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Association Between Abdominal Aortic and Common Iliac Artery Aneurysms: Case Report

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Abstract

The infrarenal abdominal aortic aneurysm is the most common among arterial aneurysms; it happens when there is an abnormal and irreversible enlargement of the blood vessel. This disease usually compromises other arterial segments and is linked to high mortality rates, mainly due to its rupture. Given its importance, we present a case study of an abdominal aortic aneurysm associated with a common iliac artery aneurysm. During a dissection practice in the Morphofunctional Laboratory at FACERES Medical School, we observed the

presence of a mild stenosis in the abdominal aorta below the renal arteries, as well as the formation of an infrarenal abdominal aortic aneurysm. In addition, we noticed that the infrarenal abdominal aortic aneurysm was associated with a bilateral common iliac artery aneurysm. Morphological analyses carried out in the blood vessels showed a large quantity of atheromatous plaques, which are the probable cause of the pathology. The information herein may broaden the knowledge on the infrarenal abdominal aortic aneurysmal disease, thus reducing its complications and mortality rates.

Keywords: pathological dilatation, aneurysmal disease, atheromatous plaques, vascular pathology

1. Introduction

The abdominal aortic aneurysm is a pathology characterized by an anomalous and irreversible dilatation of blood vessels (Sakalihasan et al., 2005). This disease is commonly caused by a degenerative process of atherosclerosis in the endothelium, which results in a fragile arterial tunica media (Dent et al., 1972; Johnston et al., 1991). However, it may sometimes be linked to other etiologies, such as trauma, infections, genetic characteristics and inflammations (Neto et al., 2010; Rojas et al., 2005). This vascular pathology has a global incidence of 2%, and it is more frequent in male patients over 60 years old (Cabrera et al., 2006). Its clinical significance is based on the irreversibility of the arterial dilatation and its progressive nature, which may cause its rupture if not surgically repaired (Collin et al., 1988). It is estimated that the abdominal aortic aneurysm rupture is the cause of death in 80 to 90% of patients (Becker et al., 2002) due to the clinical picture of abdominal bleeding.

The abdominal aortic aneurysm is normally associated with the common iliac artery aneurysm (Mehta et al., 2004). According to Buck et al. (2015), approximately 20% of abdominal aortic aneurysm cases are associated with the common iliac arteries. Therefore, the common iliac artery aneurysm is considered to be an extension of the abdominal aortic aneurysmal disease. The iliac artery aneurysm is usually asymptomatic (Richardson & Greenfield, 1988) and, similarly to the aortic aneurysm, its size is directly proportional to the probability of rupture (Nagarajan et al., 2000). Another possible complication is thrombus formation, which may cause acute ischemia of the pelvic organs and lower limbs (Akiyama et al., 1999; Ferreira et al., 2006).

The aneurysmal disease rates have been increasing in the last decades, especially due to the population's longer life expectancy and to technological advancements, which enables the diagnosis of such pathology (Cowan et al., 2006; Moll et al., 2011). Thus, the need for more information becomes fundamental, aiming at avoiding its complications and reducing mortality rates. Hence, this paper presents a case study in which an abdominal aortic aneurysm was associated with a common iliac artery aneurysm.

2. Case Report

During a routine dissection of the abdominal region of a male cadaver (donated from the Legal Medical Institute of Guarulhos, São Paulo, Brazil) the Morphofunctional Laboratory at FACERES Medical School, we noticed an abdominal aortic aneurysm associated with a

common iliac artery aneurysm. For a better understanding and a more effective morphometric analysis, we removed the connective tissue that was coating the blood vessels. We performed a cephalocaudal incision on the rear side of the abdominal aortic and common iliac artery aneurysms, in order to obtain a morphological description of the blood vessels lumen. The artery dissections were carried out following classic anatomical planes, preserving their syntopy with other structures. After this procedure, we observed that the abdominal aortic artery had a regular straight descending trajectory, with a 30 mm mean diameter. However, approximately 25 mm below the renal arteries, there was a vascular stenosis and the formation of an infrarenal abdominal aortic aneurysm (Fig. 1). The infrarenal abdominal aortic aneurysm had a mean diameter value of 108 mm in its central region and a mean length of 93 mm. In addition, we noticed that the infrarenal abdominal aortic aneurysm was associated with a bilateral common iliac artery aneurysm. Both common iliac arteries had dilatations with mean diameters of 25 mm in their central regions (Fig. 2). The morphological analysis of the infrarenal abdominal aortic and common iliac arteries indicated multiple atherosclerosis plaques with different sizes (1 to 10 mm diameter). The atherosclerosis plaques were macroscopically characterized by white maculae and lines with a yellowish center; some segments presented protrusions in the artery lumen. The most extensive injuries were associated with calcification areas (hardening of the arteries' walls), ulceration (thrombus formation areas) and round aneurysmal dilatations with internal thrombus (Fig. 3A and B).

