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Short Report

Percutaneous Treatment of Liver Failure and Acute Mesenteric Ischaemia

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ABSTRACT

Introduction: Synchronous embolism to the superior mesenteric artery (SMA) and coeliac axis (CA) is a rare disease.
Report: A 67-year-old man with atrial fibrillation developed acute liver failure due to an embolic occlusion of the CA and SMA, with a severe coagulation disorder. He was successfully managed with percutaneous stent placement and an exploratory laparotomy was not needed. He remains symptom-free 1 year after the procedure, and duplex follow-up showed stent patency.
Conclusion: Endovascular techniques in patients with liver failure, no signs of peritonism, early diagnosis and high operative risk seem feasible and should be used if possible, as first-line option.

The survival rate of liver and mesenteric ischaemia has not improved substantially during the past years, despite the advances in open surgery and endovascular techniques.[1] Endovascular therapies include different techniques, such as catheter-directed vasodilator, aspiration thrombolytic therapy, endovascular angioplasty or stent placement.

Report

A 67-year-old man with a nephrectomy done the previous day presented with a history of acute liver failure and mid-to-upper abdominal pain. The patient's medical history was significant for an atrial fibrillation. An urgent computed tomography (CT) angiography revealed a coeliac trunk and superior mesenteric artery (SMA) occlusion. On physical examination, he had absent peritonism signs. Laboratory data revealed metabolic acidosis, leucocytosis ($14{,}580 \times 10^3$ μl^{-1}) and elevated levels of lactate (55 mg dl^{-1}), aspartate aminotransferase (AST, 4337 U l^{-1}), alanine aminotransferase (ALT, 2190 U l^{-1}), lactate dehydrogenase (LDH, 10170 U l^{-1}), International normalised ratio (INR) 3.73 and activated partial thromboplastin time (aPTT, 59 s).

An anterioposterior and lateral aortogram was performed via the transfemoral approach (Fig. 1). A Simmons 1 catheter (Bard Angiomed, Karlsruhe, Germany) was used to select the expected origin of the SMA. The occlusion could then be crossed with a 0.035-inch hydrophilic wire (Radiofocus M; Terumo, Leuven, Belgium). The technique included placement of an 8 × 59-mm balloon-expandable stent (Omnilink Elite, Abbott Vascular Devices, Ulestraten, the Netherlands) across the occlusion without predilation, introduced over a stiff guide wire (Amplatz Super Stiff; Boston Scientific, Natick, MA, USA) to prevent a prolapse into the aorta. A left brachial approach was added to improve the angle of entry into the ostia of the coeliac axis (CA) and because of the acute angle of entry into the CA from the femoral approach. A 5-F cobra-shaped catheter (Bard Angiomed, Karlsruhe, Germany) with a less traumatic 0.014-inch wire (Spartacore 14, Abbott Vascular International, Diegem, Belgium) was employed to cross the occlusive lesion. Once the wire was placed across the occlusion, a catheter (CXI Support Catheter, Cook Medical, Bloomington, IN, USA) was carefully advanced over the wire across the lesion and a second stiffer wire (Amplatz Super Stiff; Boston Scientific, Natick, MA, USA) was exchanged through the catheter to facilitate the placement of a 8 × 59-mm balloon-expandable stent (Omnilink Elite, Abbott Vascular Devices, Ulestraten, the Netherlands). A subsequent arteriogram confirmed an excellent flow to the liver territory.

The patient was haemodynamically stable and a persistently normal abdominal examination was presented. On the first post-interventional day, lactic acid decreased to 20 mg dl^{-1}; coagulation and liver function returned to normal values on the third postoperative day. An angio CT examination showed normal patency of the CA and SMA (Fig. 2). The patient was discharged with oral anticoagulant therapy and 100 mg of aspirin daily indefinitely.

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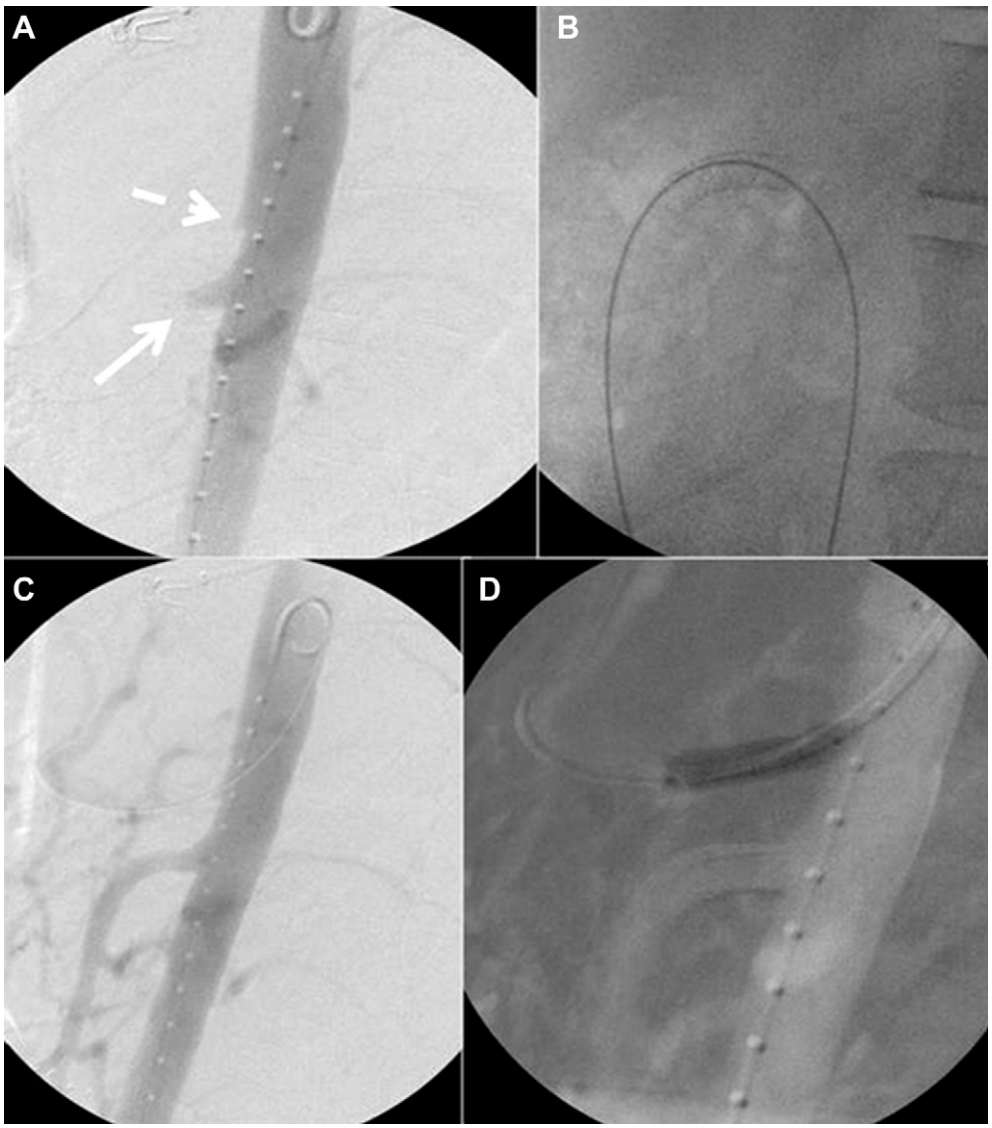

