



Primary Venous Aneurysms - Hypothesis of Etiology and Treatment: Case Series and a Brief Review

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Abstract

Primary venous aneurysms are rare clinical-pathological entities. Also, there are relatively few literature data referring to the etiological hypotheses of this condition. This paper presents our results regarding the histopathological appearance highlighted in surgically resected venous aneurysm specimens that reveal the potential causes that lead to this condition onset, as well as a brief review the literature data. At the same time, current therapeutic options are discussed.

Keywords: Primary venous aneurysm etiology; Endophlebohertophy; Endophleboscclerosis

Introduction

Isolated Venous Aneurysms (VA) can be defined as a focal dilation at least two or three times larger than the diameter of the venous trunk, and it should not be contained in a varicose vein segment [1]. VA is a relatively rare abnormality (literature data reveal a number between 300 and 500 cases described around the world so far) [2,3]. However, the etiology of VA is uncertain. This article discusses possible hypothesis of etiology for VA by presenting our results obtained from morphological analysis of several specimens (surgically resected VA, optical microscopy analyses) and a brief review of literature.

Methodology

Seven specimens (surgically resected primary VA) from 7 different patients (4 females, 3 males, age: 44.6 ± 8.2 years, BMI: 29.1 ± 3.4), were analyzed by the Pathology Laboratory (Hematoxylin-Eosin and the Masson trichrome stain). Our results were compared with literature data searched in PubMed and Google Scholar database (publications in English written from the establishment of the database to September 2022).

Results

Six great saphenous vein aneurysms measuring between 2.2/1.5 cm and 5.5/3.8 cm, and one small saphenous vein aneurysm (2.3/2.1 cm) were analyzed. Histological examination demonstrated that the pathophysiological processes which occur once with primary venous aneurysm development, involve all layers of the vein wall. Irregular intimal surface with disrupted endothelial layer and marked cellular infiltration of the intimal layer was noted in most of the cases. For that reason, intima appears thicker than the media, due to the pronounced infiltration. Most affected seems to be tunica media, where there is significant degradation of collagen fibers, fibrosis, and a reduction in the number of vascular smooth muscle cells. Progressive loss of smooth muscle tissue is most likely due to inefficient reparative elastogenesis. In some places, the tunica media is replaced by hyalinized connective tissue, and the elastic lamina is damaged. At the level of the tunica media and tunica externa, an inflammatory reaction occurs with predominantly lymphocytes and macrophages, which form vascular-associated lymphoid tissue and develop vasa vasorum thickening. The inflammatory reaction is present in places, consists mainly of lymphocytes and macrophages, eosinophils, neutrophils, and plasma cells may be present (Figure 1). In 2 cases, a thrombus (adherent to the endo-vein surface) was noticed.

Discussion

Chronic Venous Disease (CVD) is a common pathology that significantly affects patient's quality of life [4]. However, on the opposite side, primary venous aneurysms are a relatively rare pathology. There are not many literature data related to the microscopic morphological appearance

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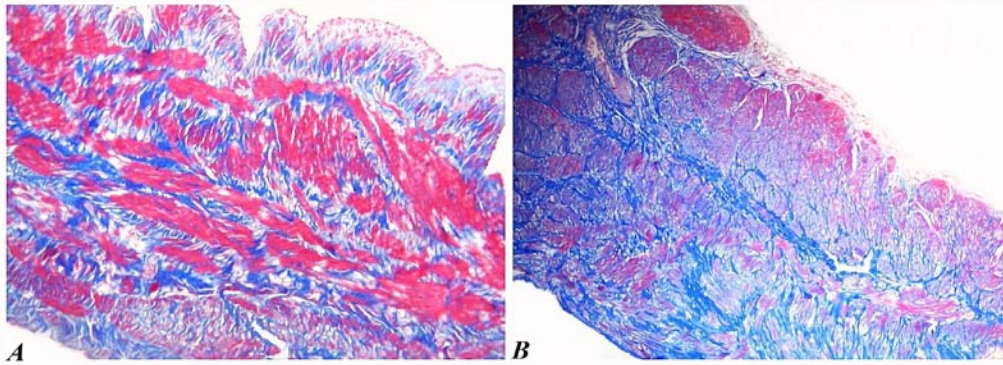


Figure 1: Hypertrophy of muscle fibers with disorganization and elongation, presence of collagen deposits in the tunica media (magnification x400, A). Thickened tunica media with predominance of collagen between muscle fibers (magnification x200, B). Masson's trichrome stain.

of varicose veins [5], and no regarding venous aneurysms and their etiology, either.

Morphological analysis of various surgically resected specimens revealed an aneurysm venous wall with thickened, fibrotic, moderately cellular intima adjacent to a densely fibrotic adventitia fragmentation, attenuation of the elastic lamellae, and loss of smooth muscle cells. In the case of thrombosis, medial fibrosis in areas of thrombus adherence was observed [1,6-8]. The cases we described present similarities with the microscopic morphology described in the literature. In the case of large venous aneurysms, the deposition of fibrous tissue between the smooth muscle layers that explained the degeneration of the media can be considered the cause which led to their enlargement. There are theories that the development of VA is the result of the congenital absence of smooth muscle in the venous media [9], associated with low amounts of elastin fibers and smooth muscle cells, fibrous connective tissue, and elastic fibers in the venous wall [10]. Endophlebohypertrophy and endophleboscrosis, processes that occur with age, have also been considered to have a potential role in the development of aneurysms [9,11,12]. Considering the age of the patients included in this study, our results plead for endophlebohypertrophy (marked cellular infiltration of the intimal layer, intima appears thicker than the media) and endophleboscrosis (fibrous tissue dispersed between the circular and longitudinal muscle layers, excessive subendothelial collagen deposition) as the most probable hypothesis of etiology.

Even if treatment guidelines are not clearly established and thus treatment strategies vary, depending on the location and clinical manifestations, some principles have been described [10,11]. Some data recommend conservative treatment for uncomplicated or asymptomatic aneurysms, or with jugular, subclavian, thoracic, or visceral localization. There are also reported cases with iliac localization successfully treated conservatively by anticoagulant medication and inferior vena cava filter. In the case of symptomatic, complicated or growing aneurysms, or those located in the deep veins of the lower limbs, primary surgery is indicated. Interventions for aesthetic reasons have also been described. As surgical techniques, ligation/excision, tangential aneurysmectomy and lateral venography, resection of VA with interposition autologous vein graft can be practiced. The endovascular approach has also been described in some cases for subclavian VA [13]. Cryostripping has been described as a feasible therapeutic alternative for the surgical resection of the venous segments containing the aneurysm [14].

Conclusion

Due to the decreased frequency of this disease, there are still insufficient studies that provide data for its etiology. For patients who are not in the first decades of life, we consider that the presence of aneurysms is due to the processes of endofleboscrosis. The destruction of tunica media produced by the separation of the smooth muscle bundles and the significant deposits of fibrous tissue, which weaken the structure of the venous wall, allows aneurysmal dilatation. Multicentric studies which analyze more data about the VA etiology would be useful to reach a consensus. Regarding the treatment, most data, including our clinical experience, recommend venous aneurysm resection performed through different procedures as the first therapeutic option.

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