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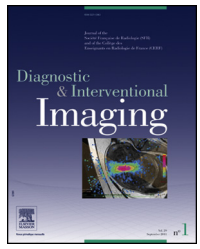

ORIGINAL ARTICLE / *Cardiovascular*

Arterial splanchnic aneurysms: Presentation, treatment and outcome in 112 patients

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Aneurysm;
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Abstract
Purpose: The purpose of this study was to identify subgroups with different risks of progression and their appropriate management among the heterogeneous group of 112 patients diagnosed with splanchnic aneurysm.
Methods: Using radiology databases and medical records of our institution (Hospital Édouard-Hérriot, Lyon, France), we undertook a retrospective review of all patients diagnosed with splanchnic artery aneurysms from 1995 to 2011. Cases were analyzed by aneurysm location, etiology and a distinction was also made between true and false aneurysms.
Results: False aneurysms were more likely than true aneurysms to be diagnosed as symptomatic and/or ruptured (TA: 50/66 patients asymptomatic vs. FA: 16/46 asymptomatic, $P < 0.05$) with a rupture rate of 59% (27/46) which was unrelated to the size of aneurysms. Percutaneous treatment was carried in the majority of patients with a final success rate of 91%. Peripancreatic true aneurysms were associated in 75% of cases with celiac occlusive disease and diagnosed mostly in symptomatic patients (7/9: 78%) with a rupture rate of 44% unrelated to their size. Radiologic treatment has faced problems due to failure of catheterization and incomplete embolization, although there have been cases in which delayed occlusion was achieved. Common true aneurysms were incidental findings in 87% (57/66) of patients with 3 ruptured aneurysms which were larger than 2 cm. Observation in that group was safe: significant growth was seen only in one patient and the embolization required was successful. Splanchnic false aneurysms and peripancreatic true aneurysms carried a high and an unpredictable risk of rupture that warranted prompt endovascular treatment as soon as possible.

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Conclusions: Stratification by localization and by the true or false appearance of the aneurysm was an effective (means of identifying) way to identify subgroups with different risks of progression. False aneurysms and peripancreatic true aneurysms carried a high and unpredictable risk of rupture. The splanchnic aneurysms should have been treated in the case of patients of childbearing age, size $\geq$ 20 mm, and in the case of liver transplantation. Other splanchnic aneurysms should either have been observed, if smaller than 2 cm. In the absence of rigorous published comparisons, surgical and endovascular methods should have been considered equally suitable in the elective treatment of these patients.

Since the first splenic aneurysm has been reported by Beaussier in 1770 [1], several authors have described splanchnic aneurysm as rare but potentially life-threatening. Shanley et al. highlighted the unexpectedly large number of intrahepatic false aneurysms and confirmed the seriousness of splanchnic aneurysm rupture [2]. It has been reported a mortality rate of 21% for ruptured hepatic artery aneurysms and 100% for ruptured celiac artery aneurysms. The management of these splanchnic aneurysms is not clearly established in the literature. Some authors argue that all splanchnic aneurysms ought to be treated [3—5], while others tried to identify the place of conservative management [6—11]. However, most of the existing literature consists on small series or case reviews with biases in favor of unusual presentations and positive outcomes. Single institutional series with more than 50 patients are uncommon [6—9,11—14]. Furthermore, some major series do not include false aneurysms [6,7,9—11,15]. Recent studies do take these distinctions into account but include only patients undergoing intervention and exclude those assigned to conservative management [3,4,13,14,16—21]. The purpose of this study was to identify subgroups among the heterogeneous group of splanchnic aneurysms who have different risks of progression and to determine their appropriate management.

Materials and methods

Patients' selection

Using radiology databases and medical records at our institution (Hospital Édouard-Hérriot, Lyon, France), we undertook a retrospective review of all patients diagnosed with splanchnic artery aneurysms in the period 1995 to 2011.

Patient characteristics

The review included aneurysms of the celiac, superior and inferior mesenteric arteries, and their respective branches, and comprised 112 patients in total.

We collected data on patients' demographic characteristics, medical history, and clinical presentation. Characterization of the aneurysm on initial imaging included its location, size, signs of rupture and method of diagnosis. Pseudoaneurysms were distinguished from true aneurysms by clinical and imaging criteria: the true aneurysm arterial wall is composed of an intima, a media and an adventitia unlike false aneurysm (or pseudoaneurysm) that does not contain adventitia and is as a circulating hematoma encapsulated in communication with the light of a broken vessel. The etiology of splanchnic aneurysm was sought for each patient in his or her medical records. Only 10 patients had no clear etiology of their aneurysm (10/112: 9%).

Aneurysm management

According to their clinical circumstances, patients received one of four initial approaches: percutaneous intervention, open surgical repair, close observation or no further management. Percutaneous and surgical interventions were considered for symptomatic patients, and those with ruptured aneurysms, false aneurysms, arteriosclerotic aneurysms bigger than 2 cm in diameter, and peripancreatic true aneurysms linked to celiac stenosis. The conservative management group is consisted generally of asymptomatic patients with true aneurysms $\leq$ 2 cm in diameter or hepatic false aneurysms $\leq$ 1 cm expected to regress spontaneously.

Criteria studied

Comparisons were made between true and false aneurysms, their etiologies and location with respect to patients' demographics, clinical presentation, rupture size and related management. Initial methods of diagnosis were stratified according to the false or true nature of the aneurysm, and by asymptomatic vs. symptomatic clinical presentation. Comparisons were also made between management groups with an emphasis in the case of percutaneous management on the characteristics of patients with incomplete initial procedures or selective catheterisation failure.

Follow-up

Follow-up dated from definitive diagnosis of the splanchnic aneurysm to discharge or death. Management was described as effective if the period to discharge or death exceeded 12 months. Recorded complications were categorized as death, or major and minor complications. Major complications were defined as which can result in death or requiring a new radiological or surgical intervention [22]. Outcomes in the group managed percutaneously included technical success, failure and incomplete primary embolization with continued filling of the aneurysm on early imaging.