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Young age patient with aortic and bilateral iliac artery aneurysm: risk factors and strategy of endovascular treatment - case study

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Abstract

Aim: To present a clinical case in which abdominal aortic aneurysm (AAA), common iliac artery (CIA) and internal iliac artery (IIA) aneurysms were cured for an unusually young patient, to discuss the methods of treatment and to present their results.

Case report: A 57-year-old man was presented at LUHS Kaunas Clinics Department of Vascular Surgery in 2014 with bilateral CIA stenosis. In 2016, he was presented again because of an acute thrombosis of his left superficial femoral artery. Femoropopliteal bypass was formed and popliteal artery aneurysm (PAA) was resected. In 2017, an identical procedure was made on his right leg. In 2019, a Computer Tomography (CT) scan showed a widened infrarenal aneurysm (from 56 mm to 88 mm of length), changes in both CIA (23 mm and 23 mm respectively) and bilateral IIA (19 mm on the right side and 23 mm on the left side) so a spiral embolization of bilateral IAA was performed. In 2020 02 14 an endovascular artery repair (EVAR) was performed placing an aorto-bi-iliac stent graft.

Conclusion: According to the prevalence of AAA and IAA, the patient (57 years old) was unusually young to experience the occurrence of these pathologies (> 65 years). He had some typical risk factors: male gender, arterial hypertension, dyslipidaemia. PAA was treated by forming a femoropopliteal bypass, bilateral IIA were embolised using spirals, and CIA and aorta were treated by using EVAR aorto-bi-iliac endograft.

Keywords: aortic aneurysm, iliac artery aneurysm, young age, endovascular treatment.

1. Introduction

Abdominal aortic aneurysm (AAA) is a potentially lethal condition responsible for a significant mortality. Up to 40 percent of patients who present with AAA have at least one iliac artery aneurysm (IAA) with common iliac artery (CIA) affected in 70 percent of patients who have IAA (1, 2). Although typically asymptomatic, CIAs expand over time with a potential for life-threatening rupture similar to that of AAAs (3 - 5).

Infrarenal aorta is the most common site of aortic aneurysm formation which is defined as a dilatation of an artery to at least 1.5 times of its usual size. As an average diameter of the adult human infrarenal aorta is approximately 2 cm, infrarenal aorta with a diameter of ≥ 3.0 cm is considered to be aneurysmal (6, 7). Common iliac artery normally averages 1.2 ± 0.2 cm in men and the internal iliac artery in both genders averages 0.54 ± 0.15 cm. According to these values, an aneurysm in males can be diagnosed if a common iliac artery measures > 1.85 cm and the diameter of internal iliac artery measures > 0.8 cm (8).

Generally accepted risk factors for AAA include hypertension, chronic obstructive pulmonary disease (COPD), history of cigarette smoking, male gender, and family history of an aortic aneurysm (9, 10). The prevalence of AAA increases with age in both men and women, although the age-related increase is more prominent in men and rises sharply in individuals over 65 years (9 - 12). Most of the risk factors for degenerative IAA matches the ones for AAA and include male gender, white race, advancing age, history of smoking, and hypertension. (13, 15).

Elective AAA repair prior to the development of symptoms is the most effective measure to prevent rupture and aneurysm-related sudden death. Endovascular abdominal aortic aneurysm repair (EVAR) is widely accepted as a less invasive alternative to open repair. (14) General recommendations suggest that even asymptomatic iliac artery aneurysms should be repaired when their diameter reaches 3.0 cm or more; a smaller than 3.0 cm aneurysm may be considered for a treatment if a coexisting AAA is present and meets the criteria for repair. (15,16)

2. Aim

To present a clinical case in which AAA, CIA and internal iliac artery (IIA) aneurysms were cured for an unusually young patient. To discuss methods of diagnosis and treatment which were used and present their results.

3. Case report

A 57 year old man was treated at LUHS Kaunas Clinics Department of Vascular Surgery in 2020 due to multiple aneurysms. He was a continuous patient of this clinic since 2014, had normal BMI (25,83 kg/m2) and one previous laparoscopic surgery because of a pancreatic pathology. Patient did not smoke and had no known allergies. He was diagnosed with II degree arterial hypertension thirty years ago, had ischaemic heart disease (classis functionalis 2, NYHA II) and dyslipidemia. He was firstly presented with bilateral CIA stenosis in 2014 02 14. Later, in 2016 05 04, he was presented again because of an acute thrombosis of his left superficial femoral artery occurring at the first third of distal popliteal artery. Femoropopliteal bypass was formed and popliteal artery aneurysm (PAA) was resected. Then, in 2017 11 29, an identical procedure was made on his right leg. During the examination of abdominal aorta in 2017 12 04 a dilation of 35 mm was found in its infrarenal part. Later, in 2019 05 23, during a Computer Tomography (CT) scan the same infrarenal

