VOL. 3, NO. 3, 2023
ISSN 2772-3747

Letters

RESEARCH LETTER

Timing of Myocardial Infarction Diagnosis in Type A Acute Aortic Dissection and Coronary Artery Involvement

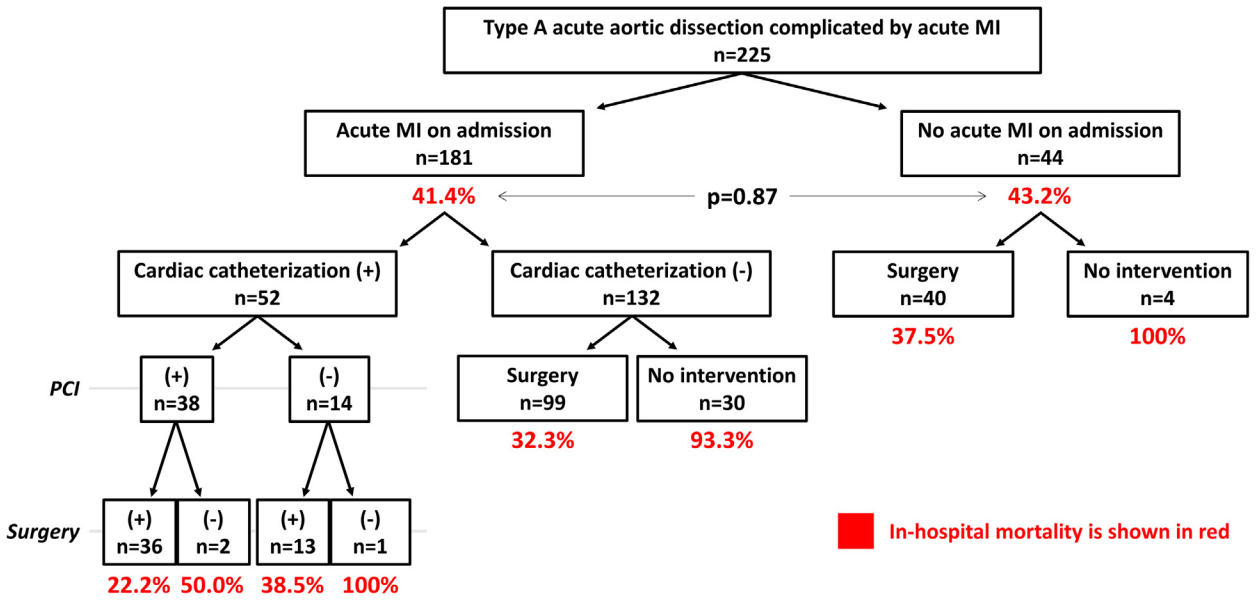
Type A acute aortic dissection (AAD) is a life-threatening disease, especially when complicated by coronary artery involvement. Coronary malperfusion by aortic dissection results in acute myocardial infarction (MI) and subsequent poor prognosis.[1] We previously showed that in-hospital mortality was more than 90% in patients with type A AAD and coronary involvement when medically treated, and surgical treatment does and percutaneous coronary intervention (PCI) may improve survival in this condition.[2,3] A recent report demonstrated that survival probability in patients with type A AAD decreased every hour by 0.09% in those treated with surgery and by 0.5% in medically treated patients during the initial 48 hours after hospital arrival.[4] Interestingly, the registry data showed that an increased time interval from hospital admission to surgery was counterintuitively associated with better survival in the multivariable analysis.[4] These findings suggest that timely intervention is essential, whereas the accurate risk assessment and subsequent therapeutic strategies also may be important to improve outcomes. In the present study, we evaluated the impact of acute MI on admission or thereafter on treatment strategies and clinical outcomes in patients with type A AAD complicated by coronary artery involvement.

