

## STANDARD TREATMENT WORKFLOW (STW)

# ACUTE AORTIC SYNDROME

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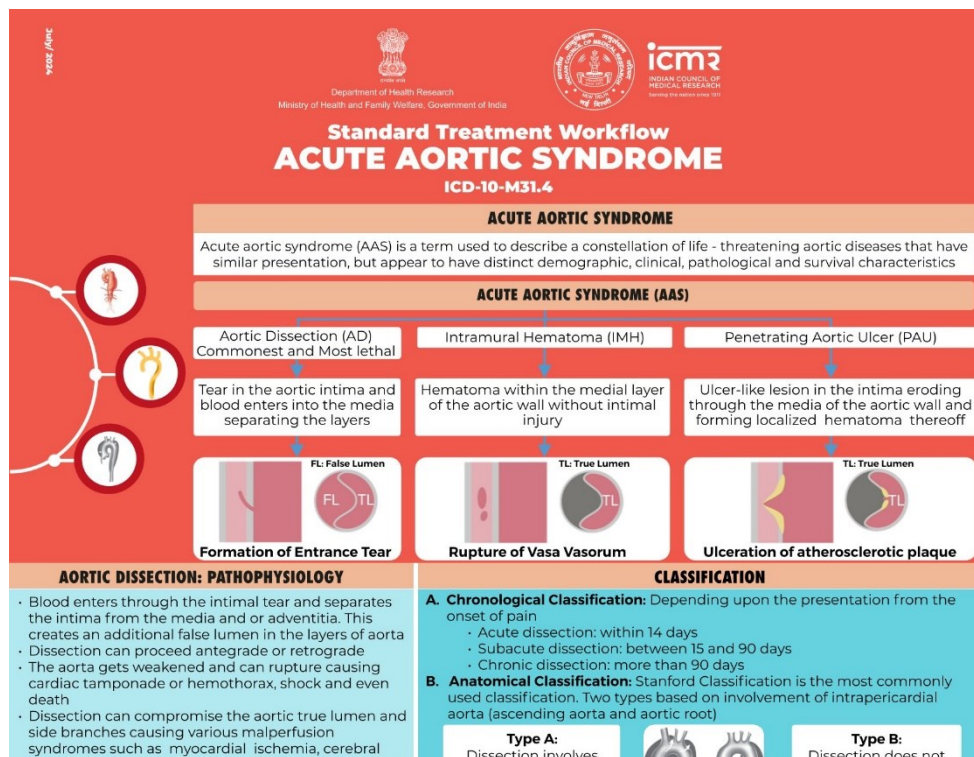
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## Standard Treatment Workflow ACUTE AORTIC SYNDROME

ICD-10-M31.4

ACUTE AORTIC SYNDROME

Acute aortic syndrome (AAS) is a term used to describe a constellation of life - threatening aortic diseases that have similar presentation, but appear to have distinct demographic, clinical, pathological and survival characteristics

ACUTE AORTIC SYNDROME (AAS)

<p><b>Aortic Dissection (AD)</b> Commonest and Most lethal</p> <p>Tear in the aortic intima and blood enters into the media separating the layers</p> <p><b>FL: False Lumen</b></p> <p><b>Formation of Entrance Tear</b></p>	<p><b>Intramural Hematoma (IMH)</b></p> <p>Hematoma within the medial layer of the aortic wall without intimal injury</p> <p><b>TL: True Lumen</b></p> <p><b>Rupture of Vasa Vasorum</b></p>	<p><b>Penetrating Aortic Ulcer (PAU)</b></p> <p>Ulcer-like lesion in the intima eroding through the media of the aortic wall and forming localized hematoma thereof</p> <p><b>TL: True Lumen</b></p> <p><b>Ulceration of atherosclerotic plaque</b></p>
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AORTIC DISSECTION: PATHOPHYSIOLOGY

- Blood enters through the intimal tear and separates the intima from the media and or adventitia. This creates an additional false lumen in the layers of aorta
- Dissection can proceed antegrade or retrograde
- The aorta gets weakened and can rupture causing cardiac tamponade or hemothorax, shock and even death
- Dissection can compromise the aortic true lumen and side branches causing various malperfusion syndromes such as myocardial ischemia, cerebral ischemia, spinal cord ischemia, mesenteric, renal and limb ischemia
- If the dissection involves aortic root it may cause acute aortic valve insufficiency
- If a patient survives acute episode, the false lumen may either get thrombosed or may dilate aneurysmally

