

EDITORIAL

Treatment of Thoracic and Thoraco-abdominal Aortic Pathology in the Endovascular Era

Surgical treatment of aneurysms in the thoracic and thoraco-abdominal aorta poses a great challenge to the patient and surgeon alike. The open surgical treatment of such pathologies was pioneered by the great vascular surgeons of the mid-twentieth century, including Stanley Crawford and Michael DeBakey, and the benchmark for surgical outcome was set by large specialised centres with large volumes. Over the past decade, the availability of endovascular techniques has revolutionised the treatment of thoracic aortic disease. Although no randomised trials exist that compare open surgery with thoracic endovascular aortic repair (TEVAR), the enormously less invasive nature of TEVAR when compared with open thoracic aortic aneurysm (TAA)/thoraco-abdominal aortic aneurysm (TAAA) repair has resulted in a rapid adoption of endovascular surgery for these pathologies, owing much thanks to both patients' and surgeons' preferences.

Published in the current edition of the *European Journal of Vascular and Endovascular Surgery (EJVES)*, two studies document this radical change in TAA and TAAA repair in Germany, in the period from 2005 to 2014.^{1,2} These studies follow previously published papers by the same group assessing the practice of abdominal aortic aneurysm (AAA) repair in Germany.³ The authors analysed a national administrative dataset, based on the International Statistical Classification of Diseases and Related Health Problems 10th Edition (ICD-10). The ICD-10 is intended mainly as a standard diagnostic tool for epidemiology, health management, and national insurance policies. These analyses may present the great advantage of examining almost the entire national population (military hospitals are reportedly exempt from filing these data in Germany). However, data to be analysed for a specific pathology are limited on ICD-10. Therefore, this approach may provide a nice panoramic picture, without having the power to look into the details. Moreover, claims data depend on the validity of the coding performed during the hospital episodes, and expose the analyses to the risk of coding errors affecting the results.^{4,5} Data on complications are limited to the in hospital period without providing any follow up information, and it is impossible to distinguish pre-operative risk factors from post-operative complications. Dedicated national clinical databases would provide better insights into the evolving therapeutic approach of complex diseases such as TAA and TAAA.

Nonetheless, these papers present interesting insights into the evolving epidemiology of TAA/TAAA repair. Over the 10 years assessed in these two studies, TEVAR has become increasingly the dominant strategy for the treatment of TAAs in Germany, with almost 90% of TAA repairs and 76% of TAAA repairs being performed endovascularly, in the last year of analysis. Additionally, the availability of a minimally invasive surgical approach resulted in a surge in incidence of surgical repair of intact TAAs, with a >50% increase in incidence of non-ruptured (nr) TAA repair, and more than doubling of the incidence of TAAA repair. The increasing number of repairs is performed at many more hospitals over time, the number of hospitals performing TAAA repair in Germany increased from 53 in 2005 to 131 in 2014, while the median annual number of cases per centre was only two TAAA repairs and three TAA repairs. Although both studies show a positive trend in survival after TAA/TAAA repair, it merits underlining that the in hospital mortality was 5% for nrTAA and 16% for nrTAAA repair.

From an epidemiological perspective, these two studies indicate that TEVAR has revolutionised the treatment of thoracic aortic pathology in a way that is far more radical than the effect of endovascular aortic repair (EVAR) on AAA surgery.^{6–9} The use of TEVAR and fenestrated/branched EVAR (f/bEVAR) has made open thoracic aortic repair a far less common approach in Germany. Additionally, the important increase in incidence of repair suggests that surgical treatment is now offered to new patient cohorts, who were not considered for surgical intervention previously. This may be due either to increasing treatment of frail and elderly patients unfit for open repair, or possibly to a lowering of the diameter threshold for repair of a TAA/TAAA.

In comparison with AAAs, current knowledge regarding the natural course of an aneurysm in the thoracic aorta remains highly limited. As an example, there are no trials assessing the risk of rupture vs. risk of surgical intervention in TAAs or TAAAs. The threshold for repair, which is often recommended at 5.5 or 6 cm,⁹ is set based on extrapolation of data from the AAA trials, and the expected rupture risk of TAA and TAAA at this size, which is referred to as 10–20%. The current studies suggest that the risk associated with thoracic aortic repair remains high for certain patient groups in the elective setting even when using minimally invasive techniques. Optimally, it would be desirable to monitor whether the important increase in elective surgery for TAA and TAAA actually results in a decrease in the number of TAA/TAAA related deaths.

Overall, the current studies underline the profound effect of TEVAR and f/bEVAR on changes in treatment patterns for TAA/TAAA. The shift from open to mainly endovascular repair for the thoracic aorta is inevitable considering the vast benefits of endovascular therapy in terms of reduced morbidity and recovery after such intervention compared with open surgery. It is thus not surprising that this shift has occurred rapidly despite the lack of level A evidence from randomised trials. However, the important increase in the number of repairs may be a matter of concern. Additionally, an interesting phenomenon is represented by the lack of centralisation for these complex procedures in Germany.

The editors of *EJVES* welcome the submission of high quality data from national registries, as they contribute to our scientific and clinical knowledge, and to continuous improvement in the vascular surgical care that we offer to our patients.^{5,10}

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