Review Article

Aortic Dissection: Causes, Investigations and Treatment

Abstract

Background: Recently, new concepts have been developed for the diagnosis, classification and treatment of aortic dissection. The purpose of this article is to describe the current state of knowledge on the subject and to discuss any issues related to it. New data on the pathogenesis of aortic dissection focus on inhibitory surgery, biomarkers, and indications for the flow of 4D) magnetic resonance imaging. A new phase of aortic division (TEM, STS / SVS) has been proposed. Finally, the latest advances in treatment options for aortic dissection were introduced, such as the frozen elephant trunk, thoracic endovascular correction, and the Endo-Bentall concept as a future option findings.

Conclusion: The International Registry of Acute Aortic Dissection confirms that patient selection plays an important role in determining the outcome of surgery in patients with severe aortic dissection. Knowledge of risk factors important for active mortality may contribute to better management and more detailed risk assessment in patients with severe aortic dissection.

Keywords*: Aortic dissection; Aortic endograft; Classification system; Dissection type.*

Introduction

Although rare, acute aortic dissection (AAD) is a rare but disastrous problem. Aortic division is due to the separation of the layers of the aortic wall. The rupture of the inner layer results in further dissection (either proximal or retrograde) mainly due to the ingress of blood between the intima and the media. Dangerous aorta dissection is associated with very high mortality; most die even before reaching the emergency department. Patients with chronic aortic dissection (over two weeks) have slightly better prognosis. According to tradition described by a patient who complains of a sudden onset of severe 'broken' chest pain, presentations can often be subtle. Physicians rightly suspect a diagnosis in 15% to 43% of confirmed AAD cases. If left untreated, death is close to 50% in the first 48 hours. Despite the wealth of literature, a significant number of aortic dissections have been missed in the emergency department. There are two main anatomic categories used to differentiate aortic dissection. The Stanford system is widely used. It classifies the division into two types based on whether the ascending or descending part of the aorta is involved. Type A involves the ascending aorta, regardless of intimal tear. Type A dissection is defined as dissection near the brachiocephalic artery. Type B aorta dissection extending to the far left artery of the subclavia and which includes only the descending aorta. DeBakey's division is based on the location of the division of the division. Type 1 is from the ascending aorta and at least the aorta arch. Type 2 is internal and is limited to the ascending aorta. Type 3 begins in the descending aorta and extends far beyond the diaphragm (type 3a) or below the diaphragm (type 3b). Increased aortic dissection is almost doubled as a descending division (figure 1) (1).

Comment [NMME1]: Abbreviations should be written in full

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Comment [NMME6]: Beyond and below the diaphragm are the same meaning

Comment [NMME7]: The classifications need scientific revision.

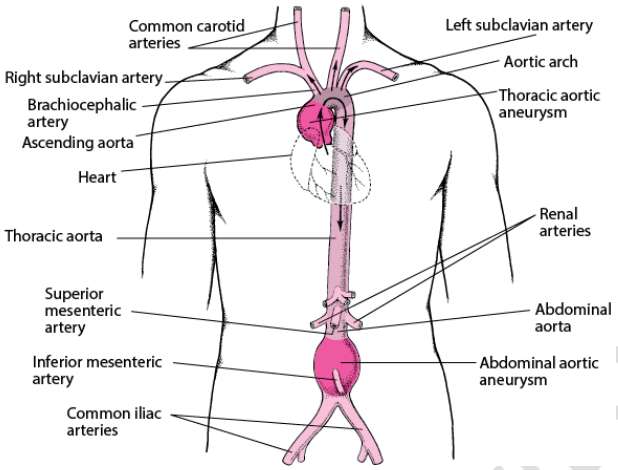

Figure 1 Overview of Aortic Dissection (1)

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Causes of Aortic Dissection

Factors that place a high risk of non-invasive aortic dissection include: High blood pressure (occurs in 70% of patients with distal Standford type B AAD). A sudden, temporary, severe increase in blood pressure (e.g., strenuous weight lifting and the use of sympathomimetic agents such as cocaine, ecstasy, or energy drinks). Genetic conditions including Marfan syndrome (In IRAD Review, Marfan syndrome was present in 50% of those under 40, compared with only 2% of older patients), Ehlers-Danlos syndrome, Turner syndrome, with bicuspid aortic valve, connecting the aorta. In patients with Marfan syndrome, cystic medial necrosis is seen in the muscles. Pre-existing aorta aneurysm. Atherossteosis. Pregnancy and childbirth (risk is included in pregnant women with tissue-related problems such as Marfan syndrome). Family history. Aortic instrumentation or surgery (coronary artery bypass, aortic or mitral valve replacement, and percutaneous stenting or catheter). Inflammatory or infectious diseases that cause vasculitis (syphilis, cocaine use) (figure 2) (2).

