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CASE REPORT

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Aortic Dissection: Spectacular Survival or Nightmare?

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ABSTRACT

We describe the case of a male patient who remarkably survived two severe cardiovascular events: ascending aortic dissection and descending aortic dissection two years later.

Later, the third occurrence of aortic dissection, this time involving the abdominal aorta, became an absolute nightmare for the patient, progressively being complicated by periaortic hematoma and severe anemia – events that ultimately led to his death.

Keywords: dissection, aorta , survival

INTRODUCTION

Aortic dissection represents a life-threatening surgical emergency with a considerably increased early mortality rate.

At the time of onset, mortality risk is as high as is 30% and gradually increases to 50% within the first 48 hours of onset (approximately 1-2% of patients die every 60 minutes) (1, 2).

Damage to the structural integrity of the intima and media results in aortic dissection, leading to the rupture of the intima, emergence of the dissection fold and separation of layers of the aortic wall into a false lumen and the actual lumen, with or without communication between the two entities (3).

Aortic dissection has been attributed to risk factors including hypertension, smoking, advanced age, genetic diseases such as (Marfan syndrome, Loeys-Dietz syndrome, Ehlers-Danlos syndrome or Turner syndrome), also congenital conditions such as (bicuspid aortic valve and coarctation of aorta) as well as various other conditions, including inflammatory vasculitis, infections of the aortic wall, pregnancy, polycystic kidney disease or a history of cardiovascular surgery (1, 3). ❑

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CASE PRESENTATION

We describe the case of a 53-year-old male patient, former smoker (10 packs/year and ex-smoker for five years), who came to our clinic with severe anterior chest pain with interscapulo-vertebral radiation and inspiratory dyspnea at rest. It should be noted that the patient's symptoms began two weeks prior to admission and were relatively stable until the final 12 to 24 hours before admission, when they progressively deteriorated and became severe.

The patient's family history was not known and his past medical history revealed the following data: ascending aorta dissection, the involved segment being replaced with a 24 mm Dacron prosthesis and E-VITA stent-graft implantation (https://onlinelibrary.wiley.com/doi/epdf/10.1111/jocs.15044) (4) performed at the level of the aortic arch using the hybrid technique (https://onlinelibrary.wiley.com/doi/epdf/10.1111/jocs.15044) (4), along with reimplantation of the supra-aortic arterial trunks (four years before); descending aorta dissection with E-VITA stent-graft implantation which was placed at supra-celiac level for distal endo-leak (two years before); and hypertension and dyslipidemia. No relevant personal and familial medical history was found.

Pre-admission medication included beta-blockers, antiarrhythmics, dihydropyridine calcium channel blockers, and alpha-2-agonists with central action (Nebivolol 5 mg/day, Amiodarone 200 mg/day, Lercanidipine 10 mg/day, Moxonidinum 0.4 mg/day).

Physical examination at the time of admission showed a moderately altered general condition, with cardiovascular examination revealing rhythmic heart sounds synchronous with the peripheral pulse; systolic blood pressure (SBP) 80 mm Hg and diastolic blood pressure (DBP) 50 mm Hg measured at the left upper limb; SBP 125 mm Hg and DBP 60 mm Hg at the right upper limb. The respiratory system examination revealed thoracic asymmetry, vesicular breath sound in the right hemithorax without added sounds, vesicular breath sound abolished in the left hemithorax, SaO_2 85% without O_2; SaO_2 97% on oxygen mask with 5 L/min; arterial congestion (pO_2 80 mm Hg; pCO_2 55 mm Hg); pale skin and mucous membranes; normal body weight, with a body mass index (BMI) 20 kg/m^2).

