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Periaortitis Secondary to Evar: Case Report and Literature Review

M. Massara, MD, PhD[1], V. Alberti, MD[1], G. Restifo, MD[2], A. Alberti, MD[1], and P. Volpe, MD[1]

Abstract

Periaortitis post endovascular aortic aneurysm repair (EVAR) represents a very rare complication, described only in 10 cases between 2001 and 2023. It may appear early or late after EVAR and the majority of patients had ureter compression, and all patients were treated with high dose of corticosteroids, with a complete resolution of symptoms except for one patient. We report a literature review and a case of early post-EVAR periaortitis manifested with acute renal failure due to ureter compression, treated with urgent bilateral J stent and high dose of corticosteroid, with complete resolution of symptoms.

Clinical Impact

Even if periaortitis secondary to EVAR is a very rare complication, it is important for the surgeon to know this possible rare complication and its characteristics, in order to immediately recognize it and treat it adequately to avoid complications.

Keywords

periaortitis, EVAR complications, corticosteroids, abdominal aortic aneurysm, acute renal failure

Introduction

Inflammatory abdominal aortic aneurysms (AAAs) are a rare variant of infrarenal AAA (5%–10%),[1] characterized by excessive wall thickening, retroperitoneal fibrosis, and adhesions to adjacent structures and usually occur in a population 10 years younger than those with non-inflammatory AAA.[1–4]

A consensus statement from the Society for Cardiovascular Pathology defined aortitis and periaortitis as inflammatory aortic conditions with atherosclerotic changes in the intima, marked medial thinning with elastin degeneration, and loss of smooth muscle cells, with inflammatory process limited to the aortic wall in aortitis and extended into the periaortic space in periaortitis.[5,6]

Clinical presentation can include back or abdominal pain, weight loss, malaise, and/or anorexia. With respect to infrarenal AAA, the risk of rupture is lower and the best modality of treatment reported is steroids therapy, able to reduce the periaortic fibrosis and adhesions with adjacent structures, prior to traditional open surgical repair or endovascular aortic repair (EVAR).

Instead, periaortic inflammation after EVAR is a very uncommon complication with unclear pathogenesis, different time of onset and clinical presentations, rarely reported in the current literature.

Computed tomography (CT) scan is necessary to exclude endograft-related complications and to distinguish graft infection from periaortitis, characterized generally by aortic wall thickening and a low-density, mildly enhancing soft tissue mass surrounding the aorta, with a variable extension of fibrosis that can be responsible of compression of the nearest organs.

We present a case of early periaortitis post-EVAR responsible for acute renal failure due to ureter obstructions and a literature review.

Materials and Methods

A 68-year-old man presented to our department with a CT diagnosis of iAAA with transverse diameter of 5.7 cm,

[1]Unit of Vascular and Endovascular Surgery, Grande Ospedale Metropolitano "Bianchi-Melacrino-Morelli," Reggio, Italy
[2]Unit of Nuclear Medicine, Grande Ospedale Metropolitano "Bianchi-Melacrino-Morelli," Reggio, Italy

Corresponding Author:
M. Massara, Unit of Vascular and Endovascular Surgery, Grande Ospedale Metropolitano "Bianchi-Melacrino-Morelli," Via G. Melacrino 21, 89124 Reggio, Italy.
Email: drmafaldamassara@gmail.com

