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CASE REPORT

# Acute Dissection of the Ascending Aorta: A Case Report and Topic Review

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## ABSTRACT

Aortic dissection (AD) is a rare entity with an incidence estimated to be 5 to 30 cases per million people per year[1] (*The Gale Encyclopedia of Medicine*, 3rd ed.). It has association with hypertension, connective tissue disorders, congenital aortic stenosis, and bicuspid aortic valve. Spontaneous dissections are rare. It has a high mortality rate when left untreated. Recent advances in imaging have allowed for early and accurate diagnosis of acute aortic syndromes and the options for management are expanding. This case report and review presents the case of a 20-year-old man with Marfan's syndrome with acute type I AD who underwent emergency Bentall's procedure.


**Keywords:** Aortic dissection, Bentall's procedure, Hypertension, Type I aortic dissection.

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## INTRODUCTION

A high index of suspicion is required for prompt diagnosis and treatment of deadly and relatively rare aortic dissection (AD), yet diagnosis is both elusive and challenging, with a diversity of manifestations, depending on where it occurs along the aorta[1]. Approximately 40% of patients with acute AD die before reaching the hospital,[2] with in-hospital early mortality of 1 to 2% per hour for those who do survive to hospital-level care.[3] Recent advances in imaging have allowed for early and accurate diagnosis of acute aortic syndromes, and the options for management are expanding. We report a case which was managed successfully with emergency Bentall's procedure and that too without any immediate or short-term complications and is doing well in follow-up till date.

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## CASE REPORT

A 20-year-old nondiabetic, nonsmoker gentleman with Marfan's syndrome was admitted in Mahatma Gandhi Medical College & Hospital (MGH), Jaipur, India, with complaint of severe chest pain radiating to left shoulder since 1 day duration. He had a blood pressure (BP) of 138/88 mm Hg in right arm. There was no evidence of myocardial, cerebral, visceral, or limb ischemia.

Echocardiography showed (MGH, Jaipur on September 6, 2016) dilated left ventricle with fair contraction with severe aortic regurgitation. Aortic root was dilated with ascending aorta measuring 58 mm and aortic annulus measuring 24 mm. Dissection flap was seen in aorta (Fig. 1).

Contrast computed tomography (CT) showed a 7.5 cm ascending aorta with a large tear and dissection. The dissection extended to mid-descending aorta. The coronaries and innominate appeared to be arising from dissected area, but flow in them was preserved (Fig. 2).

Immediately, he was started on nitroglycerine infusion at 20 µg/kg/minute and nitroprusside infusion at 2.5 µg/kg/minute with the aim of maintaining mean BP around 90 mm Hg. Beta-blockers were avoided as patient's heart rate varied from 50 to 68 per minute.

The patient was prepared for emergency Bentall's procedure. Standard median sternotomy approach was used and anatomy assessed (Fig. 3).

