The left internal thoracic artery supplying a major part of the gastrointestinal tract

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Video clip is available online.

Collateral circulations from the internal thoracic arteries have been described mostly in patients with aortic coarctation and atherosclerotic distal aortic stenosis. In those cases, the collaterals usually follow the Winslow pathway over the superior epigastric artery.¹⁻³

The left internal thoracic artery (LITA) is the criterion standard graft for revascularizing the left anterior descending coronary artery (LAD), with proven superiority in survival and event-free survival.⁴ We present a very rare case in which the LITA was involved in collateral circulations to supply the foregut and midgut, which was discovered accidentally during coronary artery bypass grafting (CABG).

CLINICAL SUMMARY

A 78-year-old man with 3-vessel disease was referred to our hospital for CABG. Results of physical examination were unremarkable, with pulses equal bilaterally and showing normal gradients. His previous medical history included diabetes mellitus, peripheral vascular disease, carotid stenosis, myocardial infarction, and cerebral infarction.

The plan was to revascularize the LAD with the LITA according to standard procedure. On preparation of the LITA, however, the surgeon (A.T.) noticed that the vessel was enlarged and strongly pulsating. Bearing in mind the possibility of an undiagnosed vascular abnormality, he decided to spare the LITA and instead performed all the anastomoses with saphenous vein grafts. Three venous grafts were used. The remaining operative and postoperative courses were otherwise unremarkable. No signs or symptoms of

Thoracic-hepatic circulation. Notice the dilated LITA and collateral pathway in the liver.

Central Message

Collateral circulations of the internal thoracic artery are rare, but it is important to be aware of them. This report presents a case in which the gut was almost dependent on such a circulation.

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mesenteric ischemia or hypoperfusion were observed. The patient was discharged on the 10th postoperative day.

VIDEO 1. Volume rendering computed tomographic angiogram of the collateral circulation. Video available at: [http://www.jtcvsonline.org/article/S0022-5223\(17\)31979-7/fulltext](http://www.jtcvsonline.org/article/S0022-5223(17)31979-7/fulltext).

FIGURE 1. Thoracic-hepatic circulation. Notice the dilated left internal thoracic artery and collateral pathway in the liver (arrows).

The LITA was further evaluated by computed tomographic angiography (Video 1). According to the clinical examination, a coarctation was excluded. Nevertheless, complete proximal occlusions of the celiac axis (CA) and superior mesenteric artery (SMA) was found. The LITA showed a diameter of 8 mm. An extensive network of collaterals had developed and connected the superior epigastric artery to intrahepatic collaterals over the falciform ligament (Figure 1). The left superior epigastric artery was correspondingly enlarged and communicated through these collaterals with the CA distal to the occlusion. Blood flowed through the hepatic artery to the CA and through the pancreaticoduodenal arcade to the SMA. This provided adequate blood supply to the foregut and midgut, which was reinforced distally by a hypertrophied Riolan arch.

DISCUSSION

The LITA has become the graft of choice for revascularization of the LAD because of its excellent long-term

outcome. A rare condition that would preclude harvesting the LITA is its involvement in collateral circulations with distal aortic branches. Usually, this is due to aortic coarctation or aortoiliac disease.^{1-3,5,6} In patients with mesenteric vascular occlusion, the intestine could be supplied by such collaterals originating from the bilateral internal thoracic arteries (BITA). This was reported in a case from Japan. In that case, the collaterals from the BITA found their way on both sides to the mesenteric vessels: on the left side, from the musculophrenic artery through the left inferior phrenic artery to the left gastric artery, and on the right side, through the same pathway to the hepatic artery. The condition was readily diagnosed preoperatively, and the operation was planned such that the arterial revascularization of the LAD was to be achieved with the radial artery.

Internal thoracic angiography is not a consistent practice in cardiac centers referring to our hospital, so we were faced with this unusual finding intraoperatively. We bore in mind that the LITA can be vital for the perfusion of other organs than the chest wall, and we retrospectively found out that it had been the right decision to sacrifice arterial revascularization of the LAD. In patients with severe peripheral vascular disease, takedown of the LITA can have quite dramatic results.⁵ In our case, the consequence would have been acute bowel ischemia, which could have been fatal.⁷ In patients with CA stenosis, collateral pathways open between the SMA and CA.⁸ In our patient, however, the SMA was also occluded.

Although such cases are extremely rare, lower limb perfusion is commonly dependent on the BITA, and such a phenomenon should always be kept in mind when a morphologically abnormal internal thoracic is encountered during CABG. Moreover, routine angiography of the BITA should be considered in patients with severe peripheral vascular disease undergoing CABG and may be advisable to include in the guidelines.^{1,9-11} In addition, we cannot stress enough the importance of computed tomographic angiography in diagnosing and mapping vascular abnormalities.^{12,13}

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