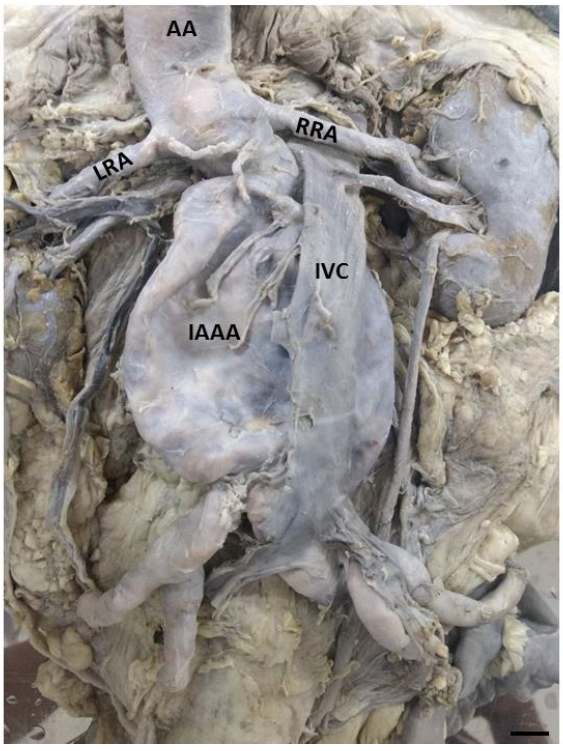

Figure 1. Rear view of the infrarenal abdominal aortic aneurysm in male corpse. AA (abdominal aorta); RRA (right renal artery); LRA (left renal artery); IAAA (infrarenal abdominal aortic aneurysm); IVC (inferior vena cava). Bar scale = 100 μM

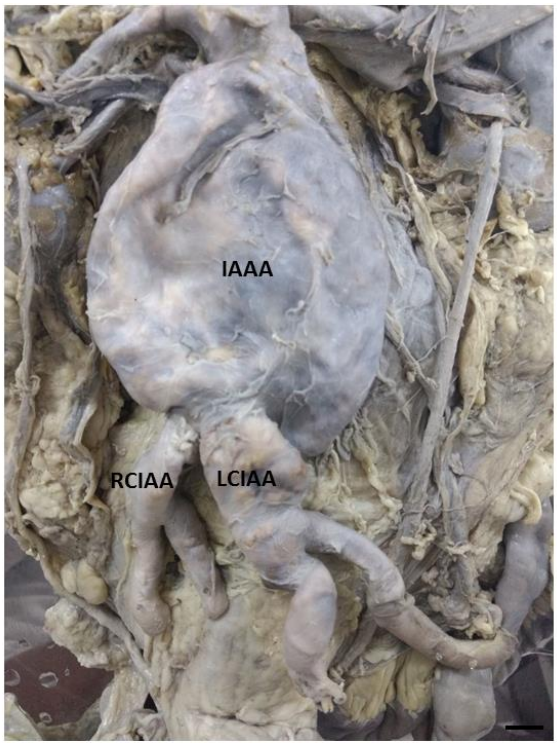

Figure 2. Rear view of both the infrarenal abdominal aortic and the bilateral common iliac artery aneurysms in male corpse. IAAA (infrarenal abdominal aortic aneurysm); RCIAA (right common iliac artery aneurysm); LCIAA (left common iliac artery aneurysm). Bar scale = 100 μM