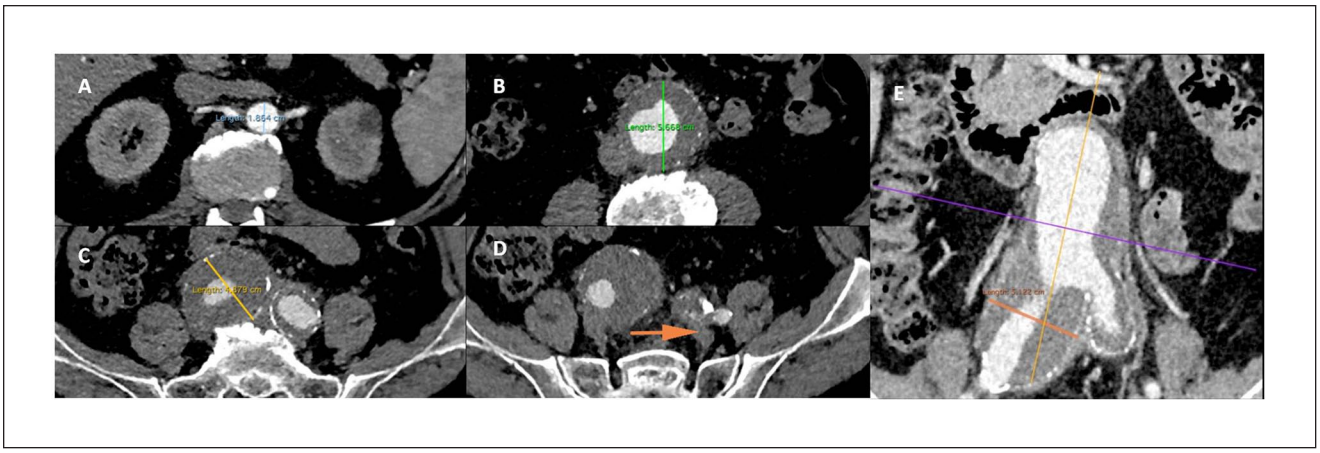

Figure 1. Proximal aortic neck (A), transversal aneurysmal diameter (B), aneurysmatic common iliac arteries (C), chronic occlusion of left hypogastric artery (D), and coronal CT image showing absence of pre-operative periaortitis (E).

involving also the right common iliac artery that had a transverse diameter of 4.9 cm and concomitant chronic obstruction of the left hypogastric artery, in the absence of signs of inflammatory AAA (Figure 1). He was affected by hypertension, dyslipidemia, chronic obstructive pulmonary disease, and chronic myocardial ischemia previously treated through Percutaneous transluminal coronary angioplasty (PTCA). Preoperative blood tests were normal, in particular C-reactive protein (CRP) levels, the white blood cell count, and renal function. After cardiac and anesthetic evaluation, due to his severe comorbidities, open surgery was excluded and we planned an endovascular treatment through a bifurcated endograft (Jotec GmbH, Hechingen, Germany) with right iliac branch to avoid right hypogastric artery coverage.

Under epidural anesthesia, the patient was operated in the hybrid room of our hospital. We recurred to a bilateral percutaneous common femoral access. The aneurysm was correctly excluded in the absence of intraoperative angiographic signs of endoleaks or other complications. Percutaneous femoral accesses were closed with Proglides (Abbott Vascular, Abbott Park, Illinois). Blood loss was minimal, and the procedure time was about 95 minutes, with a consumption of a quantity of medium contrast of 75 mL.

The perioperative and postoperative periods were uneventful and the patient was discharged on third postoperative day under double antiplatelet therapy for at least 1 month to preserve hypogastric artery stent patency, with recommendation to perform CT scan control at 3 months.

Results

One month later, the patient presented to the Emergency Room of our Hospital with an acute lower back pain, in the absence of other clinical signs such as fever. Urgent blood tests showed an acute renal failure with high levels of CRP (301 mg/dL), absence of neutrophilic leukocytosis, and negative blood cultures.

Due to the recent operation of EVAR, he was promptly submitted to an urgent CT scan that showed the correct deployment of the endograft in the absence of endoleaks or other endograft-related complications such as perigraft gas, with regular patency of both renal arteries and a periaortitis (Figure 2) involving both ureters that resulted in obstruction with a subsequent bilateral hydronephrosis (Figure 3).

So, he was admitted to the Urology Department to undergo urgent bilateral ureter J stents with immediate improvement of the renal function.

A whole-body ^{18}F-FDG PET/CT scan confirmed the periaortitis, with a mean SUV (standard uptake value) of 7.2 and the presence of fibrotic tissue around both kidneys, especially the left one. In particular, on the left side, the pathologic tissue was around the kidney and the ureter (SUV max Bw 8.06, SUV mean 4.80; Figures 4 and 5). The patient started immediately high doses of corticosteroids (Methylprednisolone: 20 endovenous mg EV x 2/die for 2 days; 32 mg daily for 2 weeks; 24 mg daily for 2 weeks, 16 mg daily for 2 weeks, 12 mg daily for other 2 weeks, and finally 8 mg daily for a total of 2 months) in association with calcium carbonate and cholecalciferol 1000 mg/die and alendronate 70 mg for week, with significant reduction of periaortic tissue thickness 3 months later and improvement of CRP values (31 mg/dL; Figure 6).