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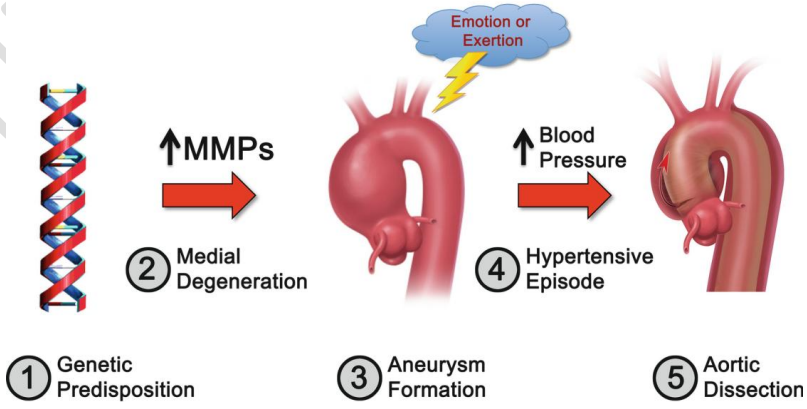

Figure 2 Causes of Aortic Dissection (2)

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Symptoms

The symptoms of aortic dissection vary. Many patients complain of sudden onset of severe chest, back, or abdominal pain. Some people experience shortness of breath, pain in the arms and legs, weakness, and loss of consciousness (syncope). Separation affects the arteries that supply the heart and can cause a heart attack. Patients can have a stroke if the dissection interferes with the blood supply to the brain. Because aortic dissection can mimic many other conditions, clinicians should include aortic dissection in the list of possible diagnoses so as not to overlook patients who complain of chest pain (3).

Mechanism of Aortic Dissection

The wall of the aorta consists of three layers: intima, media, and adventitia. Frequent exposure to high pulsatile pressure and shear pressure leads to a narrowing of the aortic wall in affected patients leading to intimate pain. After this recruitment, blood flows into the intima-media space, creating a false lumen. Most of these tears occur in the ascending aorta, usually on the right wall where a large shear force in the aorta occurs. AAD can spread anterograde and / or reverse and depending on the course of the dissection, causing branch blockage that produces ischemia of the affected area (coronary, cerebral, spinal, or visceral), and in close proximity to type A -AAD can cause a dangerous, aortic tamponade. recurrence or rupture of the aorta. In AAD, the real lumen is intact and the false lumen is internal to the media. In most cases, the true lumen is smaller than the false lumen. Over time, blood flowing through the false lumen leads to the development of a strong ruptured aneurysm. The three most common AAD sites are as follows: About 2-2.5 cm above the root of the aorta (the most common area). Just distal at the base of the left subclavian artery. In the aorta arch (figure 3) (4).

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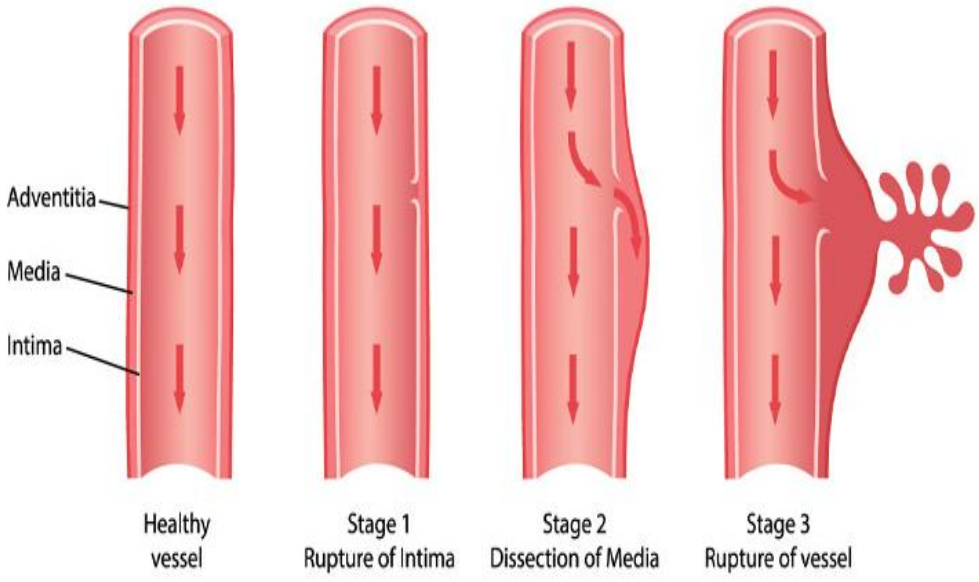