**Two factors are primarily responsible for pathogenesis of dissection**

- Higher wall stress due to hypertension or dilatation of aorta
- Inherently weak/degenerated aortic media

**Predisposing factors**

- The commonest risk factor is hypertension.
- Genetically mediated aortopathies like
  - Marfan's syndrome
  - Vascular Ehlers-Danlos syndrome
  - Bicuspid aortic valve
  - Familial aortic dissection

Trauma and iatrogenic injury are also emerging as important causes of aortic dissection

CLASSIFICATION

**A. Chronological Classification:** Depending upon the presentation from the onset of pain

- Acute dissection: within 14 days
- Subacute dissection: between 15 and 90 days
- Chronic dissection: more than 90 days

**B. Anatomical Classification:** Stanford Classification is the most commonly used classification. Two types based on involvement of intrapericardial aorta (ascending aorta and aortic root)

**Type A:**  
Dissection involves the intrapericardial aorta regardless of the site of intimal tear. It is also known as Proximal dissection

**Type B:**  
Dissection does not involve the intrapericardial aorta. It is also known as Distal dissection

CLINICAL PRESENTATION AND COMPLICATIONS

IMPORTANT COMPLICATIONS OF DISSECTION, CAUSATIVE MECHANISMS, AND PRESENTATIONS

MYOCARDIAL INFARCTION VS ACUTE TYPE A DISSECTION

- Clinically, a dissection-related coronary malperfusion may present with ECG changes of primary myocardial ischemia or infarction. This may increase the likelihood of misdiagnosis and inappropriate therapeutic intervention
- Before starting the treatment algorithm for myocardial ischemia, it is important to differentiate between a primary coronary event and coronary malperfusion secondary to dissection process
- In dissection, pain is usually abrupt, piercing, and well localized. Presence of diastolic murmur of aortic regurgitation, unequal pulses, limb ischemia or neurological complications favor the diagnosis of acute dissection
- If dissection is diagnosed with myocardial ischemia it should be managed on the line of dissection and thrombolytic therapy should NOT be initiated

DIAGNOSTIC IMAGING IN ACUTE AORTIC DISSECTION

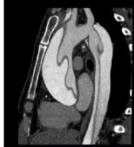
- The main purpose of imaging is the comprehensive assessment of the entire aorta and its branches with primary goals of confirmation of diagnosis, classification of dissection, assessment of branch vessels, and identification of complications (aortic rupture, aortic regurgitation, and malperfusion)
- Besides these, imaging is also needed to assess myocardial and valvular function, pulmonary parenchyma, and state of kidneys

IMAGING AND DIAGNOSTIC ALGORITHM


If Acute Aortic Syndrome is suspected kindly refer the patient to higher center


  
**Standard Treatment Workflow**  
**ACUTE AORTIC SYNDROME**  
 (Continued)

DIAGNOSTIC METHODS AND OUTPUT		TREATMENT OF ACUTE DISSECTION
<b>Diagnostic method</b>	<b>Output</b>	<ul style="list-style-type: none"> <li>Acute Type A dissection is a surgical emergency. Acute Type B dissection is mostly subjected to medical treatment unless complicated. Irrespective of surgical or endovascular intervention, medical therapy to control blood pressure and pain is essential</li> <li><b>Initial Medical Therapy</b></li> <li>Initial management of dissection is directed at pain control and limiting the propagation of dissection by reducing the aortic wall stress. Aortic wall stress is affected by the velocity of ventricular contraction (dP/dt), the rate of ventricular contraction and blood pressure</li> <li>Initial medical treatment with beta blockers controls these 3 parameters by reducing heart rate and blood pressure to the lowest amounts that will still maintain adequate end-organ perfusion. Reasonable initial targets are a heart rate nearly 60/minute and a systolic blood pressure between 100 and 120 mm Hg</li> <li>In patients with severe aortic regurgitation, it is important to maintain a mean arterial pressure between 70-80 mm of Hg to ensure adequate end-organ perfusion. In presence of significant aortic regurgitation target heart rate is kept near 80/minute as lowering the heart rate further may prolong diastole and aggravate regurgitation</li> </ul>
Chest X-ray	Any evidence of leak; widened mediastinum, pleural collection	
CT angiography	Confirmation of diagnosis of dissection, Anatomical extent of dissection, Localization of entry and re-entry tears, Aortic rupture, State of arch vessels, coronary arteries, visceral arteries, renal arteries, and ilio-femoral arteries, State of lungs and kidneys	
Transthoracic Echocardiography	Evaluation of aortic valve, Pericardial effusion, Evidence of tamponade, Myocardial function, Mitral and Tricuspid valve function	
ECC	Evidence of myocardial ischemia	
Vascular Ultrasound	State of axillary, carotid and femoral arteries	



