

Cardiothoracic Surgical Emergencies in the Intensive Care Unit



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KEYWORDS

- Cardiothoracic surgical emergencies • Operative intervention
- Collaborative team approach • ICU

KEY POINTS

- Patients with cardiothoracic surgical emergencies are frequently admitted to the ICU, either prior to operative intervention or after surgery.
- Recognition and appropriate timing of operative intervention are key factors in improving outcomes.
- A collaborative team approach with the cardiothoracic service is imperative in managing this patient population.

INTRODUCTION

Patients with cardiothoracic surgical emergencies are frequently admitted to the ICU, either prior to operative intervention or after surgery. Intensivists must be able to recognize and manage the medical aspects of cardiothoracic surgical emergencies, and know when to involve the cardiothoracic surgical team. This article covers common cardiothoracic surgical emergencies that require emergent intervention, the indications for surgery, and methods of acute stabilization of patients prior to operative intervention.

GREAT VESSEL PATHOLOGY

Thoracic Aortic Dissection

Acute aortic dissection, and the closely related entities of penetrating aortic ulcer and intramural hematoma, is a true life-threatening emergency. In the seminal work published by Hirst and colleagues¹ in 1958, they reported a 1% to 2% per hour mortality

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rate early after symptom onset from an ascending aortic aneurysm. In the era prior to modern management of acute aortic dissection, it is estimated via autopsy series that 40% to 50% of patients with dissection of the proximal aorta died within 48 hours.¹ Death results from either frank exsanguination due to aortic rupture, pericardial tamponade, myocardial ischemia due to coronary dissection, or malperfusion to the brain, gut, kidney or spinal cord. In the modern era, patients with proximal ascending dissections who rapidly undergo surgery in experienced tertiary centers have a 30-day survival rate of 80% to 85%.² Patients with dissection of the descending aorta treated with aggressive antihypertensive therapy have a 30-day survival rate greater than 90%.²

The incidence of aortic dissection remains difficult to ascertain, because acute dissection often results in sudden death that may be attributed to another process. Population-based studies have estimated an incidence of 2 to 3.5 cases per 100,000 person-years, correlating with 6000 to 10,000 cases annually in the United States.³ The International Registry of Acute Aortic Dissection (IRAD) was established in 1996 to help overcome small numbers in single-center registries and to promote further investigation of acute aortic dissection. It currently comprises 30 large referral centers in 11 different countries. Data from IRAD published in 2000 showed a mean age at presentation of 63 years, with a 65% male predominance.⁴

The aortic wall is composed of 3 tissue layers: the intima, which is continuous with the vessel lumen; the media; and the adventitia. Aortic dissection is defined as disruption of the media layer of the aorta with bleeding within and along the wall of the aorta, resulting in separation of the layers of the aorta. In a majority of patients, an intimal tear can be identified that results in pressurized blood cleaving a dissection plane within the media. The separation of the layers of the aorta results in the creation of 2 aortic lumens, the false lumen and the true lumen, with a septum, or intimal flap, separating the 2 lumens. The true lumen remains surrounded by intima, whereas the false lumen is surrounded by the intimal-medial dissection flap and a weak media-adventitial outer wall. The weakened false lumen may rupture externally or internally, may extend either anterograde down the aorta or retrograde back toward the aortic valve, or may thrombose over time.^{2,5} Although on noninvasive imaging 15% of patients have an apparent intramural hematoma without evidence of an intimal tear, on autopsy only 4% are found to have no visible intimal tear (Fig. 1).³

Aortic dissection most commonly occurs in patients with a previously dilated or damaged aorta. Hypertension is the most common predisposing factor in 72% of patients, followed by atherosclerosis (31%), history of cardiac surgery (18%), Marfan syndrome (5%), and iatrogenic causes (4%).^{4,6} Other predisposing factors are listed in Box 1.

Accurate classification of aortic dissection is important because it drives decisions regarding surgical versus nonsurgical management. The 2 most commonly used classification systems are the DeBakey and Stanford systems. For purposes of classification, ascending aorta is proximal to the brachiocephalic artery and descending aorta is distal to the left subclavian artery.

DeBakey Classification System

Type I: Dissection originates in ascending aorta and propagates distally to include at least the aortic arch and typically the descending aorta.

Type II: Dissection originates in and is confined to the ascending aorta.

Type III: Dissection originates in the descending aorta and propagates most often distally.

IIla: Limited to the descending thoracic aorta

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