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Acute Type A Aortic Dissection in the Elderly: Clinical Characteristics, Management, and Outcomes in the Current Era

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OBJECTIVES We sought to evaluate the clinical characteristics, management, and outcomes of elderly patients with acute type A aortic dissection.

BACKGROUND Few data exist on the clinical manifestations and outcomes of acute type A aortic dissection in an elderly patient cohort.

METHODS We categorized 550 patients with type A aortic dissection enrolled in the International Registry of Acute Aortic Dissection into two age strata (<70 and ≥70 years) and compared their clinical features, management, and in-hospital events.

RESULTS Thirty-two percent of patients with type A dissection were aged ≥70 years. Marfan syndrome was exclusively associated with dissection in the young, whereas hypertension, atherosclerosis and iatrogenic dissection predominated in older patients. Typical symptoms (abrupt onset of chest or back pain) and signs (aortic regurgitation murmur or pulse deficits) of dissection were less common among the elderly. Fewer elderly patients were managed surgically than younger patients (64% vs. 86%, $p < 0.0001$). Hypotension occurred more frequently (46% vs. 32%, $p = 0.002$) and focal neurologic deficits less frequently (18% vs. 26%, $p = 0.04$) among the elderly. In-hospital mortality was higher among older patients (43% vs. 28%, $p = 0.0006$). Logistic regression analysis identified age ≥70 years as an independent predictor of hospital death for acute type A aortic dissection (odds ratio 1.7, 95% confidence interval 1.1–2.8; $p = 0.03$).

CONCLUSIONS Our study shows significant differences between older (age ≥70 years) and younger (age <70 years) patients with acute type A aortic dissection in their clinical characteristics, management, and hospital outcomes. Future research should evaluate strategies to improve outcomes in this high-risk elderly cohort. (J Am Coll Cardiol 2002;40:685–92) © 2002 by the American College of Cardiology Foundation

Cardiovascular diseases are the most common cause of morbidity and mortality among the rapidly increasing population of elderly patients (1,2). Although many studies have evaluated elderly patients with coronary (3–5) and valvular heart disease (6,7), there are no studies to date that have addressed the clinical characteristics, management, and outcomes in a large cohort of elderly patients with acute type A aortic dissection. The International Registry of Aortic Dissection (IRAD) provides a unique opportunity to examine a relatively large number of patients with aortic dissection (8). We utilized the registry to evaluate the differences in the clinical presentation, management, and hospital outcomes between patients with acute type A aortic dissection who were <70 years of age and those ≥70 years. We anticipated that this analysis would provide further insights into the distinguishing features of aortic dissection among elderly patients.

METHODS

Patient selection. We analyzed all patients with acute type A aortic dissection enrolled in IRAD from January 1, 1996, to December 31, 1999. The institution and structure of IRAD have been described previously (8). Patients were identified prospectively at presentation or retrospectively by searching hospital discharge diagnosis records and surgical and echocardiographic databases. Diagnosis was based on history, imaging study, visualization at surgery, or postmortem examination. Acute type A dissection was defined as any dissection that involved the ascending aorta with pre-

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Abbreviations and Acronyms
IRAD = International Registry of Acute Aortic Dissection

sentation within 14 days of symptom onset (8). Patients were stratified by age <70 years and ≥70 years.

Data collection. Data were collected on a standard questionnaire developed by the IRAD investigators. Data collected included patient demographics, history, clinical presentation, physical findings, imaging study results, medical and surgical management, in-hospital clinical events, length of stay, and hospital mortality. Completed data entry forms were forwarded to the IRAD coordinating center at the University of Michigan. Data were scanned electronically into an access database.

Statistical analysis. Summary statistics of the two age groups were presented as frequencies and percentages, mean ± SD or as median and interquartile range. In all cases, missing data were not defaulted to negative and denominators reflect cases reported. Univariate associations among the age groups for nominal variables were compared using the Pearson chi-square test or two-sided Fisher exact test; the two-tailed Student *t* test was used for continuous variables. Iterative logistic regression modeling was performed to derive independent predictors of hospital mortality and to derive adjusted estimates for the odds ratios of in-hospital mortality for the younger versus the older patients using likelihood ratio tests. Initial modeling used variables marginally suggestive of unadjusted association to in-hospital death ($p < 0.20$). Variables were reviewed for clinical significance before testing. Diagnostic routines (Hosmer-Lemeshow test for lack of fit, change in deviance and likelihood ratio test) were used for the final model selection (9). SAS Version 8.2 (SAS Institute, Cary, North Carolina) was utilized for all analyses.