Discussion

Among post-EVAR complications, periaortitis is very uncommon and rarely has been reported in the current literature. Periaortitis may appear early or late after EVAR and, due to compression of tissues around the aorta, may occur more often with back pain, hydronephrosis, and acute renal failure for ureter compression and rarely with lower limbs edema for inferior vena cava compression, as

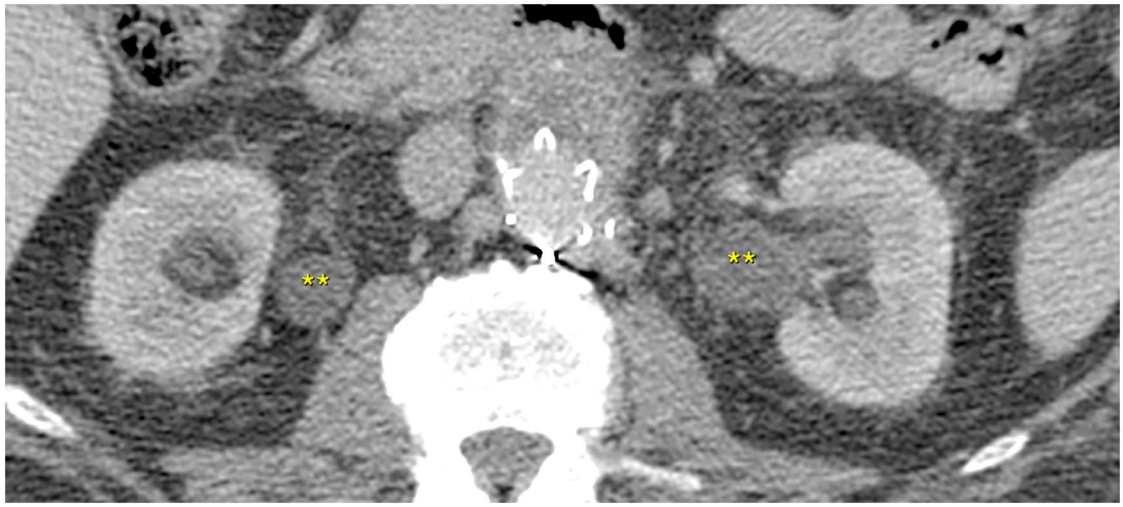

Figure 2. Urgent CT scan with bilateral hydronephrosis post-EVAR.
* indicate the hydronephrosis.

