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abdominal aortic aneurysm rupture**

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## Case report - Aortic and aneurysmal Preoperative evaluation of retroperitoneal venous system anomalies during abdominal aortic aneurysm rupture

Roberto Gabrielli<sup>a,\*</sup>, Maria Sofia Rosati<sup>b</sup>, Andrea Siani<sup>a</sup>, Giustino Marcucci<sup>a</sup>

<sup>a</sup>Department of Vascular Surgery, ASL-RMF 'S. Paolo' Hospital Civitavecchia, Rome, Italy

<sup>b</sup>Department of Oncology Policlinico Umberto I 'Sapienza' University of Rome, Italy

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### Abstract

The association of a retroaortic left renal vein and an abdominal aortic aneurysm (AAA) fistula is an infrequent event. We present two cases of AAA rupture into the retroaortic left renal vein. Preoperative computed tomography (CT) assessment showed retroperitoneal bleeding due to a large AAA rupture with an associated unusual retroaortic left renal vein. Patients underwent successful arteriovenous fistula sutures with abdominal aorto-iliac replacement. The patients had uneventful recoveries, and they were discharged on the seventh to ninth postoperative day (POD) without renal complications. The clinical onset was characterized by the unique syndrome: continuous abdominal bruit, abdominal and left flank pain with an associated pulsatile mass (Mansour Triad). Moreover patients presented with haematuria, proteinuria and a large non-functional left kidney on the imaging scan. The CT-scan may suggest the presence of the venous anomaly. Unusual anatomical presentation recommends a careful surgical approach during AAA operations.

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**Keywords:** Aortic aneurysm rupture; Abdominal arteriovenous fistula; Preoperative evaluation computed tomography

### 1. Introduction

Several anatomical anomalies of the retroperitoneal venous system have been described and many represent potential hazards for the vascular surgeon. The renal vein anomaly may be responsible for massive bleeding during abdominal aortic surgery.

An accurate preoperative evaluation is mandatory to avoid massive bleeding due to venous damage.

We present two cases of abdominal aortic aneurysm (AAA) rupture into the retroaortic left renal vein.

### 2. Case 1

A 79-year-old male presented with left flank pain. His blood pressure was 100/50 mmHg and pulse rate was 135 beats/min on admission. He reported medical history of hypertension, diabetes and haematuria. A continuous abdominal bruit was revealed on physical examination and abdominal sounds were absent. The serum creatinine level of 290  $\mu\text{mol/l}$  (3.3 mg/dl) suggested renal impairment.

An AAA was confirmed on ultrasound examination.

Enhanced multi-slice computed tomography (CT) study confirmed an AAA rupture into retroaortic vascular structure (Fig. 1).

### 3. Case 2

A 61-year-old female presented with acute left flank pain. She reported vascular comorbidity, as myocardial infarction and transient ischemic attack seven and nine years earlier, respectively. Her blood pressure was 80/50 mmHg and pulse rate was 103 beats/min on admission. Physical examination revealed a continuous abdominal bruit, and urinalysis showed a clear haematuria. Renal failure was associated with a creatinine serum level of 572  $\mu\text{mol/l}$  (6.5 mg/dl). Abdominal ultrasound examination revealed an infrarenal AAA. Enhanced multi-slice CT was performed immediately and a 7-cm infrarenal AAA rupture, associated with an unenhanced left kidney and an abnormal retro-aortic course of the left renal vein, was confirmed.

In both cases the CT findings, as the visualization of an enhanced vascular structure, originating from the renal hilum and terminating in the posterior wall of the aneurysm, and giving rise to the left gonadic vein, was most likely related to a retro-aortic left renal vein, which suggested the diagnosis of arteriovenous fistula between the retro-aortic left renal vein and AAA.

The transperitoneal approach was performed in both cases and showed an AAA rupture with massive bleeding in the retroperitoneal space with an associated AAA-retroaortic left renal vein fistula. The opening of the aneurysm sac showed a massive dark-coloured bleeding from the posterior aortic wall due to the arteriovenous fistula. The defect was closed by suture with polypropylene 3-0 within aneurysm to preserve the gonadic veins.

\*Corresponding author. Via Don Luigi Sturzo 9, 00061 Anguillara Sabazia, Rome, Italy. Tel.: +39-33-91654903; fax: +39-06-99901586.

E-mail address: rogado@libero.it (R. Gabrielli).

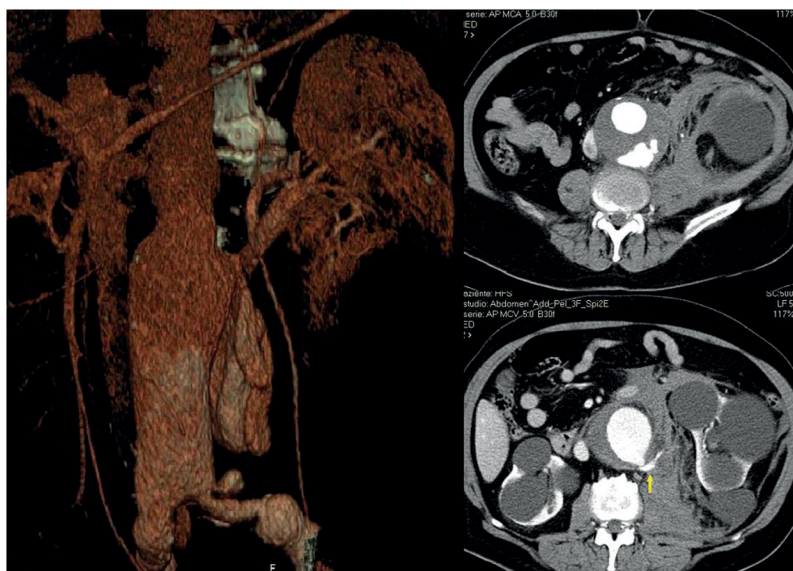


Fig. 1. Three-dimensional CT-scan view where the retroaortic left renal vein can be seen ending in the aortic aneurysm and axial CT-scans showing AAA rupture and fistula with the retroaortic left renal vein (yellow arrow). AAA, abdominal aortic aneurysm.

