

# Clinical presentation, management, and short-term outcome of patients with type A acute dissection complicated by mesenteric malperfusion: Observations from the International Registry of Acute Aortic Dissection

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**Background:** Few data exist on clinical/imaging characteristics, management, and outcomes of patients with type A acute dissection and mesenteric malperfusion.

**Methods:** Patients with type A acute dissection enrolled in the International Registry for Acute Dissection (IRAD) were evaluated to assess differences in clinical features, management, and in-hospital outcomes according to the presence/absence of mesenteric malperfusion. A mortality model was used to identify predictors of in-hospital mortality in patients with mesenteric malperfusion.

**Results:** Mesenteric malperfusion was detected in 68 (3.7%) of 1809 patients with type A acute dissection. Patients with mesenteric malperfusion were more likely to be older and to have coma, cerebrovascular accident, spinal cord ischemia, acute renal failure, limb ischemia, and any pulse deficit. They were less likely to undergo surgical/hybrid treatment (52.9% vs 87.9%) and more likely to receive only medical (30.9% vs 11.6%) or endovascular (16.2% vs 0.5%) management ( $P < .001$ ). Overall in-hospital mortality was 63.2% and 23.8% in patients with and without mesenteric malperfusion, respectively ( $P < .001$ ). In-hospital mortality of patients with mesenteric malperfusion receiving medical, endovascular, and surgical/hybrid therapy was 95.2%, 72.7%, and 41.7%, respectively ( $P < .001$ ). At multivariate analysis, male gender (odds ratio [OR], 1.7;  $P = .002$ ), age (OR, 1.1/y;  $P = .002$ ), and renal failure (OR, 5.9;  $P = .020$ ) were predictors of mortality whereas surgical/hybrid management (OR, 0.1;  $P = .005$ ) was associated with better outcome.

**Conclusions:** Type A acute aortic dissection complicated by mesenteric malperfusion is a rare but ominous complication carrying a high risk of hospital mortality. Surgical/hybrid therapy, although associated with 2-fold hospital mortality, appears to be associated with better long-term outcomes in the management of type A acute aortic dissection in this setting. (*J Thorac Cardiovasc Surg* 2013;145:385-90)

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Over the past 2 decades, knowledge of natural history, diagnosis, and management of acute type A aortic dissection has markedly improved. Despite this, hospital mortality in patients with aortic dissection remains substantial, ranging from 7% to 30%.<sup>1-3</sup> Preoperative patients' characteristics mostly affect hospital outcomes, with the worst results being reported in patients with hypotension, tamponade, and organ malperfusion.<sup>4</sup>

Although several studies have assessed outcomes of patients with type A aortic dissection complicated by end-organ malperfusion syndromes, few have focused on mesenteric malperfusion. The International Registry of Acute Dissection (IRAD) represents a unique opportunity to study a large group of patients with aortic dissection collected in 18 referral centers worldwide.

**Abbreviations and Acronyms**

|      |  |
|------|--|
| CI   | = confidence interval                        |
| IRAD | = International Registry of Acute Dissection |
| NS   | = not significant                            |
| OR   | = odds ratio                                 |

Aims of the present study were to compare clinical/imaging characteristics, management, and outcome of patients with type A acute dissection with and without mesenteric malperfusion and to assess outcomes of patients with mesenteric malperfusion according to different therapeutic strategies (surgical/hybrid, endovascular, and exclusively medical).

**METHODS****Study Population and Data Collection**

The rationale and methodology of IRAD have been published previously.<sup>5,6</sup> At the time of our study, we examined 1809 consecutive patients with type A acute dissection enrolled at 18 institutions between December 1995 and August 2010. Acute type A dissection was defined as any dissection that involved the ascending aorta and/or aortic arch appearing within 14 days of the onset of symptoms. The diagnosis of aortic dissection was based on history, imaging studies, direct visualization at surgery, and/or postmortem findings. Patients were categorized according to presence/absence of mesenteric malperfusion, which was defined as any radiologic evidence of decreased perfusion through the celiac trunk, superior mesenteric artery, and inferior mesenteric artery with decreased viability or necrosis of the gut, with or without lactic acidosis, pain, or abdominal distention.

