

## INVITED COMMENTARY

## Predictors of Neurological Complications After Transthoracic Endovascular Aneurysm Repair: More Questions than Answers

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Several randomised controlled trials (RCTs) have compared open with endovascular repair (EVAR) of abdominal aortic aneurysms (AAAs) in both elective and ruptured aneurysms, in both fit and unfit patients, in both small and large aneurysms, and in both the peri-operative period and the long term. In a remarkable contrast to this wealth of level A evidence for EVAR, "evidence comparing open repair and thoracic endovascular aneurysm repair (TEVAR) in the treatment of descending thoracic aneurysms relies on systematic reviews and meta-analysis of retrospective series and non-randomised controlled or population based studies".<sup>1</sup> Despite this, TEVAR is recommended as the treatment of choice for thoracic aneurysm with the only prerequisite being anatomical suitability.<sup>1</sup> Fuelled by this easy win against open surgical repair, TEVAR is nowadays expanding towards both the aortic arch and the abdominal aorta, with this extended aortic coverage posing the question of whether this strategy is associated with an acceptable risk of neurological complications.

In the current issue of *EJVES*, Piazza *et al.*<sup>2</sup> investigate the incidence and predictors of early and mid term neurological complications following TEVAR in a study based on prospectively collected data from 833 patients included in the Global Registry for Endovascular Aortic Treatment (GREAT) registry. The large number of patients and the prospective collection of the data are the main strengths of the study. However, as the authors acknowledge, the study is limited by the fact that the GREAT registry was not specifically designed to identify neurological complications and therefore several potentially meaningful predictors, such as the number of patent intercostal arteries, mean arterial pressure, blood loss, and spinal drainage strategy, were not recorded.

The study concludes that the overall neurological complication rate after TEVAR is low. Indeed the cerebrovascular accident (CVA) rate within 30 days was only 1.5%, but if this percentage is analysed by proximal landing zone, it was 13.3% for zone 0, 2.5%–2.9% for zones 1 and 2, respectively, and 0.4%–0.6% for zones 3 and 4, respectively. Another interesting finding of the study is that left subclavian artery (LSA) revascularisation did not reduce the CVA rate in cases of LSA coverage. This finding is in line with

several other studies, as well as with a recent meta-analysis, indicating that LSA coverage significantly increases stroke risk, whereas LSA revascularisation does not have any statistically significant effect.<sup>3</sup> This sounds like an oxymoron that future RCTs will have to resolve.

The spinal cord ischaemia rate within 30 days was 1.8%, leading to an overall early neurological complication rate after TEVAR of 3.3%. It should be noted that even though this 3.3% incidence is rightfully described as low, it remains higher than the rate of all the other procedure related complications together: type I endoleak (0.8%), stent induced dissection (0.5%), aortic rupture (0.4%), type III endoleak (0.2%), and migration (0.1%). Remarkably, no clinical, anatomical, or procedural factors were associated with early ischaemic spinal cord injury, including LSA revascularisation, length of aortic coverage, and emergency/urgent setting. This is in contrast to some other studies, identifying planned coverage of the thoracic aorta over more than 200 mm or involving level T8 – T12, previous AAA surgery, LSA coverage, and chronic renal failure as significant predictors of SCI.<sup>1</sup> These findings, however, are not universal and this fact highlights more gaps in the existing literature.

Another gap in the literature that Piazza *et al.*<sup>2</sup> have tried to fill is the lack of data on the mid term incidence of CVA and spinal cord injury after TEVAR. Although rare, these complications continued to occur after the peri-operative period and were associated with LSA coverage and the length of the endograft. The take home message is that technical issues not only determine peri-operative complications, but also the mid term outcome, and, in this context, Piazza *et al.*<sup>2</sup> have to be commended for reminding us of this basic surgical rule.

### REFERENCES

- 1 Riambau V, Böckler D, Brunkwall J, Cao P, Chiesa R, Coppi G, et al. Editor's choice – management of descending thoracic aorta diseases: clinical practice guidelines of the european society for vascular surgery (ESVS). *Eur J Vasc Endovasc Surg* 2017;53:4–52.
- 2 Piazza M, Squizzato F, Milan L, Miccoli T, Grego F, Antonello M. Incidence and predictors of neurological complications following TEVAR in the global registry for endovascular aortic treatment (GREAT). *Eur J Vasc Endovasc Surg* 2019;58:512–9.
- 3 von Allmen RS, Gahl B, Powell JT. Editor's Choice – incidence of stroke following thoracic endovascular aortic repair for descending aortic aneurysm: a systematic review of the literature with meta-analysis. *Eur J Vasc Endovasc Surg* 2017;53:176–84.

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