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Case Presentation

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Aortic Intramural Hematoma Leading to Emergent Aortic Dissection: A Case Report

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Abstract

Introduction: Acute aortic syndromes (AAS), encompassing intramural hematoma (IMH), pose serious threats to the aortic wall. IMH, defined by blood within the aortic medial layer without an overt intimal tear, holds significance in the AAS spectrum. This case report explores the diagnostic and management challenges of IMH, emphasizing the need for personalized approaches.

Case report: A 62-year-old male with chest pain underwent computed tomography angiography revealing a mural thrombus in the ascending and aortic arch. Urgent surgical intervention was deemed necessary due to an ascending aortic hematoma (58 mm diameter, 15 mm thickness). A saccular aneurysm in the descending aorta prompted semi-elective Thoracic Endovascular Aortic Repair (TEVAR).

Discussion: IMH's elusive nature complicates its diagnosis compared to more identifiable conditions like aortic dissection. Stanford and DeBakey classifications guide treatment decisions based on the IMH type. Predictive factors for fatal events include low systolic blood pressure, pericardial effusion, an ascending aortic diameter exceeding 45 mm, and the existence of Ulcer-Like Projection (ULP) in the ascending aorta. Long-term survival rates for Type A IMH surpass those for classic Type A aortic dissection.

Conclusion: Managing IMH within AAS requires personalized approaches. Factors predicting fatal events underscore the significance of early identification. This case highlights the urgency of surgery for ascending aortic hematoma, contributing to a better understanding of AAS for future research and clinical practice.

Keywords: Aortic intramural hematoma; Acute aortic sydromes; Aortic dissection; Thoracal endovascular aortic replacement

Introduction

Acute aortic Syndromes (AAS), İncluding İntramural Hematoma (IMH), pose serious threats within the aortic Wall [1]. IMH, defined as the presence of blood within the medial layer of the aortic wall without an overt intimal tear or patent false lumen, holds significant importance within the AAS spectrum [2]. IMH typically affects hypertensive and atherosclerotic individuals, with spontaneous or PAU-related bleeding from vasa vasorum rupture. The optimal initial treatment for thoracic aortic IMH remains debated. IMH is categorized into two types: Type I with a smooth inner aortic lumen, and Type II associated with aortic atherosclerosis. Clinical outcomes differ, with type A IMH cases requiring urgent surgical intervention, while type B-distal cases may resolve spontaneously [2,3]. Incidence of AAS, predominantly aortic dissection, increases with age. AAS and IMH share clinical features but have distinct mechanisms, with IMH potentially evolving into aortic dissection. Stanford and DeBakey classifications guide AAS delineation, highlighting the importance of prompt imaging (CT or MRI) when AAS is suspected [4]. Treatment modalities, medical or surgical, depend on location and complications. In medical therapy, strict blood pressure control with β-blockers is crucial. Surgical interventions, open or endovascular (TEVAR), are viable options [5]. This case report contributes insights into aortic IMH, enhancing our understanding of optimal treatment strategies and outcomes in AAS subsets.

Case Presentation

We present a case of a 62-year-old male patient who reported the onset of chest pain ten days prior to presentation. Having sought initial medical attention at an external facility, the patient was subsequently referred to our institution following a Computed Tomography Angiography (CTA) revealing a mural thrombus in the ascending and aortic arch. Upon arrival at the emergency department, the patient was conscious, oriented, and cooperative, with arterial blood pressure measuring 142/86 mmHg in the left arm and 140/92 mmHg in the right arm. Room air oxygen saturation was 96%, and the heart rate was 92 beats per minute, maintaining a sinus rhythm on electrocardiography. Peripheral pulses were palpable in all four extremities. Echocardiographic evaluation demonstrated normal left ventricular systolic function (ejection fraction, EF: 65%), an aortic diameter of 48 mm in the ascending aorta, along with mild aortic, mitral, and tricuspid regurgitation. Pulmonary Artery Systolic Pressure (PABS) was 35 mmHg, and a pericardial effusion of 6 mm without compression around the right ventricle was noted. The CTA triggered by EKG revealed a maximum diameter of 58mm in the ascending aorta **(Figure 1 and 2)**, exhibiting a concentric rim with a thickness of 15 mm. A saccular aneurysmatic segment measuring 45 mm was observed proximally in the thoracic aorta.