This was a retrospective, multicenter, observational study done in 15 tertiary referral hospitals across Japan, collaborating with the Angina Pectoris-Myocardial Infarction Multicenter Investigators.[5] Details are described in our previous reports.[2,3] Briefly, a total of 4,230 patients with type A AAD were admitted to the 15 institutions from January 2008 to May 2018, among whom 225 (5.3%) were complicated by coronary artery involvement (ie, acute MI). Type A AAD was defined as any dissection involving the ascending aorta on contrast-enhanced computed tomography, within 14 days of symptom onset.[1-3] This study was conducted in compliance with the Declaration of Helsinki and was approved by the ethics committee at each hospital. In this study, all patients had at least 1 of the following criteria of MI: 1) a significant rise of cardiac biomarker values; 2) ischemic electrocardiographic changes; 3) echocardiographic regional wall motion abnormality; and 4) coronary (sub)occlusion on angiography.[1-3] All MI was noted before the end of surgery in surgically treated patients or within 48 hours in those who were medically treated. In the present study, patients were divided into 2 groups according to the presence or absence of recognition of MI on admission: early-diagnosed MI (ie, MI noted on admission) and late-diagnosed MI (ie, MI noted after admission). Early-diagnosed MI was usually noted immediately after hospital arrival (eg, at an emergency room), whereas late-diagnosed MI was noted usually in an operating room, catheterization laboratory, or hospital ward. The timing of MI recognition was determined based on medical records. Treatment strategies including surgery and/or PCI procedures were left at the physician's discretion in a real-world clinical setting. The primary endpoint of this study was in-hospital mortality. Continuous variables were compared with Student's *t*-test, and categorical variables were assessed with Fisher's exact test.

Of the 225 patients, 181 had acute MI on admission, whereas MI was recognized thereafter in the remaining 44 (19.6%) patients. Overall patient characteristics are available in the previous report.[2] Although baseline characteristics were similar between the 2 groups, patients with early-diagnosed MI were more likely to present with cardiogenic shock (49.7% vs 20.5%, $P < 0.001$) and cardiac arrest (14.4% vs 2.3%, $P = 0.03$) than those with late-diagnosed MI. The mode of surgical treatment was not significantly different between the 2 groups, whereas almost all coronary angiography and PCI procedures were performed in patients with MI on admission (only 1 patient in the late-diagnosed MI group underwent cardiac catheterization). During the hospitalization, 94 (41.8%) patients died. In-hospital mortality did not differ significantly between the 2 groups (41.4% vs 43.2%, $P = 0.87$) (**Figure 1**). In-hospital mortality was

JACC: ASIA, VOL. 3, NO. 3, 2023
JUNE 2023:531–533

FIGURE 1 **Presence of MI on Admission and In-Hospital Mortality**



In-hospital mortality in each group is shown in **red**. One patient in the group of no acute MI on admission underwent catheterization with PCI before surgery. "No intervention" indicates that neither surgery nor PCI was performed. The findings illustrate that in-hospital mortality was not significantly different between patients with acute MI on admission and thereafter, and was numerically lowest in patients with acute MI on admission who underwent preceding PCI and subsequent surgical procedures. MI = myocardial infarction; PCI = percutaneous coronary intervention.

numerically lowest in patients with acute MI on admission who underwent preceding PCI and subsequent surgical procedures (Figure 1).

The present study demonstrated that approximately 5% of patients with type A AAD had coronary artery involvement, among whom acute MI was noted on admission in most cases but was also recognized after admission in nearly 20%, suggesting a dynamic nature of this catastrophic condition. Despite the severe clinical presentation with a higher likelihood of cardiogenic shock and cardiac arrest, patients with early-diagnosed MI had similar in-hospital mortality as compared with those with late-diagnosed MI, potentially explained by an increased likelihood of cardiac catheterization with PCI as a bridge to surgery. Further investigations are warranted to clarify the prognostic impact of timing of diagnosis of organ malperfusion and interventional approaches in patients with type A AAD.

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https://doi.org/10.1016/j.jacasi.2023.03.012

This work was supported by grants from Takeda Science Foundation. Dr Oshima has received payment or honoraria for lectures, presentations, Speakers Bureau, manuscript writing, or educational events from Terumo. Dr Yasuda has received payment or honoraria for lectures, presentations, Speakers Bureau, manuscript writing or educational events, and payment for expert testimony from Bristol Myers Squibb and Daiichi Sankyo. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.
The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

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