

PROFILE AND MANAGEMENT OF PATIENTS WITH AORTIC DISSECTION: A NARRATIVE REVIEW

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Abstract: Objectives: Explain the main concepts of aortic dissection, delving into its epidemiology, patient profile, diagnosis and management. **Methodology:** A narrative review of the literature was carried out based on 20 scientific articles. **Results:** Acute aortic dissection is the rupture of the intima layer of the aorta, with blood penetrating between the middle and intima layers of the artery, dissecting one from the other, creating a space called false lumen. The annual incidence of aortic dissection (AD) varies from 4.6 to 7.2 per 100 thousand inhabitants. It mainly affects males (66%), with an average age of 60 years, while in females (34%) it manifests itself at an average age of 67 years. Among the causal factors related to AD, there are acute, chronic, acquired or genetic factors. SAH is the most common with a prevalence of 76.6% in all those affected by AD. Its main clinical characteristics are acute chest pain, back pain and syncope. On physical examination, it is possible to observe hypotension and tachycardia caused by cardiogenic shock, reduction or absence of peripheral pulse, probable diastolic murmur of aortic regurgitation, and, in 30% of cases, there is a difference in systolic blood pressure greater than 20 mmHg between the limbs. Surgical treatment is indicated for ascending aortic dissections. **Conclusion:** AD presents numerous risk factors. Diagnosis is clinical along with contrast CT angiography. AD management initially consists of controlling pain, blood pressure and heart rate.

Keywords: Aortic Dissection, Epidemiology, Diagnosis and Therapeutics.

INTRODUCTION

Acute aortic dissection (AD) is a cardiovascular emergency with high mortality. This disease consists of the formation of a false lumen due to the separation of the layers of the aorta artery (BEZERRA PCLB,

et al., 2021). Currently, there are 2 ways of classifying the pathology based on the aortic segment involved - the Stanford classification and the DeBakey classification (BEZERRA PCLB, et al., 2021; SAYED A, et al., 2021). Epidemiological data, however, is scarce and can estimate the occurrence of approximately 6 cases per 100,000 inhabitants per year (BEZERRA PCLB, et al., 2021). Its symptoms, which are commonly non-specific, make suspicion and diagnosis difficult, which is carried out with the aid of a computed tomography examination (SAYED A, et al., 2021; RYLSKY B, et al., 2023; NAZERIAN P, et al., 2018).

AD has numerous risk factors. Among them, we can mention trauma, cocaine use, male sex, advanced age from 63 years old, high blood pressure in up to 70% of cases, history of heart surgery, atherosclerosis and patients with aortic aneurysms. Furthermore, the middle layer of the aorta can also be affected due to abnormalities in the bicuspid aortic valve, inflammatory vasculitis, Marfan syndrome and infections (BOSSONE E and EAGLE KA, 2021; CAMARGO DP, et al., 2022). Due to the severity of the pathology, patients may develop irreversible sequelae (RIMMER LJ, et al., 2020). For example, individuals who have had AD have a more dilated aorta, with a greater risk of damage to the vessel wall, a greater likelihood of cardiovascular disease, including aortic rupture or a new episode of dissection (FENG D, et al., 2021).

AD can present a diverse clinical picture and, despite diagnostic and therapeutic advances, the complications of the disease remain high (BOSSONE E and EAGLE KA, 2021). It is the pathology with the highest mortality among acute aortic syndromes with sudden onset of chest pain, with 1% per hour in the first 48 hours, and 75% at the end of the second week. Less than 10% of untreated patients survive for one year (SANTOS CRC,

et al., 2015).

The diagnosis of aortic dissection is clinical in conjunction with complementary exams, with contrast angiotomography being the gold standard (BEZERRA PCLB, et al., 2021; RIMMER LJ, et al., 2020). The management of AD depends, in addition to the patient's profile, on the affected aortic segment and the level of AD complication for treatment indication. Such factors will define whether the treatment must be surgical, which can be conventional open or endovascular (RYLSKY B, et al., 2023). In addition to this, there is a recommendation for drug therapy to control symptoms, mainly to reduce blood pressure, as it is associated with a reduction in mortality in patients (SAYED A, et al., 2021). Based on this analysis, this review aims to expose the main concepts of aortic dissection, delving deeper into its epidemiology, patient profile, diagnosis and management.