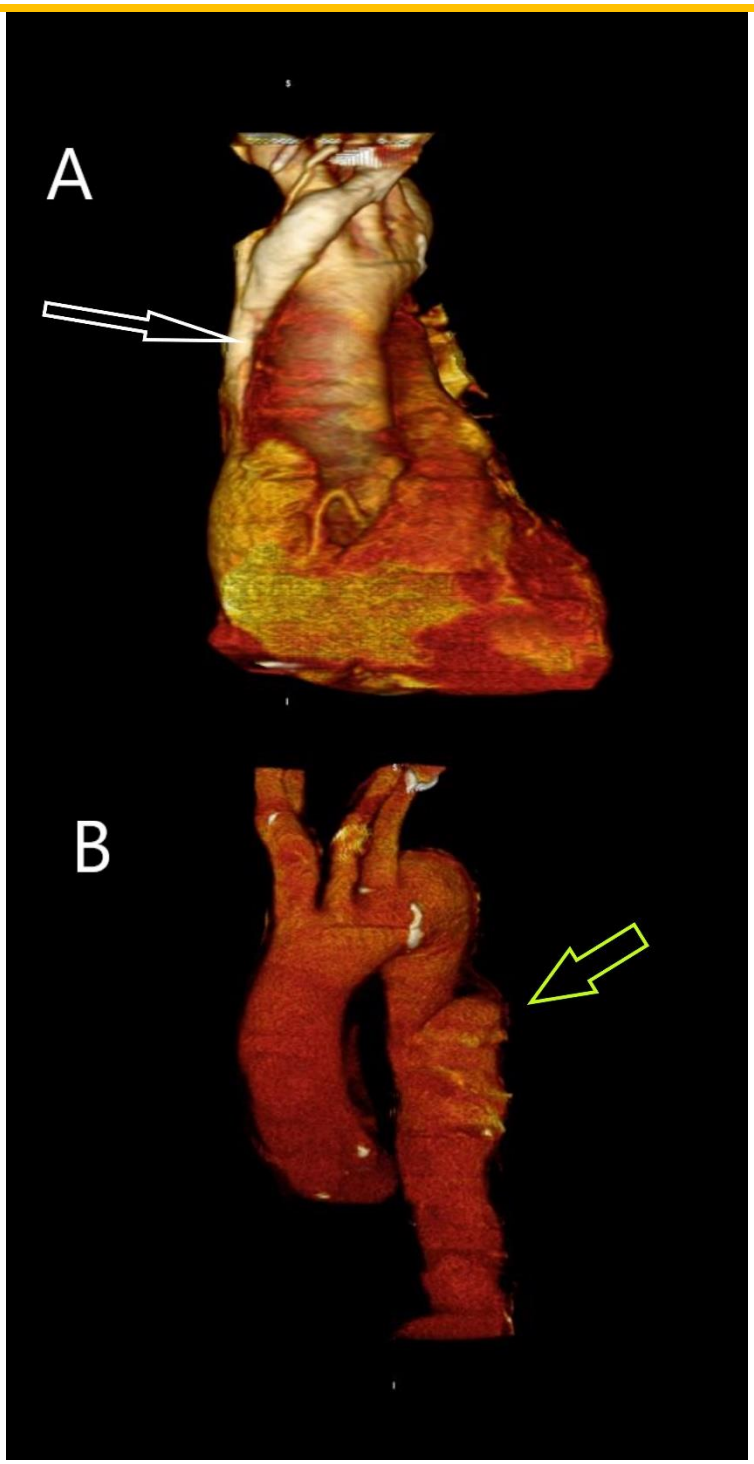

Figure 1: Preoperative 3D-rendered CT angiography. (A) Ascending aorta with intramural hematoma (white arrow). **(B)** Saccular aneurysm in the descending aorta (yellow arrow).

