# Initial Medical Treatment for Acute Type A Intramural Hematoma and Aortic Dissection

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***Background.*** **There are contradictory reports on outcomes of patients treated for Stanford type A acute intramural hematoma (IMH) and acute aortic dissections (AAD) with thrombosed false lumens. We evaluated short-term clinical outcomes and predictors of adverse outcomes.**

***Methods.*** **We retrospectively analyzed 59 symptomatic patients with type A acute IMH and AAD with thrombosed thoracic false lumens who initially received treatment. Survival, aortic death (death from aortic events and sudden deaths), and aortic event-free survival rates were investigated. False lumen thickness ratios (FTR [false lumen thickness/aortic diameter]) were measured by computed tomography scan and the relationship with aortic events was evaluated.**

***Results.*** **Survival, aortic death-free survival, and aortic event-free survival rates at 2 years were 90.0%, 96.6%, and 55.8%, respectively. Ascending aortic diameters, false lumen thickness of the ascending aortas, and rate of penetrating aortic ulcers in the ascending aortas were higher among patients with aortic events. The FTR of the ascending aorta (FTRA)/FTR of the descending aorta (FTRD) was also higher in these patients (1.3 ± 0.9 versus 0.8 ± 0.5, $p = 0.0021$). Multivariate analysis revealed FTRA/FTRD greater than 0.98 (odds ratio 5.35; 95% confidence interval: 0.05 to 1.72; $p = 0.0431$) as an independent predictor of aortic events. An FTRA/FTRD greater than 0.98 predicted aortic events with 87.1% sensitivity and 58.4% specificity.**

***Conclusions.*** **High aortic event rates were seen after treatment for type A acute IMH and AAD with thrombosed thoracic false lumens. Nevertheless, short-term survival rates were favorable. An FTRA/FTRD greater than 0.98 may be a highly sensitive predictor for aortic events.**

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Aortic intramural hematomas (IMH) were first described in 1920 as “dissections without intimal tears” by Krukenberg and associates [1] Recently, the development of computed tomography (CT) and magnetic resonance imaging confirmed that clots and hematomas fill false lumens, clarifying the steps in the progression of hematomas. This type of dissection is widely known as thrombosed dissection or IMH [2]. However, the ideal treatment policy, emergent surgery or medical treatment, remains controversial. In previous reports, medical treatment alone was insufficient to manage all type A IMH and acute aortic dissection (AAD) patients, and nearly half of the patients needed surgical intervention. Conversely, emergent surgical repair was not necessary for all patients to achieve favorable surgical outcomes [3]. Some reports have shown that predictors of worse clinical course are associated with initial medical treatment [2]. This study evaluated the short-term clinical outcomes of initial medical treatment for acute type A IMH and AAD with thrombosed false lumens and investigated the predictors of adverse outcomes.

## Patients and Methods

The Institutional Review Board of Kokura Memorial Hospital approved this study and waived the individual consent because of the study’s retrospective design. Between March 2004 and March 2012, 59 symptomatic patients with Stanford type A acute IMH and AAD with thrombosed false lumens of the ascending aorta, who initially received medical treatment, were included in this study. All diagnoses were confirmed by contrast CT. The presence of a hematoma within the aortic wall, recognizable as a crescent or circular local aortic wall thickening, and the absence of a visible intimal flap or tear were prerequisites for the diagnosis of IMH. The Stanford classification of aortic dissection was used to categorize IMH and AAD according to the location of disease. Type A indicates involvement of the ascending aorta. A penetrating aortic ulcer (PAU) was defined as a deep,

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**Abbreviations and Acronyms**

AAD = acute aortic dissection
CT = computed tomography
FT = false lumen thickness
FTR = false lumen thickness ratio
FTRA = false lumen thickness ratio of the ascending aorta
FTRD = false lumen thickness ratio of the descending aorta
IMH = intramural hematoma
PAU = penetrating aortic ulcer

ulcerated lesion in the thickest part of the IMH, within the involved aorta. Acute aortic dissection with thrombosed false lumen of the ascending aorta was defined as a lesion that did not display enhanced contrast media in the false lumen of the ascending aorta during contrast CT and where the thoracic descending aortic false lumen was partially thrombosed. Based on these definitions, there were 35 patients with IMH unaccompanied by PAU, 15 patients with IMH associated with PAU, and 9 patients with AAD with thrombosed false lumens of the ascending aorta.