Results

Demographics and etiology of aortic dissection (Table 1). Patients 70 years of age and older made up 31.6% (174/550) of all acute type A aortic dissections. The number of patients in different age groups of the elderly were: 70 to 74 years = 69, 75 to 79 years = 70, 80 to 84 years = 23, and >85 years = 12. Men constituted 48.3% of the elderly, but 73.6% of the younger cohort. Transfer from outside hospitals to IRAD sites accounted for a similar proportion of patients in both groups. The proportion of patients aged ≥70 years was significantly greater among those treated at the U.S. sites.

Acute aortic dissection as a result of Marfan syndrome was seen only in the younger patient cohort. In contrast, hypertension, atherosclerosis, iatrogenic dissection (particularly following cardiac surgery), and dissection in an existing aortic aneurysm were more common in the elderly. Comorbidities such as history of diabetes and prior cardiac surgery were also more frequent in patients ≥70 years (Table 1).

Table 1. Demographics and Patient History for All Patients With Type A Aortic Dissection

Variable	Overall	Patients <70 years	Patients ≥70 years	p Value
N (%)	550	376 (68.4)	174 (31.6)	
Demographics				
Age-mean (±SD), yrs	61.8 (14.2)	54.9 (11.4)	76.8 (4.6)	NA
Gender-male (%)	360 (65.6)	276 (73.6)	84 (48.3)	< 0.0001
Transferred to IRAD sites (%)	372 (67.8)	260 (69.3)	112 (64.4)	0.25
Seen at IRAD sites in U.S. (%)	217 (39.5)	124 (33.0)	93 (53.5)	< 0.0001
Time from symptoms to presentation (h)	2.9 (16.1)	2.8 (12.4)	3.1 (22.1)	0.89
Etiology and history				
Marfan syndrome (%)	31 (5.8)	31 (8.5)	0 (0.0)	NA
Pregnancy (%)	1 (0.2)	1 (0.3)	0 (0.0)	NA
Cocaine abuse (%)	1 (0.2)	1 (0.3)	0 (0.0)	NA
Hypertension (%)	368 (69.2)	244 (66.7)	124 (74.7)	0.06
Atherosclerosis (%)	145 (27.1)	73 (19.7)	72 (43.4)	< 0.0001
Biscuspid aortic valve (%) (reported in 263 patients)	15 (5.7)	7 (4.1)	8 (8.9)	0.11
Iatrogenic dissection (%)	33 (6.8)	15 (4.2)	18 (11.3)	0.003
Cardiac catheterization/PTCA (%)	11 (2.1)	8 (2.3)	3 (1.9)	0.78
Cardiac surgery (%)	23 (4.5)	9 (2.5)	14 (8.8)	0.002
Prior aortic dissection (%)	18 (3.4)	16 (4.4)	2 (1.2)	0.06
Prior aortic aneurysm (%)	66 (12.4)	38 (10.3)	28 (17.0)	0.03
Diabetes (%)	25 (4.7)	9 (2.5)	16 (9.8)	0.0002
Prior cardiac surgery (%)*	80 (15.3)	47 (13.1)	33 (20.1)	0.04
Aortic valve replacement (%)	23 (4.5)	18 (5.1)	5 (3.1)	0.33
Aortic aneurysm/dissection repair (%)	33 (6.4)	18 (5.1)	16 (9.3)	0.07
Other cardiac surgeries (CABG, MVR) (%)	38 (7.3)	21 (5.9)	17 (10.6)	0.05

*Surgeries not mutually exclusive.
CABG = coronary artery bypass graft surgery; IRAD = International registry of Acute Aortic Dissection; MVR = mitral valve replacement or repair; PTCA = percutaneous transluminal coronary angioplasty.