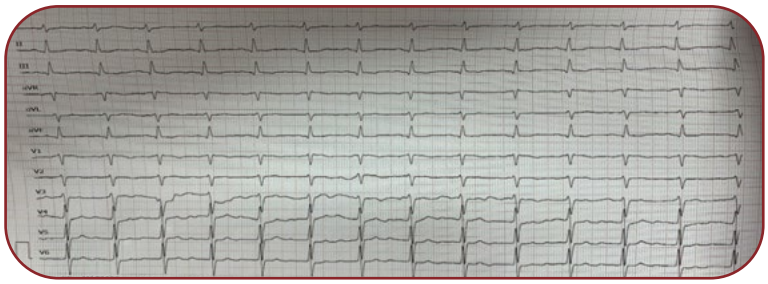

FIGURE 1. Electrocardiogram at presentation

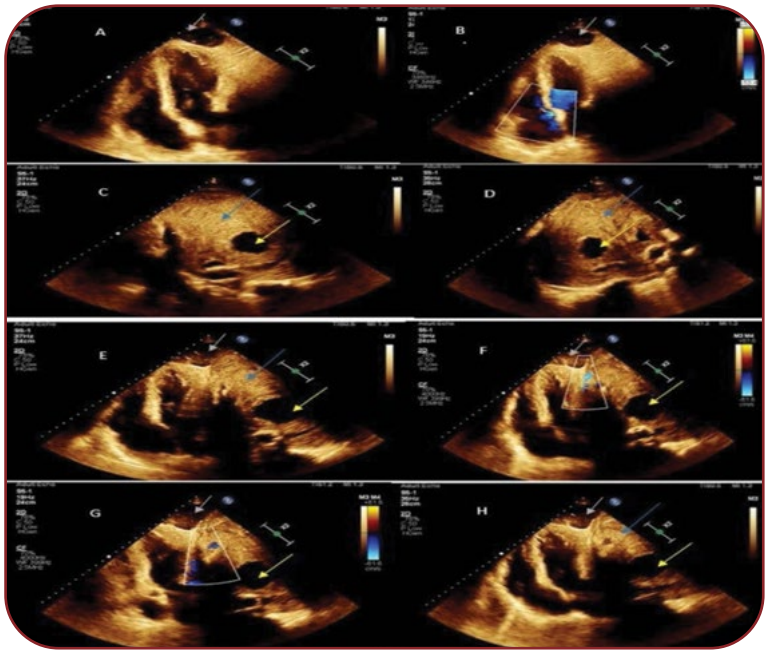

FIGURE 2. Transthoracic echocardiography – apical section four chambers (A, E, F, H); two chamber view (G); colour Doppler examination (B, F, G); A, B, E, F, G, H (grey arrow) collapsed left lung parenchyma; C, D, E, H (blue arrow) massive periaortic hematoma; and C, D, E, F, G, H (yellow arrow) true aortic lumen.

Laboratory findings showed leukocyte count 6.3 thousand/µL (4.0-10.0 thousand/µL); number of erythrocytes 2.88 million/µL; severe anemia with hemoglobin (HGB) 5.4 g/dL (13.0-17.0 g/dL); PLT: 254 thousand/µL (150-400 thousand/µL); serum creatinine 1.09 mg/dL; ALT 11 U/L; AST 15 U/L; LDL-cholesterol 64 mg/dL; HDL-cholesterol 48 mg/dL; triglycerides 47 mg/dL; total cholesterol 125 mg/dL; TSH 8.78 µIU/mL; and FT4 22.14 pmol/L.

The electrocardiogram highlighted patient in sinus rhythm; ventricular rate 80 beats/minute; QRS axis at +90°; negative T waves in DIII; aVF; left anterior-superior hemiblock (Figure 1).

The echocardiography performed at presentation showed a non-dilated left ventricle with preserved systolic function, concentric left ven-

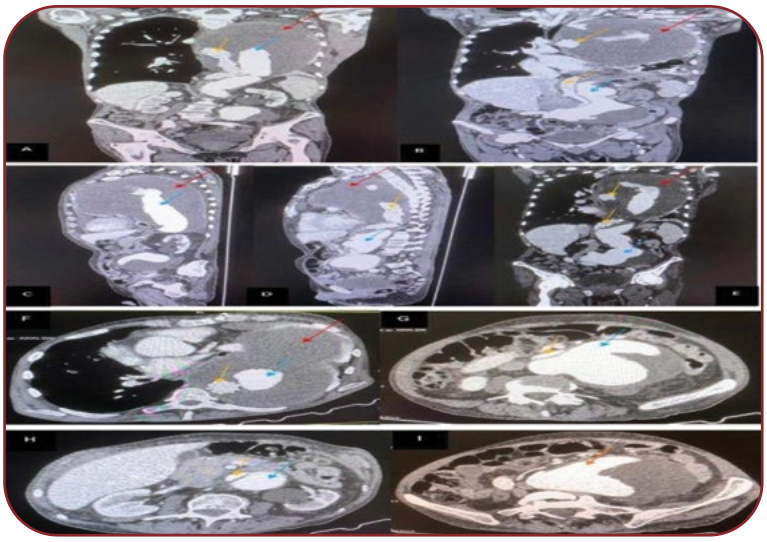

FIGURE 3. Angio CT aorta: ascending, descending and abdominal aorta – coronary plane (A, B, E); sagittal plane (C, D); axial plane (F, G, H, I). A, B, C, D, E, F (red arrow) massive aneurysm and periaortic hematoma at the level of the aortic arch with extension to the level of the descending thoracic aorta; A, B, D, E, F, G, H (yellow arrow) true aortic lumen; A, B, C, D, E, F, G, H (blue arrow) false lumen; B (green arrow) collapsed left pulmonary parenchyma, remaining; I (orange arrow) partially thrombosed abdominal aortic aneurysm.