Figure 3 Stages of Aortic Dissection (4)

Classification

In the Debeki category of aortic dissection: Type I includes the ascending aorta, arch, and descending thoracic aorta and can develop to involve the abdominal aorta. Type II is trapped in the ascending aorta. Type III involves narrowing of the thoracic aorta distal to the left subclavian artery and adjacent to the celiac artery. The Class IIIb classification includes the thoracic part of the left subclavian artery and the distal abdomen of the aorta. In the Stanford stage of aortic bifurcation: Type A involves the ascending aorta and may involve the arch and thoracoabdominal aorta. Type B involves narrowing of the distal thoracic or thoracoabdominal aorta in the left subclavian artery without compromising the ascending aorta (figure 4) (5).

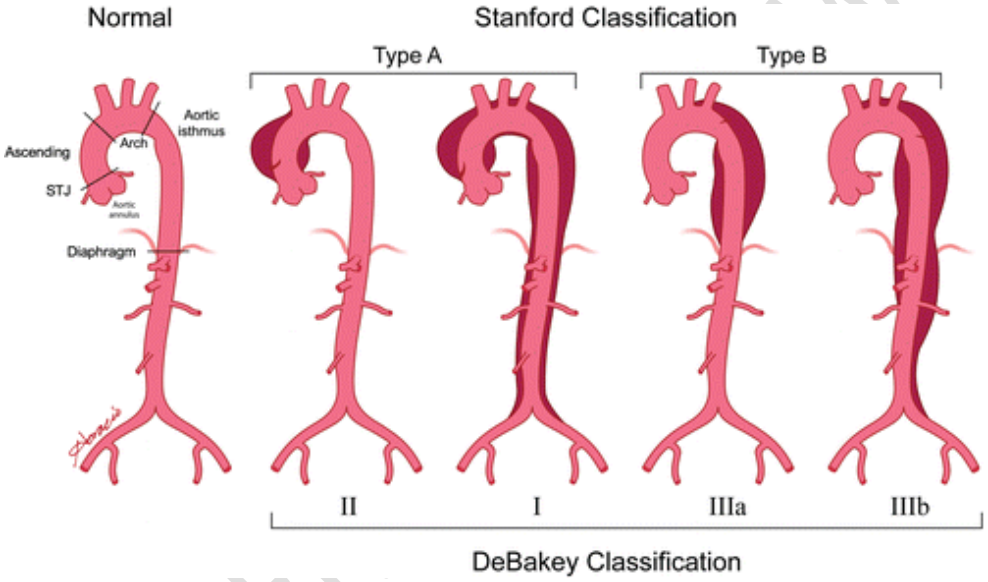

Figure 4 Classification of Aortic Dissection (5)

Investigations

Your doctor will perform a full-body test that includes measuring your blood pressure, listening to your heart, and checking your heart rate. Factors such as heartburn, which indicates aortic valve leakage, and abnormal pulse rates can increase the suspicion of a doctor being disconnected. An electrocardiogram (ECG) may indicate anatomical complications, including heart disease. A chest x-ray may show an enlarged aorta. However, ECG and chest x-rays may be completely normal for aortic dissection, and aortic dissection cannot be diagnosed or ruled out (6).

Common tests used to diagnose aortic dissection and its complications include computer tomography (CT), transesophageal echocardiography, and magnetic resonance imaging (MRI). All three tests are very accurate in diagnosing aortic dissection. Specific diagnostic tests are usually based on the availability and training of a particular hospital and the

Comment [NMME12]: You have mentioned the classification in the introduction. This repetition is not needed. Write it once after revision of the data and add good quality and illustrative images for both types.