Figure 1. Digital subtraction angiography. A: Abrupt cutoff of the SMA with the absence of collateral circulation (*continuous arrow*) and complete occlusion of the CA (*doted arrow*). B: Image during fluoroscopy shows an Amplatz wire selecting the SMA after selective fibrinolysis. C: Wire across CA occlusion and a stent in the SMA showing normal flow. D: CA stent placement without predilation.

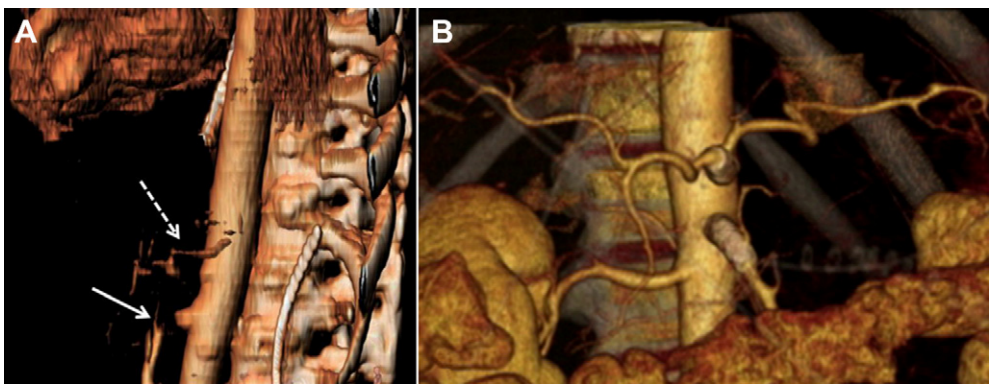

Figure 2. A: Preoperative CT scan shows occlusion of CA and SMA. B: 3D reconstruction computed tomography angiogram (CT) 5 days post CA and SMA stenting. Adequate luminal patency of the coeliac artery and hepatic artery is seen.

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At 1 year, duplex examination of the CA and SMA showed no haemodynamically significant residual stenosis.

Discussion

Acute mesenteric ischaemia is a life-threatening surgical emergency associated with high morbidity and mortality rates. Atrial fibrillation, SMA occlusion and synchronous embolism are common findings. Acosta et al. reported that visceral synchronous embolism occurred in 113 of 273 (41%) arterial segments, of which 10 emboli were lodged in the coeliac trunk.[2]

Previously, endovascular treatment was not applied to patients presenting with acute mesenteric arterial thrombosis because it does not allow for bowel viability assessment, requires advanced endovascular surgery skills and procedure time can delay revascularisation. The advantages of endoluminal techniques include timely visualisation of the affected vascular anatomy with near-immediate restoration of flow and replacement of the need for open surgical reconstruction, avoiding aortic clamping and prosthetic conduit contamination.

The systematic review of Schoots et al.[3] suggested that catheter-directed fibrinolysis with urokinase may serve as an adjunctive treatment modality to surgery. Indication requires no development of peritonitis and good collaterals in arteriography. SMA percutaneous transluminal angioplasty (PTA) can achieve a rapid recanalisation more quickly than primary thrombolysis. Peripheral embolisation of the thrombus partly dissolved and broken by PTA is the most likely complication of PTA. Stenting could avoid this risk for distal embolisation. Successful endovascular treatment was associated with improved mortality compared with traditional therapy (36% vs. 50%).[4] The technique called 'retrograde superior mesenteric artery stenting' (ROMS) combines both open surgical and endovascular methods.

According to the literature, this seems to be the first case of an acute liver failure due to a combined thrombo-embolic occlusion of CA and SMA treated with stenting. In the largest single-centre experience published,[5] liver function alterations were rare, with AST mean value of 25 U l^{-1} (18–35) and ALT of 20 U l^{-1} (11–39). In our opinion, endovascular treatment in patients with liver failure, no signs of peritonism, early diagnosis and high operative risk, seems feasible and should be used if possible, as first-line option.

Conflict of Interest

None.

Funding

None.

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