All patients were classified according to 3 different therapeutic strategies: surgical/hybrid, endovascular, and exclusively medical therapy. A surgical/hybrid procedure was defined as a planned central aortic operation (ascending aorta/arch replacement) possibly associated with any percutaneous aortic or branch artery procedure (fenestration, stenting) performed simultaneously or within the same hospitalization. Endovascular treatment was defined as any percutaneous aortic or branch artery procedure (fenestration, stenting) in which any other central surgical procedure was not performed.

IRAD data forms were used to collect 290 clinical variables, including patient demographics, history, clinical presentation, physical findings, imaging studies, therapeutic management, in-hospital mortality, and adverse events. Completed data forms were forwarded to the coordinating center at the University of Michigan and reviewed for faced validity and completeness.

**Statistical Analysis**

Continuous variables were expressed as the mean  $\pm$  1 standard deviation or median and Q1-Q3 and categorical variables as percentages. In all cases, missing data were not defaulted to negative, and denominators reflect only cases reported.

Univariate analyses between groups were done using  $\chi^2$  tests (or Fisher exact tests) and Student *t* tests where appropriate. All *P* values are 2-sided.

Preoperative and intraoperative variables were first analyzed using univariate analysis to determine whether any single factor was related to therapeutic strategy and hospital mortality in all patients and in those with mesenteric malperfusion. Variables that achieved *P* values less than .15 in the univariate analysis were examined using gender-adjusted multivariate analysis by forward stepwise logistic regression to estimate the independent odds ratios (ORs) of factors related to nonsurgical/hybrid management (all patients and patients with mesenteric malperfusion) and hospital mortality in patients with mesenteric malperfusion.

Statistical analysis was performed by SPSS version 18.0 (SPSS, Inc, Chicago, Ill).

**RESULTS****Clinical Characteristics of Patients With and Without Mesenteric Malperfusion (Tables 1, 2, and 3)**

Of 3099 consecutive patients with acute aortic dissection enrolled between December 1995 and August 2010, 1967 (63.5%) had type A dissection. Sixty-eight (3.8%) of 1809 patients with available data had mesenteric malperfusion.

Compared with those who did not have mesenteric malperfusion, those who did were older ( $61.8 \pm 14.4$  vs  $57.9 \pm 14.4$  years; *P* = .028) and more likely to have abdominal (58.5% vs 24.2%; *P* < .001), leg (35.9% vs 12.0%; *P* < .001), and migrating (21.3% vs 12.1%; *P* = .032) pain. Patients with mesenteric malperfusion more frequently had coma (10.0% vs 3.1%; *P* = .003), ischemic spinal cord damage (6.8% vs 0.8%; *P* = .002), acute renal failure (52.2% vs 7.2%; *P* < .001), limb ischemia (38.5% vs 9.9%; *P* < .001), and any pulse deficit (45.8% vs 29.8%; *P* = .009).

Electrocardiographic evidence of new myocardial infarction (8.5% vs 7.2%; *P* = not significant [NS]), left ventricular hypertrophy (24.1% vs 20.9%; *P* = NS), and low voltage (5.2% vs 4.5%; *P* = NS) were similar in patients with and without mesenteric malperfusion. On imaging studies, widened mediastinum (52.0% vs 54.1%; *P* = NS), pleural effusion (20.8% vs 12.4%; *P* = NS), aortic regurgitation (65.5% vs 53.5%; *P* = NS), and coronary artery compromise (16.7% vs 12.4%; *P* = NS) were equally present in patients with and without mesenteric malperfusion.

Computed tomographic angiography, magnetic resonance imaging, and transesophageal echocardiography were used with similar frequency to assess characteristics of dissection in patients with and without mesenteric malperfusion. Angiography was more frequently performed in patients with mesenteric malperfusion (33.3% vs 11.0%; *P* < .001), in whom an overall higher number of imaging tests were required to complete the diagnostic process ( $2.0 \pm 0.8$  vs  $1.6 \pm 0.6$ ; *P* < .001). Despite that, the time delay (hours) between symptom onset and diagnosis was similar in patients with and without mesenteric malperfusion (6.5 vs 5.8; *P* = NS).

The intimal-medial flap originated more frequently at the aortic root (62.7% vs 45.2%; *P* = .005) in patients with mesenteric malperfusion and at the ascending aorta (36.5% vs 23.9%; *P* = .035) in patients without mesenteric malperfusion. Patients with mesenteric malperfusion were more likely to have arch vessel involvement (52.9% vs 35.7%; *P* = .012) and any renal artery (70.6% vs 18.0%; *P* < .001) involvement by the dissection.

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