Type A Aortic Dissection in the United Kingdom: The Untold Facts

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There is a lack of evidence on multiple levels for appropriate recognition, management, and outcome results in Type A aortic dissection management in the United Kingdom. A huge amount of retrospective data exists in the literature which provides nonmeaningful prospect to a service that meets the current era. Electronic searches were performed on PubMed and Cochrane databases with no limits placed on dates. Search terms were charted to MeSH terms and combined using Boolean operations, and also used as key words. Papers were selected on the basis of title and abstract. The reference lists of selected papers were reviewed to identify any relevant papers that might be suitable for inclusion in the study. Papers were selected based on providing primary end points of death, rupture, or dissection and/or information regarding aortic aneurysm growth. Papers were not excluded based on patient population age. We demonstrated the lack of evidence for quality outcomes in type A aortic dissection in the United Kingdom. This highlighted the unwarranted variation seen in this entity and the caveats needed to improve structuring of type A aortic dissection from early identification in emergency departments to arrival at destination site for optimum intervention. Emergency services should be restructured to meet the immediate affirmation of diagnosis with gold standard imaging modality available. Management of this dire disease should be instituted at local hospitals prior to transportation and results should be audited regularly to improve quality outcomes. Attempts should be made to create local area networks to improve the efficiencies and outcomes of the service and transfer to centers with concentration of expertise. Recognition of regional networks by the UK Government Care Quality Commission should in part based on cumulative evidence sought after from virtual multidisciplinary teams. Unwarranted variation is an avenue that requires to be addressed to rise with service provision that meets our patients aspiration and be of current evidence in the 21st era.

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Central Message

Despite centralization of services for the management of acute type A aortic dissection, there is room for improvement of the optimum outcomes through the establishment of the regional network to early recognize such critical pathology and have virtual MDT to decide on best management option on a case-by-case base.

Perspective Statement

Centralization of services for type A aortic dissection into specialist and regional centers have improved the outcomes in the United Kingdom, but yet it is at its infancy and further improvement is required at the first step of presentation and provision of standardized services at national level.

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INTRODUCTION

In the United Kingdom, thoracic aortic dissection outcome reporting remains elusive. Population-based studies are limited, thus, epidemiological analysis highlighting data on risk factors, incidence, and outcomes are largely biased by observational reporting and retrospective single-center experience.

Raw data indicate that there has been a steady rise in admissions for thoracic aortic dissection across the United Kingdom from 7.2 to 8.8 per 100,000 population over the last decade,[1] while admissions for thoracic aortic aneurysms have increased from 4.4 to 9.0

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per 100,000.[2] It is unclear how many of those with thoracic aortic aneurysm sustained an acute aortic syndrome. However, Hospital Episode Statistics is frequently used to get an indication of activity within the National Health Service. In addition to this, the national statistics service gives an indication of mortality. Those databases are not without their own limitations and confounding biases. Currently, thoracic aortic dissection treatment is performed by cardiac surgeons, vascular surgeons, interventional radiologists, and cardiologists with clinical interest in aortovascular disease. Hence, there is no single regulatory body and no single registry that houses data on this dire disease. Some data are being stored by the Society for Cardiothoracic Surgery, the Vascular Society, and Commercial Companies including the UK Registry for Thoracic Stent Grafts, rendering data validation for cardinal features and quality outcomes inaccurate due to database bias.

Aortic subspecialization in the United Kingdom is a new trend followed by the many and practiced by the few. This subspecialization is very much governed by the relative volume of the surgeon and over the entire specific unit.[3] In addition, it is very much linked to available resources, a range of structural and policy changes. Hence, generalization of subspecialization across the NHS has not been assessed. In an attempt to improve outcomes, few hospitals have developed their own perspective of specialized service serving their population cohort. This was centered on service provision for elective and nonelective work. For the nonelective part, we previously demonstrated the improved outcomes following the implementation of 24 hours on-call rota.[4] However, the impact of subspecialization on national level, its clinical, and cost effectiveness of thoracic aortic surgery remains a moving target.

