifurcated left.

The accessory MCA (aMCA) was found in 31.25 per cent of the patients. The aMCA originates cranial to the MCA from the SMA, its trajectory leading to the splenic flexure. In 50 per cent of patients in this study, the aMCA followed the lower border of the pancreas. This introduces another possible pathway for lymphatic spread, and it is potentially important to be aware of whether an aMCA is present or not when undertaking central lymph node dissection<sup>3</sup>.

The IMA was constantly present. Its origin was usually found caudal to the MCA origin (87.5 per cent). However, in 12.5 per cent it was found to be cranial; all such patients had an aMCA.

From the origin of the IMA to the origin of the MCA there is a 3D connection, called the mesenteric interarterial stair. The median

longitudinal height parallel to the aorta was 2.87 (range 1.04–9.65) cm and the lateral median distance in the transverse plane was 2.63 (0.85–4.74) cm. This connection traverses two different embryological mesenteries, from the midgut and the hindgut. The exact border is not clearly defined<sup>4</sup>.

Thus, the vascular supply of the splenic flexure is highly variable. It was found that the predominant supply was from the IMA/the inferior mesenteric vein (IMV) in 59.4 per cent, the MCA/the SMV in 25.0 per cent, and equally from both in 15.6 per cent.

The IMV drains the left colon. In this study, the IMV entered the splenic vein in 34.4 per cent and the drainage area of the SMV in 65.6 per cent. In the latter group, 85.7 per cent drained directly into the SMV and 14.3 per cent drained into the SMV through a jejunal vein. The IMV passes near the pancreas, and the IMV confluence including its surgical accessibility was classified accordingly: infrapancreatic/accessible (53.1 per cent); infrapancreatic with retropancreatic arch/partially accessible (21.9 per cent); and retropancreatic/not accessible (25.0 per cent).

## Conclusion

There is a 3D relationship between the origins of the IMA and the MCA. When a surgeon performs 3D oncological dissection for splenic flexure cancer, the IMA origin should be connected with the MCA origin by following the IMV. The surgeon could follow the IMV to its confluence when accessible, or to the lower border of the pancreas and then turn towards the SMA when the IMV confluence is not accessible.

Lymph node metastases might occur along both vascular tributaries, so surgeons need to be aware of the vascular anatomy, and the authors recommend use of preoperative CT 3D reconstruction and possibly 3D printed models to visualize the mesenteric interarterial stair, including the IMV trajectory, and to determine whether an aMCA is present (Fig. 1)<sup>5</sup>.

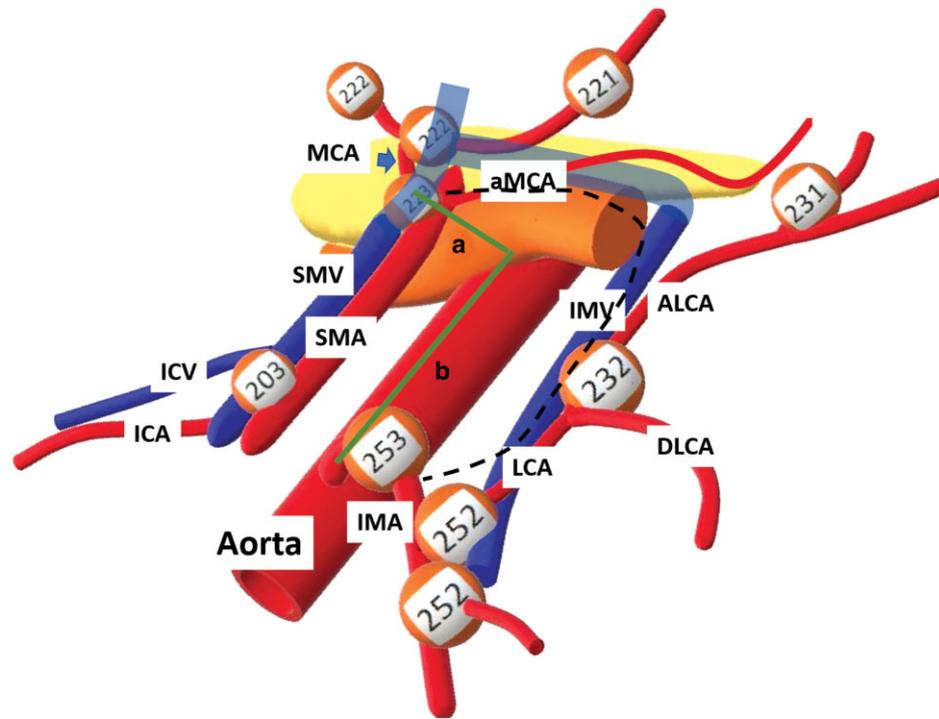
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**Fig. 1** The mesenteric interarterial stair with resection line from the inferior mesenteric artery origin to the middle colic artery origin following the inferior mesenteric vein to the caudal border of pancreas, turning towards the patient's right

Lymph nodes are numbered according to the Japanese Classification. The dashed line indicates the resection line. Distance A is the lateral distance in the transverse plane, and distance B is the longitudinal height parallel to the aorta. ALCA, ascending left colic artery; aMCA, accessory middle colic artery; DLCA, descending left colic artery; ICA, ileocolic artery; ICV, ileocolic vein; IMA, inferior mesenteric artery; IMV, inferior mesenteric vein; LCA, left colic artery; MCA, middle colic artery; SMA, superior mesenteric artery; SMV, superior mesenteric vein.

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