

IMAGES IN CARDIOLOGY

A giant aneurysm of abdominal aorta

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Abstract: The risk factors for aortic aneurysm usually include history of smoking, chronic obstructive pulmonary disease and hypertension, but patients at highest risk for abdominal aortic aneurysms (AAAs) are those who are older than 65 years and have peripheral atherosclerotic vascular disease. Patients who have first-degree relatives with AAA are also considered as having high risk¹. Less frequent causes of AAA are Marfan and Ehlers-Danlos syndromes, collagen vascular diseases, and mycotic aneurysms. AAAs are usually asymptomatic until they expand and disrupt¹.

Keywords: abdominal aortic aneurysms, hypertension

Rezumat: Factorii de risc pentru aneurismul aortic includ, de obicei, fumatul, boala pulmonară obstructivă cronică și hipertensiunea arterială, dar pacienții cu cel mai mare risc pentru aneurismul aortic abdominal (AAA) sunt cei care au vârsta peste 65 de ani și au boală vasculară aterosclerotică periferică. Pacienții care au rude de gradul I cu AAA sunt, de asemenea, considerați ca având un risc înalt¹. Cauzele mai puțin frecvente ale AAA sunt sindroamele Marfan și Ehlers-Danlos, bolile vasculare de colagen și aneurismele micotice. AAA sunt, de obicei, asimptomatice până când se extind și se rup¹.

Cuvinte cheie: aneurism abdominal aortic, hipertensiune arterială

CASE REPORT

We report the case of a 79 years old male having a recently discovered AAA during a routine abdominal ultrasonography examination. The patient was a non smoker, alcohol abstinent, with history of hypertension, dyslipidemia and atrial fibrillation (AF). The patient complained of light exercise chest pain and fatigue. He was chronically administered betablocker, angiotensin converting enzyme inhibitor, statine and oral anticoagulation agent.

Clinical examination at hospital admission revealed normal BMI (25 kg/m²), irregular rhythm with heart rate of 74 beats/min, with no pathologic sounds and murmurs. Blood pressure was 140/80 mmHg. Other findings of the physical examination were not clinically significant. Biological parameters were in the normal range. The 12-lead electrocardiogram (ECG) indicated AF with a ventricular rate of 70. Transthoracic echocardiography (TTE) documented moderate concentric

left ventricular hypertrophy (14 mm), hypokinesia at the level of basal segments of the infero-posterior wall and mild mitral regurgitation. Heart chambers were otherwise normal sized and left ventricular ejection fraction was normal (LVEF 50%). Ultrasonography examination of the carotid arteries revealed diffuse atheromatosis with no significant stenosis.

A multi-slice angio-CT targeting the abdominal segment of the aorta and peripheral arteries was performed in order to obtain a better anatomic characterization of the aneurysm and more accurate measurements of the aneurysm and the ilio-femoral arteries diameters. The aneurysm was located 5 cm below the renal arteries take-off and had the maximum size of 77/85 mm (Figure 1, 2).

The AAA's neck diameter was 24 mm and proximal neck angulation was <60° with respect to the body of aneurysm. The distal landing zone of aneurysm was situated in the close proximity of the aortic bifurcation.

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Figure 1. Measurements of the maximum diameters of the aortic aneurysm. AngioCT with contrast, axial section.

Both iliac and common femoral arteries were calcified but normally sized with no significant tortuosity (Figure 3).

Due to the abnormal movement of the infero-posterior wall, a coronary angiogram was performed and revealed a severe stenosis of a dominant left circumflex artery (a 4.5 mm diameter vessel) located next to the origine of the first marginal branch artery (Figure 4).

Having all this data we may conclude that, in this patient, the major clinical issue consists in the presence of a huge infrarenal aortic aneurysm with a very high risk of disruption, in association with a severe coronary lesion to be treated, in the context of a long-life need of chronic anticoagulant therapy due to the association of AF.

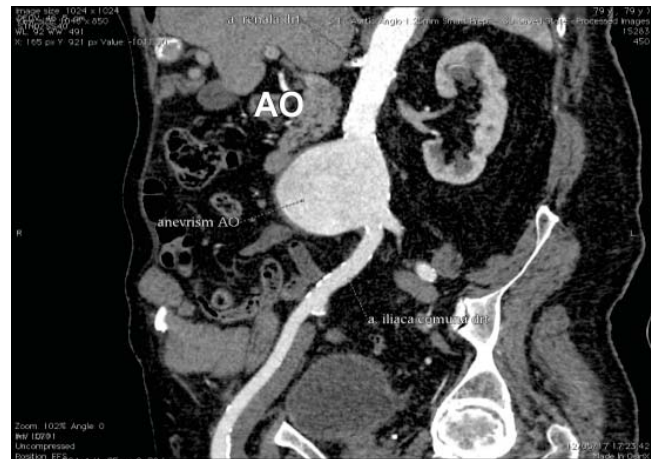


Figure 2. Measurements of the maximum diameters of the aortic aneurysm. AngioCT with contrast, sagittal section.