METHODOLOGY

A narrative review of the literature was carried out based on 20 scientific articles, which ranged from 2017 to 2023 during the months of July to September 2023. The articles covered the English, Portuguese and Spanish languages and were removed from the databases of LILACS, PubMed and Scielo data. The descriptors used were "Aortic Dissection", "Epidemiology", "Diagnosis" and "Therapeutics".

RESULTS

DEFINITION AND PATHOPHYSIOLOGY

Acute aortic dissection is the rupture of the intima layer of the aorta, with blood penetrating between the middle and intima layers of the artery, dissecting one from the other, creating a space called false lumen. It is a clinical condition that can be fatal, in which the subsequent propagation of blood flow

through the false lumen can be followed by aortic rupture that causes exsanguination and death (CAMARGO DP, et al., 2022).

EPIDEMIOLOGY AND RISK FACTORS

It is estimated that the annual incidence of AD varies from 4.6 to 7.2 per 100 thousand inhabitants (MECCANICI F, et al., 2022; MCCLURE RS, et al., 2018). This pathology mainly affects males (66%), with an average age of 60 years, while in females (34%) it manifests itself at an average age of 67 years (EVANGELISTA A, et al., 2018; MECCANICI F, et al., 2022). The literature suggests that an older age at diagnosis, attributed to women, is in line with the incidence of cardiovascular diseases in general (MECCANICI F, et al., 2022).

Among the causal factors related to AD, there are acute factors (such as trauma and cocaine use), acquired chronic factors (such as high blood pressure and atherosclerosis) and genetic factors (such as bicuspid aortic valve and Marfan Syndrome) (BOSSONE E and EAGLE KA, 2021). In this scenario, hypertension (mainly not controlled by drug therapy) is the most common risk factor with a prevalence of 76.6% in all those affected by AD (EVANGELISTA A, et al., 2018). Similarly, pre-existing conditions such as atherosclerosis (26.5%), previous heart surgery (16.1%) and aortic aneurysm (15.5%) are common in the presentation of the disease (EVANGELISTA A, et al., 2018).

At the same time, when comparing the epidemiological profile of young patients with those of more advanced age, it is clear that the latter are more likely to have chronic diseases such as hypertension and atherosclerosis, while the former are more likely to have congenital diseases or connective tissue diseases (HUYNH N, et al., 2019). In this sense, patients with a bicuspid aortic valve

represent up to 9% of those diagnosed with AD under 40 years of age, compared to 1% of those over 40 years of age. Likewise, Marfan Syndrome is present in up to 50% of those under 40 years of age with AD, compared to 4.4% of all those affected (EVANGELISTA A, et al., 2018).

RATINGS

The classification of aortic dissection is based on its anatomical location, the main ones being: Stanford and DeBakey. The Stanford classification defines it as type A when it involves the ascending aorta and as type B when it involves only the descending aorta. On the other hand, DeBakey's classification categorizes according to the compromised segment and its extent. In type I, the rupture is located in the ascending aorta and affects all segments of the aorta. In type II, only the ascending aorta is involved. In type III, it only affects the descending aorta (DINATO FJ, et al., 2018).

Another possibility of classification is according to the time of onset of symptoms. Dissection is defined as acute when the first episode of chest pain appears within a period of up to 1 week; subacute up to 1 month; chronic when present for more than 1 month. This information is important as it influences the patient's prognosis, since the most serious complications occur in the first hours or days (FRÍAS AS and MOLINA AEF, 2020).

DIAGNOSIS

AD is a potentially fatal condition, which is why early diagnosis is extremely important for patient survival and must be carried out thoroughly, avoiding possible errors in diagnosis. Given this, it is worth highlighting an autopsy study that was carried out with 388 patients, of which 63% were not diagnosed with AD before death, thus neglecting the investigation of AD in these individuals, and

thus resulting in a late diagnosis. (HUYNH N, et al., 2019).

