Healthy Heart

From the Desk of Hon. Editor:

Honorary Editor :
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Dear Friends,

Aortic Dissection occurs when a tear in the intima of the Aorta and causes blood to flow between the layers of the aorta, forsing layers apart or adventitial tear.

Aortic Dissection is relatively rare, occuring at an estimated rate of 2-3.5 per 1,00,000 people every year. Many cases of aortic dissection lead to death so rapidly that the person does not reach at hospital in time. Mortality is also associated with its complications. Only treatment of type-A dissection is surgery untill it is contraindicated. Type-B disection can be treated either medically or endovascular stenting.

- Dr. Dhaval Naik

Acute Aortic Dissection

Definition and classification

Aortic dissection(AD) is defined as disruption of the medial layer provoked by intramural bleeding, resulting in separation of the aortic wall layers and subsequent formation of a True Lumen and an False Lumen with or without communication. In most cases, an intimal tear is the initiating condition, resulting in tracking of the blood in a dissection plane within the media. This process is followed either by an aortic rupture in the case of adventitial disruption or by a re-entering into the aortic lumen through a second intimal tear. The dissection can be either ante-grade or retro-grade. The present Guidelines will apply the Stanford classification unless stated otherwise. This classification takes into account the extent of dissection, rather than the location of the entry tear. The propagation can also affect side branches. Other complications include tamponade, aortic valve regurgitation, and proximal or distal malperfusion syndromes.

Epidemiology

The incidence of AD is estimated at six per hundred thousand persons per year. This incidence is higher in men than in women and increases with age.The prognosis is poorer in women, as a result of atypical presentation and delayed diagnosis. The most common risk factor associated with AD is hypertension, observed in 65– 75% of individuals, mostly poorly controlled. Other risk factors include pre-existing aortic diseases or aortic valve disease, family history of aortic diseases, history of cardiac surgery, cigarette smoking, direct blunt chest trauma and use of intravenous drugs (e.g. cocaine and amphetamines).

Classifications

□ **DeBakey**
- Type I= ascending aorta, aortic arch, descending aorta
- Type II= ascending aorta only
- Type III= descending aorta distal to left subclavian artery

□ **Stanford (most common)**
- **Type A**= involves ascending aorta
- **Type B**= no ascending aorta, distal

Clinical Presentation & Complications

	Type A	Type B
Chest pain	80%	70%
Back pain	40%	70%
Abrupt onset of pain	85%	85%
Migrating pain	<15%	20%
Aortic regurgitation	40-75%	N/A
Cardiac tamponade	<20%	N/A
Myocardial ischaemia or infarction	10-15%	10%
Heart failure	<10%	<5%
Pleural effusion	15%	20%
Syncope	15%	<5%
Major neurological deficit (coma/stroke)	<10%	<5%
Spinal cord injury	<1%	NR
Mesenteric ischaemia	<5%	NR
Acute renal failure	<20%	10%
Lower limb ischaemia	<10%	<10%

Laboratory testing

In patients admitted to the hospital with chest pain and suspicion of AD, the following laboratory tests, listed in Table , are required for differential diagnosis or detection of complications.

Red blood cell count	Blood loss, bleeding, anaemia
White blood cell count	Infection, inflammation (SIRS)
C-reactive protein	Inflammatory response
ProCalcitonin	Differential diagnosis between SIRS and sepsis
Creatine kinase	Reperfusion injury, rhabdomyolysis
Troponin I or T	Myocardial ischaemia, myocardial infarction
D-dimer	Aortic dissection, pulmonary embolism, thrombosis
Creatinine	Renal failure (existing or developing)
Aspartate transaminase/ alanine aminotransferase	Liver ischaemia, liver disease
Lactate	Bowel ischaemia, metabolic disorder
Glucose	Diabetes mellitus
Blood gases	Metabolic disorder, oxygenation

Diagnostic imaging in acute aortic dissection

The main purpose of imaging in AAD is the comprehensive assessment of the entire aorta, including the aortic diameters, shape and extent of a dissection membrane, the involvement in a dissection process of the aortic valve, aortic branches, the relationship with adjacent structures, and the presence of mural thrombus. Following table shows details required from imaging in Aortic Dissection.

