Management of mesenteric malperfusion syndrome in patients with type A aortic dissection: an unsettled issue.

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Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Acute type A aortic dissection (ATAAD) represents one of the most complex and life-threatening disorders of the cardiovascular system. Aortic rupture and consequent cardiac tamponade are the most common cause of death (1). Emergency surgery on ascending aorta with or without partial or total arch replacement represents, in most of cases, the only therapeutic option. Among all ATAAD patients, those presenting with concomitant dissection-related severe end-organ malperfusion and consequential failure (malperfusion syndrome, or MPS) have a significantly increased mortality (2-7). Particularly, mesenteric MPS (mesMPS) has been reported to have a very poor prognosis with an in-hospital mortality ranging from 60 to 75%. The optimal management of ATAAD patients with MPS remains an unsettled issue. However, with the advancement in the endovascular treatment of aortic pathology, we have more choices to percutaneously cure mesMPS prior to central aortic repair and this strategy appears to be associated with improved outcomes (6,7).

In the current issue of the journal, Yang and colleagues (8) presented their decades-long work trying to identify a better method to treat this very high-risk patients. From 1996 to 2017 they identified 82 patients with ATAAD and mesMPS, and treated all of them with upfront interventional therapy prior to open aortic repair, in the hopes of resolving the visceral ischemia and its sequelae. To achieve endovascular reperfusion, a total of 113 fenestrations, 119 aortic stents and 45 branch vessels stents were performed together with a small number of branch vessel thrombolysis (n. 3) and suction embolectomy (n. 1) procedures. The operative mortality for the 82 patients with mMPS was significantly higher than that for those without mesMPS (39% vs. 7.5%, $p < 0.001$), but for those who underwent both endovascular revascularization and open aortic repair, in-hospital mortality

and major postoperative complications were not significantly different than those who had no mesMPS (2.1% v 7.7%, p=0.23), suggesting that the impact of this complication could potentially be eliminate if promptly and successfully treated. Another important finding is represented by the recognition of stroke, bowel necrosis at laparotomy and serum lactate ≥ 6 mmol/L as independent predictors of death from organ failure after resolution of malperfusion. This is another important information that can guide us in identifying which patient would benefit the most from a staged approach. Moreover, the long-term survival for mesMPS patients surviving to hospital discharge was similar to those without MPS and MesMPS at admission was no longer a risk factor after patients were successfully treated with endovascular fenestration/stenting and recovered from MPS [HR=0.8 (0.4, 1.4), p=0.37].

Traditional surgical philosophy has emphasized emergent surgery, identification and resection of the primary tear and replacement of the ascending and/or transverse aortic arch in order to restore true lumen perfusion. However, given the presence of distal re-entry tears, persistence of false lumen flow and potential for branch vessel involvement, the restoration of proximal true lumen inflow may not consistently address the problem of distal malperfusion. With the progress of the endovascular techniques, some centres have implemented a strategy of central aortic operation after percutaneous end-organ blood flow restoration in patients presenting with significant mesMPS (6,7). The results from the current study (8) support once more the current idea that the treatment of patients with ATAAD should be based on their clinical presentation rather than just focusing on repairing the ascending aorta in the quickest possible way. There is an increasing body of evidence suggesting worse operative mortality, short- and long-term outcomes in patients with

concomitant MPS (and particularly mesMPS), so that our practise should consider a more careful evaluation of the patients in order to stratify the risk and allow better decision making and tailor the surgical strategies on the base of the predicted individual risk. Endovascular treatment of the malperfusion when performed as a staged procedure with open central aortic repair appears to improve both short-and long-term outcomes. In patients with clinically significant mesenteric malperfusion at presentation, it certainly seems reasonable to start the surgical treatment with an endovascular reversal of the malperfusion, followed by central aortic repair (7), if the patient is clinically stable and there is no evidence of cardiac tamponade or aortic rupture. In this setting, the hybrid operating room assumes an important role, permitting the precise diagnosis of downstream malperfusion sites and allowing surgical and/or endovascular treatment without delay and at small risk to the patient. We believe that this is the way forward and once again we endorse the crucial role of dedicated specialized aortic centres in the modern treatment of acute aortic syndromes (9): as already demonstrated by other studies these types of centers provide better care for ATAAD and have significantly improved outcomes in treating these very complex diseases (10).

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Central Figure