Centralization of the aortic dissection and rerouting of presenting cases is not without its limitations and disadvantages. This to an effect may underestimate incidence and case fatality by incomplete inclusion of deaths prior to hospital admission, which might also bias assessment of risk factors, predictors of outcome, and surgeons and hospital outcome. This may also impact the emergency services by creating unnecessary delay in diagnosis, transportation, and effective intervention. The net results of which have not been assessed in the United Kingdom per se.

In this perspective, we wish to draw a 30,000 feet overview of aortic dissection service configuration and provision. We demonstrate the factual effect of this in specialized world and its effect on emergency services setting and the impact on patient outcomes.

RISK PROFILING AND ASSESSMENT

In an era of precision medicine and healthcare, risk profiling of patients who are potentially at hazard of developing thoracic aortic dissection is virtually nonexistent in the United Kingdom. Different surgeons give different understanding to risk profiling, while some consider it as a chance of loss, others see it as an element of uncertainty.

It is crucial to risk profile patients who are known of having an existing aortic aneurysm and are at risk of acute dissection. Surveillance data on this group are scarce and have not been published. Patients' categorization, genotyping, and phenotyping analysis is of paramount for nonsyndromic group. Investment in their disease's natural history and preventative measures are imperative especially evidence exist to suggest that patients with specific genetic mutations require earlier interventions at smaller aortic sizes.[5] For instance, Dr Diana Milewicz has shown that patients with certain specific genetic abnormalities have a different natural history course of thoracic aortic disease.[6]

Such crucial information is the building block of any epidemiological assessment that will assist in identifying this disease and be at the foremost risk assessment and modification. On the contrary, many centers in the United Kingdom are bound to historical assessment which is centered on the very controversial element of size of an aneurysm and growth rate.

In an attempt to diversify the norm, Oxford Vascular Study (OXVASC) study highlighted event rates, incidence, risk factors, early case fatality, and long-term outcome of all acute aortic events occurring in a population of 92,728 in Oxfordshire, United Kingdom, between 2002 and 2012.[1] They developed predictions of incidence of acute aortic dissection over the next 40 years. They reported that the incidence of acute aortic dissection is approximately half that of ruptured/symptomatic aortic aneurysms which surely represents a significant clinical burden. Taking this into perspective, and adding this to the increase in aging population who readily present with complex and multiple comorbidities, there is a posing challenge for aortic surgeons to tackle this.

The surge of endovascular aortic interventions and the provision of acceptable midterm results, aortic surgeons in the United Kingdom will need to account for this change and contingency planning should be mandated.

AWARENESS OF TYPE A AORTIC DISSECTION ON THE EMERGENCY SHOP FLOOR

Being able to recognize this dire disease in the busy department of Emergency Medicine remains one of the main challenges out there. Because of its nonfrequent presentation, type A aortic dissection can be missed and might be labeled as acute coronary syndrome. Moreover, the absence of aortovascular disease-related biomarkers and the wide availability of gold standard aortic imaging modalities across the National Health Service with centralization of those modalities to tertiary centers, type A aortic dissection remains faceless. Hence, majority of aortic dissection patients inevitably get marinated with antiplatelets and anticoagulation medications. Compounding this is the significant delays in patient diagnosis and transportation. The precise clinical and diagnostic factors that contribute to these delays are unknown.

The IRAD registry documented delays between symptom onset and diagnosis are related lack of pain, female sex, and abdominal pain. However, prior data from tertiary referral centers suggested that in patients with proven aortic dissections, a diagnosis other than dissection was first considered in more than one-third of the cases.[7] Unfortunately, aortic dissection

was not discovered until postmortem examination in nearly one-third of cases.[8]

In the United Kingdom, recognition of type A aortic dissection, establishment of diagnosis, suitable resources and available imaging modality, transportation, and arrival at tertiary centers with delays in operating times from initial arrival onset, expertise of the operator, and the infrastructure available derived from service specification for dealing with aortic dissections are all areas that remain elusive and unproven. The educational efforts put in place to improve awareness, recognition, and diagnosis although maybe relevant are not enough, particularly in nontertiary hospitals with low exposure to aortic emergencies.