aneurysm was found to be widened to 56 mm and reached a total length of 88 mm. Changes were also seen in both CIA (23 mm and 23 mm respectively) and bilateral IIA (19 mm on the right side and 23 mm on the left side) while external iliac arteries (EIA) were normal. It was decided to perform a first stage of bilateral IIAs spiral embolization in 2019 06 12 and embolize the right IIA. However, a complete effect was not reached and a sufficient amount of spirals could not be used due to the risk of possible dislocation. Later that year, an ultrasound check of abdominal aorta (performed in 2019 11 07) showed its dilation to 49 x 53 mm with a length of 80 mm and bilateral CIA dilations (25 mm on the right, 23 mm on the left). In 2019 11 29, a second stage of bilateral IIA embolization was executed with a fully successful embolization of the left IIA. In 2020 01 02 a CT scan was performed again in order to evaluate any possible changes. Dilated suprarenal artery was found (up to 23 x 23 mm). Infrarenal aortic aneurysm reached bifurcation and was enlarged (61 x 58 mm, length 94 mm). Also, a parietal thrombus was found (~ 17 mm in width). CIA were evaluated: right CIA has enlarged by an extra 3 mm, left by an extra 5 mm. Parietal thrombi were found in CIA (~ 9 mm in thickness). EIA remained without any pathological changes. Due to these findings, an endovascular artery repair (EVAR) was performed in 2020 02 14 through the small incisions in both groins placing aorto-bi-iliac stent graft. After successful surgery the patient was observed for 6 days and, in absence of any early complications, was sent to rehabilitation.

4. Discussion

Multiple aneurysms, especially bilateral PAA leading to a development of AAA, mostly occur in older than 65 years old patients (17). One of the main factors leading to aneurysm formation is atherosclerotic changes of the artery walls. Multiple aneurysms in a young population are often associated with Behçet's disease or syndromes such as Ehlers-Danlos syndrome or Marfan syndrome. However, none of these conditions were diagnosed for the patient discussed in our case (18, 19). On the other hand, our patient had other cardiovascular risk factors leading to artery wall damage: history of smoking, dyslipidemia, and arterial hypertension which lasted for thrity years. According to Ravn H et al bilateral PAA are usually linked with generalized aneurysm disease more than the conjunction of two - PAA and an AAA, which is also reflected in our study (20). In their research Björck M et al raised a hypothesis about the relation between the occurrence of multiple aneurysms and the length of blood cell telomeres, but no direct connection was found. Instead, a strong linkage between cardiovascular risk factors and the length of telomeres was discovered (21).

Patients with bilateral common iliac artery aneurysms or patients with coexistent AAA are usually managed with aorto-bi-iliac or aorto-bifemoral graft placement (8). The origin of the graft in patients with bilateral iliac artery aneurysms should be just below the renal arteries due to the increased risk of future aneurysmal aortic wall degeneration (22). In the case we discussed, aorto-bi-iliac stent graft was successfully used and placed in the favourable location without any early post - operative complications.

Internal iliac artery aneurysms are usually treated with a combination of embolization and stent-grafting. However, embolization alone can also be used and in our case it was chosen as a method of treatment for IIA on both sides. Adequate coil embolization of internal iliac artery aneurysms is considered to be reached when there is an effective arrest of the blood flow within the aneurysm sac due to which it should thrombose afterwards (23). Even though this was successfully achieved while embolising left IIA, the same effect could

not be reached on the right IIA and no measures were taken to fix it due to the high risk of dislocation.

When bilateral IIA embolization is chosen, a staged approach with one to two weeks between procedures may allow the development of pelvic collaterals (24). In the case we discussed, a staged approach was also performed with the gap between the both stages being more than 5 months. It must be mentioned that there are a few nonrandomized studies which compared simultaneous and sequential IIA embolization and found lower rates of ischemic complications with simultaneous embolization (25, 26). However, due to the lack of more convincing evidence as these studies were quite small, many clinicians prefer staged repair when bilateral IIA aneurysms complicate endovascular aortic aneurysm repair.

5. Conclusions

Compared to the usual prevalence of AAA and IAA the patient (57 years old) was 8 years younger for the typical manifestation of these pathologies (> 65 years). He had some distinctive risk factors: male gender, arterial hypertension, dyslipidemia. PAA was treated by forming a femoropopliteal bypass, bilateral IIA were embolised using spirals, and CIA and aorta were treated by using EVAR aorto-bi-iliac endograft.

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