

Perigraft air and endoleak post endovascular repair of abdominal aortic aneurysm: is it always catastrophic?

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DESCRIPTION

A 68-year-old man with hypertension presented with a sudden onset of abdominal pain radiating to the back. An abdominal ultrasound revealed a large peripherally thrombosed pseudoaneurysm of the infra-abdominal aorta. A CT angiogram confirmed the abdominal aortic aneurysm (AAA) with a maximum diameter of 5.8 cm and contained rupture as evidenced by the periaortic haematoma (figure 1A). The aneurysm was extending up to the aortic bifurcation with an incidental finding of right renal artery stenosis. Bilateral common iliac arteries showed atherosclerotic changes without any significant stenosis or tortuosity (figure 2A).

The patient was taken up for endovascular repair (EVAR) of the AAA owing to the lesion morphology. The abdominal aortic stent-graft (Endurant II, Medtronic, USA) was deployed via the left femoral access with the suprarenal fixation of the proximal end and distal end in the ipsilateral common iliac artery (CIA). The iliac limb extension of the stent-graft (Medtronic, USA) was deployed from the right common femoral artery (CFA) access with its distal end in the ipsilateral CIA. The check angiogram revealed good proximal and distal approximation of the stent-graft. However, a jet of contrast is seen extending into the perigraft aorta from the carina of the stent-graft (figure 2 and video 1), which was reduced after an interval angiogram postnormalisation of the activated clotting time. It suggests

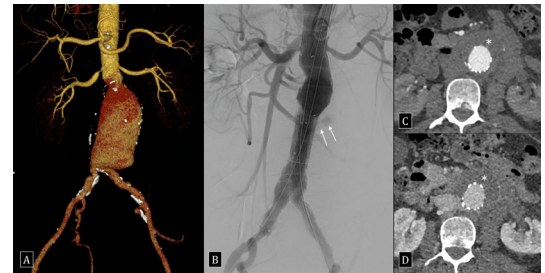


Figure 2 CT VRT image (A) showing abdominal aortic aneurysm extending up to the bifurcation and right renal artery stenosis (arrowhead). Digital subtraction angiography image (B) showing good proximal and distal approximation of stent-graft with an endoleak near the carina (arrows). Day 5 arterial (C) and venous (D) phase images show patent stent-graft without pooling of contrast in the excluded aneurysmal sac (marked by an asterisk).

an endoleak due to the porosity of the stent-graft (type IV endoleak) as opposed to the manufacturing defects (type III endoleak).

A follow-up CT 5 days postprocedure did not show any contrast extravasation confirming the diagnosis of type IV endoleak (figure 2C,D). However, there was an air pocket seen in the thrombosed portion of the aneurysmal sac (figure 1B) without any peripheral enhancement or tissue infiltration to suggest secondary infection. The patient was afebrile without raised inflammatory markers or positive blood culture. The size of the air pocket was reduced at 19 days (figure 1C), and it completely disappeared at 30 days postprocedure (figure 1D). An interval reduction of the periaortic haematoma was also evident in serial CT scans (figure 1).

The endograft infection is one of the most dreaded complications post-EVAR with a significant in-hospital mortality rate (19%–32%).¹ The diagnosis is based on the clinical presentation, imaging findings, and lab parameters. Patients usually have constitutional findings like fever, pain, increased leucocyte and C reactive protein levels as well as positive blood culture. They can also present with fatigue, weight loss and bleeding per rectum (with aorto-enteric fistula). However, a minority of patients can be asymptomatic. The CT findings include periaortic tissue infiltration and enlarged lymph nodes as well as perigraft air. Adjacent bowel wall thickening or extravasation of contrast into the bowel lumen can also be noted in an aorto-enteric fistula.² However, the mere presence of perigraft air is not indicative of the endograft infection without