tricular hypertrophy, mild mitral insufficiency, moderate tricuspid insufficiency, medium secondary pulmonary hypertension, massive mediastinal and periaortic hematoma, and hematoma at the antero-lateral level of the apex of the left ventricle (Figure 2).

The computed tomography (CT) angiography of the ascending, descending and abdominal aorta performed in the first 60 minutes after presentation revealed massive aneurysm of the aortic arch extending to the level of the descending thoracic aorta, with massive aortic dissection along the entire length of the aorta down to the bifurcation of the abdominal aorta; metal clips sleeve the aorta from the level of the aortic arch to the sub-diaphragmatic level of the abdominal aorta; aspect of dissection of the aorta at the level of the descending aorta until the bifurcation of the abdominal aorta into the iliac arteries with a real lumen of 16 mm, the false lumen 87 mm (Aortic dissection = transversal tear of the intima and of the internal layers of the media called portal of entry which leads to the separation of the layers of the aortic wall further causing the formation of a lumen containing a parallel blood stream called false lumen which can expand distally or proximally to the portal of entry inside the aortic wall.) (1); left lung parenchyma collapsed by the aortic formation that occupied almost the entire lung field, trachea, mediastinum compressed and displaced to the right; bilateral delayed kidney perfusion, impeded secretion and excretion especially in the left kidney due to the pressure exerted by the aortic aneurysm (Figure 3).

Based on the clinical examination corroborated with paraclinical data, the following diagnosis was established: subacute dissection of thoracoabdominal aorta De Bakey type I, aortic dissection extending over the entire length of the aorta until the level of the abdominal aorta bifurcation (Table 1).

Patient's status post-dissection of the aorta and replacement of the ascending aorta with a 24 mm Dacron prosthesis and E-VITA stent-graft implantation at the level of the aortic arch using the hybrid technique with reimplantation of the supra-aortic arterial trunks (four years before).

Patient's status post-dissection of the descending aorta with E-VITA stent-graft implantation at the level of the descending aorta up to the supra-celiac level for distal endo-leak (two years before).

TABLE 1. Classification of aortic dissection (1, 3)

Anatomo-pathological classification	Classification according to evolution	Classification according to the onset of symptoms
1. **By Bakey** • Type I – dissection with extension from the level of the ascending aorta towards the aortic arch and the descending aorta • Type II – dissection limited to the level of the ascending aorta • Type III – dissection located at the level of the descending aorta IIIA – dissection with extension from the left subclavian artery to the subdiaphragmatic level III B – dissection in the upper abdominal region 2. **Stanford** • Type A – dissection involving the ascending aorta • Type B – dissection without involvement of the ascending aorta	Aortic dissection: - complicated - uncomplicated Aortic dissection with propagation: - anterograde - retrograde	Aortic dissection: - acute: in the first 14 days - subacute: from at least 15 days to 90 days - chronic: over 90 days

Further findings included essential arterial hypertension stage II with very high cardiovascular risk, heart failure NYHA III, left antero-superior fascicular block, mild degenerative mitral insufficiency, moderate functional tricuspid insufficiency, moderate secondary pulmonary hypertension, dyslipidemia, and severe anemia.

The patient received medical treatment, including beta-blockers, antiarrhythmics, dihydropyridine calcium channel blockers, angiotensin converting enzyme inhibitors, alpha-2-agonists with central action; proton pump inhibitors, analgesics (opioids) and transfusion of erythrocyte mass, which resulted in temporary hemodynamic stability. Considering the above diagnosis, the patient had an indication for emergency surgical treatment for thoraco-abdominal aorta reconstruction, which explained why he was transferred to a surgical unit in view of performing this type of surgery.

After the patient was transferred with the intention of surgical treatment for the reconstruction of the thoracoabdominal aorta, his condition deteriorated. He died shortly thereafter, being thus unable to benefit from surgical correction.