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characteristics of each patient. CT scans should use intravenous (opposite) pigments to reveal lesions in the true and false lumens and branch vessels of the aorta. Transesophageal echocardiography can be performed near the patient's bed and requires the placement of an ultrasound probe in the patient's throat to align the heart with the aorta. Although diagnosing aortic dissection is more accurate, MRI scans take longer than other tests and are usually not the first choice. Note that aortic dissection may be detected by transthoracic echocardiography, which is an ultrasound performed on the chest wall. Some patients may need various tests to confirm aortic isolation and its complications. Currently, there are no blood tests available for acute aortic dissection (figure 5) (7).

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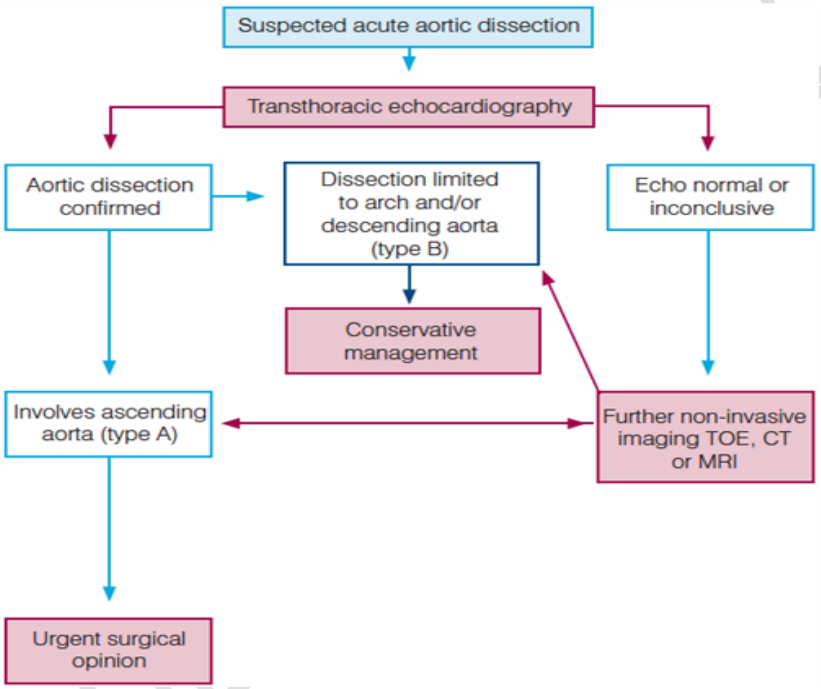

Figure 5 Aortic Dissection Investigations (8)

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Radiological Evaluation of Aortic Dissection

Plain radiograph

Chest x-rays may be normal or show some suggested findings, such as: Dilated mediastinum:> 8.0-8.8 cm at the level of the aortic knob on a portable anterior-posterior chest radiograph. However, the upper limit of this normal intensity depends on (and may be larger):) Depending on vision, FFD and X-ray tape, double aorta, abnormal aortic contour, internal migration of atherosclerotic calcification (1 cm from the end of the aorta), etiology, per-aortic or mediastinum: There may be signs of hematoma, including: blurred aortic knob, blurred AP window, mediastinal deviation, right throat or NGT, right trachea, main left bronchus (smaller angle than horizontal), left and / or Enlargement of right paratracheal line, apical capping, especially left (figure 6) (9).