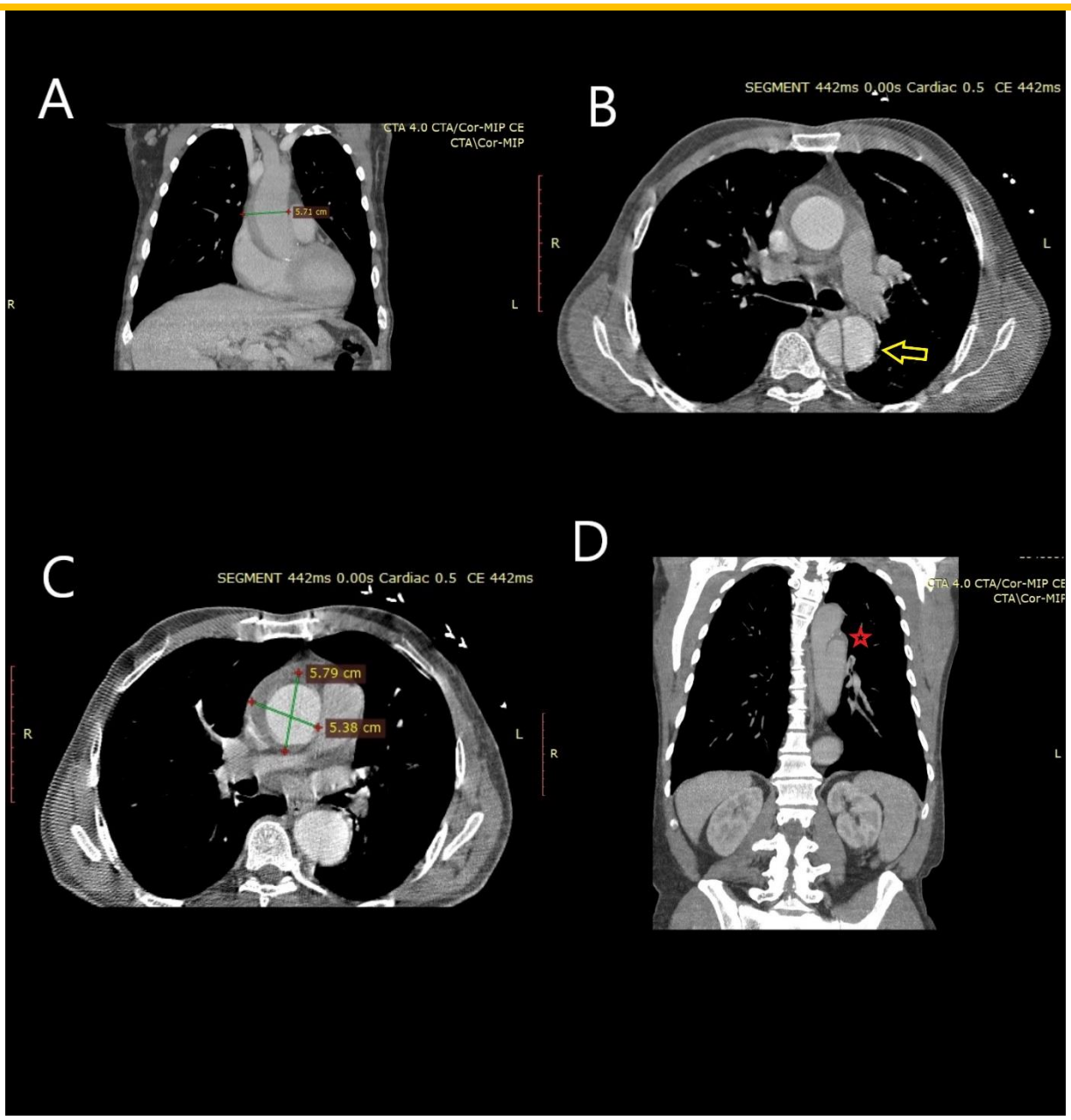

Figure 2: Preoperative CT angiogram of the aorta. (A) Coronal section of the ascending aorta with intramural hematoma. **(B)** Transverse section of the saccular aneurysm in the descending aorta (yellow arrow). **(C)** Intramural hematoma and dilated ascending aorta (maximum diameter: 58 mm). **(D)** Coronal section showing the saccular aneurysm sac (red star).

