Aortic dissection—a contemporary revisit of an autopsy series

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The paper in this issue of the journal[1] investigates the characteristics of patients with aortic dissection in the Jesse E. Edwards Registry of Cardiovascular Disease. The Jesse E. Edwards Registry of Cardiovascular Disease is a repository/collection of autopsy and surgical samples contributed to by both domestic and international institutions, medical examiners, device companies, and organ procurement facilities.[2] Most cardiovascular (CV) diseases, including congenital and rare diseases, are included in addition to sudden cardiac death samples as referred by coroners and medical examiners, thus making this a very unique collection. More than 30,000 cardiac specimens have been currently catalogued, making it one of the largest comprehensive and active collections currently available. The present paper provides an analysis of aortic dissection patient samples.

The authors investigated clinical and pathological characteristics of 338 patients with aortic dissection over a period of 60 years split for those between 1956-1992 (early cohort, 166 cases) and 1993-2015 (current cohort, 170 cases). Cases with types A or B dissection did not differ with respect to age or gender.

As the authors mention, autopsy series of aortic dissection were common when surgical treatment of the condition was still in pioneering stages 60 years ago, but recent autopsy-based studies have been less frequent likely because of the dropping autopsy rate.[3-5] Current information on aortic dissection has been provided in large by clinical registries and studies such as the International Registry of Acute Aortic Dissection.[6] It is therefore of interest to revisit an autopsy series in this contemporary era of management of aortic dissection to understand where we stand now, how far we have come, and what questions still remain.

Autopsy- and surgical pathology–based registries of disease are not reflective of the typical clinically presenting cohort of the disease of interest; however, autopsy-based cohorts provide valuable insight into patients that present with sudden cardiac death. Aortic dissection has been reported to be the second most frequent cause of sudden CV death (most common is ischemic heart disease) as investigated by medical examiners.[7,8] A striking finding of the present study was that aortic dissection was not detected clinically and first identified at autopsy in >60% of cases under medical care at time of death. Subjects were defined as being under medical care if they were in the hospital or had visited a clinic or hospital with symptoms and documentation of being evaluated by a medical provider prior to their demise (including those sent home from medical facility). As this frequency was similar between the early and current cohorts, this might suggest that there has not been vast improvement for prevention/identification of aortic dissection before death even if under medical care in recent times.

Of the 162 cases known to be under medical care at time of death, 114 had data available regarding diagnostic testing performed prior to death, with primary modalities used in the early cohort being electrocardiogram, chest radiograph, and invasive aortography (22%) and with more often computed tomography (50%) and echocardiography (39%) being used in the current cohort. Although noninvasive diagnostic techniques have become increasingly used, the data suggest that imaging is still underused at the time of medical presentation. From a clinical standpoint, the fact that many aortic dissections remain unrecognized at time of death tells us that we still need to increase awareness and heighten suspicion of aortic dissection in patients presenting with symptoms or risk factors of physical findings.

The most common preexisting conditions for aortic dissection included hypertension and prior CV surgery as well as bicuspid aortic valve. Presence of left ventricular hypertrophy as a sequela of persistent hypertension was used as an index of underlying hypertension and seen in 84% of patients, and this percentage was similar to both types A and B lesions. This might suggest that underlying hypertension is still underrecognized and remains an issue that can be better addressed. Prior CV surgery and bicuspid aortic valve were also commonly seen and also did not change significantly over the study time interval (regardless of the early or current cohorts). More than one-third of this series had a history of prior CV surgery, which is much higher than the 18% in the clinical International Registry of Acute Aortic Dissection database[6] and may reflect a referral basis of this autopsy registry. Many included those

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with aortic surgery but also those including or with standalone AVR.

Pathologically, an intimal tear, the inciting event in aortic dissection, was present in every case and found in the ascending aorta in the majority of cases (68%) of patients.

Rupture was the most common cause of death. Contemporary variants of aortic dissection such as intramural hematoma[9] were not fully recorded in this series and await further clarification in the future.

