



Specialized thoracic aortic team is the next step in improving outcome in acute aortic dissection care

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In this issue of *JTD*, Umana-Pizano *et al.* examined 580 acute type A aortic dissection (ATAAD) cases from 1999 to 2016 at a high-volume centre, and found that there was a 3.72-fold increase in in-hospital mortality by an all low-volume aortic surgeon (LVAS) team compared to teams with a high-volume aortic surgeon (HVAS), and this increase in mortality extends into 5-year of follow-up (1). HVAS was defined as >10 cases per year, and LVAS was defined as ≤10 cases per year. The study was performed at a high-volume centre where there was no difference in resource allocation to the various team structures examined. The author concluded that the instead of hospital volume, a surgeon's case-volume may also be an important factor that influences short- and long-term outcome of ATAAD patients.

Over the past decade, the surgical mortality of ATAAD decreased significantly from 25% to 18% (2). This improvement in outcome is mainly related to better diagnostic imaging, advances in hypothermic circulatory arrests and cerebral perfusion strategies, increased safety and efficacy of aortic replacement procedures, and peri-operative intensive care. However, with an in-hospital mortality of 1 in 5 patients, acute aortic dissection remains a life-threatening condition that is challenging to diagnose and treat.

To further improve surgical outcome in patients with type A aortic dissection, centre volume and surgeon case volume have been evaluated. The positive correlation between increased volume of cases and improved surgical outcome for high-risk procedures is well-studied in the

literature, and underlies the process of specialization and centralization of complex surgical care (3,4). In cardiac surgery, the volume-outcome relationship has been demonstrated with coronary artery bypass grafting, mitral valve surgery for mitral regurgitation, as well as aortic valve replacement (5-7). In ATAAD, multiple studies have shown that centre volume is one of the strongest predictors of peri-operative outcome, and this association remains significant after adjusting for patient factors and co-morbidities (8,9). In a survey of 5,184 patients from the national inpatient sample database from 2003 to 2008, Chikwe *et al.* found that a strong inverse relationship between operative mortality and both institution and surgeon volume. Surgeons who performed less than 1 aortic dissection repair per year had a mean operative mortality of 27.5%, compared with 17.0% for those averaging 5 or more annually (10). This was similar to the relationship seen between institution volume and mortality: operative mortality was 27.4% in institutions performing 3 or fewer acute aortic dissections a year, compared with 16.4% in those performing more than 13 annually.

In practice, regionalization and the utilization of an aortic dissection pathway to a specialized multi-disciplinary aortic dissection team have also been shown to greatly improve post-operative outcome. Recently, a study of 16,886 Medicare beneficiaries looked at whether regionalizing care at high-volume hospitals for ATAADs was associated with lower mortality (11). The authors demonstrated that despite delaying surgery, a regionalization policy that transfers

patients to high-volume hospitals was associated with a 7.2% absolute risk reduction in operative mortality, and the association persisted in the long term, with a hazard ratio of 0.81 (95% CI, 0.75–0.87). Furthermore, Andersen *et al.* demonstrated that treatment of type A aortic dissection with dedicated multi-disciplinary thoracic aortic team significantly improved peri-operative outcome⁹.

A few questions remain to be explored. The number of cases that is required to improve patient outcome may need further delineation; as the author acknowledged, the mean experience in this study for HVAS was 15 cases/year, which may be significantly higher than most other specialized cardiac surgery centers. Whether specialized fellowship training in aortic surgery or high volume of elective aortic surgery improves outcome in ATAAD management is yet to be determined. One interesting observation from the study is that the outcome is comparable as long as there is a HVAS on the team, regardless if the HVAS was the primary surgeon or assistant. This has important implications in resident/fellow training, in that it would be justifiable for surgeon-in-training to take up the primary operator role under the guidance of the HVAS, without compromising outcome in these high-risk patients. Lastly, extrapolating on experiences in acute aortic dissection, the need for dedicated thoracic aortic team for complex elective aortic surgery involving prolonged hypothermic circulatory arrest, multiple arch vessel reconstruction, and descending thoracic aortic intervention, also needs to be further studied.

As more studies establish links between volume and outcome in specialized cardiac surgical cases, the broader notion of what constitutes adequate training and experience for a general cardiac surgeon will continue to be challenged. The next generation of cardiac surgeons will need to rise to this challenge to deliver safe, effective, and innovative care to our patients. A strong mentorship between senior surgeons and junior staff as well as senior residents or fellows are critical. For centers with dedicated aortic dissection call team, it is important to involve senior trainees in pre-operative planning as well as participation/assistance in the surgery. In centers without a dedicated dissection team, senior surgeons or surgeons with specialized aortic training should be available to provide assistance to junior surgeons. As outlined in the study, the experienced HVAS does not necessarily require to be the primary surgeon to achieve satisfactory outcome, as long as they are present to provide guidance in key elements of the surgery. In addition, a strong quality improvement program is required to review individual cases at rounds, which would provide a

learning experience for surgeons and trainees that were not directly involved.

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