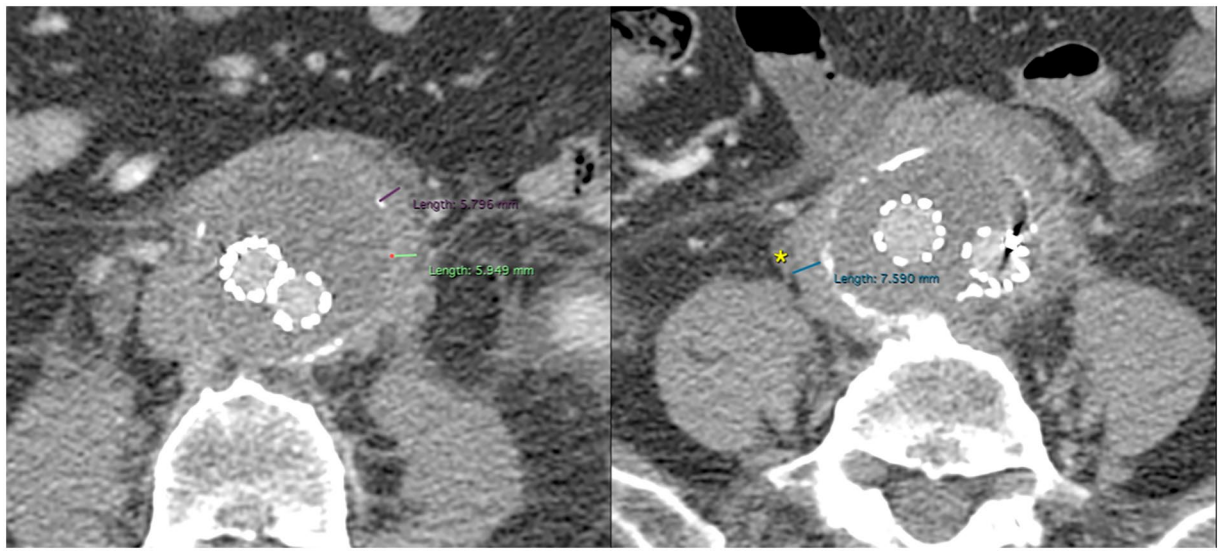

Figure 3. Periaortic fibrosis post-EVAR.
* indicate the maximum site of fibrosis.

suggested in the current literature. A correct diagnosis is necessary to distinct periaortitis from graft infection and post-implantation syndrome (PIS) and to start immediately the correct therapy.

The absence of fever and the nonappearance of symptoms in the immediate postoperative period allow to distinguish periaortitis from PIS that is more frequent after complex procedures of EVAR with respect to traditional EVAR.[7]

The absence of bacteremia at blood examination and the absence of pseudoaneurysm formation, ectopic gas, perigraft inflammation, and fluid and thickening of adjacent bowel in the CT scan allow to distinguish graft infection from periaortitis, characterized generally by aortic wall thickening and a low density, mildly enhancing soft tissue mass surrounding the aorta, with a variable extension of fibrosis that can be responsible for compression of the nearest organs.