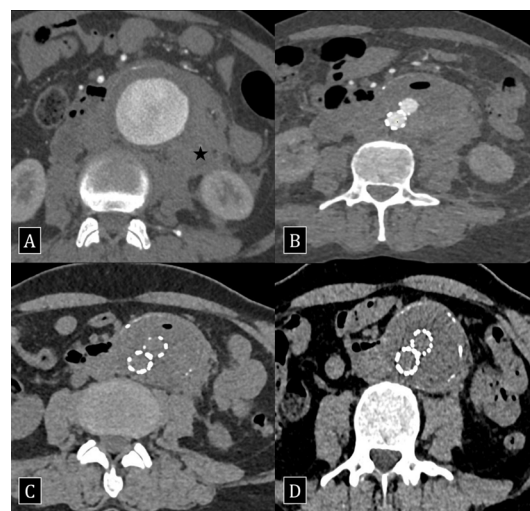


Figure 1 CT axial image showing (A) abdominal aortic aneurysm with contained rupture (marked by a star). Day 5 postprocedure shows a patent stent-graft with a perigraft air focus (B), reduction of air focus at day 19 (C) and complete resolution at day 30 postprocedure CT (D).



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Video 1 Check angiogram postprocedure shows extravasation of contrast near the carina of the stent-graft (type IV endoleak).

the additional radiological, clinical or biochemical findings. The perigraft air in isolation can be seen up to 30 days post-EVAR, which may be due to the delivery of residual air bubbles in the outer sheath of the stent-graft during stent-graft deployment.^{3 4} In addition, fever, leucocytosis and perigraft air in the postoperative period can be related to postimplantation syndrome (PIS) and do not necessarily imply the endograft or systemic infection. It is postulated to be secondary to local inflammatory reaction and found to be more common with polyester graft material. PIS is usually managed conservatively, but it occasionally results in hepatic failure or adverse cardiovascular events.⁵ As a result, the patients with symptomatic or asymptomatic perigraft air should be monitored carefully to exclude the possibility of graft infection.

Type III endoleak is due to the separation of the stent-graft components or a defect in the fabric of the stent-graft. It can occur early due to component defect of the stent-graft or late due to material fatigue secondary to constant pulsatile forces of the blood column and eventual changes in the morphology of aneurysmal sac.⁶ There is usually a high-pressure leak through the defect in fabric into the aneurysmal sac. It can be seen on the Doppler examination as a high-velocity jet extending into the aneurysmal sac or on an angiogram as the continuous column of contrast extravasation as well as opacification and pooling of contrast into the aneurysmal sac. It often results in a measurable increase in the aneurysmal sac diameter and eventual rupture due to high pressure, if left untreated.^{7 8} Type IV endoleak, on the other hand, is due to the fabric-related porosity of the stent-graft and is rarely described in newer-generation devices due to high-density, multifilament polyester graft material.⁹ It is seen in the immediate postdeployment angiogram as a blush of contrast, usually without a discernible point of leakage. It occurs when the patient is anticoagulated and resolves spontaneously with normalisation of the coagulation profile. It is important to differentiate type IV from type III endoleak as the latter requires

immediate sealing of the defect with an additional stent-graft or open repair, whereas the former is self-limiting.¹⁰

Thus, type IV endoleak and perigraft air are routine findings post-EVAR and should not be confused with disastrous type III endoleak and perigraft infection, respectively.

Learning points

- ▶ Perigraft air in isolation in the post-endovascular repair (EVAR) period is a routine finding and can be seen up to 1 month postprocedure. It should be differentiated from the perigraft infection based on additional radiographic, clinical and biochemical features.
- ▶ Fever, leucocytosis and perigraft air can be related to the postimplantation syndrome. It occurs secondary to local inflammatory reactions and is managed conservatively under careful monitoring.
- ▶ Type IV endoleak due to porosity in the fabric material is rarely seen in modern endoprosthesis used for EVAR. It is usually self-limiting and disappears postnormalisation of the coagulation profile of the patient. However, it should be differentiated from the disastrous type III endoleak due to a defect in the fabric, which needs to be managed immediately with an additional stent-graft or with open surgical repair.

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