Of interest was documentation of activity at time of death. Of the 60 cases that had relevant data regarding activity at time of onset of AD, 10 patients (17%) were sleeping, 25 patients (46%) were engaging in minimal activity (driving, watching TV, eating dinner, etc), and 20 patients (33%) were engaging in strenuous activity (shoveling snow, lifting heavy objects, sexual intercourse), with 5 patients demonstrating emotional/mental strain as a possible precipitating factor. Exertional activity was not necessarily the "triggering" factor for onset of aortic dissection, being only seen in one-third of patients.

Another finding of interest was that healed dissections were found in 7% of cases (n = 25; 20 type A, 5 type B), each of whom was not recognized clinically and died from non–AD-related causes (eg, intracerebral hemorrhage, subdural hematoma, myocardial infarction, rejection of orthotropic heart transplant, and septic shock). Subclinical "natural survivors" of aortic dissection are few but not necessarily "rare" at 7%.

Endovascular stent treatment for type B lesions, a treatment that is increasingly being used, was not seen in the current series.

In all, the present paper provides an autopsy-based viewpoint to aortic dissection that is insightful for clinicians. There are lessons to be learned. One being that, despite recent advances in noninvasive diagnostic tests and newer treatment approaches, 60% of patients under medical care at time of death were identified at time of autopsy and that this percentage remained constant regardless of the timing of the cohort being early or current. Imaging investigations such as computed tomography and echocardiography seem to be underused, with less than half of patients having had an investigation prior to death. Aortic dissection remains a challenge for the clinician to diagnose given often obscure signs and symptoms. Nevertheless, this paper provides a wake-up call that, despite these contemporary advances in diagnosis and treatment, clinical acumen and suspicion of acute aortic dissection still remain the mainstay for initial clinical recognition of the disease. Misdiagnosis of aortic dissection can be a medicolegal matter,[10] and therefore, educational awareness toward identifying and recognizing aortic dissection is an issue that needs to be better addressed moving forward. Patients with prior aortic/CV surgery and aortic valve replacement in addition to bicuspid aortic valve are at risk of aortic dissection as well as patients with hypertension, and therefore, clinicians should remain vigilant of risk of dissection in patients with underlying risk (ie, suspect aortic dissection in such patients presenting with chest pain and consider use of the Aortic Dissection Detection Risk Score as adopted by both the American and European guidelines).[11,12]

References

1. Paper of interest in the issue.
2. https://www.allinahealth.org/united-hospital/services/jesse-e-edwards-registry-of-cardiovascular-disease/.
3. Roberts WC, Vowels TJ, Ko JM, et al. Acute aortic dissection with tear in ascending aorta not diagnosed until necropsy or operation (for another condition) and comparison to similar cases receiving proper operative therapy. Am J Cardiol 2012;110:728-35.
4. Spittell PC, Spittell Jr JA, Joyce JW, et al. Clinical features and differential diagnosis of aortic dissection: experience with 236 cases (1980 through 1990). Mayo Clin Proc 1993;68:642-51.
5. Hoyert DL. The changing profile of autopsied deaths in the United States, 1972–2007. NCHS Data Brief 2011;67:1-8.
6. Hagan PG, Nienaber CA, Isselbacher EM, et al. The International Registry of Acute Aortic Dissection (IRAD): new insights into an old disease. JAMA 2000;283:897-903.
7. Murai T, Baba M, Ro A, et al. Sudden death due to cardiovascular disorders: a review of the studies on the medico-legal cases in Tokyo. Keio J Med 2001;50:175-81.
8. Ding Z, Yang M, Wang Y, et al. Retrospective analysis of 769 cases of sudden cardiac death from 2006 to 2015: a forensic experience in China. Forensic Sci Med Pathol 2017;13:336-41.
9. Harris KM, Braverman AC, Eagle KA, et al. Acute aortic intramural hematoma: an analysis from the International Registry of Acute Aortic Dissection. Circulation 2012;126:S91-6.
10. Elefteriades JA. Editorial comment: legal liability in atypical aortic dissection. Cardiol Clin 2010;28:253-4.
11. Hiratzka LF, Bakris GL, Beckman JA, et al. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with thoracic aortic disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. Circulation 2010;121:e266-369.
12. Erbel R, Aboyans V, Boileau C, et al. 2014 ESC guidelines on the diagnosis and treatment of aortic diseases: document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). Eur Heart J 2014;35:2873-926.