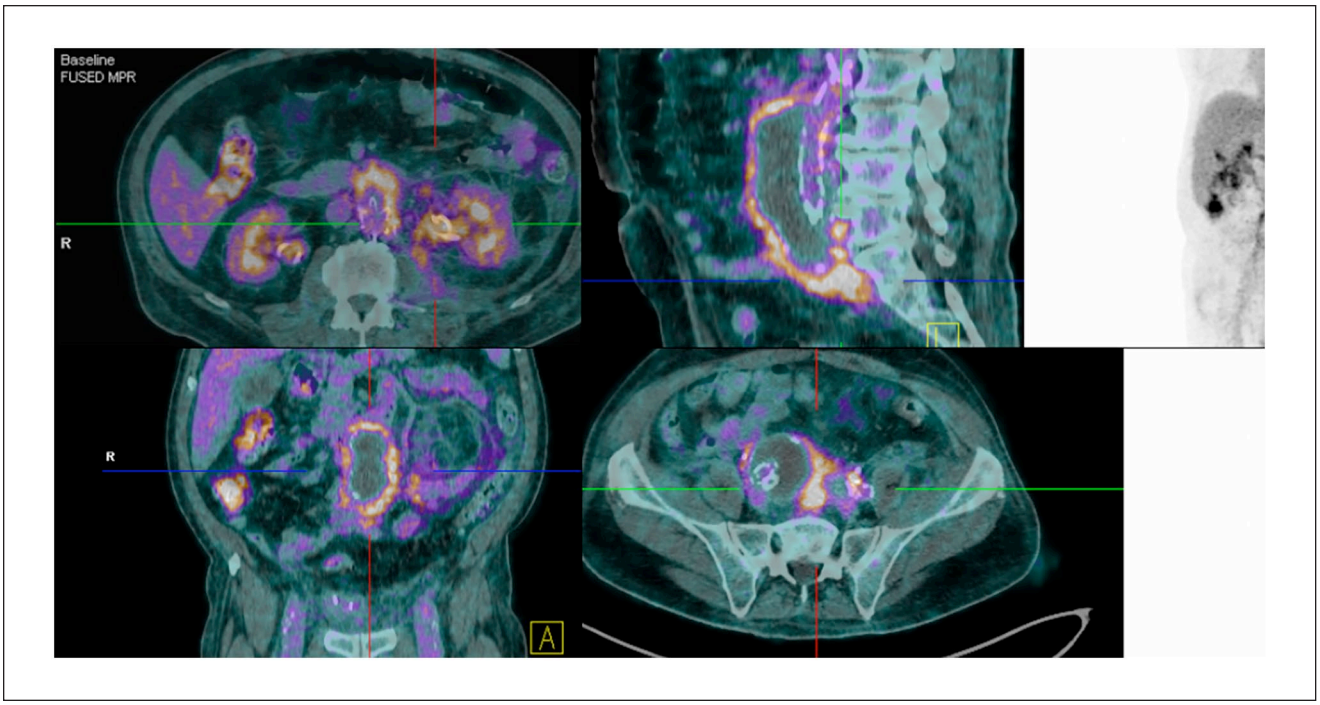

Figure 4. Whole-body 18F-FDG PET/CT scan with a mean SUV (standard uptake value) of 7.2 and the presence of fibrotic tissue around both kidneys, especially the left one where the pathologic tissue is around the kidney and the ureter (SUV max Bw 8.06, SUV mean 4.80).

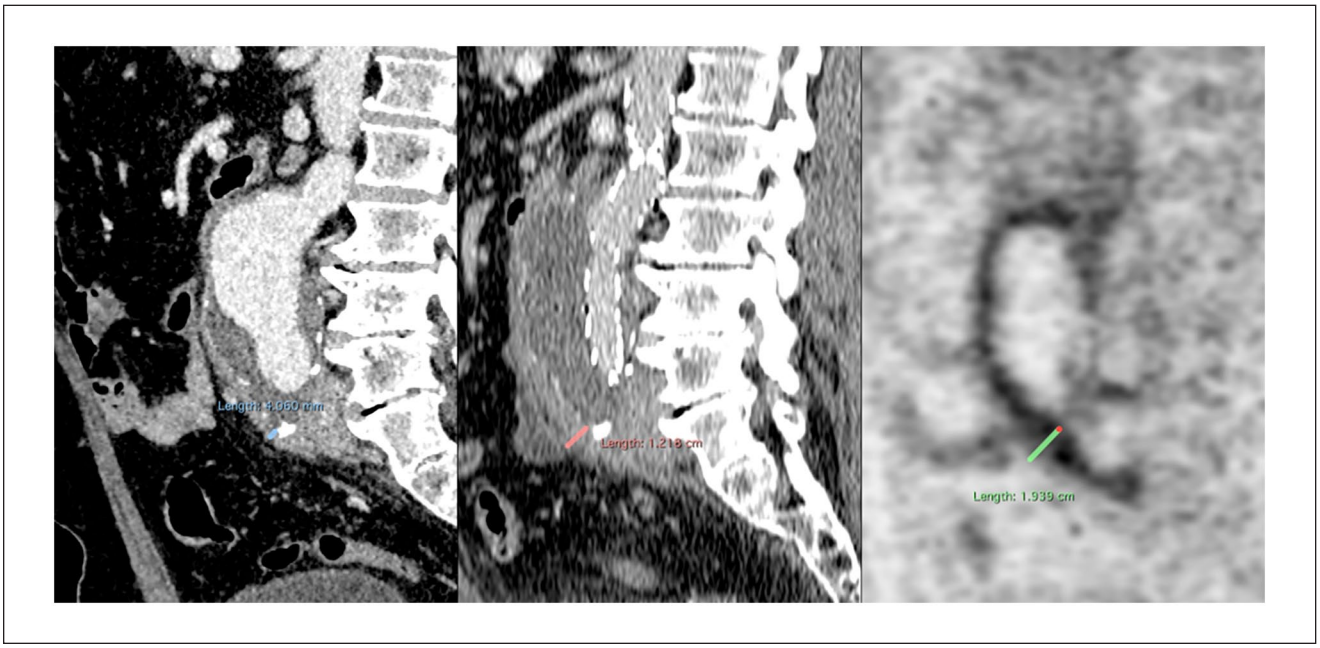

Figure 5. Preoperative coronal CT scan image showing absence of periaortitis (A), periaortitis after EVAR at CT scan (B), and 18F-FDG PET/CT (C).

From a careful literature review from 2001 to 2023 on PubMed, we have identified 10 case reports on periaortitis post-EVAR (Table 1).

