Hybrid Approach as the Rescuer of Malperfusion Syndrome in Acute Type I Aortic Dissection: A New Hope?

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Malperfusion syndrome is the most devastating complication of acute type I aortic dissection. Immediate open surgical repair of the proximal aorta is accepted as the standard therapeutic approach, which is reportedly resolve distal malperfusion by the regain of true lumen flow in majority of the cases. Nevertheless, with very high operative mortality by the conventional open proximal aortic repair in this setting, there have been debates over the strategy of interventional therapy first to restore end-organ perfusion prior to surgical aortic repair. This strategy is supported by observations that some subsets of malperfusion syndrome do not respond to aortic repair alone because of static obstruction caused by thrombosed false lumen. Persistent high pressurization of the false lumen attributed to distal reentrant sites may also exist to contribute ongoing malperfusion even after surgery.

To address this malperfusion issue, first interventional therapy to alleviate the malperfusion SD and subsequent open aortic repair has been suggested as a justifiable approach. This approach, however, also carries risks of interim mortality due to aortic rupture or other complications before the initiation of surgery, by which this strategy is often criticized as "natural selection."

With these in mind, circumventing the pitfalls of these 2 approaches may give the right answer, which is dealt by a paper by Tsagakis et al in this issue of *Seminars of Thoracic and Cardiovascular Surgery*.[1] Sophisticated stratified approaches depending on the timing of presentation and mode of malperfusion (static vs dynamic) in the hybrid room setting was utilized to treat malperfusion syndrome associated with acute type I aortic dissection. It appears that a threshold of ">6 hours of dynamic malperfusion" has been adopted for stratifying the treatments (stenting first over surgery) while suspected "static" malperfusion resulted in stenting first regardless of timing of presentation. As the interventional therapy, bare metal stents were placed in the corresponding aortic segments.

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Central Message

A hybrid approach using uncovered stenting and open aorta repair may be a promising approach to treat acute aortic dissection complicated by malperfusion syndrome.

Over a 10-year period (2007–2017) of their single-center experiences, 18 patients out of 181 who were operated on acute type I aortic dissection met the inclusion criteria, in all of whom, visceral or peripheral malperfusion were present, and uncovered stents were placed in the true lumen depending on the target locations.[1] Additional stenting of aortic branches was required in 33% to restore the perfusion. Early outcomes were excellent with the mortality rate of 16.7% ($n = 3$) given the reported high operative mortality risks of such patients (40–70%). During follow-up, complete thrombosis was more frequently observed in proximal level (segment A, 67%) than distal levels (segment B and C, 13–27%) while distal descending thoracic aorta and abdominal aortic sizes tended to increase

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($P < 0.005$). No intimal rupture or occlusion of arteries occurred during follow-up. Limitations of this study include the nature inherent to retrospective review of single-center experiences, and the sample size was small. Hybrid room setting for acute aortic syndrome is not usually available in most centers around the world, and therefore, reproducibility of their multidisciplinary experiences is certainly limited in the current era. On the contrary, their excellent early outcomes established by such sophisticated strategy may also be a good model-approach for further generalization to treat the most devastating medical condition.

Of note, by a chance to examine a patient into the stented portion of the distal aorta, the authors demonstrated that the stented segments showed neointimalization while opening of the major branching vessels remained intact without interference of vessels' offspring. As the authors state, these findings suggest that uncovered stenting in the downstream aorta in the setting of acute dissection may "opens up opportunities for new endovascular strategies to exclude the residual false lumen or to heal the entire aorta."[1] The conclusion needs validation by further collection of experiences and data analyses from larger cohorts.

REFERENCE

1. Tsagakis K, Jánosi RA, Frey UH, et al: True lumen stabilization to overcome malperfusion in acute type I aortic dissection. Semin Thorac Cardiovasc Surg 31:740–748, 2019