- Visualization of intimal flap
- Extent of the disease according to the aortic anatomic segmentation
- Identification of the false and true lumens (if present)
- Localization of entry and re-entry tears (if present)
- Identification of antegrade and/or retrograde aortic dissection
- Identification grading, and mechanism of aortic valve regurgitation
- Involvement of side branches
- Detection of malperfusion (low flow or no flow)
- Detection of organ ischaemia (brain, myocardium, bowels, kidneys, etc.)
- Detection of pericardial effusion and its severity
- Detection and extent of pleural effusion
- Detection of peri-aortic bleeding
- Signs of mediastinal bleeding

Echocardiography

The diagnosis of AD by standard transthoracic M-mode and two-dimensional echocardiography is based on detecting intimal flaps in the aorta. The sensitivity and specificity of TTE range from 77– 80% and 93 – 96%, respectively, for the involvement of the ascending aorta.TTE is successful in detecting a distal dissection of the thoracic aorta in only 70% of patients.

Computed tomography

Diagnosis of AD can be made on transverse CT images, but multi-planar reconstruction images play an important complementary role in confirming the diagnosis and determining the extent of involvement, especially with regard to involvement of aortic branch vessels.

Aortography

The angiographic diagnosis of AD is based upon 'direct' angiographic signs, such as the visualization of the intimal flap (a negative, frequently mobile, linear image) or the recognition of two separate lumens; or 'indirect' signs including aortic lumen contour irregular-ities, rigidity or compression, branch vessel abnormalities, thickening of the aortic walls, and aortic regurgitation. This technique is no longer used for the diagnosis of AD, except during coronary angiography or endovascular intervention.
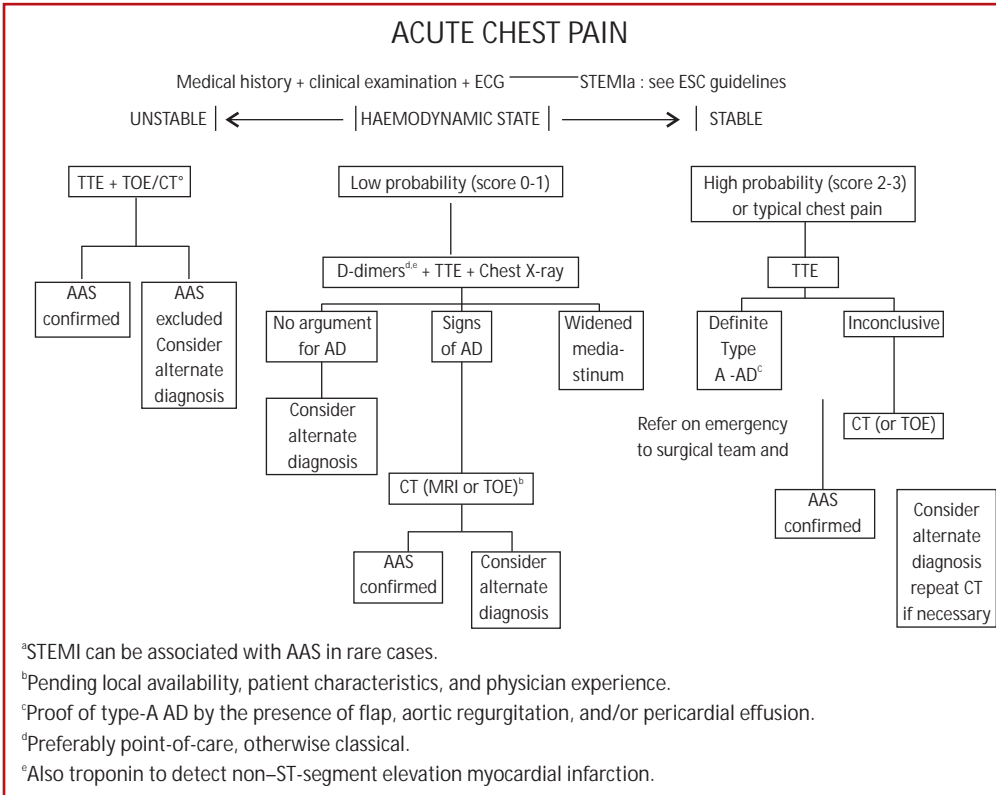
Magnetic resonance imaging

MRI is considered the leading technique for diagnosis of AD, with a reported sensitivity and specificity of 98%.It clearly demonstrates the extent of the disease and depicts the distal ascending aorta and the aortic arch in more detail than is achieved by TOE. Unfortunately Cardiac MRI is not that common in our country.