Table 2. Clinical Presentations, Signs, and Diagnostic Imaging Results of All Patients With Type A Aortic Dissection

Variable	Overall	Patients <70 years	Patients ≥70 years	p Value
Clinical presentations and signs				
Chest pain (%)	418 (78.7)	293 (80.3)	125 (75.3)	0.19
Abrupt onset of pain (%)	439 (84.7)	315 (88.5)	124 (76.5)	0.0005
Migrating pain (%)	70 (13.7)	51 (14.5)	19 (12.0)	0.43
All neurologic deficits (%)	94 (17.1)	70 (18.6)	24 (13.8)	0.16
Coma/altered consciousness (%)	78 (14.9)	54 (15.2)	24 (14.4)	0.80
Syncope (%)	96 (18.4)	71 (19.7)	25 (15.4)	0.25
Congestive heart failure (%)	31 (6.0)	22 (6.2)	9 (5.6)	0.77
Mean systolic blood pressure (SD), mm Hg	127 (39.9)	129 (39.5)	123 (40.4)	0.08
Mean diastolic blood pressure (SD), mm Hg	72 (25.0)	73 (23.5)	70 (28.0)	0.16
Murmur of aortic regurgitation (%)	203 (41.7)	162 (47.1)	41 (28.7)	0.0002
Hypotension/shock/tamponade (%)	154 (28.8)	99 (27.0)	61 (32.7)	0.17
Any pulse deficit (%)	154 (30.1)	114 (33.0)	40 (24.2)	0.04
Diagnostic imaging results				
Chest X-ray (%)	476 (86.5)	330 (87.8)	146 (83.9)	0.22
Normal (%)	64 (13.4)	46 (13.9)	18 (12.3)	0.63
Widened mediastinum (%)	296 (62.3)	206 (62.4)	90 (62.1)	0.94
Abnormal aortic contour (%)	213 (45.1)	148 (45.0)	65 (45.5)	0.92
Pleural effusion (%)	88 (18.7)	51 (15.6)	37 (26.1)	0.008
Electrocardiogram (%)	517 (94.0)	354 (94.2)	163 (93.7)	0.83
Normal (%)	155 (30.0)	114 (32.2)	41 (25.2)	0.10
New Q-wave ST-elevations and/or ischemia (%)	33 (6.6)	18 (5.2)	15 (9.7)	0.06
Any imaging with TEE, CT, MRI, or aortogram (%)	541 (98.4)	372 (98.9)	169 (97.1)	0.15
Transesophageal echocardiography (%)	429 (78.0)	296 (78.7)	133 (76.4)	0.55
Computerized tomography (%)	370 (67.3)	249 (66.2)	121 (69.5)	0.44
Magnetic resonance imaging (%)	32 (5.8)	21 (5.6)	11 (6.3)	0.73
Aortogram (%)	112 (20.4)	78 (20.7)	34 (19.5)	0.74
Coronary angiography (%)	24 (5.5)	12 (3.7)	12 (10.7)	0.005
Findings on diagnostic imaging				
Arch involvement (%)	122 (27.3)	92 (29.8)	30 (21.7)	0.98
Intramural hematoma (%)	26 (5.3)	11 (3.2)	15 (9.7)	0.003
Periaortic hematoma (%)	124 (25.6)	84 (25.3)	40 (26.3)	0.81
False lumen thrombosis (%)	35 (8.9)	14 (5.0)	21 (18.3)	< 0.0001
Aortic regurgitation (%)	297 (58.9)	211 (60.5)	86 (55.5)	0.29
Coronary artery involvement (%)	61 (14.6)	42 (15.1)	19 (13.8)	0.73
Pericardial effusion (%)	231 (45.2)	156 (44.1)	75 (47.8)	0.44
Widest diameter of ascending aorta (mean ± SD, cm)	5.4 (2.8)	5.4 (3.1)	5.3 (1.5)	0.63
Widest diameter of aortic arch (mean ± SD, cm)	4.1 (2.8)	4.1 (3.3)	4.1 (0.9)	0.97

CT = computerized tomography; TEE = transesophageal echocardiography; MRI = magnetic resonance imaging.