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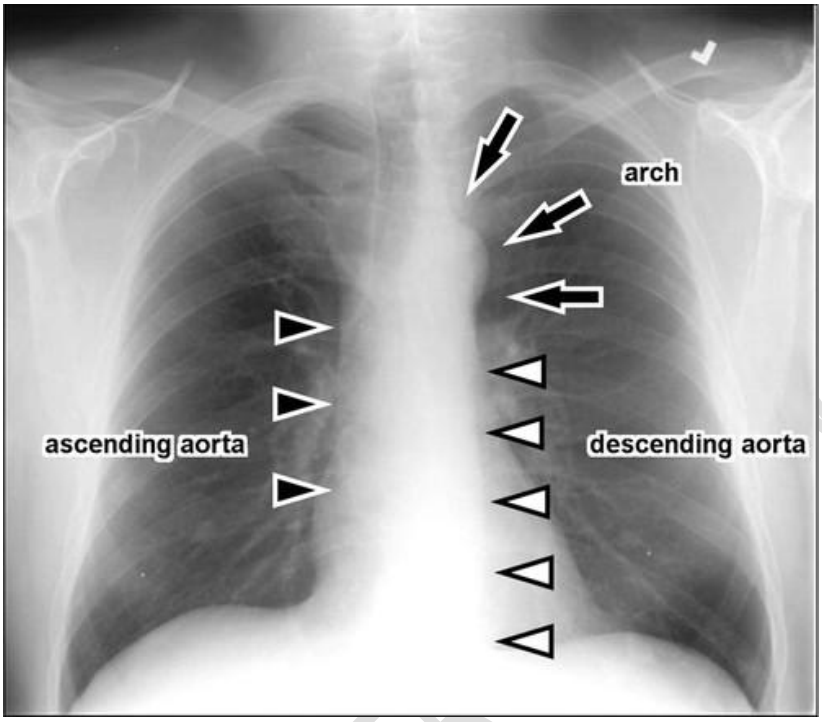

Figure 6 Plain radiograph of Aortic Dissection (9)

CT

CT is a particularly preferred study using enhanced arterial differentiation (CTA), which can not only diagnose and distinguish anatomy, but also diagnose distal disorders. Nearly 100% sensitivity and specificity have been reported. Non-invasive CT may reveal only subtle findings. However, high-density wall-wall hematomas are common. Removal of calcification of atherosclerosis of the lumen is also frequently seen. Ablation associated with the aortic root should be carefully assessed using the ECG Gate CTA, which eliminates flutter artifacts almost completely. Pulsating artifacts may mimic fragmentation and are more common and are found in 92% of non-portable CTA subjects. Advanced CT (preferably CTA) provides excellent information. Findings include intimal flaps, double lumens representing true and false lumens, enlargement of the aorta due to aortic dysfunction, potentially isolated aortic intramural hematoma, and Mercedes in the case of "third barrel" dissection. Includes Benz indications. Windsock sign, consider the characteristics of the problem of aortic dissection (10).

Identifying the true lumen is the most important part of the aortic dissection test, because placing the endoluminal stent in the false lumen can have negative effects. The difference between the two is usually straightforward, but in some cases, there is no apparent persistence of a single lumen with a normal vein. In such cases, many features are useful: the true lumen, which is often compressed by the wrong lumen of the upper and lower extremities, contains

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figures of the outer wall (useful for dynamic separation), usually associated with the aortic root, the aorta. Root. Celiac disease, SMA, and right renal artery stem are usually caused by true, false positives, usually false positives of bite size (but size is affected by cardiovascular disease), usually by low density difference , low elasticity and elasticity due to delayed opacity. Posterolateral aspect of the right, left descending aorta, peak mark, linear cord and dissection), perhaps a low-density thrombosed mural (usually in a permanent dissection), left renal artery generally false positive, Stanford A Thick and straight, instead of broken, The CTA X-ray report should include at least: proximal and distal. Degree of separation, location of internal tears, other associated types of AAS, size of aorta (largest orthogonal measurement), lesion and supply of aortic branches (from true or false lumen), presence of thrombosis in false lumen, signs of organ ischemia (figure 7) (11).

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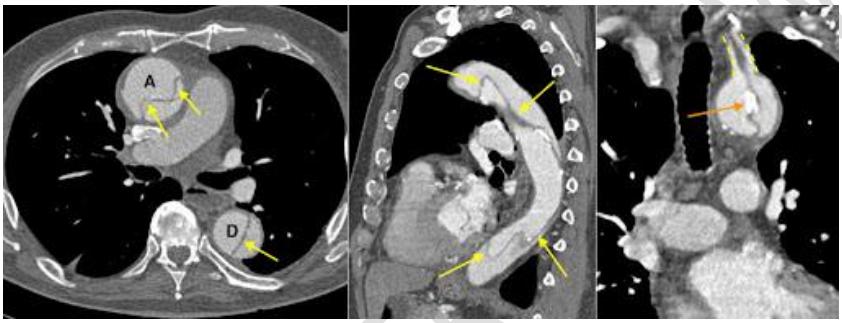

Figure 7 CT of Aortic Dissection (11)

Transesophageal Echocardiography

Transesophageal echocardiography (TOE) has greater sensitivity and clarity to aortic dissection testing, but due to limited access and its invasive nature, it is often replaced by CTA (or in some cases MRA) (figure 8) (12).