Among these 10 cases, there were 9 males (90%) and 1 female (10%), mean age 70 years; just a patient had a pre-operative solitary functioning right kidney. After EVAR for

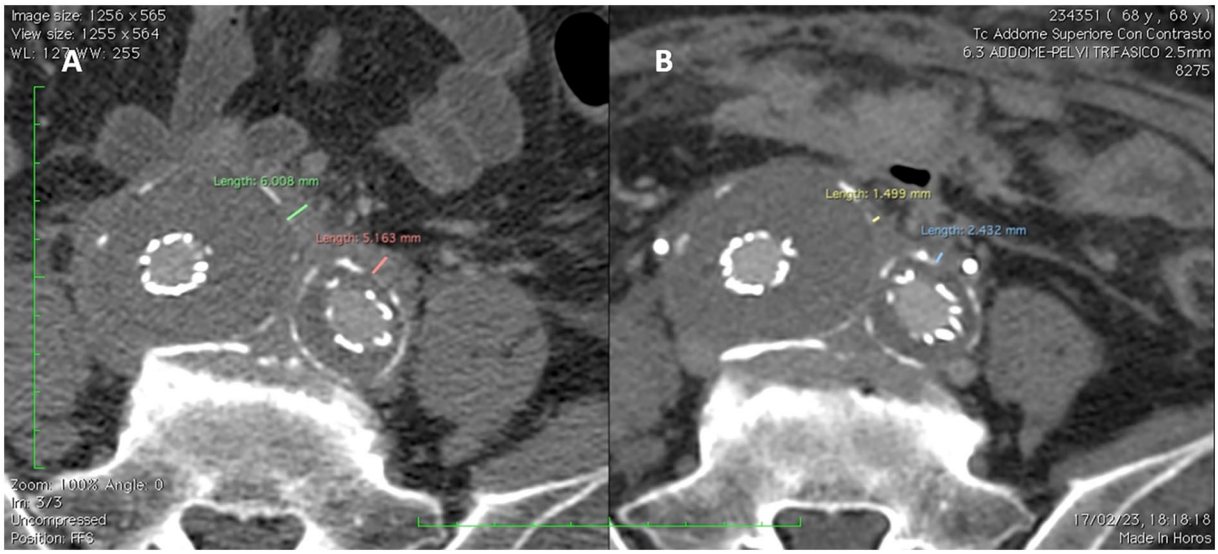

Figure 6. CT scan control in the acute phase (A) and 3 months after best medical therapy (B) with important reduction on the periaortic tissue thickness.

Table 1. Literature Review of Periaortitis After EVAR.

Authors	Case presentation	Onset of periaortitis and symptoms	Treatment and resolution of symptoms
Simons et al[8]	M, 59 y EVAR for iAAA (Talent)	17 months after EVAR: left-sided abdominal pain for left ureter obstruction and renal malfunction	Nephrectomy—tamoxifen 10 mg x2/die
Jetty and Barber[9]	M, 76 y EVAR (AneuRx -Medtronic)	5 months later: acute renal failure and ureters obstruction	Bilateral ureters stenting, corticosteroids and tamoxifen
Goswami et al[10]	F, 79 y EVAR for iAAA.(Zenit, Cook) Solitary functioning right kidney	5 weeks later: systemic infection with blood and urine infection Right hydronephrosis	Right nephrostomy + Ureteral J stent
Vijaynagar et al[11]	M, 63 y EVAR for iAAA (Cook)	3 months later: left loin pain CT: periaortitis with left ureteric obstruction CRP 80 mg/dL	Left ureteric stenting, prednisolone 90 mg daily in divided doses for 12 weeks) and tamoxifen 20 mg daily CT improvement after 2 months
Peters et al[12]	M, 81 y EVAR	4 weeks after EVAR: renal failure and periaortitis	Oral glucocorticoids and symptoms resolution
Taguchi et al[13]	M, 78 y EVAR for iAAA	15 months after EVAR: severe abdominal pain and fever	High dose of corticosteroids
Alomran et al[14]	M, 63 y EVAR for iAAA (Endurant)	3 months later: vague abdominal discomfort and constipation 8 months later: acute-onset renal failure with a serum creatinine of 124 mmol/L and an inflammatory syndrome with a CRP of 124 mg/L CT: PAF engulfing the ureters with hydronephrosis	Double J catheters in both ureters Prednisolone therapy: 1 mg/kg, reduced by 5 mg bimonthly Normal renal function 2 weeks later. CT scan 3 months later: significant reduction in PAF
Mansour et al[15]	M, 67 y EVAR for iAAA (W. L. Gore & Associates, Flagstaff, AZ)	Eight days after discharge: lumbar pain and lower limb heaviness Nine days after readmission, lower limb swelling CT: periaortic inflammation with retraction and stretching of the inferior vena cava and dilatation of the iliac and pelvis veins with no ureteral involvement	Corticosteroid drugs (methylprednisolone, 16 mg daily) for 6 months, with complete clinical symptoms resolution