Clinical presentations and diagnostic imaging findings (Table 2). Elderly patients with acute type A aortic dissection were less likely to present with abrupt onset of chest or back pain (76.5% vs. 88.5%, p = 0.0005). Mean systolic blood pressure at the time of presentation tended to be lower in the older patients. Similarly, the murmur of aortic regurgitation (28.7% vs. 47.1%, p = 0.0002) and pulse deficits (24.2% vs. 33.0%, p = 0.04) were noted in proportionately fewer elderly patients with acute type A aortic dissection. On the other hand, the incidences of congestive heart failure, hypotension/shock/tamponade, or any neurologic deficit or coma at presentation did not differ between the two groups of patients.

Pleural effusions on a chest X-ray were more common in older patients (26.1% vs. 15.6%, p = 0.008). Electrocardiographic evidence of new Q waves or ST-segment deviations tended to be more in the older patients (9.7% vs. 5.2%, p = 0.06). Virtually all patients with type A aortic dissection underwent some form of imaging study (computerized tomography, transesophageal echocardiography, magnetic resonance imaging, or aortography). Frequencies of use of these imaging modalities were not different between the two groups of patients, with the exception of coronary angiography, which was performed more frequently in the elderly group (Table 2). Similarly, the preferred modality for the initial diagnosis in the younger as well as the older patients was computerized tomography. Findings on any imaging modalities (including the widest diameter of ascending aorta or arch) did not differ between the two groups of patients. However, intramural hematoma (9.7% vs. 3.2, p = 0.003) and false lumen thrombosis (18.3% vs. 5.0%, p < 0.0001) were more frequent among the older patients compared with the younger group.

In-hospital treatment and outcomes (Tables 3 and 4). Relatively fewer elderly patients were managed surgically (64.4% vs. 86.4%, p < 0.001). The reasons for medical management in the younger cohort were not recorded in 26% of patients, and in the remaining were cited as

Table 3. In-Hospital Treatments and Surgical Data of All Patients With Type A Dissection

Variable	Overall	Patients <70 years	Patients ≥70 years	p Value
Definitive management				
Surgery (%)	437 (79.5)	325 (86.4)	112 (64.4)	< 0.0001*
Medical treatment (%)	113 (20.5)	51 (13.6)	62 (35.6)	
Operative variable				
Surgery beyond 24 h of presentation (%)	90 (20.9)	70 (21.9)	20 (18.2)	0.41
Root replacement (%)	115 (31.8)	92 (34.0)	23 (25.3)	0.12
Ascending aortic replacement (%)	384 (91.4)	289 (92.6)	95 (88.0)	0.14
Open procedure (%)	383 (92.1)	287 (92.3)	96 (91.4)	0.78
Complete arch replacement (%)	51 (12.6)	45 (15.0)	6 (5.8)	0.02
Hypothermic circulatory arrest (%)	316 (87.5)	271 (88.0)	94 (86.2)	0.64
Retrograde cerebral perfusion (%)	227 (55.6)	173 (57.1)	54 (51.3)	0.31
Aortic cross-clamp time (min, mean [SD])	69.7 (68.8)	68.9 (90.1)	70.0 (60.0)	0.92
Initial medical treatment (excluding hypotensive patients, N = 429)				
Beta-blockers (%)	231 (56.3)	170 (59.2)	61 (49.6)	0.07
Nitroprusside (%)	136 (34.4)	97 (34.9)	39 (33.3)	0.77
Calcium channel antagonist (%)	64 (16.4)	50 (18.1)	14 (12.3)	0.16
Other vasodilators (%)	151 (38.4)	110 (39.7)	41 (35.3)	0.42

*Chi-square test for management type.

comorbid conditions (54%), patient refusal (10%), and intramural hematoma (10%). Similarly, 15% of the older cohort did not have the reason for medical management listed. In the remaining older patients, comorbid conditions (56%), age (15%), patient refusal (11%), and intramural hematoma (4%) were alluded to as the reason for medical therapy. Most operative variables did not differ between the two groups, with the exception of a lower incidence of complete arch replacement in the older cohort. There was a trend towards less frequent use of beta-blockers among the elderly (49.6% vs. 59.2%, p = 0.07) without contraindications to such treatment.