Aortoiliac replacement was performed using a tube Dacron graft of  $20 \times 10$  mm in the first case and  $18 \times 9$  mm in the second. The renal failure markedly improved after surgery, the serum creatinine level was  $114 \mu\text{mol/l}$  ( $1.3 \text{ mg/dl}$ ) at time of discharge in seven days in case 1 and  $167 \mu\text{mol/l}$  ( $1.9 \text{ mg/dl}$ ) in nine days in case 2.

The CT angiography control performed one month later after hydration with sodium bicarbonate and oral N-acetylcysteine (prevention of contrast-induced nephropathy), showed a surgically excluded retroaortic segment of the left renal vein normal enhancement of the left kidney and morphology of the aorto-iliac graft (Fig. 2) in both of the cases. At the 12-month follow-up the patients are asymptomatic.

#### 4. Discussion

Among the complications of aortic aneurysm, arteriovenous fistula between AAA and left renal vein is rare. In 1964, Lord et al. reported the first case [1]. Arteriovenous fistula with retroaortic left renal vein during rupture of aneurysm is an extremely rare complication, only three cases have been described [2].

The retroaortic left renal vein has an incidence of 4% in the general population [2, 3].

In abdominal surgery, unexpected venous injury may be responsible for serious bleeding, especially due to anatomical variations [4, 5].

In our case abdominal pain, haematuria and decreased enhancement of the left kidney during radiological evaluation were present, suggesting of a clinical syndrome as described by Mansour et al. in 1991 [2].

Brener et al. and Nonami et al. emphasized the importance of the careful identification of the left renal vein before the aortic surgery to avoid severe haemorrhage [6, 7]. Missing the presence of anatomical anomalies of retroperitoneal venous system may be responsible of torrential venous bleeding during the aneurysm sac opening [7].

In our case, the arteriovenous fistula was large but aneurysm compression occluded the distal part of the retroaortic left renal vein; in fact preoperatively the central

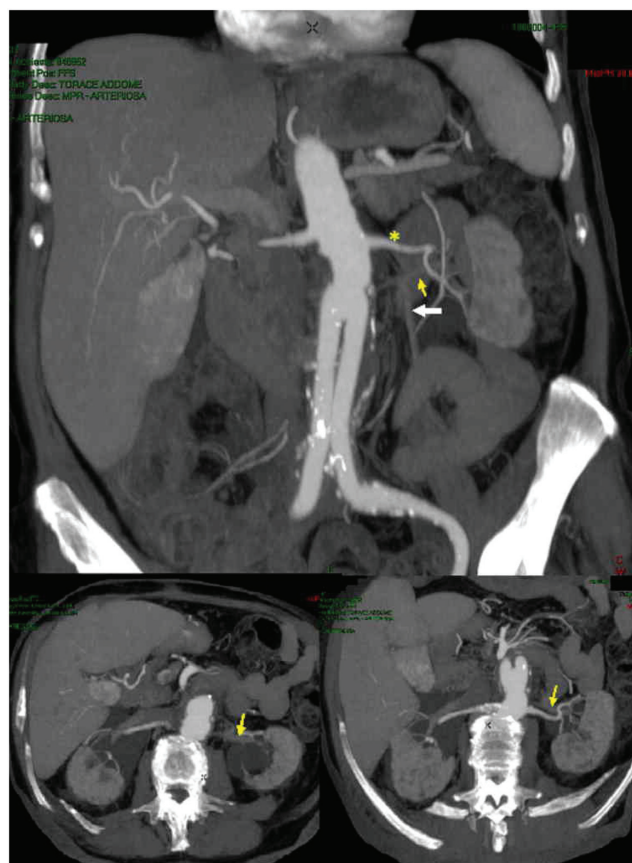


Fig. 2. The one month follow-up CT angiography control showed surgically excluded retroaortic segment of left renal vein (yellow arrow), normal enhancement of the left kidney, left spermatic vein (white arrow) and morphology of the aortoiliac graft.

venous pressure due to a massive left-to-right shunt was not increased. The signs of left renal vein hypertension, as haematuria and renal impairment and left flank pain were present [4]. Nonetheless, haematuria with abdominal continuous bruit suggest the presence of the arteriovenous fistula.

We preferred an open AAA approach because in both cases the angulation of the proximal aneurysm neck was suggested for negative effects on the endovascular aneurysm repair results. Furthermore, the proximity of the arteriovenous fistula to the renal arteries increased the risk of endoleak type 1 because it influenced the sealing and fixation zone of the stent graft even more. A contrast-enhanced CT can give enough information about AAA and venous anomalies.

Multislice CT angiography assessment should be performed in all patients undergoing a repair of AAA even during AAA rupture because it can provide details of anomalous venous anatomy to avoid dangerous bleeding [8].

Anatomical venous anomaly could complicate abdominal aorta surgery and significantly increase mortality especially when a presurgical assessment was not performed. Vascular surgeons should always consider the possibility of these anomalies to modify the surgical approach as soon as

possible. In the vast majority of cases CT-scans provide a complete diagnostic feature for surgery planning.

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