

# Early and Intermediate Results of Elective Endovascular Treatment of True Visceral Artery Aneurysms

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**Background:** To retrospectively analyze early and follow-up results of endovascular management of visceral artery aneurysms (VAAs) in a single-center experience.

**Methods:** From 2007 to June 2013, 26 consecutive elective endovascular interventions for VAAs were performed in 26 patients; preoperative, intraoperative, and postoperative data were prospectively collected in a dedicated database. Early (<30 days) and follow-up results were evaluated.

**Results:** The site of aneurysm was splenic artery in 17 patients, common hepatic artery in 3 patients, renal artery and pancreaticoduodenal artery in 2 cases each, and gastroduodenal artery and celiac trunk in one case each. All the lesions were asymptomatic, and the mean diameter was 22.8 mm. Interventions consisted in coiling in 19 cases; in 4 patients a covered stent was placed, whereas the remaining 3 patients had a multilayer stent. Technical success was 89%. There were no perioperative deaths; 1 patient with splenic artery aneurysm had coils migration with symptomatic splenic infarction and underwent successful redo coils packing. Median duration of follow-up was 18 months. During follow-up, 1 aneurysm-unrelated death occurred. One asymptomatic thrombosis of a treated vessel was recorded, with a 2-year estimated patency rate of 91%. Mean aneurysmal diameter at the latest follow-up was 20.2 mm ( $P = 0.001$  in comparison with preoperative values; 95% confidence interval 1.9–5.2). Complete exclusion of the aneurysm occurred in all but 1 patient, who had a limited increasing in the diameter of its splenic aneurysmal sac after coiling. Another patient developed a more distal aneurysm of the splenic artery after 24 months. No reinterventions were required. Freedom from aneurysm-related complications at 2 years was 72.9% (Standard Error, 0.09).

**Conclusions:** In our experience, endovascular treatment of VAA, when feasible, provided excellent perioperative results with low rates of complications and reinterventions. Even if the risk of developing aneurysm-related complications during follow-up is substantial, most of them can be watched without the need for repeated interventions.

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## INTRODUCTION

Aneurysmal degeneration at the level of visceral and renal arteries is a rare condition,<sup>1–3</sup> anyway the number of diagnosed visceral aneurysms is increasing because of the wide use of noninvasive enhanced diagnostic techniques.<sup>4</sup>

Its main complication is the rupture, whose risk tends to increase when the maximum aneurysmal diameter exceeds 2 cm. Even if there are few data in literature documenting the risk of nontreatment

of such aneurysms,<sup>5,6</sup> elective surgical treatment of asymptomatic visceral artery aneurysms (VAAs) larger than 2 cm has been suggested by most authors.<sup>7,8</sup> Open surgical repair has been considered for many years the treatment of choice, providing low perioperative mortality and morbidity rates<sup>9–11</sup> and an excellent durability in the long-term setting.<sup>12</sup> With the development of endovascular techniques, the use of endovascular surgery has been proposed also in this field, with promising early results<sup>4</sup>; however, the intermediate and long-term effectiveness of such interventions have not been demonstrated, yet.

The aim of this study was retrospectively analyze early and follow-up results of endovascular repair of true VAAs in our single-center experience.

## MATERIAL AND METHODS

### Study Group

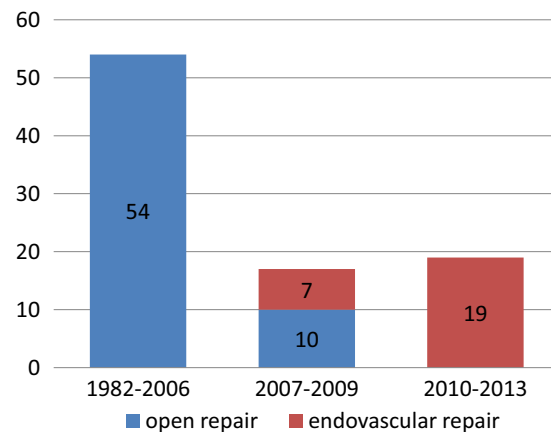
A revision of our institutional database<sup>12</sup> including all the interventions performed for abdominal aneurysms from January 1982 to June 2013 was conducted and 90 patients operated on for true VAAs were identified. Until 2007, 54 open interventions were performed; in the period ranging from 2007 to 2009, 7 endovascular interventions and 10 open interventions were performed, whereas starting from 2010, all the interventions (*n.* 19) were endovascularly performed (Fig. 1). The 26 patients who had an endovascular procedure represented our study group. Interventions performed for pseudoaneurysms were excluded from this analysis.

Preoperative, intraoperative, and postoperative variables were analyzed: preoperative variables included demographic data, risk factors and comorbidities, clinical and anatomic features. Intraoperative data included all the technical details concerning the endovascular procedure, whereas among postoperative data all clinical events in perioperative and follow-up data were comprised.

### Indications, Diagnostic Work-Up, and Endovascular Technique

Our indications for treatment were the presence of a symptomatic aneurysm regardless its diameter or of an asymptomatic aneurysm with a maximum diameter larger than 2 cm. In young women of child-bearing age and in patients with saccular aneurysms the indication was considered and discussed case-by-case also in the presence of smaller lesions.

Preoperative diagnostic assessment included angio computed tomography (CT) scan of



**Fig. 1.** Trend of VAAs treatment over the time in our institution.

thoracoabdominal aorta, of visceral vessels and of iliac arteries; in all the patients duplex ultrasound (DUS) examination of lower limbs' arteries was performed to exclude the presence of concomitant peripheral aneurysms. At the very beginning of our experience, we considered exclusion's criteria for endovascular treatment the presence of aneurysms without an adequate neck for catheterization or without optimal proximal and distal landing zones when stent placement was planned; the presence of significant tortuosity of the target vessel and all the contraindications to the use of iodinated contrast medium were considered exclusion's criteria, as well. In more recent years, we widened our indications, and nowadays, we are used to performing an endovascular-first strategy in all patients, regardless of anatomic considerations; the only exclusion's criterion remains the presence of contraindications to contrast medium.

All the interventions were performed by vascular surgeons in a hybrid suite, under local anesthesia, supplemented with intravenous sedation or analgesia when required. A standard technique of arterial access with unilateral femoral approach was preferentially used; in selected cases, concomitant left brachial access was performed. All the patients underwent intraoperative administration of 5,000 IU of intravenous sodium heparin at the time of arterial catheterization. The endovascular strategy was planned on the basis of the morphology of the aneurysm and of the characteristics of inflow and outflow vessels. In the presence of saccular aneurysms or when the preservation of blood vessels arising from the aneurysm was not considered mandatory, a coil packing (filling the aneurysmal sac with coils) or embolization (coil occlusion of outflow and inflow vessels) was attempted. In detail, all the coils

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