The elderly were more likely to sustain hypotension (45.7% vs. 32.2%, p = 0.002) but had a lower incidence of neurologic deficit during hospitalization (17.8% vs. 26.0%, p = 0.04, Table 4). Postoperative complications were similar in the two groups (data not shown). In-hospital mortality was 50% higher in the elderly cohort (42.8% vs. 28%, p = 0.0006). The mortality was similarly high for patients managed medically in both groups (52.5% and 60.0% among older and younger patients, respectively). However, among patients managed with surgery, mortality was higher among the elderly (37.5% vs. 23.0, p = 0.003) (Table 4, Fig. 1). Total hospital mortality was high among patients younger than 35 years of age (33.3%), lowest for patients 35 years to 44 years of age (21.1%) and thereafter increased gradually with age, with highest mortality observed among patients age 85 and older (58.3%). In-hospital mortality rates among the elderly patients managed surgically were: 70 to 74 years = 31.6%, 75 to 79 years = 42.5%, 80 to 84 years = 45.5%, and ≥85 years = 50%. Mortality among the medically managed cohort of the elderly patients was: 70 to 74 years = 50%, 75 to 79 years = 53.3%, 80 to 84 years = 45.5%, and ≥85 years = 62.5%. Multivariable logistic regression analysis (9) identified age ≥70 years as an independent predictor of death for acute type A aortic dissection (odds ratio 1.7, 95% confidence interval 1.1 to 2.8; p = 0.03). The cause of death was not specified or was unknown in 28.6% and 40.3% of the younger and older patients, respectively. In the remaining patients, rupture, neu-

Table 4. In-Hospital Complications (Including Postoperative) and Mortality of All Patients With Type A Dissection

Variable	Overall	Patients <70 years	Patients ≥70 years	p Value
In-hospital complications				
All neurologic deficits (%)	128 (23.4)	97 (26.0)	31 (17.8)	0.04
Coma/altered consciousness (%)	98 (18.5)	66 (18.2)	32 (19.2)	0.80
Myocardial ischemia/infarction (%)	75 (14.5)	48 (13.3)	27 (17.1)	0.26
Mesenteric ischemia/infarction (%)	28 (5.4)	19 (5.3)	9 (5.7)	0.85
Acute renal failure (%)	104 (20.2)	78 (21.9)	26 (16.6)	0.17
Hypotension (%)	200 (36.4)	121 (32.2)	79 (45.7)	0.002
Cardiac tamponade (%)	98 (17.9)	65 (17.3)	33 (19.1)	0.61
Limb ischemia (%)	61 (11.9)	45 (12.6)	16 (10.3)	0.47
Mortality (%)	178 (32.7)	104 (28.0)	74 (42.8)	0.0006
Mortality for patient treated surgically (%)	116 (26.7)	74 (23.0)	42 (37.5)	0.003
Mortality for patient treated medically (%)	62 (55.9)	30 (60.0)	32 (52.5)	0.43

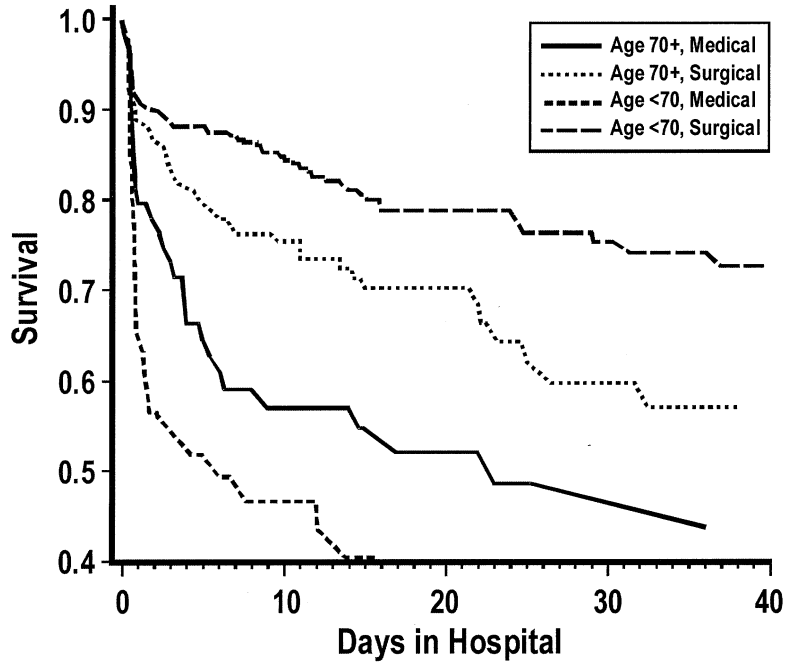

Figure 1. Kaplan-Meier survival curves for patients with type A aortic dissection age ≥70 years versus those <70 years treated medically or surgically. The log rank p = 0.003 for patients <70 years versus those ≥70 years treated with surgery. The log-rank p = 0.10 for patients <70 years versus those ≥70 years treated medically.