(continued)

Table 1. (continued)

Authors	Case presentation	Onset of periaortitis and symptoms	Treatment and resolution of symptoms
Frech et al[16]	M, 70 y EVAR for iAAA (Endurant II)	3 months later: back pain CT: periaortitis and left hydronephrosis	Prednisolone (initial dose, 80 mg/d; maintenance dose, 4 mg/d) Improvement of CT images and renal function after 3 months
Trinder et al[17]	M, 64 y EVAR for iAAA (. L. Gore & Associates, Flagstaff, AZ)	2 months later: aneurysmal sac enlargement for type II endoleak and peri-aortitis Several months later: abdominal pain and night sweats with increase in the peri-aortitis at CT scan PET-CT scan 5 months post-intervention: intense uptake of 18F-fluorodeoxyglucose throughout the thickened wall of the aneurysm sac	Prednisolone (initial dose, 75 mg/d) A follow-up PET scan performed after 5 months of medical therapy: excellent partial resolution of the peri-aortitis

Abbreviations: EVAR, endovascular aortic repair; iAAA, infrarenal abdominal aortic aneurysm; CT, computed tomography; PAF, periaortic fibrosis; CRP, C-reactive protein.

iAAA, 7 patients presented ureter obstruction with acute renal failure: only one patient was submitted to nephrectomy, while 4 patients underwent ureter J stent placement with improvement of the renal function.[8,10–12,14,16,17]

Just one patient had lower limb swelling due to inferior vena cava compression by periaortitis and resolution of symptoms recurring to best medical therapy.[15]

Two patients with a late periaortitis had fever and abdominal pain associated with night sweats. Also these patients were treated with high dose of corticosteroids.[9,13]

The date of onset of this rare post-EVAR complication in 3 cases is reported a late periaortitis, starting 8, 15, and 17 months after EVAR while in the remaining cases, the periaortitis became symptomatic within 3 months from operation. About medical therapy, all patients underwent best medical therapy consisting of high dose of corticosteroids, associated with tamoxifen only in 3 cases.

The cause of this rare complication remains actually unclear, probably because patients are treated with medical therapy without the need to resort to operation and subsequently a histological examination of tissue surrounding the aorta cannot be performed.

In a sheep model, Schurmann et al[18] reported a high percentage of serum antibodies to oxidized low-density lipoproteins that are often localized in the atherosclerotic plaques of the abdominal aorta. Consecutively, based on this research, an autoallergic inflammation of the aortic wall is suggested as possible cause of periaortitis after endograft implantation.[19]

As in the majority of cases reported in the literature, our patient presented an early acute renal failure due to retroperitoneal fibrosis 1 month after EVAR, responsible for ureter obstruction and acute renal failure and he required an urgent bilateral ureter J stent deployment and high dose corticosteroids therapy associated with calcium carbonate and cholecalciferol 1000 mg/d and alendronate 70 mg for week, with complete resolution of symptoms 1 month later and resolution of fibrosis at CT scan control. Diagnosis was made resorting to CT scan and baseline fluorodeoxyglucose (FDG) positron emission tomography-computed tomography (PET-CT) that shows intense FDG activity corresponding to the irregular thickened wall of the aortic aneurysm sac.

Conclusions

Among post-EVAR complications, periaortitis is very uncommon and rarely has been reported in the literature. Etiology of this complication remains unclear and further investigations are required to identify its pathophysiology. It may present with acute symptoms, early or late after EVAR, leading to a CT scan and a correct diagnosis is necessary to avoid severe complications.

The treatment of choice is represented by corticosteroid drugs and some patients with acute renal failure require ureter J stent placement to solve the problem.

Declaration of Conflicting Interests

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ORCID iD

M. Massara https://orcid.org/0000-0003-2995-7458

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