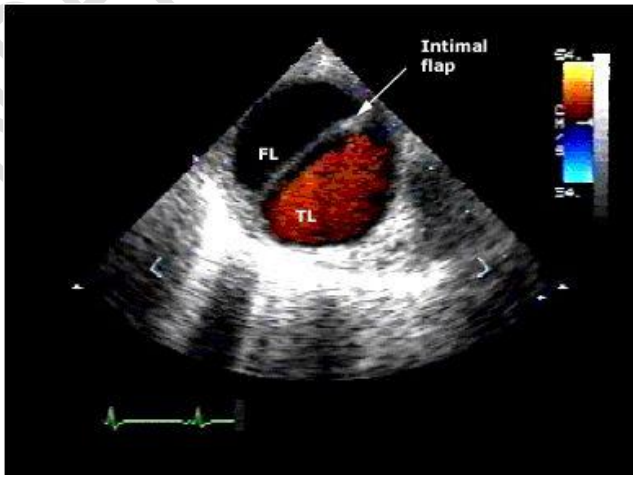

Figure 8 Transesophageal Echocardiography of Aortic Dissection (12)

MRI

Although MRA is usually reserved for follow-up testing, non-invasive rapid imaging techniques (e.g., true FISP) can be seen to play an important role in the critical diagnosis of MRI, especially in patients with dementia 'renal failure. It has similar sensitivity and specificity to CTA and TOE but has limited availability and difficulty in performing MRI in patients with pain (figure 9) (13).

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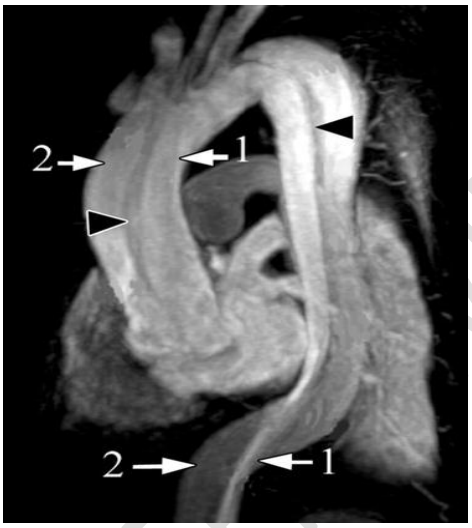

Figure 9 MR Angiography of Aortic Dissection (13)

DSA - angiography

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Historically, a common angiography was a standard gold probe for digital removal. The CTA has now been adapted as a first-line test, not only because it is not invasive but also because of a better definition of faded false positives, intramural hematoma and endothelial ischemia. Angiography is required for endometrial repair. Risks of angiography include the usual risks of angiography as well as the risk of false ligament insertion and aortic fracture (figure 10) (14).

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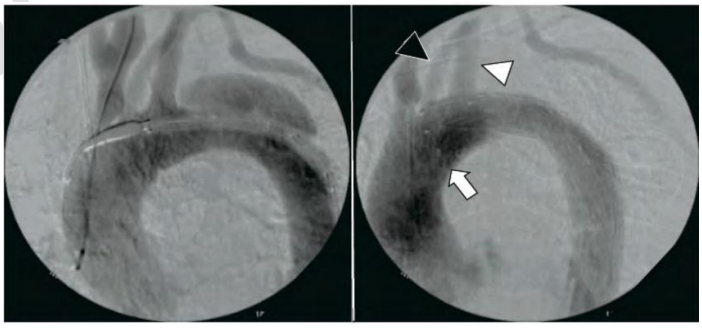

Figure 10 Digital subtraction angiography (14)

Prevention

You can reduce the risk of coronary heart disease by taking steps to prevent chest injury and keep your heart healthy. Check blood pressure. If you have high blood pressure, get a home blood pressure monitor to help monitor your blood pressure. Do not smoke. Take steps to quit if you smoke. Maintain proper weight. Eat a low-salt diet with lots of fruits, vegetables and whole grains and exercise regularly. Use a safety belt. This reduces the risk of chest injuries during a car accident. Work with your doctor. Tell your doctor if you have a family history of aortic dissection, connective tissue, or bicuspid aortic valve. If you have aortic aneurysm, find out how often you need to monitor it and if you need surgery to fix your aneurysm. If you have a genetic predisposition to an increased risk of aortic dissection, your doctor may prescribe medication, even if your blood pressure is normal (15).