rologic deficit, visceral ischemia/renal failure, and cardiac tamponade accounted for the cause of death in 30.6%, 16.3%, 13.3%, and 11.2% of patients <70 years and 37.3%, 10.5%, 9.0%, and 3.0% of patients ≥70 years, respectively.

DISCUSSION

IRAD: an opportunity to study the elderly with acute aortic dissection. The current study represents the largest, most comprehensive investigation of the differences in demographics, clinical characteristics, treatments, and outcomes of a large unselected group of elderly patients with acute type A aortic dissection. We found that the elderly differ from younger patients in several important respects. Although some of the observed differences were expected on the basis of previously reported series, others were not anticipated. Several of these differences have important diagnostic and therapeutic implications.

Differences in demographics, etiology, clinical presentation, and imaging findings between patients <70 years and those ≥70 years. Patients age ≥70 were a significant proportion (31.6%) of patients presenting with acute type A aortic dissection. As life expectancy increases, this number is bound to increase further. Thus, it is important to be familiar with the clinical characteristics, management, and outcomes of this cohort of elderly patients. The male preponderance seen in younger patients with this disease entity tends to disappear in the elderly, likely a result of the relatively longer life expectancy of women (10). Age does not seem to play a decisive role in the transfer of patients with acute aortic dissection to tertiary referral centers. Relatively more elderly patients with aortic dissection were treated at U.S. sites than at non-U.S. sites. This difference could merely be a reflection of longer life expectancy in the U.S. population, a greater availability of newer technology (computerized tomography, magnetic resonance imaging, transesophageal echocardiography, and aortography) among U.S. hospitals, a more aggressive approach taken to the health care of the elderly at U.S. sites, or to differences in patient and physician attitudes in these geographic areas.

The etiology of type A aortic dissection varied between the young and older cohorts. Marfan syndrome-related type A dissections were seen exclusively in younger patients, whereas hypertension, atherosclerosis, prior aortic aneurysms, and iatrogenic dissections were seen more frequently in the elderly (Table 1). These observations may have different implications regarding disease prevention in the two cohorts. For example, genetic counseling, screening of family members, avoidance of pregnancy and beta-blockers for patients with Marfan syndrome would be more appropriate in the younger group. On the other hand, aggressive management of hypertension and special efforts to avoid iatrogenic dissection (careful cannulation of the aorta during cardiothoracic surgery and more gentle maneuvering of cardiac catheters) would represent potentially effective prevention strategies in the elderly. Although cocaine abuse and pregnancy are listed as causes of aortic dissection, these conditions were associated with type A dissection in only one patient each in IRAD (both in the younger cohort), suggesting that these entities are rare causes of dissection.

Classic symptoms and signs of aortic dissection also differ between patients <70 years and ≥70 years. Although most clinicians have been taught to associate the abrupt onset of

a tearing or ripping chest or back pain with acute aortic dissection (11), our study suggests that these symptoms occur less frequently in the elderly. The presence of pulse deficits or a murmur of aortic regurgitation in patients presenting with chest or back pain often makes a physician suspect aortic dissection, but these signs are seen less often in the elderly. In distinction, symptoms and signs of congestive heart failure, and neurologic deficit or coma on presentation, which one might expect to be present more frequently in the elderly, did not differ between the two groups of patients. Such features of the clinical presentation may delay the accurate diagnosis of dissection in elderly patients. Physicians should be aware of such atypical presentations of acute dissection in this group.