Differential diagnosis – cardiovascular diseases: acute myocardial infarction, acute heart failure, pulmonary thromboembolism, left subclavian artery stenosis; pulmonary diseases: pneumothorax, acute pneumopathy, atelectasis, pleurisy. ❑

DISCUSSION

Currently there are at least three classifications of aortic dissection according to the anatomo-pathological classification, classification according to evolution, classification according to the moment of symptom onset (Table 1).

Pain, typically felt like a tearing, stabbing pain, is the most common clinical presentation of aortic dissection (5-8).

Other symptoms include syncope and symptoms related to the perfusion deficit and ischemia of the target organs caused by the obstruction produced by the dissection fold (9, 10).

Aortic dissection is characterized by the following clinical symptoms: pulse deficit and left-right blood pressure differences, limb ischemia, focal motor deficits (9, 11, 12), paraplegia, mesenteric ischemia and renal ischemia (9, 11-14).

Immediate complications in aortic dissection include pericardial effusion, cardiac tamponade, acute aortic regurgitation, periaortic hematoma, and myocardial ischemia (most commonly inferior myocardial infarction) (2, 7, 9, 14-24).

Delayed complications in patients who did not undergo surgical treatment include sudden death or aortic rupture (25, 26).

Possible complications in patients who underwent endovascular treatment include recurrent aortic dissection in the distal segment, retrograde aortic dissection, aortic rupture, severe aortic regurgitation, stroke, and sudden death (24, 27, 28).

The diagnosis is based on the clinical and paraclinical examination. Clinical presentation and associated risk factors play an important role in diagnosis. The imaging evaluation is based on transthoracic echocardiography, transesophageal echocardiography, computed tomography or nuclear magnetic resonance (9, 29-36). These types of investigations seek to establish a diagnosis of certainty by highlighting the dissection fold, type of dissection, location of the entrance portal, location of the portal of exit, identification of the false and true lumen, but also the diagnosis of possible complications associated with them (3, 33).

Treatment is divided into medication (essential for pain management and hemodynamic status) (3, 37), surgical and endovascular (38), which is different depending on the type of dissection (39-42).

Recurrence of aortic dissection is frequently associated with poor compliance for medical follow-up since the first cardiovascular event (absence of a genetic panel for aortic diseases, poor control of blood pressure values, absence of abdominal aortic diameter monitoring, etc), which increases the risk for recurrence of aortic diseases.

In this particular patient's case, the particularity regarding he evolution of the disease deserves all the attention: the spectacular survival of four years, after two major aortic dissection events (for which the ascending aorta was replaced with a 24 mm Dacron prosthesis and E-VITA stent-graft implantation at the level of the aortic arch using the hybrid technique, with reimplantation of the supra-aortic arterial trunks (four years before), followed by E-VITA stent-graft implantation from the level of the descending aorta down to the supra-celiac level for distal

endo-leak) two years later, and later, the dramatic evolution for the third episode of aortic dissection due to the delay in presenting to the emergency unit: the severe complications ultimately led to the patient's death. ❑

CONCLUSION

The unfavorable outcome is primarily attributable to the delayed presentation to the emergency unit (14 days after symptom onset), which led to an increased mortality risk due to the presence of associated complications (periaortic hematoma, severe anemia), with eventually raising the risk for surgical treatment and leading to the patient's death.

In addition, we must consider the complexity of associated pathologies (two previous episodes of aortic dissection separated by two years), which increases the risk of preoperative, intraoperative and postoperative complications exponentially.

We cannot outline precisely what this patient's prognosis would have been if he had come to our unit within the first few hours of symptom onset, but we can consider the possibility of a favorable evolution, as occurred in two previous cases (with the patient presenting within the first few hours of symptom onset). Considering our patient's history (two previous episodes of aortic dissection), we have to mention that the prospective surgical treatment for the third episode is associated with a much higher operative risk compared to previous interventions.

No similar cases have been reported in the medical literature and thus, we cannot predict the evolution of this patient who experienced a third event of aortic dissection, nor can we state that the occurrence of the third event could have been prevented only by the strict management of the modifiable risk factors associated with aortic dissection (hypertension, smoking, dyslipidemia). Mortality rates in aortic dissection are high even during the first event, and this risk is increasing with every acute aortic syndrome. Nonetheless, this patient was saved twice by means of novel methods of treatment. ❑

Conflicts of interest: none declared.

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Informed consent: not applicable/ the patient is deceased.

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