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Case Report

Air within surgical arterial graft on computed tomography—An alarming finding of a rare complication

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ABSTRACT

We present a case of a 61 years old lady operated 2 years back for severe superior mesenteric artery stenosis with a surgical vascular graft and presenting as acute severe abdominal pain and vomiting. Her CT angiography showed occlusion of the surgical vascular graft with graft migration into small bowel. Both the findings of graft occlusion and bowel perforation were optimally demonstrated on the CT angiography study. The alarm of bowel perforation in addition to graft infection was raised by the presence of air pockets within the graft and its communication with bowel lumen. Coexistent graft infection was evident on graft culture.

Introduction

The purpose of this case report is to draw attention to an extremely alarming finding of air within surgical/vascular grafts. Vascular grafts are evaluated for their patency and possible complications such as occlusion by CT angiography. However, the presence of air within graft raises an alarm of infection by gas forming organisms or communication with an air containing physiological structure such as bowel.

Case report

A 61-year-old woman presented to the emergency department with 1 day of severe abdominal pain and vomiting (possible hematemesis).She had previous episodes of intermittent abdominal pain in last 1 month. Two years back she was operated upon for severe superior mesenteric artery (SMA) stenosis. A synthetic arterial graft extending from left common iliac

Abbreviations: CT, computed tomography; SMA, superior mesenteric artery; CIA, common iliac artery.

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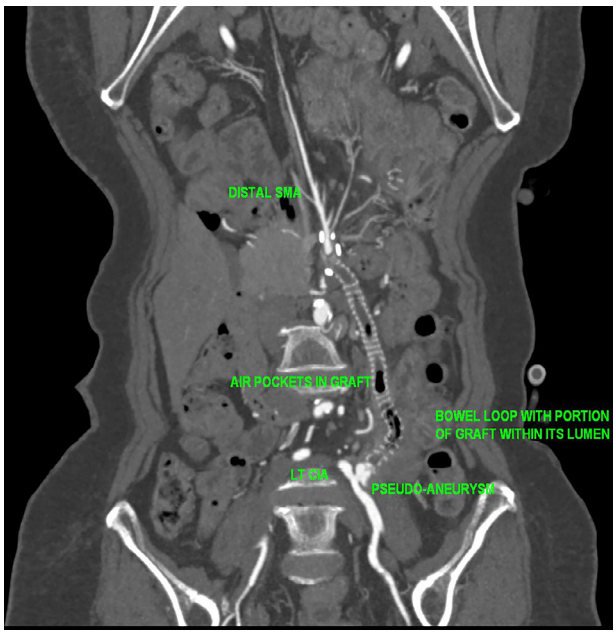

Fig. 1 – Sixty-one-year old female with abdominal pain. Findings: Coronal curved reformatted image of CT mesenteric angiography (arterial phase) demonstrates retrograde graft from left common iliac artery to superior mesenteric artery. Note: Lack of contrast opacification and presence of patchy air pockets within the graft and pseudoaneurysm.

Fig. 2 – Sixty-one-year old female with abdominal pain. Findings: Axial source image of CT mesenteric angiography (arterial phase) demonstrates portion of the synthetic arterial graft within the lumen of a small bowel loop. Note: Lack of contrast opacification and presence of patchy air pockets within the graft.

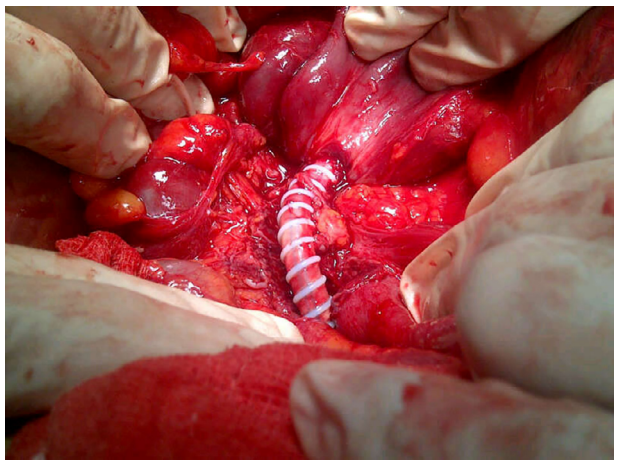

Fig. 3 – Sixty-one-year old female with abdominal pain. Findings: Intraoperative photograph showing migration of surgical vascular graft into the bowel loop with bowel perforation.

artery to SMA was put as a retrograde bypass and the graft was extraperitonealised.