Clinical data useful to assess the prior probability of acute aortic dissection

High-risk conditions	High-risk pain features	High-risk examination features

• Marfan syndrome (or other connective tissue diseases)
• Family history of aortic disease
• Known aortic valve disease
• Known thoracic aortic aneurysm
• Previous aortic manipulation (including cardiac surgery)
	• Chest, back, or abdominal pain described as any of the following:
	  - abrupt onset
	  - severe intensity
	  - ripping or tearing
		• Evidence of perfusion deficit:
		  - pulse deficit
		  - systolic blood pressure difference
		  - focal neurological deficit (in conjunction with pain)
		• Aortic diastolic murmur (new and with pain)
		• Hypotension or shock

Flowchart for decision-making based on pre-test sensitivity of acute aortic syndrome. AAS:abdominal aortic aneurysm; AD:aorticdissection; CT:computed tomography; MRI:magnetic resonance imaging; TOE:transoesophageal echocardiography;

ACUTE CHEST PAIN

Medical history + clinical examination + ECG ———— STEMIa : see ESC guidelines

UNSTABLE ← HAEMODYNAMIC STATE → STABLE

TTE + TOE/CT°
- AAS confirmed
- AAS excluded Consider alternate diagnosis

Low probability (score 0-1)

D-dimers[d,e] + TTE + Chest X-ray
- No argument for AD → Consider alternate diagnosis
- Signs of AD
- Widened media-stinum

CT (MRI or TOE)[b]
- AAS confirmed
- Consider alternate diagnosis

High probability (score 2-3) or typical chest pain

TTE
- Definite Type A -AD[c] → Refer on emergency to surgical team and
- Inconclusive → CT (or TOE)
  - AAS confirmed
  - Consider alternate diagnosis repeat CT if necessary

[a]STEMI can be associated with AAS in rare cases.
[b]Pending local availability, patient characteristics, and physician experience.
[c]Proof of type-A AD by the presence of flap, aortic regurgitation, and/or pericardial effusion.
[d]Preferably point-of-care, otherwise classical.
[e]Also troponin to detect non–ST-segment elevation myocardial infarction.

Recommendations for treatment of aortic dissection

| Recommendations	Class[a]	Level[b]
In all patients with AD, medical therapy including pain relief and blood pressure control is recommended.	I	C
In patients with Type A AD, urgent surgery is recommended.	I	B
In patients with acute Type A AD and organ malperfusion, a hybrid approach (i.e. ascending aorta and/or arch replacement associated with any percutaneous aortic or branch artery procedure) should be considered.	IIa	B
In uncomplicated Type B AD, medical therapy should always be recommended.	I	C
In uncomplicated Type B AD, TEVAR should be considered.	IIa	B
In complicated Type B AD, TEVAR is recommended.	I	C
In complicated Type B AD, surgery may be considered.	IIb	C

[a]Class of recommendation.
[b]Level of evidence.
[c]Reference(s) supporting recommendations.
AD ¼ aortic dissection; TEVAR ¼ thoracic endovascular aortic repair.

Treatment

Type A aortic dissection

Surgery is the treatment of choice. Acute Type A AD has a mortality of 50% within the first 48 hours if not operated. Despite improvements in surgical and anaesthetic techniques, perioperative mortality (25%) and neurological complications (18%) remain high. However, surgery reduces 1-month mortality from 90% to 30%. The advantage of surgery over conservative therapy is particularly obvious in the long-term follow-up.
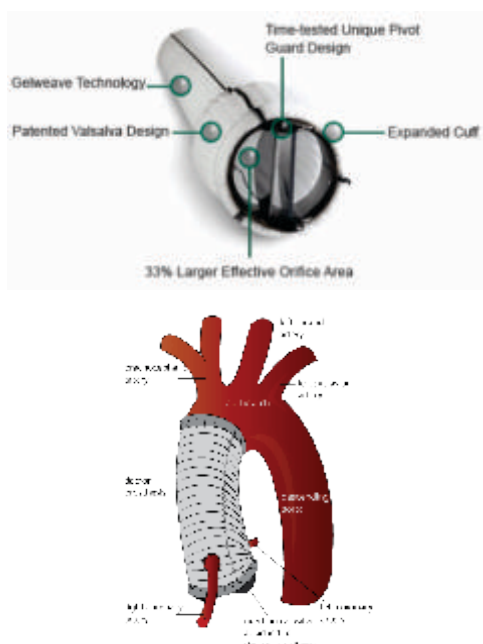
Tybe B aortic dissection

In most of the cases with type-B dissection medical management is useful. Endovascular stenting is a new option available in chronic cases.