It is known that the risk of aneurysm rupture increases exponentially with the aneurysm size. The annual risk of rupture is low in AAA having maximal diameter below 5 cm (<1%), the risk of rupture is ~10% in AAA having maximal diameter >5-6 cm, 20% in AAA with the diameter >6 cm and over 30% if the diameter of aneurysm exceeds 8 cm^{1,2}.

The case was taken for Heart Team evaluation and we decided to manage the case using mini-invasive techniques.

Firstly, we performed the percutaneous myocardial revascularization. In this respect, a balloon self apposing stent of 3.5-4.5/ 22 mm was used in order to treat the severe lesion of the circumflex artery. The final angiographic result is depicted in Figure 5.

Second step was undertaken two days later and targeted the endovascular aortic repair (EVAR) of the aortic aneurysm. The intervention was performed in the cath-lab under general anesthesia and standard anticoagulation protocol (intravenous heparin target-



Figure 3. AngioCT reconstruction demonstrated the diameter of aortic aneurysm and the length of aortic neck.

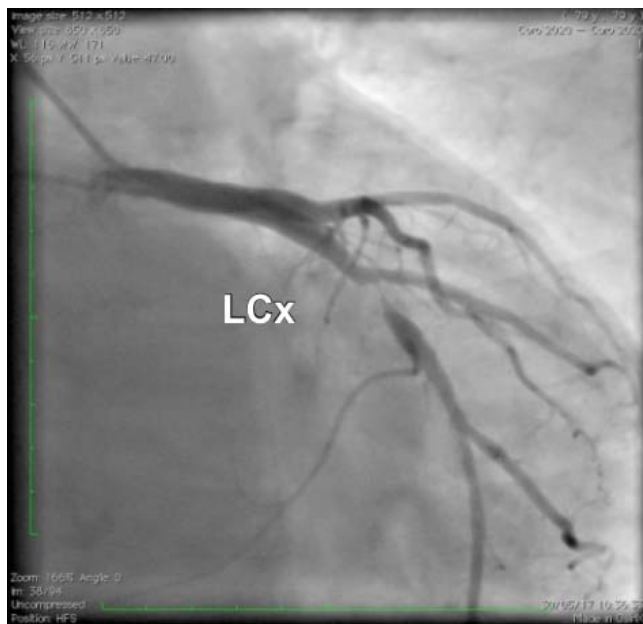


Figure 4. Coronary angiography. Stenosis of left circumflex (LCx) artery.

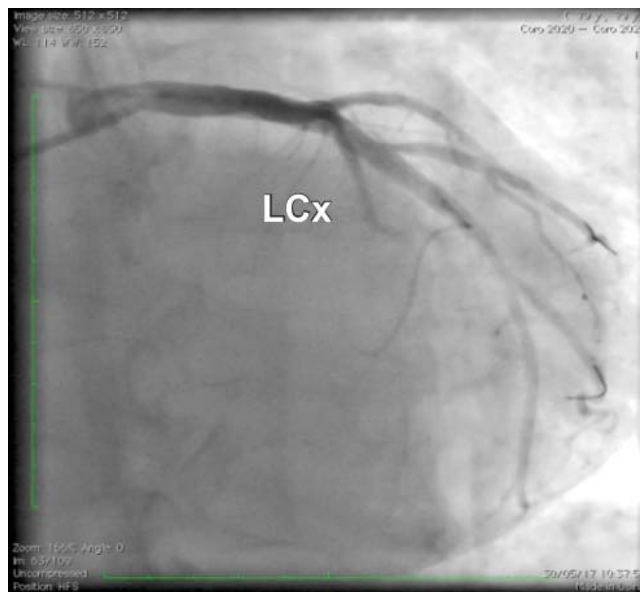


Figure 5. Coronary angiography. Left circumflex after stenting.

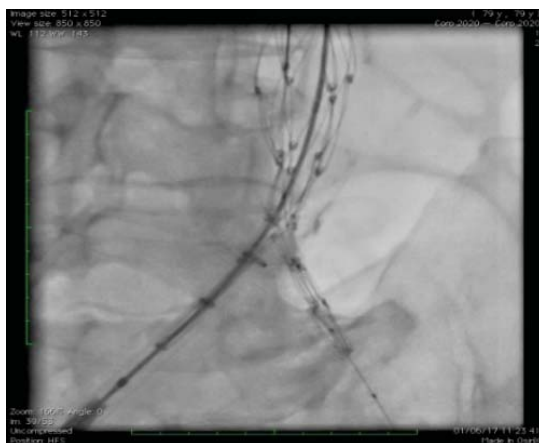


Figure 6. Angiography. Deployment of stentgraft and final result.