Solutions would be:

1) To develop a national registry that is designed to measure clinician awareness of dissection and quantify service level provisions and quality improvements. A systematic approach to the diagnosis and management of aortic dissection will likely reduce avoidable delays. This should include development of networks not only at hospital level but also on regional level with aortic surgeons with highest volume and acceptable outcomes to participate in this framework.
2) The other valuable initiative for expediting diagnosis and for initiation of clinical protocols would be to train and equip paramedics with the skills and aortic echocardiography to identify localized dissection flap in susceptible patients. This would then trigger a fast response team at local hospitals who would receive this patient and channel efforts to appropriate imaging for definitive diagnosis and initial management. This initiative should mirror the already established rapid chest pain response and PCI pathways in the United Kingdom.

VOLUME-OUTCOME RELATIONSHIP PARADOX

In undertaking any activity, the greater the level of experience/practice that any individual has access to, the better the performance and outcomes. The volume-outcome relationship is a longitudinal process where an increase in the volume of a particular procedure performed by a surgeon is anticipated to lead to improved patient outcomes (mortality, hospital length of stay, and survival).[3]

So what really defines an aortic surgeon? Is it the number of cases performed with reported viable outcomes or is it the number of cases plus the availability of resources, robust referral system, centralized team and 24-hour rota to deal with incoming emergencies?

In our recently published work,[3] we reviewed the outcomes of 1632 patients diagnosed with type A aortic dissection in the United Kingdom and reported that significant improvements of in-hospital mortality can be observed beyond a surgeon with mean annual case volume (MAV) of 4.0−4.5. More specifically, the unadjusted in-hospital mortality rate decreased from 19.3% in the group of surgeons who had an MAV. However, Preventza[9] reported that the minimum number of cases that individual cardiac surgeons need to perform to significantly reduce the mortality associated with emergency aortic operations probably depends on their cumulative aortic experience. This raises further question; do low-volume surgeons at high-volume institutions have the benefit to treat more stable patients, who have been transferred from outside institutions, whereas low-volume surgeons at low-volume institutions treat sicker and less stable patients? Are high-volume surgeons' outcomes the same at high- and low-volume hospitals?

How all this is related to quality cost and resources use? The resource utilization brings 2 contradictory facts that can potentially affect hospital increment costs. If concentration of expertise in a subspecialized hospital reduces in-hospital mortality, the average length of stay could easily increase, since a patient who dies in hospital has their stay curtailed while a patient who is sent home does so only when they have a sufficient recovery in hospital. On the other hand, higher quality surgery and a reduction in adverse events could mean that patients recover more quickly and avoid the very long ICU and ward stays that result from complications. The same is also true for the costs of the surgeries themselves; a successful surgery may take longer than one in which the patient dies before it is completed, but a more experienced surgeon may complete the surgery with fewer complications and in less time than one who is less skilled.

The timing and the expediency of surgery are other factors that we ought to consider. Andersen et al[10] noted that since their multidisciplinary thoracic aortic surgery program was implemented, the proportion of cases initiated at night decreased from 48% to 29% and the number of emergent cases decreased from 89% to 75%. In most of the aortic centers, the trend is to defer surgery until daylight hours in stable patients who present more than 48 hours after symptom onset, given the low rate of rupture or acute decompression in these patients. This strategy is associated with many advantages, including performance of a thorough preoperative evaluation as well as embarking upon these challenging cases with the most qualified ancillary team members and without the undue effects of sleep deprivation on the members of the team. However, how is this played in a context of regional variation in outcomes and what are the repercussions on the emergency services? This is imperative and will need to be explored and identified in the United Kingdom among the tertiary centers.