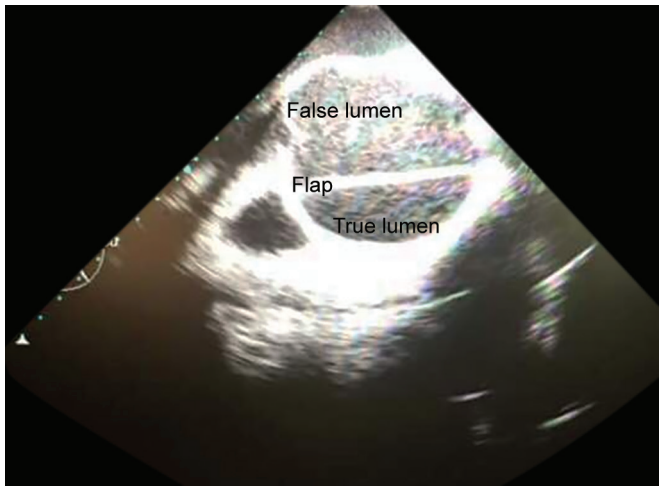


**Fig. 1:** Two-dimensional echocardiography showing dissection of mid ascending aorta

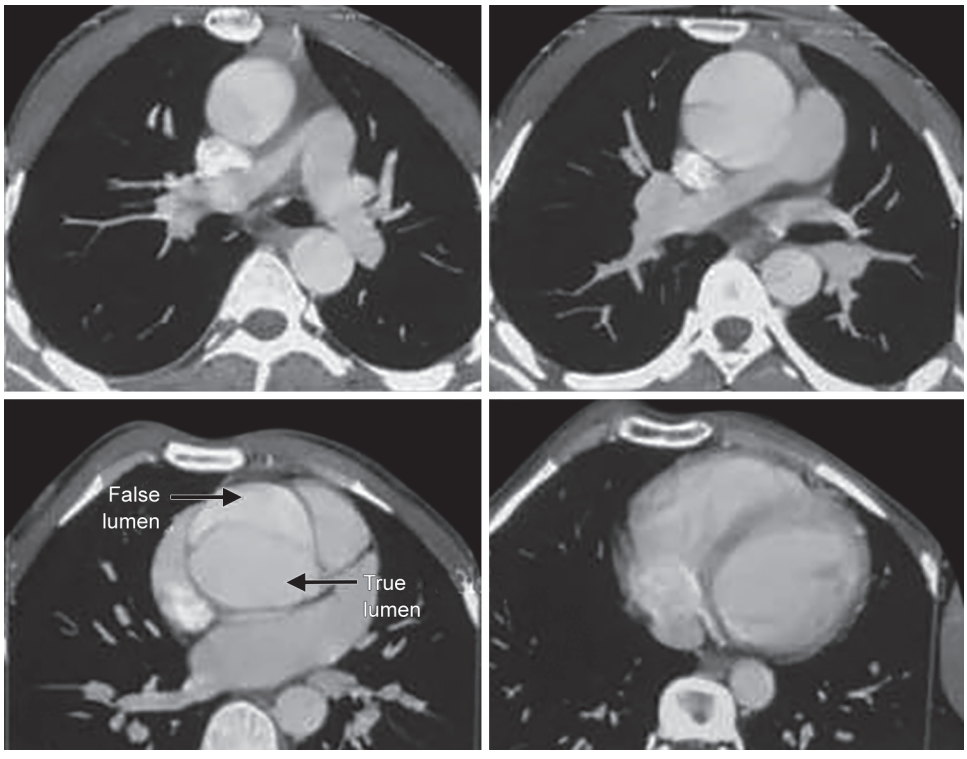


**Fig. 2:** Computed tomography angiography showing dissection of mid-ascending aorta

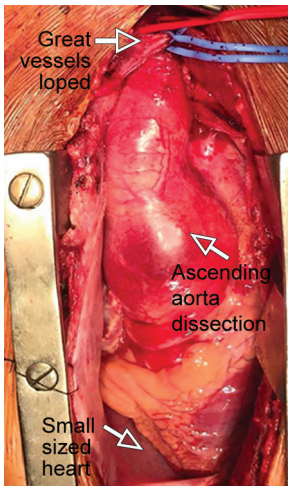


**Fig. 3:** Aortic arch showing dissection of mid-ascending aorta

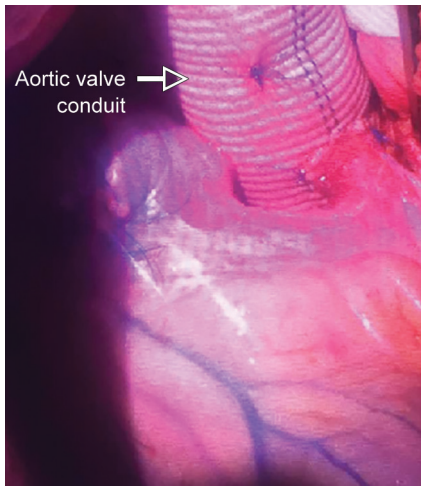


**Fig. 4:** Aortic valved conduit in place

An 8 mm Dacron graft was anastomosed end to side to the right axillary artery, incorporating a narrow strip of pericardium into the anastomosis. This was done in anticipation of possible arch replacement, which was not needed later.

Bicaval cannulation was then done and a retrograde cardioplegia cannula was placed into the coronary sinus. Left ventricle was vented and cardiopulmonary bypass (CPB) was established. After full flow on CPB, upper ascending aorta was clamped and retrograde cardioplegia started. Anterograde cardioplegia was given after transaction of ascending aorta. Cooling was done to 18°C. The dissection was nearly circumferential in the entire ascending aorta and sinuses. About 60% of the right coronary artery and 30% of the left main orifice circumference were involved.