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Treatment in General

When the patient is diagnosed with aortic dissection, the goal is to control the crying, determine if the tears are being used, and treat any problems. When controlling the cry, blood pressure is reduced as much as possible. Surgery will be considered and any problems resolved. Beta-blockers that control blood pressure (drugs that reduce heart rate and blood pressure) are usually given as the first drug to lower blood pressure. When a beta blocker is not used, calcium channel blockers such as diltiazem or verapamil are often used. As pain increases the patient's blood pressure, painkillers such as morphine are often needed. If these drugs are unable to control blood pressure, other drugs such as angiotensin converting enzyme or angiotensin receptor blocker inhibitors and / or intravenous hypertension drugs are usually required (figure 11) (16).

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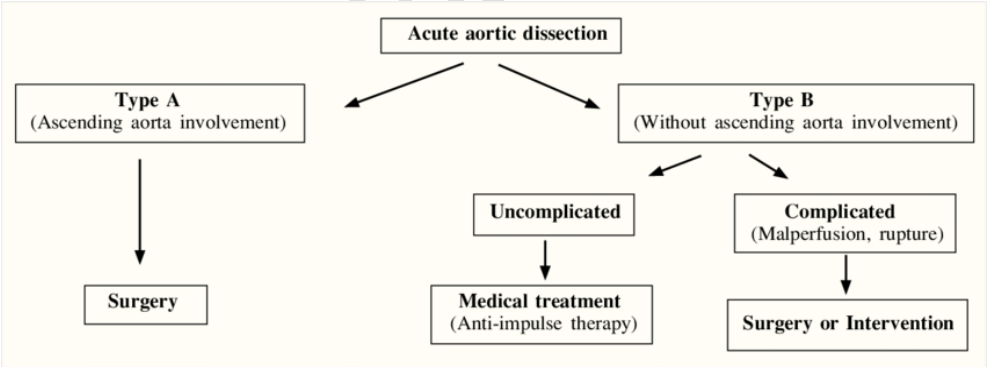

Figure 11 Algorism for Intervention in Case of Aortic Dissection (16)

Surgical Treatment

All patients with aortic dissection should be evaluated by a cardiothoracic surgeon. In patients, discharge from the ascending aorta (type A dissection) is indicated for immediate surgery. If the dissection only affects the lower aorta (type B), medical treatment is indicated, and surgery is generally not recommended. However, if the dissection proceeds rapidly, there is a risk of a lack of blood flow (improper perfusion) due to aorta or rupture of vital organs,

insufficient radiologist or surgeon may use a catheter-based procedure to correct the destruction of vital arterial organs or Emergency Aortic Surgery (17).

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Emergency surgery to repair a dislocated aorta is very aggressive and difficult. This usually requires a dacron (artificial material) graft that occupies part of the aorta to prevent blood flow in the false lumen. On average, the risk of dying from a severe aortic dissection is about 20%. The risk is much higher in some patients with serious complications. Other options, such as endovascular stenting, are currently being evaluated as an alternative to certain patients with type B dissection. This procedure repairs the aorta by inserting a stent graft from the lower extremity artery to the aorta. Research is ongoing to explore this approach (figure 12) (18).