Initial CT, performed within 48 hours after onset of the initial symptoms, the maximal thickness of the false lumen, the maximal diameter of aorta, and the false lumen thickness (FT) ratio (FTR [false lumen thickness/aortic diameter]) were measured at the ascending and descending aorta (Fig 1). For the descending aorta, measurements were taken near the level of the bifurcation of the left and right pulmonary arteries.

### *Medical Treatment*

Our treatment strategy for type A IMH and AAD with thrombosed false lumens involved medications. Nevertheless, it was accompanied by pericardial effusion and dilation of the ascending aorta. Rupture and uncontrollable malperfusion cases received immediate surgical intervention. If the patient demonstrated cardiac tamponade, we performed percutaneous drainage. Patients who were diagnosed with acute type A IMH or AAD with a thrombosed false lumen were admitted to the intensive care unit for monitoring with a continuous arterial pressure monitor. Antihypertensive therapies, including intravenous beta-blockers and calcium-channel blockers, were initiated to control systolic blood pressure to less than 110 mm Hg. Patients underwent serial contrast CT follow-up on days 1, 3, and 5, and weekly thereafter. If the CT findings did not deteriorate, the patient continued antihypertensive therapy. Patients who did not experience an aortic event were discharged 1 month after onset of the dissection. These patients received annual CT follow-up in the outpatient clinic.

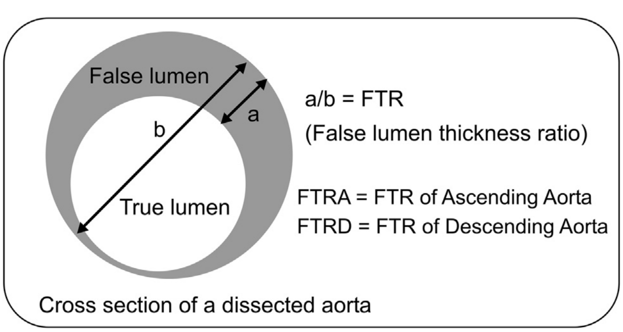


*Fig 1. Definition of the measurements in initial computed tomography findings. (FTR = false lumen thickness ratio; FTRA = FTR of ascending aorta; FTRD = FTR of descending aorta.)*

### *Indications for Surgery*

When aortic dilation, PAU enlargement, or redissection were observed in the follow-up CT scans, elective surgery was performed if the patient's vital conditions were stable.

### *Study Endpoints*

The primary clinical endpoint was freedom from aortic events and death. Aortic events were defined as redissection, recanalization, rupture, PAU enlargement, and aortic surgery. Aortic death was defined as death from an aortic event and sudden death. We investigated the predictors of adverse outcomes based on the initial CT findings.

### *Statistical Analyses*

Categorical variables were compared using the $\chi^2$ test or Fisher's exact test. Continuous variables were analyzed using Student's *t* test. Multiple stepwise logistic regression analysis was used to identify independent predictors of adverse outcomes. Factors with *p* values less than 0.5 were included in a multivariate analysis. A receiver-operating characteristics curve analysis was performed to determine the best cutoff value for predicting adverse outcomes. Survival and event-free survival were analyzed using the Kaplan-Meier method. All analyses were conducted using SAS software, JMP version 10 (SAS Institute, Cary, NC).

### *Follow-Up*

Follow-up was obtained by means of a direct telephone questionnaire or at the outpatient clinic. The CT follow-ups were conducted annually. The median duration of follow-up was 25.6 ± 20.6 months (range, 0 to 89); the follow-up rate was 100%.

## Results

### *Patient Characteristics*

The patients' baseline clinical characteristics are summarized in Table 1. Eleven patients showed pericardial effusion, and 4 of the 11 patients were treated with percutaneous drainage. All of the drainage patients' hemodynamic states stabilized after drainage. There was no clinical evidence of cardiac tamponade after drainage.

### *Kaplan-Meier Analysis*

The 2-year survival, aortic death-free survival, and aortic event-free survival rates were 90.0%, 96.6%, and 55.8%,