The coronary buttons were carefully fashioned and layers glued together using BioGlue with appropriate size probes inside the coronaries. Although the aortic leaflets looked good, preserving the valve was not considered, given the underlying pathology (Marfan's syndrome). The aortic annulus was 31 mm. A 29 St. Jude Medical™ valved aortic conduit was chosen and sutured into place using 2/0 Ti-Cron™ sutures with pledgets. The coronary ostia were next implanted into the tube graft and the suture lines glued (Fig. 4).

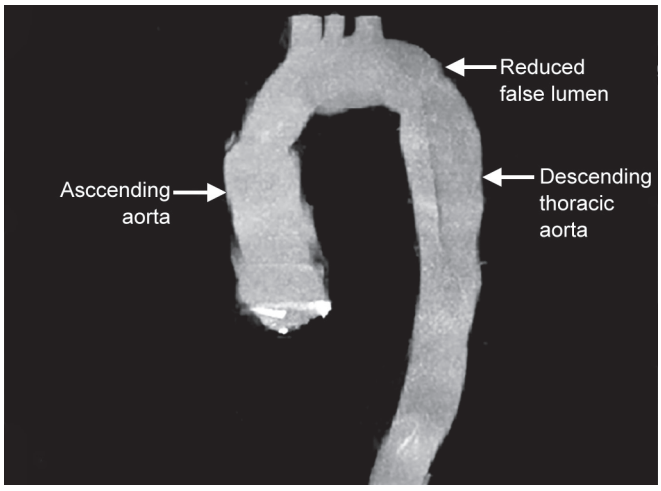


**Fig. 5:** Postoperative CT showing well-functioning aortic conduit

The innominate artery was clamped after reducing CPB flow to 500 mL/minute and the aortic cross clamp was released. The arch and proximal descending aorta were checked and found free of any intimal tears. As much as possible of the clot was extruded by gentle compression and arch branch lumens were unobstructed.

After gluing the layers of the distal aortic stump and reinforcing it with a strip of felt, the innominate cross-clamp was released and the aorta gently cross-clamped again, restoring full CPB flow. The distal anastomosis was done without total circulatory arrest with relative ease. Closure was done in usual manner.

Postoperative course was uneventful. Postoperative echocardiography (September 12, 2016) was suggestive of prosthetic aortic valve functioning well (MG/PG 8/18 mm Hg) with no aortic regurgitation. Postoperative contrast CT was suggestive of well-functioning aortic valved conduit with reduction in false lumen (Fig. 5).

## DISCUSSION

Aortic dissection is the most common catastrophe of the aorta, two to three times more common than rupture of the abdominal aorta. Patients with a confirmed diagnosis of an ascending AD should be treated as a surgical emergency due to the high early mortality (mortality rate of 1% per hour over the first 24 hours)[3] and increased rates of complications, such as aortic insufficiency and subsequent heart failure, cardiac tamponade, myocardial infarction, and aortic rupture. Incidence of dissections is high in male patients by a ratio of 3:1.2. Dissections of the thoracic aorta have been classified anatomically by two different methods. The Stanford classification divides dissections into two types: type I and type II.

- Type I involves the ascending aorta (DeBakey types I and II); type II does not (DeBakey type III).
- This system also helps delineate treatment. Usually, type I dissections require surgery, while type II dissections may be managed medically under most conditions.

It is important to identify the potential risk factors of AD through thorough history taking. Aortic dissection occurs more often in men (1.55:1) and increases with age.[4] We must ask about patient's underlying disease, such as hypertension, atherosclerosis, and any preexisting collagen disease. In this case report, the patient was a known case of Marfan's syndrome. Family history of aortic disease may also contribute as a risk factor.[5]

Mostly, patients with acute AD present with symptom of severe chest pain, which accounts for 79% of type I dissections and 63% of type II dissections.[6] The pain in AD is typically sharp, tearing, and ripping with an abrupt onset. The severity of the pain is excruciating usually with maximum severity at the time of onset. Pain may change its location with further extension of dissection.