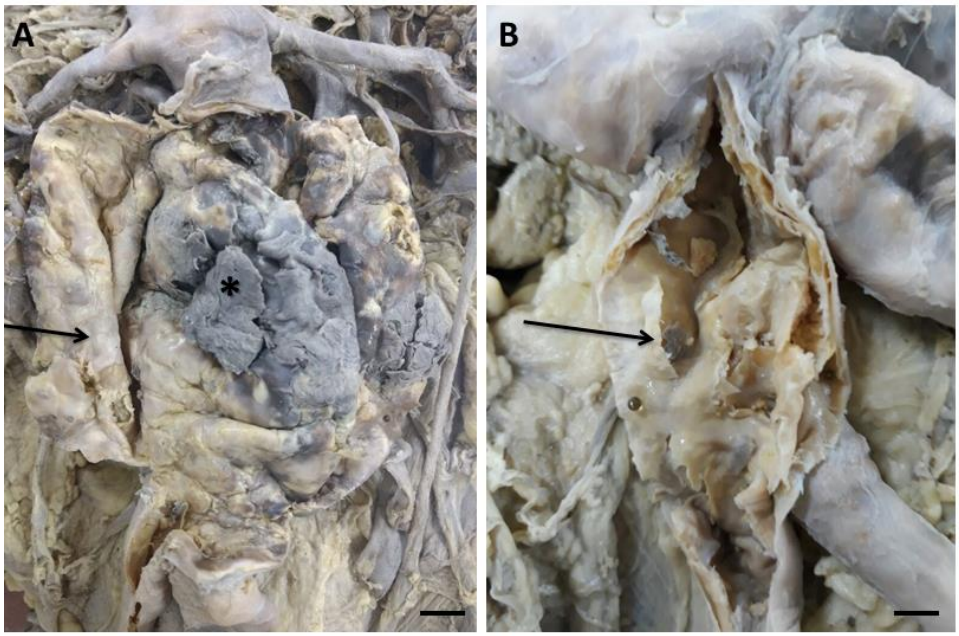

Figure 3. **A**) Internal view after sagittal cut of the infrarenal abdominal aortic aneurysm in male corpse. Arrow (atheromatous plaques); Asterisk (thrombi). B) Internal view after sagittal cut of the left common iliac artery aneurysm in male corpse. Arrow (atheromatous plaques). Bar scale = 100 μM.

3. Discussion

The disseminating of informations about the infrarenal abdominal aortic aneurysmal disease is extremely relevant to clinically diagnosing it and surgically treating it. Knowing the morphological characteristics and possible causes of such pathology may contribute to the health professionals' scientific understanding of it, thus reducing complications and mortality rates linked to the disease. In this study, we presented a case in which an infrarenal abdominal aortic aneurysm was associated with a common iliac artery aneurysm. The abdominal aortic aneurysms are the most commonly reported in the literature, followed by the iliac and splenic arteries ones (Coselli et al., 2004). It is estimated that there are 25 cases of abdominal aortic aneurysms for each 100.000 patients every year, and most cases of aneurysms affect the infrarenal aortic segment (Becker et al., 2002; Silva et al., 2002). Moreover, in the literature, the infrarenal abdominal aortic aneurysm has been found to be associated with common iliac artery aneurysms in about 20% of the cases (Matsumoto et al., 2002; Brito et al., 2014; Buck et al., 2015). Therefore, the results presented herein corroborate with those documented in the literature.

The morphometrical analyses carried out in the infrarenal abdominal aortic and common iliac artery aneurysms showed large dilatations, with diameter values above those recommended for surgical repair. In those cases, surgical treatment is necessary due to high indices of spontaneous rupture. According to Lederle et al. (2002), patients with aortic aneurysms between 55 and 59 mm diameter had a 9.4% annual rate of rupture; that percentage went up to 32.5% when aneurysms had a 70 mm diameter. In this study, we observed a mean aneurysm diameter similar to that found by Silva et al. (2015), who reported an infrarenal abdominal aortic aneurysm of 93 mm, as well as other aneurysms close to the common iliac artery bifurcation.

The morphological evaluation of the abdominal aorta and common iliac arteries indicated the presence of large amounts of atheromatous plaque along their trajectories. Etiopathogenic factors related to the occurrence of arterial aneurysms are multiple, for example, genetic (Powell et al., 1990), inflammatory (Koch et al., 1990) and infectious (Fukunaga et al., 2012; Sediv et al., 2012). Also, the etiology may vary according to the arterial segment that is compromised. Nevertheless, in abdominal aortic aneurysm cases, the factors are linked to the degenerative process of atherosclerosis in 90% of patients. The degenerative process of atherosclerosis is mainly characterized by the formation of atheromatous plaques, a result from the accumulation of cholesterol crystals and the abnormal cellular proliferation on the arterial walls (Beckstrom et al., 2007).

4. Conclusion

In conclusion, the results here presented contain information that broadens the specialized knowledge about the infrarenal abdominal aortic aneurysmal disease. In addition, the morphometrical data and morphological characterization of the blood vessels may help develop new approaches of assistance and treatment, aiming at reducing the complications and mortality rates associated with the aneurysmal disease.

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