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# Case of the Month #170: The Unilateral Persistent Nephrogram After Endovascular Aortic Aneurysm Repair (EVAR): New Life in an Old Sign

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## Clinical Presentation

A 76-year-old man presented at our institution for endovascular aortic stent graft for elective repair of a 5.3-cm infrarenal abdominal aortic aneurysm. Fluoroscopic images obtained in the operating room showed adequate stent placement (Figure 1). After 24 hours, a routine postoperative computed tomography (CT) with unenhanced arterial and delayed-phase images was performed. The unenhanced CT showed a persistent nephrogram in the right kidney (Figure 2), with retained contrast from the previous day's EVAR. The patient's serum creatinine level increased from 93 μmol/L (42–102 μmol/L) before surgery to 154 μmol/L after surgery.

## Diagnosis

Further evaluation of the images showed a severe stenosis of the right renal artery caused by subtotal coverage of the ostium with the stent graft as seen on reconstructed images (Figure 3). The next day, the stenosed renal artery was recannulated by percutaneous stent insertion with microcatheters and a brachial artery approach. Two days after the intervention, the serum creatinine level normalized to 102 μmol/L, and the patient was discharged.

## Discussion

The persistent nephrogram, also known as renal cortical retention, refers to renal cortical enhancement hours to days after the administration of intravenous contrast material [1]. In the medical literature, most references to persistent nephrograms are related to contrast nephropathy; however, many associations were identified, including rhabdomyolysis and obstructing renal mass [1,2]. Although the physiologic basis of renal cortical retention of contrast material has not been discovered, it is thought to be a function of renal hypoperfusion and cellular injury [3]. When related to a systemic process such as hypotension, the persistent nephrogram will be bilateral, whereas a unilateral nephrogram will occur when the vascular supply of 1 kidney is compromised, as in obstruction.


Figure 1. Intraoperative fluoroscopic image shows apparent adequate stent placement.

Renal artery occlusion is a known and well-documented complication of endovascular repair of abdominal aortic aneurysm. The term endoleak is used to describe

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Figure 2. Unenhanced CT shows right sided persistent nephrogram with contrast retention from EVAR procedure performed 24 hours previously.

a phenomenon whereby blood flows around the deployed graft, transmitting systemic pressure to the bypassed aneurysmal sac [4,5]. There are a variety of causes of endoleak; however, a type 1 endoleak is attributed to failure of proximal fixation of the endograft. Based on retrospective studies, after an open abdominal aortic aneurysm repair, we know that the infrarenal aorta dilates at a greater rate after surgery than does the suprarenal and renal aorta [6]. Therefore, a commonly used strategy to avoid a type 1 endoleak is to cover the proximal aortic neck with a graft as close to the renal arteries as possible, where the rate of dilatation is lower [5]. A potential complication of this strategy is that slight cranial deployment of the graft may cause renal artery occlusion or stenosis, which can go undetected during the procedure from parallax, as in our case.

## Conclusion

Given that CT evaluation 24 hours after EVAR is standard of care at many institutions, the unilateral persistent nephrogram is an important sign in the detection of renal artery occlusion in this group of patients. Prompt identification of subtotal occlusions allows for renal artery intervention, which may salvage renal function.

Figure 3. Reformatted image shows subtotal occlusion of right renal artery by endograft.

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