IS GIRFT A GIFT?

Getting It Right First Time (GIRFT) is a national program put together to improve medical care provision within the national service by reducing unwarranted variations. It is aimed at improving efficiencies to reduce unnecessary procedures and cost savings.

Bottle et al[11] demonstrated the unwarranted variation in the quality of care for patients with diseases of the thoracic aorta. The authors derived data from the Hospital Episode Statistics (HES) and the National Adult Cardiac Surgery Audit (NACSA). A total of 24,548 adult patients in the HES study, 8058 in the NACSA study, and 103,543 from a total of 33 studies in the systematic review were obtained. They highlighted that

regional cardiac units with higher case volumes treated more complex patients and had significantly lower risk–adjusted mortality relative to low-volume units. However, the results of their systematic review indicated that the delivery of care by multidisciplinary teams (MDTs) in high-volume units resulted in better outcomes. The observational analyses and the online survey indicated that this is not how services are configured in most units in England. This paradox led the investigator to conclude that changes in the organization of services that address unwarranted variation in the provision of care for patients with thoracic aortic disease in England may result in more equitable access to treatment and improved outcomes.

However, when we compare this to the illustrated results seen in the GIRFT's document on cardiothoracic surgery in the United Kingdom,[12] what strikes us most is that aortic surgery per se is only mentioned with the least conclusive evidence and with no meaningful output to the efforts for improving efficiencies, reducing unnecessary procedures and ameliorating cost savings in this rather expensive surgery.

Compounding this is that national health tariff do not capture or reflect the complexity of the specialist aortic surgery (or the pre- and postoperative care), where often multiple surgical procedures occur within one single case/episode. There is however a significant financial risk associated with delivery of this service and that relates to the national tariff reimbursing this activity, in that the tariff are not adequately supporting the current range of surgical procedures involved in aortic surgery.

Traditional financial information and management techniques were not providing enough information to effectively understand and manage the behavioral pattern of costs and quality cost drivers. There is, however, a significant financial risk associated with delivery of this service on type A aortic dissection and that relates to the national tariff reimbursing this activity. This was not mentioned in the core document of GIRFT and remains a moving target.

CAN A MDT MEETING HELP?

The lack of group consensus for any presenting case of aortic dissection due to its emergent nature exposes this surgery to the biases of the operator. There is no stringent evidence for quality decision-making for aortic dissection from centers in the United Kingdom. In an era where majority of aortic dissection practices and given the dynamic and often unpredictable natural history of these conditions, there requires a strong element of multidisciplinary experience. The expertise should include equally advocate open surgery and endovascularist. This will help ameliorate the confounding bias and monotonous clinical decision-making. The extent of the dissection and multiple entry tears notably needs exploring for the most appropriate intervention to be implemented. This surely would need to be made in selected patients where no pending life-threatening element looming and a capacity for monitoring end-organ perfusion, repeat scanning, and multimodality therapy to achieve a successful outcome should be in place which will allow time to be given for such discussion away from odd hours.

CONCLUSION

Centralization of type A aortic dissection services to a few centers across the United Kingdom is not without its disadvantages. The lack of evidence for such an initiative remains a luxury that we cannot afford. Uncomplicated type A aortic dissection should ideally be discussed among a robust MDT for optimum outcome. Emergency services should be restructured to meet the immediate affirmation of diagnosis with gold standard imaging modality available. Management of this dire disease should be instituted at local hospitals prior to transportation and results should be audited regularly to improve quality outcomes. Attempts should be made to create local area networks to improve the efficiencies and outcomes of the service and transfer to centers with concentration of expertise. Recognition of regional networks by the UK Government Care Quality Commission should in part based on cumulative evidence sought after from virtual MDTs. Unwarranted variation is an avenue that requires to be addressed to rise with service provision that meets our patients aspiration and be of current evidence in 21st era.

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