It is not surprising that at least one diagnostic imaging technique was virtually always utilized in patients with type A dissection. Coronary angiography before surgical treatment was performed more frequently in elderly patients, in keeping with the increased likelihood of coronary artery disease in this cohort. Most of the diagnostic imaging findings did not differ between the two groups. The higher rate of pleural effusions among older patients may suggest a greater propensity for rupture of acute aortic dissection in these patients. Aortic rupture as the mode of death was indeed more frequent in older as compared with younger patients (37.3% vs. 30.6%) having type A dissection. On the other hand, it is less clear why intramural hematoma and false lumen thrombosis were detected more frequently among the older patients. Despite a similar frequency of coronary artery involvement by imaging techniques, there was a trend towards a higher incidence of new Q_waves or ST-segment deviations on electrocardiogram at the time of presentation in older patients. These differences are likely a result of more advanced atherosclerosis in the elderly as compared with the young (rather than coronary artery compromise from dissection), such that any major stress (such as dissection) could precipitate myocardial ischemia more frequently.

Differences in management and hospital outcomes between patients <70 years and ≥70 years. As is true for most other cardiovascular disorders, age was an important factor in the choice of medical or surgical treatment for patients with acute aortic dissection. Previous studies have shown age to be an independent predictor of mortality in patients with acute aortic dissection (12–14). This fact, along with a higher prevalence of comorbid conditions in the elderly, may have played a decisive role in the allocation to medical versus surgical therapy for elderly patients with acute dissection. It is noteworthy that even the medications known to reduce the risk and extension of aortic dissection, such as beta-blockers, were utilized less often in the elderly with type A aortic dissection.

One would anticipate that the elderly would incur more complications than did younger patients. Contrary to these expectations, the incidence of most in-hospital complications (coma, myocardial infarction or ischemia, acute renal failure, and cardiac tamponade) was similar in the two groups. Only hypotension occurred more frequently and neurologic deficits less frequently in the elderly group. The greater incidence of rupture among the elderly may explain the higher incidence of hypotension. On the contrary, the less common occurrence of neurologic deficits may be a reflection of a lower incidence of major branch vessel involvement (manifesting as fewer older patients having pulse deficits) among the elderly. Mortality was significantly (~50%) higher in elderly than in younger patients, a finding reported by other investigators (12–14). The survival difference was most marked for patients treated surgically (Figs. 1 and 2) . Although part of the mortality difference may be explained by a greater incidence of hypotension in the elderly (9,15), multivariable analysis identified age ≥70 years to be an independent predictor of death in patients with type A acute aortic dissection.

Many physicians believe that the risk of a surgical procedure is too high in older patients with type A aortic dissection to justify this aggressive approach, particularly for patients 80 years of age or older (16). Other studies in small numbers of elderly patients suggest that the risk of surgical repair is not prohibitive and that appropriate elderly patients (age ≥70 years) benefit significantly from surgical repair (17,18). Despite a selection bias among patients undergoing surgical treatment in our study, the frequency of postoperative complications was similar in the two groups (data not shown). In addition, the mortality in patients aged ≥70 years, at least in this selected cohort of patients treated with surgery, was not prohibitive and better than in medically treated elderly patients (Table 4, Fig. 1). In fact, medical treatment was associated with dismal outcome for both age groups, with hospital mortality in excess of 50%. Among patients enrolled in IRAD at 18 participating sites, very few patients were 80 years of age or older (n = 34, 6.2%). Only 15 of these 34 patients underwent surgical treatment. Although the surgical mortality in the octogenerians was higher than that in younger patients, it was still not as prohibitive as suggested by Neri et al. (16) and was slightly better than the mortality of octogenerians managed medically (46.6% vs. 52.6%). Thus, our study supports the findings of others (17,18) that indicated an aggressive surgical approach is not unreasonable in selected elderly patients with acute type A aortic dissection for improving survival, even for some patients age ≥80 years. Given the small number of patients ≥80 years, caution should be exercised in interpreting our data as being definitive in favor of surgery for this group of patients. Nevertheless, until information regarding outcomes is available on a large number of patients age ≥80 years, we believe that age alone should not be used as a sole criteria to exclude patients from undergoing repair of type A aortic dissection. Whether less invasive percutaneous techniques of fenestration and/or endovascular stents provide potential benefit with less risk in this group of patients remains to be established (19–21).