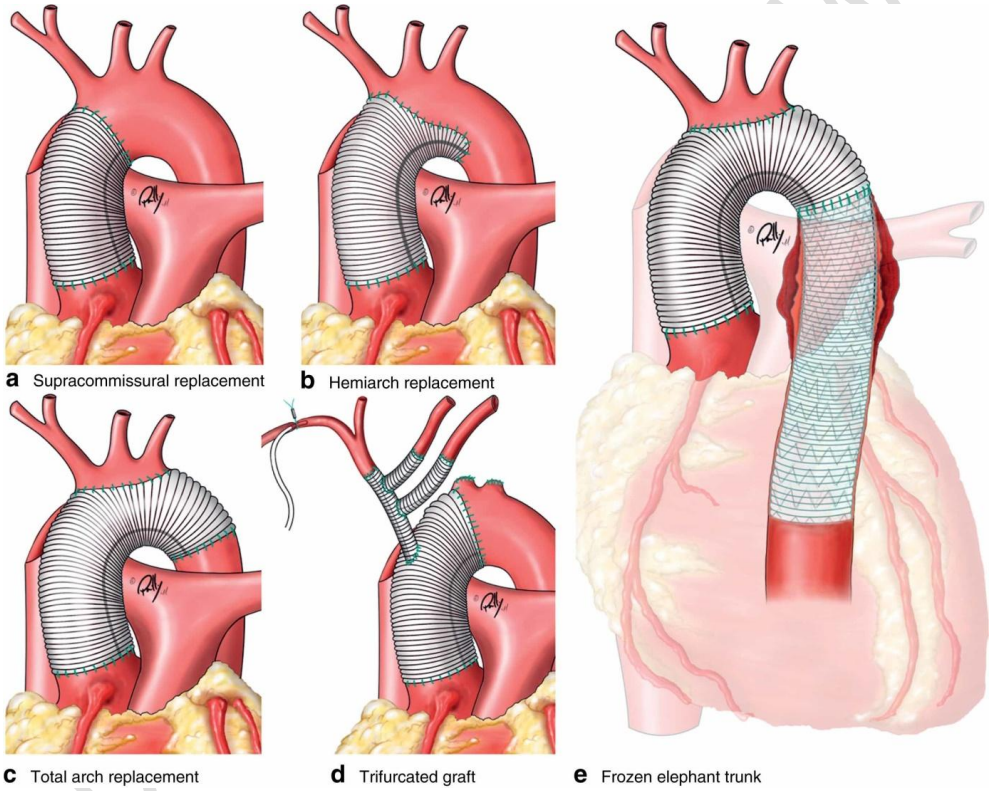

Figure 12 Surgical Interventions in Case of Aortic Dissection (18)

Treating Complications

Because it is a branch of many important arteries from the aorta, some arteries may be affected with dissection. If the arteries that compress the heart are at risk, they may need to be repaired during surgery (which may require coronary artery passage). The aortic valve, a one-way valve that allows blood to flow from the heart to the aorta, may need to be repaired or replaced with a prosthetic valve if isolation causes severe valve leakage. After surgery, patients often have to stay in the intensive care unit for close monitoring. Recovery from

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surgery usually takes 7 to 10 days. Before the patient is discharged, another CT or MRI is usually performed as a preliminary examination, confirming that the dissection has not progressed (19).

Results

The death toll at the hospital was 25.1%. Group I mortality was 31.4% compared to 16.7% in group II (P <.001). Independent predictors of preoperative mortality surgery were a history of aortic valve replacement (average imbalance = 3.12), migratory chest pain (average = 2.77), hypotension as a symptom of severe aortic dissection (aortic ratio = 1.95), shock or tamponade (complications average = 2.69), preoperative heart tamponade (incontinence = 2.22), and preoperative ischemia (odd ratio = 2.10) (20).

Comment [NMME35]: What are these results? Of which research? The current one? Isn't it a review article?

Discussion

Aortic dissection is not common, but usually manifests itself as a serious disease with severe chest or back pain and severe hemodynamic congestion. Early diagnosis and treatment are essential for survival. Aortic dissection may be associated with fractures of the pericardium, which causes cardiac tamponade, annual aortic dissection of the aorta leads to acute aortic regurgitation, coronary artery occlusion and terminal failure. Closure of abdominal aortic branchial blood vessels. The International Registry of Acute Aortic Dissection (IRAD) provides current observations from patient groups around the world at sites that anticipate and endorse medical model testing. Mortality associated with aortic dissection was high, historically up to 30 percent. However, advances in cardiac surgery have reduced the expected mortality associated with type A dissection by about 20 percent (21).

Conclusion

Several studies show that the best way to manage patient outcomes is a team of healthcare professionals consisting of a cardiologist, an intensive care physician, a pulmonologist, a nephrologist, a cardiologist, a partial radiologist, and an anesthetist. In addition, the pharmacist must educate the patient on the importance of blood pressure control and medication compliance. The effect of an aortic dissection is usually better in high-volume centers than in smaller centers with fewer than 5 cases per year.

Comment [NMME36]: ???

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