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The Impact of Dedicated Aortic Teams and Centralisation of Aortic Services, and Surgeon or Centre Specific Volumes on Outcomes of Acute Type A Aortic Dissection



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Introduction

Acute Type A aortic dissection (ATAAD) is a surgical emergency with a high expected mortality and morbidity particularly if not managed operatively within the first 24 hours [1,2]. The gold standard treatment for aortic dissection remains open surgical repair [3] and although the mortality rates can be as high as 90%, 75% - 90% long term survival rates can be achieved if treatment is immediately constituted in the form of open surgical repair [4]. Survival in patients with ATAAD is however variable with multifactorial predictors and determinants. Reports from the International Registry of Acute Aortic Dissection (IRAD) and the Society for Cardiothoracic Surgery in Great Britain and Ireland have reported operative mortality rates of 25.1% and 22.8% respectively [5,6]. In contrast, the German registry for Acute Aortic Dissection Type A (GERAADA) has reported lower mortality rates (17%) [7] and even lower motility figures of less than 10% being published by several single-centre studies [8-10]. In this short review we aim the impact of dedicated aortic teams, and surgeon or centre specific volumes on outcomes of acute type A aortic dissection.

Individual surgeon and centre volume - high versus low volume

In a multi-centre national observational database study examining the surgeon volume-outcome relationship, Bashir et al. [3] evaluated data from 1550 patients who underwent ATAAD repair by 249 individual consultant surgeons across United

Kingdom (UK) between 2007 and 2013. Although overall operative mortality was 18.3%, on multivariate analysis operating surgeons with a mean annual volume of 4 cases or less exhibited higher operative mortality rates than those with higher mean annual volumes (19.3% vs 12.6% respectively, p=0.015). Furthermore, in two separate large North-American studies undertaken by Chikwe et al. [11] and Kinpp et al. [12], outcomes of 5184 and 3013 patients with acute aortic dissections, respectively, were analysed. Both studies evaluated the effects of centre volumes on operative mortality but Chikwe and colleagues however have also assessed the impact of individual surgeon volume on outcomes and overall performance. Chikwe et al. [11] reported that surgeons with an average of less than 1 aortic dissection repair annually had a mean operative mortality of 27.5%, compared with 17.0% for those performing 5 or more such procedures annually (odds ratio 1.78; 95% confidence interval 1.39 to 2.29; p < 0.001). A similar inverse relationship was seen between institution volume and operative mortality with higher mortality rates (27.4% versus 16.4%; p < 0.001) in low volume institutions (3 or fewer acute aortic dissection repairs per year) than high volume centres (13 or more aortic dissection annually). Despite disagreements in what defines low, medium or high-volume surgery, there was consensus in both studies on the effect of centre volume on mortality with high volume centres reporting lower mortality rates than their lower volume counterparts. Annual operative volume was inversely proportional with mortality.

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Similarly, in a systematic review of 79,131 patients by Mariscalclo and colleagues [13], high-volume centres or individual surgeons had lower mortality rates (OR 0.51; 95% CI 0.46-0.56, and OR 0.41, 95% CI 0.25-0.66, respectively). All these findings were also corroborated by several studies supporting the idea that ATAAD should be managed by high volume centres and high-volume operating surgeons [14-16].

Dedicated aortic teams - does it impact the outcome?

Although It is clear from published literature that patients with ATAAD have better outcomes if treated in high volume centres by high-volume surgeons [3,10-16]. However, the impact of establishing dedicated teams for aortic surgery on the perioperative outcomes is less well studied [17].

In a large study by Andersen et al. [18], outcomes of 128 patients undergoing surgery before (56 patients) and after (72 patients) the introduction of a multidisciplinary Thoracic Aortic Surgery Program (TASP) with a dedicated aortic team were analysed. Reported operative mortality rates significantly improved from 33.9% to 2.8%. These results were further supported by a recent systematic review of observational studies [13] concluding that centres with specific multidisciplinary aortic programmes and dedicated on-call aortic teams showed a significant reduction in mortality following surgery for acute aortic syndrome (OR 0.31; 95% CI 0.19–0.5, and OR 0.37; 95% CI 0.15-0.87, respectively).

Several other studies have taken further steps and have reported on the impact of a dedicated on- call aortic team and multidisciplinary meeting that resulted in improved perioperative outcomes, especially lower mortality rates [19-21]. Among those studies, Lenos et al. [19] reported a lower mortality rate in centres with a TASP (4% vs 21.8%, p<0.001), and similarly Beller and associates [20] report improved mortality (9.7% vs 30.8%, P=0.014) in their single centre following introduction of multidisciplinary aortic surgery team and standardised management protocols for ATAAD patients. Moreover, in a study evaluating outcomes of general thoracic aortic surgery, Sales et al. [21] reported a total reduction in all-cause operative mortality (9.7% vs 22.9%, p=0.008) after introduction of the Centre of Aortic Surgery highlighting its importance of dedicated aortic teams in achieving better outcomes.

With regionalisation and centralisation of subspecialist services such as aortic surgery, it is evident that this there are several advantages, including the positive volume-outcome effect and concentration of resources. In contrast however, it is also important to note that centralisation is almost invariably associated with reduced access to subspecialist services and any such steps must be accompanied with an analysis of the regional geography, population and needs.

Conclusion

Published literature surrounding the impact of centralisation of aortic services (with dedicated on-call and aortic

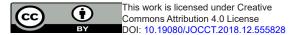
multidisciplinary teams) including the management patients with type A aortic dissection is growing with increasing supportive evidence to suggest improved mortality and morbidity. Surgeon and institutional case volume were independently associated with improved outcomes after aortic dissection repair.

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