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Presentation, Diagnosis, and Outcomes of Acute Aortic Dissection

17-Year Trends From the International Registry of Acute Aortic Dissection

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ABSTRACT

BACKGROUND Diagnosis, treatment, and outcomes of acute aortic dissection (AAS) are changing.

OBJECTIVES This study examined 17-year trends in the presentation, diagnosis, and hospital outcomes of AAD from the International Registry of Acute Aortic Dissection (IRAD).

METHODS Data from 4,428 patients enrolled at 28 IRAD centers between December 26, 1995, and February 6, 2013, were analyzed. Patients were divided according to enrollment date into 6 equal groups and by AAD type: A (n = 2,952) or B (n = 1,476).

RESULTS There was no change in the presenting complaints of severe or worst-ever pain for type A and type B AAD (93% and 94%, respectively), nor in the incidence of chest pain (83% and 71%, respectively). Use of computed tomography (CT) for diagnosis of type A increased from 46% to 73% ($p < 0.001$). Surgical management for type A increased from 79% to 90% ($p < 0.001$). Endovascular management of type B increased from 7% to 31% ($p < 0.001$). Type A in-hospital mortality decreased significantly (31% to 22%; $p < 0.001$), as surgical mortality (25% to 18%; $p = 0.003$). There was no significant trend in in-hospital mortality in type B (from 12% to 14%).

CONCLUSIONS Presenting symptoms and physical findings of AAD have not changed significantly. Use of chest CT increased for type A. More patients in both groups were managed with interventional procedures: surgery in type A and endovascular therapy in type B. A significant decrease in overall in-hospital mortality was seen for type A but not for type B. (J Am Coll Cardiol 2015;66:350–8) © 2015 by the American College of Cardiology Foundation.

Much has been written about the challenges of diagnosing and treating acute aortic dissection (AAD) and the lethal consequences of failing to do so (1). The often cited historical account of George II's death in 1760 vividly describes the symptoms and catastrophic, fatal course of AAD (2). In recent years, media reports of the deaths of a number of celebrities from unrecognized AAD

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have increased the public's awareness of what remains a very dangerous and unpredictable condition (3,4). Over the past 2 decades, the exciting discovery of genetic mechanisms underlying thoracic aortic disease has begun to affect medical treatment (5,6). Greater availability and increased use of advanced imaging modalities, particularly computed tomography (CT), have the potential to improve the diagnosis of AAD (7,8). Improvement in surgical and anesthetic techniques have led to improved survival of patients with type A dissection, whereas the expanded use of endovascular interventions is having a growing effect on management of type B dissection (9,10).

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AAD usually results from a tear in the aortic intima, which allows a pressurized hematoma to form within the media between the inner two-thirds and outer one-third of the aorta. The blood typically propagates rapidly along the length of the aorta and often compromises branch vessels along its path and/or disrupts aortic valve function, which causes aortic insufficiency. Because the blood in the false lumen is contained by only the thin outer third of the media and the loose adventitial connective tissue, rupture into the pericardial space, pleural space, or mediastinum is common. Thus, AAD represents a medical and/or surgical emergency.

Although severe, abrupt onset, chest or back pain is widely known as the classic presentation of AAD, a significant minority of AADs are not diagnosed in life (11–14). Because autopsies are infrequently performed in the current era, the frequency of missed diagnoses of AAD is unknown (14). Many patients with AAD are diagnosed and treated as having acute coronary syndrome, which is a much more frequent condition than AAD. Patients who present without pain present a diagnostic challenge and are more likely to have a missed or delayed diagnosis (13–16). Advanced imaging, especially CT, has been employed with increasing frequency in emergency departments for the "triple rule out," but whether this practice has improved the diagnosis of AAD is unknown (17). Surgical treatment is indicated for all type A AADs, and medical management is used for uncomplicated type B AAD; however, long-term outcomes indicate significant late mortality from late complications in both groups (18). These complications, especially those that involve the descending thoracic aorta of type B AAD or operated type A patients with persistent false lumens, are increasingly being managed by endovascular techniques (19–21).

The International Registry of Acute Aortic Dissection (IRAD) was established in 1996 for the purpose of enrolling patients at major aortic centers to assess the presentation, management, and outcomes of AAD (22). IRAD, which includes 28 international referral centers, is a unique registry that currently allows examination of trends in patient presentation, use of advanced imaging (CT, transesophageal echocardiography [TEE], and magnetic resonance [MR]), management, and hospital outcomes over 17 years of prospective data collection.

ABBREVIATIONS AND ACRONYMS

AAD = acute aortic dissection
CT = computed tomography
MR = magnetic resonance
TEE = transesophageal echocardiography

METHODS

PATIENT SELECTION. Twenty-eight referral centers throughout North America, Europe, and Asia participated in this study. Data were collected on an unselected population of all 4,428 IRAD patients who presented with AAD from January 1996 through February 2013. Patients included in the study were identified at hospital presentation, on the basis of hospital imaging or surgical databases and/or by searching hospital diagnosis records. The diagnosis of AAD was based on patient history, diagnostic testing (including imaging results), operative findings, and/or autopsy results. Institutional Review Board approval for this study was obtained at each participating institution.

Data on patient demographic characteristics, presenting history, physical examination, imaging studies, management, and hospital outcomes were collected by each of the 28 IRAD referral centers and entered into case report forms developed by IRAD investigators; these forms include 290 variables. Case report forms were collected and reviewed by the IRAD Coordinating Center at the University of Michigan.

Patients identified as having either type A ($n = 2,952$) or type B AAD ($n = 1,476$) were divided into 6 equal groups based on 6 roughly equal time spans in chronological order over the 17-year period. Group data were analyzed for historical trends in demographic characteristics, presentation, evaluation, management, and hospital outcomes.

STATISTICAL ANALYSIS. Categorical variables were compared using 2-sided chi-square analysis or Fisher's exact test where appropriate. Linear-by-linear association was used to evaluate linear trends across time groups. Differences among patient groups stratified by time periods for continuous variables were determined utilizing 1-way analysis of variance. A p value of ≤ 0.05 was considered statistically significant. SPSS (version 20.0, IBM Corp., Armonk, New York) was used for all analyses.