Because age ≥70 years was an independent predictor of

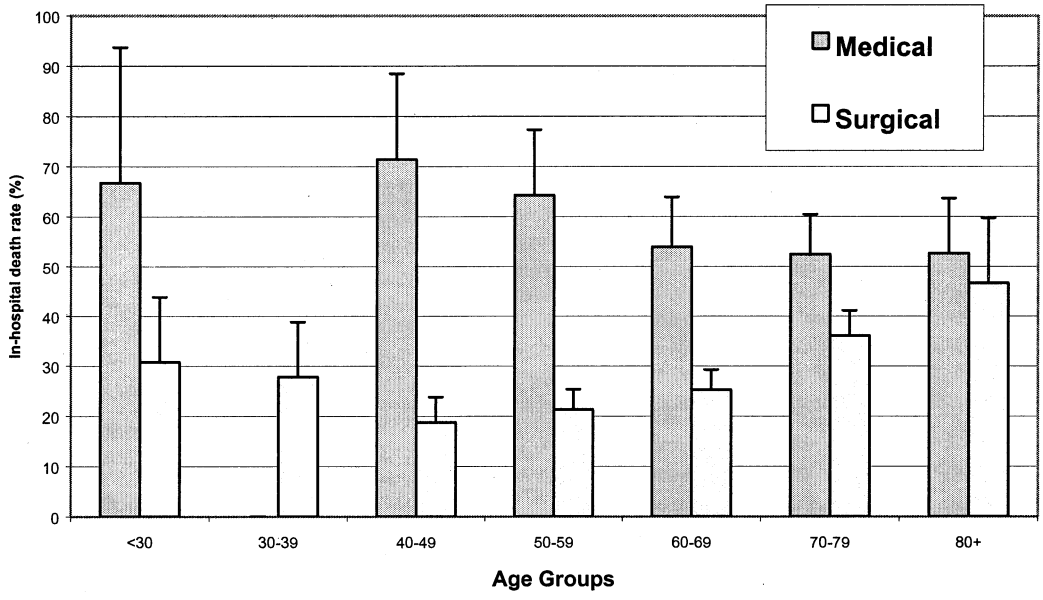

Figure 2. In-hospital mortality (%) ± standard error (%) among different age groups of patients with acute type A aortic dissection treated medically or with surgery. Please note that there are no patients age 30 to 39 in the medical management group.

death, we also anticipated a higher mortality for older than for younger patients who were managed medically. However, contrary to our expectations, there was no difference in this outcome between the two groups that were managed medically (Table 4, Figs. 1 and 2). When we fitted our previously published risk prediction model (9) for medically and surgically treated patients separately, we found that the expected mortality (23%, 34%, 64%, and 50% for patients <70 managed surgically, ≥ 70 managed surgically, <70 managed medically, and ≥ 70 managed medically, respectively) was a good fit with the observed mortality for these patients (Table 4). Thus, the similar mortality in the medically managed younger and older patients may be explained in part by the fact that among patients age <70 years, medical management was only undertaken if they had multiple comorbidities or complications that prohibited surgery. It is also possible that because a third of younger patients managed with medical therapies died within 24 h (compared with 20% of older patients), physicians may not have had enough time to get these patients to the operating room.

Study limitations. The findings of our study should be viewed in the light of its limitations. Data were collected retrospectively and subject to incomplete, missing or inaccurate reporting of events. Most IRAD centers were tertiary referral sites that have significant expertise and experience in the surgical treatment of patients with acute aortic dissection, thus limiting the applicability to centers that lack such capability. Third, only patients with acute type A dissection were included; findings should not be extrapolated to patients with chronic type A dissection or type B dissection. Fourth, because the treatment allocation was not random, many factors besides those captured in our study may have contributed to the choice of treatment modality. As such, conclusions about effectiveness of medical versus surgical therapy should not be implied. Finally, long-term outcomes were not addressed and follow-up of all patients is underway.

Conclusions. Elderly patients with acute type A aortic dissection differ from a younger cohort with respect to etiology, demographics, comorbidities, clinical features and diagnostic imaging findings, and hospital outcomes. In-hospital hypotension occurs more frequently in the elderly than in younger patients with similar rates of other complications. Despite this, elderly patients are more likely to be managed conservatively rather than with surgical repair. These differences in clinical presentations, treatment and in-hospital events appear to explain in part some of the excess risk of mortality in the elderly. Future research is needed to evaluate management strategies that would improve survival in this high-risk patient subset.

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APPENDIX

The International Registry of Acute Aortic Dissection (IRAD) Investigators

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