For definitive diagnosis, CT, magnetic resonance imaging (MRI), or transthoracic echocardiography must be performed. With improvement of CT, CT is the most often used modality to diagnose AD because of its high specificity and sensitivity, and its availability. However, CT has its limitations since it cannot detect aortic regurgitation. The MRI also has high specificity and sensitivity, but the test is time-consuming and less available. Therefore, MRI is usually used for follow-up imaging or for chronic dissections. Transthoracic echocardiography is usually used for hemodynamically unstable patients since it can be performed at the bedside or in an operating room for emergency.[7]

DeBakey et al[8] establish surgical intervention as a treatment modality; however, in the initial years, there were discouraging surgical outcomes from other medical centers. Some groups, such as Wheat et al,[9] even recommended to avoid surgical treatment for some patients with acute AD. In the 1970s, it became clear that there was a difference in patient prognosis depending upon whether the AD originates in the ascending aorta (Stanford A or DeBakey I–II) or in the descending aorta (Stanford B or DeBakey III). Appelbaum et al[10] reviewed outcomes of 108 patients with spontaneous thoracic AD at the University of Alabama Hospital between 1966 and 1973. They found that the in-hospital mortality for patients with DeBakey type I–II AD treated medically was 88% compared with 32% in patients with type III dissections. Patients who underwent surgical intervention had 24% in-hospital mortality for type I–II dissection and 36% for type III dissections. Their conclusion was that surgical treatment had a significantly lower in-hospital mortality rate than medical therapy in patients with type I–II dissections ($p < 0.0002$), while patients with type III dissections had

similar in-hospital mortality rates with either surgical or medical therapy.

Despite these dismal statistics, successful patient outcomes (low hospital mortality and reoperation rate) can be achieved with the use of conservative pathology-oriented surgery. This includes an open distal anastomosis and complete excision of the primary tear in all patients. BioGlue helps by reinforcing friable tissues and sealing anastomotic suture lines. Careful hemostasis minimizes the need for excessive red cell and coagulation product usage, which contributes to patient morbidity. In the current settings, where hospital survival is the single most important goal, more extensive procedures should be performed by surgeons who are more experienced in aortic surgery techniques.

## REFERENCES


1. The Gale Encyclopedia of Medicine. 3rd ed. Stanford (CT): Gale; 2008.
2. Hiratzka LF, Bakris GL, Beckman JA, Bersin RM, Carr VF, Casey DE Jr, Eagle KA, Hermann LK, Isselbacher EM, Kazerooni EA, et al. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the diagnosis and management of patients with thoracic aortic disease. Circulation. 2010 Apr 6;121(13):e266-e369.
3. Hirst AE Jr, Johns VJ, Kime SW Jr. Dissecting aneurysm of the aorta: a review of 505 cases. Medicine 1958 Sep;37(3):217-279.
4. Mészáros I, Mórocz J, Szlávi J, Schmidt J, Tornóci L, Nagy L, Szép L. Epidemiology and clinicopathology of aortic dissection. Chest 2000 May;117(5):1271-1278.
5. Hasham SN, Lewin MR, Tran VT, Pannu H, Muilenburg A, Willing M, Milewicz DM. Nonsyndromic genetic predisposition to aortic dissection: a newly recognized, diagnosable, and preventable occurrence in families. Ann Emerg Med 2004 Jan;43(1):79-82.
6. Hagan PG, Nienaber CA, Isselbacher EM, Bruckman D, Karavite DJ, Russman PL, Evangelista A, Fattori R, Suzuki T, Oh JK, et al. The International Registry of Acute Aortic Dissection (IRAD): new insights into an old disease. JAMA 2000 Feb 16;283(7):897-903.
7. Erbel R, Alfonso F, Boileau C, Dirsch O, Eber B, Haverich A, Rakowski H, Struyven J, Radegran K, Sechtem U, et al. Diagnosis and management of aortic dissection. Eur Heart J 2001 Sep;22(18):1642-1681.
8. DeBakey ME, Henly WS, Cooley DA, Morris GC Jr, Crawford ES, Beall AC Jr. Surgical management of dissecting aneurysms of the aorta. J Thorac Cardiovasc Surg 1965 Jan;49:130-149.
9. Wheat MW Jr, Palmer RF, Bartley TD, Seelman RC. Treatment of dissecting aneurysms of the aorta without surgery. J Thorac Cardiovasc Surg 1965 Sep;50:364-373.
10. Appelbaum A, Karp RB, Kirklin JW. Ascending vs descending aortic dissections. Ann Surg 1976 Mar;183(3):296-300.