Surgical Intervention

Given the radiological significance of intramural hematoma on CT angiography, an emergent decision for surgical intervention was made. The patient underwent sternotomy, pericardiotomy, and preparation for cardiopulmonary bypass (arterial cannulation: right axillary/subclavian artery, venous cannulation: unicaval two-stage). Intraoperatively, an

intramural hematoma and dissection were identified in the ascending aorta, leading to a supracoronary ascending aorta replacement using a 30-no Dacron tubular graft (separate graft interposition). The intima in the arch and its branches remained intact. Postoperatively, the patient was successfully extubated with stable hemodynamic parameters, and no complications were observed. Subsequent to the elective follow-ups during the inpatient care, the patient, who had been prepared for Thoracic Endovascular Aortic Repair (TEVAR) during the preoperative phase of aortic surgery, was urgently taken to the angiography unit due to back pain. Following an uneventful TEVAR procedure **(Figure 3)**, the patient developed acute kidney injury, necessitating medical management. Post-renal function recovery, the patient was discharged without further complications. This case highlights the intricacies of managing aortic pathology, emphasizing the importance of a multidisciplinary approach in optimizing patient outcomes.

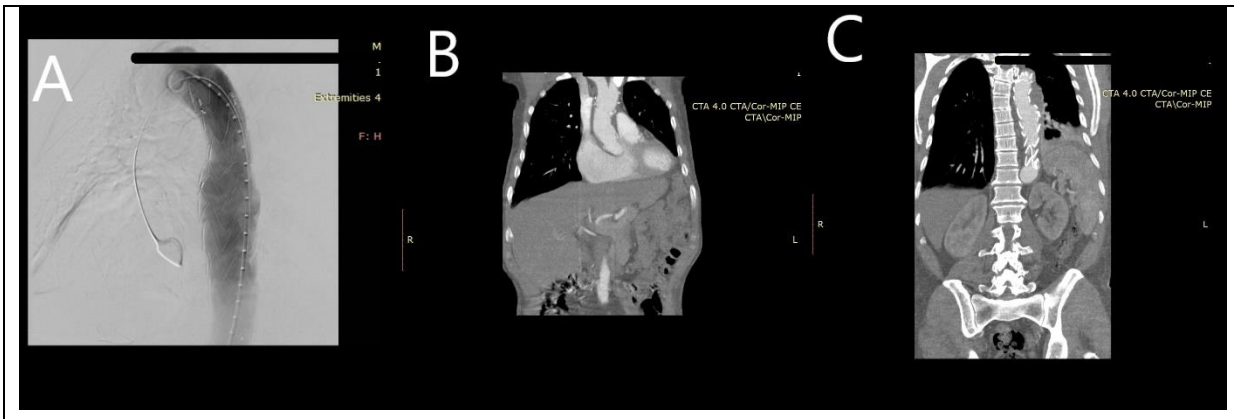

Figure 3: Intraoperative and postoperative imaging. (A) Digital Subtraction Angiography (DSA) showing the TEVAR graft. **(B)** Supracoronary replacement of the ascending aorta. **(C)** Post-TEVAR coronal section of the CT angiogram.

Discussion

Intramural Hematoma (IMH) emerges as a critical entity within the broader spectrum of Acute Aortic Syndromes (AAS), presenting unique diagnostic and management challenges. Distinguishing IMH from aortic dissection or penetrating aortic ulcer is particularly intricate due to its elusive nature without overt intimal tears. The difficulty in diagnosis makes IMH a noteworthy antithesis to more readily identifiable conditions like aortic dissection. Establishing a comprehensive understanding of IMH becomes pivotal, considering its distinct characteristics and potential evolution into more severe aortic complications **[6]**. The localization of the intramural hematoma plays a pivotal role in shaping the treatment strategy. The utilization of the Stanford and DeBakey classifications provides a systematic approach to determine the appropriate course of action. Type A IMH, characterized by a smooth inner aortic lumen, necessitates urgent surgical intervention. In contrast, Type B cases, often associated with aortic atherosclerosis, may be