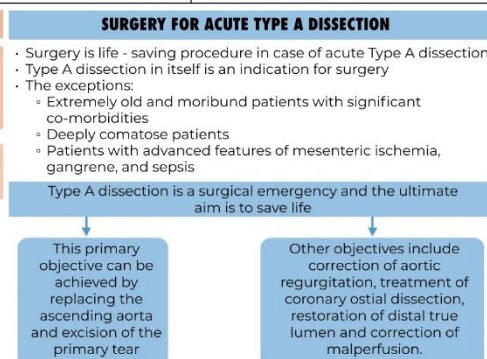
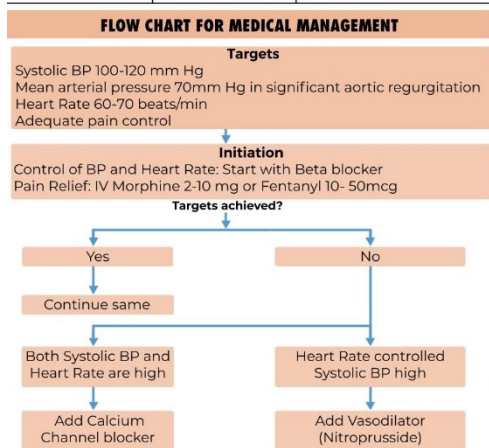
CT Angiography showing Type A Aortic Dissection



CT Angiography showing Type B Aortic Dissection

Dissection patients need management at specialized centers. Hence, after initiation of medical therapy, patient should be referred to specialized centre as soon as possible

ANTIHYPERTENSIVE DRUGS IN MANAGEMENT OF ACUTE DISSECTION			
Group	Drugs	Dose	Special precaution/contraindication
β-Blockers (one of these to be used)	Labetalol	Loading: 20 mg IV in 2 minutes Maintenance: 1-2 mg/minute	Hypersensitivity, Severe asthma, Heart block, Uncompensated heart failure, Severe chronic obstructive pulmonary disease, Severe Aortic Regurgitation (avoid extreme bradycardia)
	Esmolol	Loading : 250-500 µg/kg in one minute Maintenance: 50-100 µg/kg/min (maximum upto 300 µg/kg/min)	
	Metoprolol	Loading dose: 5mg IV over 2min, up to 3 doses; Maintenance dose: 3-5 mg every hour	
Calcium channel blockers (in addition to β blocker)	Diltiazem	Loading dose: 0.25 mg/kg over 2 to 5 min, Maintenance dose: 5mg/h IV infusion	Hypersensitivity, Atrioventricular block, Sick sinus syndrome, Ventricular dysfunction, Pulmonary congestion
	Nicardipine	2.5-15 mg/hour IV infusion	
Vasodilator (in addition to β blocker)	Nitroprusside	0.3-0.5 µg/kg/min (Maximum upto 10 µg/kg/min)	Hypersensitivity



- TYPE B DISSECTION REQUIRING INTERVENTION**
- Complications such as**
- Unremitting pain
  - Persistent, un-controlled hypertension
  - Hemodynamic instability
  - Rupture/Impending rupture/Leak
  - Rapid Aortic Expansion
  - Malperfusion
  - Retrograde Ascending aortic dissection
  - Aneurysmal dilatation (>5.5 cm)

- MANAGEMENT OF TYPE B DISSECTION**
- Gold standard in management of Type B dissection
    - Optimal medical therapy
    - Control of blood pressure and pain
  - Surgery or endovascular repair is reserved for complicated or high risk acute Type B dissections
  - Surgery aims at resection of the primary intimal tear and ruptured/aneurysmal aorta
  - Thoracic Endo-vascular Aortic Repair (TEVAR)** aims at
    - Covering the primary intimal tear
    - Expansion of the true lumen
    - Thrombolysis/remodeling of false lumen
    - Correction of malperfusion

- MANAGEMENT OF IMH AND PAU**
- The diagnosis of IMH and PAU is radiological and management is similar to acute aortic dissection

**ABBREVIATIONS**

<b>AAS:</b> Acute Aortic Syndrome	<b>FL:</b> False Lumen	<b>PAU:</b> Penetrating Aortic Ulcer
<b>AD:</b> Aortic Dissection	<b>IMH:</b> Intramural Hematoma	<b>TL:</b> True Lumen
<b>CT:</b> Computed Tomography	<b>JVP:</b> Jugular Venous Pressure	

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