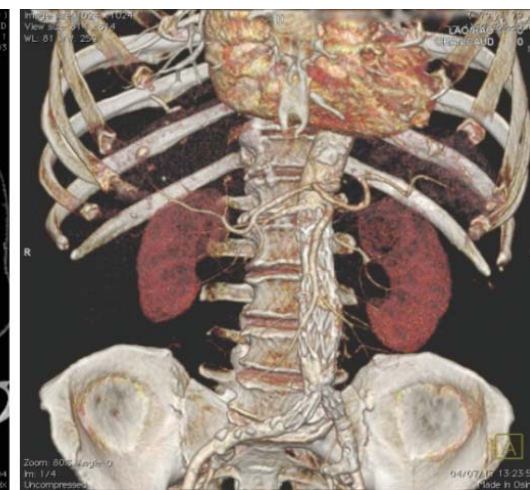


Figure 7. Abdominal angio-CT at 1 month follow up.

ting an activated clotting time up to 300 seconds). The team decided to use a bifurcated infrarenal stent graft (AFX- Endologix), a special endoprosthesis which is tailored to be anatomically fixed directly on the aortic bifurcation. The right femoral artery was cut-down for access using standard surgical techniques. A 17 Fr sheath was placed inside the surgically prepared right femoral artery in order to advance the delivery system with the aid of a 0.035" stiff guidewire. Another 7 Fr sheath was inserted into the left femoral artery using percutaneous technique. A snare catheter, introduced through left side femoral artery, served us to fix the system over the aortic bifurcation and to deploy it at the level of left iliac limb. A stentgraft Endologix AFX 2 (BEA 25-100/ 116-40) has been implanted on the aortic bifurcation and the Endologix Vela (A 28-28/ C95-O20V) aortic extension was placed in the infrarenal segment of the abdominal aorta. A 32 mm diameter balloon was used for postdilatation.

Deployment of device and the final result is depicted in Figure 6.

The patient was discharged 4 days later. An ultrasound examination of the aorta and branches was performed at discharge and revealed a normal triphasic flux at the level of both iliac and femoral artery. The angio CT examination performed at one month follow-up showed a permeable aortic stent graft without endoleak (Figure 7).

DISCUSSION

During the last two decades, endovascular technology revolutionized the management of patients with AAA. Today, EVAR represents the treatment of choice for the majority of patients with an AAA. 2 EVAR has been shown to be associated with reduced perioperative morbidity and mortality, as well as with the length of hospitalization.

The first patients undergoing EVAR were treated with tubular grafts that were anchored to the aortic wall by balloon expandable stainless steel stents. At an early stage, aortouniliac devices combined with femoro-femoral bypass and an occluding plug in the contralateral common iliac artery were used. EVAR has gained popularity once the appearance of bifurcated and modular stent grafts, which are now used in the vast majority of abdominal EVAR cases. A two- or three-piece modular design permits customization to meet a variety of anatomical and pathological conditions². Most current systems are based on self-expandable nitinol stents with Dacron or ePTFE fabric. Proximal

anchoring hooks reduce the risk of migration, whereas the possible advantage of transrenal fixation with suprarenal bare metal stent is debated².

In EVAR successful proximal endograft fixation and sealing is critical to avoid both migration and endoleak type I3. Several endografts have used different modalities to acquire proximal fixation, such as high radial force, suprarenal fixation, columnar rigidity, barbs, hooks or anchors⁴.

The AFX device consists of a main bifurcated unibody stent-graft system and a proximal aortic extension, which affix firmly to the aorta and provides sealing at the aortic neck, while reducing the possibility of stent's migration at the same time⁵. AFX2 is a newly designed endograft which offers fixation and sealing of both landing zones⁴. Thus, it represents the only graft which provides anatomical fixation to the aortic bifurcation, since all other grafts use the infrarenal neck as the main fixation point³. The prosthesis migration is prevented because the endograft is deployed since its bifurcated component remains at the level of aortoiliac bifurcation. The skeleton of the device is made of a cobalt-chromium alloy in a multilinked self-expanding unibody. External to the stent, the fabric is made of multilayer ePTFE material (STRATA). The stent is attached only to the proximal and distal ends at the proximal aortic extension and allows ePTFE to move independently and conform to abnormal surfaces, facilitating the sealing of the aneurysmal sack⁴.

There are a lot of reasons for choosing this type of prosthesis:

- Firstly this stent-graft preserves the aortic bifurcation for future endovascular procedure and the snare technique allows device to accurate placement over aortic bifurcation.
- Secondly, AFX represents the only EVAR system that utilizes a single low profile 17 F introducer sheath, contralateral access being accomplished percutaneously with a small-diameter sheath (7-French).
- Thirdly, it has a hydrophilic coating for smooth delivery and sheath- dilator system provides exceptional pushability and tracking in tortuous vessels so no gate cannulation is required (the usually obligatory and time-consuming).
- Last but not least, highly conformable ePTFE maximizes wall contact and the device is predictable precise and easy to use. Moreover it prevents the risk of migration as the endograft is anatomically fixed directly on the aortic bifurcation.

- The initial experience with the AFX stent graft system is promising, with successful aneurysm exclusion and good mid-term results with a low rate of device related complications. Further larger studies are needed to fully evaluate the long-term results⁴.

CONCLUSION

Upon our best knowledge, this was the second Romanian implantation of this new type of aortic endoprosthesis. The use of a special type of endoprosthesis in a patient with a large sized aortic aneurysm with cumulative anatomic particularities, which could be hardly managed with classical techniques, was safe and overcomes the difficulties related to anatomical characteristics and the need of chronic anticoagulation therapy.

Conflict of interest: none declared.

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