



Chivasso, P., & Bruno, V. D. (2018). Commentary: Management of mesenteric malperfusion syndrome in patients with type A aortic dissection: An unsettled issue. *Journal of Thoracic and Cardiovascular Surgery*, 158(3), 690-691. Advance online publication. <https://doi.org/10.1016/j.jtcvs.2018.11.080>

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**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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Text Word Count: 752

1 Acute type A aortic dissection (ATAAD) represents one of the most complex and life-
2 threatening disorders of the cardiovascular system. Aortic rupture and consequent cardiac
3 tamponade are the most common cause of death (1). Emergency surgery on ascending aorta
4 with or without partial or total arch replacement represents, in most of cases, the only
5 therapeutic option. Among all ATAAD patients, those presenting with concomitant
6 dissection-related severe end-organ malperfusion and consequential failure (malperfusion
7 syndrome, or MPS) have a significantly increased mortality (2-7). Particularly, mesenteric
8 MPS (mesMPS) has been reported to have a very poor prognosis with an in-hospital
9 mortality ranging from 60 to 75%. The optimal management of ATAAD patients with MPS
10 remains an unsettled issue. However, with the advancement in the endovascular treatment
11 of aortic pathology, we have more choices to percutaneously cure mesMPS prior to
12 central aortic repair and this strategy appears to be associated with improved outcomes
13 (6,7).

14 In the current issue of the journal, Yang and colleagues (8) presented their decades-long
15 work trying to identify a better method to treat this very high-risk patients. From 1996 to
16 2017 they identified 82 patients with ATAAD and mesMPS, and treated all of them with
17 upfront interventional therapy prior to open aortic repair, in the hopes of resolving the
18 visceral ischemia and its sequelae. To achieve endovascular reperfusion, a total of 113
19 fenestrations, 119 aortic stents and 45 branch vessels stents were performed together with
20 a small number of branch vessel thrombolysis (n. 3) and suction embolectomy (n. 1)
21 procedures. The operative mortality for the 82 patients with mMPS was significantly higher
22 than that for those without mesMPS (39% vs. 7.5%, $p < 0.001$), but for those who
23 underwent both endovascular revascularization and open aortic repair, in-hospital mortality

24 and major postoperative complications were not significantly different than those who had
25 no mesMPS (2.1% v 7.7%, p=0.23), suggesting that the impact of this complication could
26 potentially be eliminated if promptly and successfully treated. Another important finding is
27 represented by the recognition of stroke, bowel necrosis at laparotomy and serum lactate \geq
28 6 mmol/L as independent predictors of death from organ failure after resolution of
29 malperfusion. This is another important information that can guide us in identifying which
30 patient would benefit the most from a staged approach. Moreover, the long-term survival
31 for mesMPS patients surviving to hospital discharge was similar to those without MPS and
32 MesMPS at admission was no longer a risk factor after patients were successfully treated
33 with endovascular fenestration/stenting and recovered from MPS [HR=0.8 (0.4, 1.4),
34 p=0.37].

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

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

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