managed conservatively with vigilant monitoring and elective consideration for percutaneous intervention. However, when comlitacated IMH signs (malperfusion, periaortic hematoma, pericardial effusion with cardiac tamponade, refracter pain, rupture) are present, emergent intervention is imperative, emphasizing the significance of tailoring treatment to the specific characteristics and location of the IMH [7]. Kageyama et al. [8] demonstrated in their study involving 57 patients with a diagnosis of acute Type A intramural hematoma that low systolic blood pressure (SBP < 120 mmHg), the presence of pericardial effusion on admission CT, an ascending aortic diameter exceeding 45 mm on admission CT, and the existence of Ulcer-Like Projection (ULP) in the ascending aorta on admission CT serve as predictive factors for fatal events. Harleen K. Sandhu et al. [9] reported early and long-term outcomes in a study encompassing 523 patients who underwent surgery for both Type A aortic dissection and Type A intramural hematoma. They observed no statistically significant difference in terms of early-term mortality between the groups (11.9% vs. 16.1%). However, in the long term, the IMH group demonstrated a superior overall survival rate. Long-term survival rates at 1-, 5-, and 10-years for Type A İntramural Hematoma (ATAIMH) were 85.8%, 81.1%, and 66.7%, respectively, and were significantly better than the survival rates for classic Type A Aortic Dissection (ATAAD), which stood at 78.8%, 72.4%, and 54.3%, respectively. They showed that; age exceeding 60 years, female gender, retrograde dissection, and the presence of Marfan syndrome demonstrated notable associations with ATAIMH.

Advancement to aortic dissection, rupture, or other adverse events related to the aorta transpires in 14% to 37% of patients, with the majority of occurrences manifesting during the acute or subacute phase [3]. In their IRAD study, Kevin M. Harris et al. [10] investigated the early and long-term outcomes of patients with Type A IMH and aortic dissection. They reported that there was no statistically significant difference in in-hospital mortality rates between the groups (26.6% vs. 26.5%). The Type A IMH group, managed nonoperatively with conservative measures, exhibited a mortality rate of 40%. In-hospital mortality rates ranging from 1% to 27%, along with mid- and long-term survival following operative intervention for Type A IMH, are deemed reasonable and comparable to, if not better than, reported survival rates for Type A aortic dissection. Various approaches to the timing of surgery exist, demonstrating low mortality rates with strategies involving repair within 24 hours and a slightly delayed repair window (between 24 and 72 hours), where feasible [9,10]. In our case presentation, we encountered a patient presenting with chest pain, revealing an urgent need for intervention due to the presence of an intramural hematoma at the widest segment of the ascending aorta, measuring 58 mm in diameter and exhibiting a thickness of 15 mm. Urgent surgical intervention was deemed necessary. Additionally, a saccular aneurysm was identified in the descending aorta, prompting a semi-elective Thoracic Endovascular Aortic Repair (TEVAR) procedure. This case underscores the critical decision-making process in managing acute aortic conditions, considering both emergent and semi-elective interventions based on the specific characteristics and location of the pathology.

Conclusion

In managing Intramural Hematoma (IMH) within Acute Aortic Syndromes (AAS), challenges arise due

to its subtle nature. Treatment decisions hinge on the type and associated complications of IMH, emphasizing the need for personalized approaches. Insights from studies emphasize factors predicting fatal events in acute Type A IMH, underscoring the significance of early identification. Long-term survival rates for Type A IMH are reported to surpass those for classic Type A aortic dissection. Our case underscores the complexity of addressing acute aortic conditions, highlighting the urgency of surgery for an ascending aortic hematoma. In summary, IMH necessitates a nuanced approach in both diagnosis and management, with the findings contributing to a better understanding within the realm of AAS and guiding clinical practice and future research.

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