Aiming to reduce cases of late diagnosis, many studies sought to analyze high-risk clinical characteristics to predict AD early and then confirm the investigation with the aid of cardiovascular imaging tests. The three main clinical characteristics used to identify AD were cutting chest pain, difference in pulse or blood pressure (> 20mmHg) between the upper limbs and widening of the mediastinum on chest radiography (LOVATT S, et al., 2022). Furthermore, the Aortic Dissection Detection Risk Score (ADD-RS) is very relevant to reach the correct diagnosis. This method varies between a score of 0 to 3 and the score is based on the presence of one or more markers, these being high-risk genetic factors, chest pain and physical examination findings of low perfusion. The presence of >1 marker (ADD-RS= 2 or 3) represents a high risk of acute aortic dissection (DINATO FJ, et al., 2018)

D-dimer is a degradation product of cross-linked fibrin and high levels of this biomarker may be indicative of AD, but it is not an accurate factor for diagnosis (MORELLO F, et al., 2021). Given this, the D-dimer associated with ADD-RS exponentially increases diagnostic performance, aiming to effectively rule out suspicions of AD (GORLA R, et al., 2017). With this, it was possible to verify that the combination of a low probability acute aortic dissection risk score (ADD-RS 0 or 1) together with a negative D-dimer, that is, less than 500 ng/dl, helps in the diagnostic exclusion of acute aortic dissection (NAZERIAN P, et al., 2018).

In general, there are no accurate biomarkers available to detect AD. Therefore, advanced imaging tests are necessary to obtain a conclusive diagnosis. Computed tomography angiography is a test widely used in hemodynamically stable patients,

as it is widely available and has excellent diagnostic performance due to its high sensitivity. However, in unstable patients, the use of transesophageal echocardiography is indicated, given its use at the bedside. Magnetic resonance angiography is highly sensitive and specific, but is less used due to its low availability (MORELLO F, et al., 2021; DINATO FJ, et al., 2018).

CLINICAL PICTURE AND TREATMENT

The manifestation of AD is not specific due to the fact that it presents symptoms similar to other conditions of acute aortic syndrome (CAMARGO DP, et al., 2022; RIMMER LJ, et al., 2020). The most common symptom, reported in 85% of patients, is acute and exacerbated chest pain with an abrupt onset. Generally, patients with type A AD describe high-intensity anterior chest pain, while type B patients report excruciating abdominal pain and back pain. Pain displacement may also occur following the dissection route (SHARIF M, et al., 2020).

When performing the physical examination, in some cases it is possible to detect hypotension and tachycardia caused by cardiogenic shock, reduction or absence of peripheral pulses, probable diastolic murmur of aortic regurgitation (SHARIF M, et al., 2020), and, in 30% of cases, in some cases, there is a difference in systolic blood pressure greater than 20 mmHg between the upper limbs. The minority of patient's present syncope and neurological manifestations of motor or sensory focus (CAMARGO DP, et al., 2022).

The initial treatment of aortic dissection consists of controlling heart rate and systolic blood pressure. The treatment target is a heart rate < 60 beats per minute and systolic blood pressure of 100 to 120 mmHg. Recommended medications include the ultra-short-acting

beta-blocker Esmolol with an initial bolus of 500 ug/kg, followed by an infusion of 50 to 200 ug/kg/min. Labetalol is an alternative and can be used. For those who cannot tolerate beta-blockers, an option is the calcium channel blockers diltiazem and verapamil (DINATO FJ, et al., 2018).

If high blood pressure persists, sodium nitroprusside is a powerful vasodilator, but a beta-blocker must always be used first due to the sympathetic response that will contract the heart to compensate, causing further damage to the aortic wall. Its initial dose is 0.5 to 3 ug/kg, being used less than nitroglycerin. Pain control is also extremely important in the management of AD, with opioids being an option (DINATO FJ, et al., 2018).

Surgical treatment is indicated for ascending aortic dissections. Intraoperative mortality is high (7% to 36% in reference services). However, the survival rate of patients undergoing surgery is 70% and 10% in clinical treatment. Age over 70 years can be a predictor of a worse prognosis, but age does not contraindicate surgery (DINATO FJ, et al., 2018). Early global mortality for acute type B AD was around 13%. In this registry, in-hospital mortality was significantly higher after open surgery (34%) than after endovascular treatment (GONÇALVES FB, 2023).

CONCLUSION

Aortic dissection is a cardiovascular emergency with high mortality, with approximately 6 cases per 100,000 inhabitants per year. AD has numerous risk factors, including trauma, cocaine use, male sex, advanced age, high blood pressure, history of heart surgery, atherosclerosis, patients with aortic aneurysms and also abnormalities in the bicuspid aortic valve, inflammatory vasculitis, Marfan syndrome and infections. Diagnosis is clinical along with contrast CT

angiography. The management of AD initially consists of pain, blood pressure and heart rate control, together with the assessment of the patient's profile, the aortic segment involved and the existence of complications to indicate open or endovascular surgical treatment.

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