An emergency CT angiography (120 cc nonionic contrast – omnipaque 300 mg/ml at the rate of 4 ml/sec) was performed on a multi-detector CT (Siemens- Dual Source Definition 64). CT revealed extensive atherosclerotic changes in aorta. Celiac axis showed partial stenosis at origin due to partially calcified plaque. Right hepatic artery had separate origin from aorta. SMA was thrombosed from origin onwards for a length of about 28 mm. A portion of SMA just proximal to the graft anastomosis was filling through collaterals from inferior mesenteric artery (IMA). Distal portion of SMA was also filling through these collaterals. The graft extended from left common iliac artery (proximal end of the graft) to SMA (distal end of the graft) and had uniform caliber. It did not show any contrast opacification suggestive of occlusion but had intraluminal air pockets (Figs. 1, 2). Also, the graft was embedded within a small ileal loop. Pseudoaneurysm was noted at the anastomosis of graft and left common iliac artery (proximal end of graft). Based on above findings, a possibility of bowel perforation with intrabowel migration of the graft was suggested. No evidence of bowel dilatation/ischemia was seen.

These CT findings were confirmed during surgery (Fig. 3). The proximal end of graft was attached to the left common iliac artery with pseudoaneurysm formation while the distal end was attached to the SMA. The graft lumen showed patchy thrombus/blood and the bowel lumen also showed presence of blood. Graft lumen did not reveal any bowel fluid. The surgical graft was removed from bowel loop with a small bowel resection-anastomosis. Patch angioplasty was performed for the arteries. Graft culture showed E coli growth (though intraoperatively there was no evidence of pus within the graft, in the peritoneal cavity or in the retroperitoneum).

Discussion

Vascular arterial graft is a well-known surgical treatment for significant vascular occlusion in mesenteric circulation. Two

types of mesenteric bypass can be performed – infrarenal (retrograde) and suprarenal (supracoeliac or antegrade) [1,2]. Infrarenal bypass has a less risk of distal embolization and has the advantage of easier dissection. However, it has disadvantage of flow turbulence and runs the risk of graft failure due to progressive infrarenal aortic atherosclerosis along with graft kinking. Kinking and compression can occur with short vein grafts due to mobility of the SMA in this location [1,2].

The advantages of suprarenal/supracoeliac bypass are - it uses the usually disease-free suprarenal aorta, provides antegrade flow, uses a short length of the bypass and risk of graft kinking is minimal. The disadvantages are - more extensive dissection with partial or complete aortic clamping and the associated risks of hepatic, renal, intestinal, and lower extremity ischemia and distal embolization [1,2]. Both the bypasses are prone for intimal hyperplasia and subsequent thrombosis [1].

Post procedural follow-up of the grafts can be done with duplex ultrasound, CT angiography and MR angiography [1,3]. The surgical graft complications which are well-known are kinking (with venous grafts particularly) [4], intimal hyperplasia [4], occlusion/thrombosis (early postoperative and late postoperative) [4], reperfusion syndrome [4], infection and rupture. Migration as a complication has been reported with intravascular stents put for mesenteric ischemia [1,4].

In the literature, to the best of our knowledge, only 1 single report by Kentaro Honda et al. [5] has mentioned bowel perforation by a vascular arterial graft where they also found pus formation within the graft. The review of literature by Oderich et al. [6] also does not mention migration of surgical arterial graft into the bowel lumen. We believe that air within the graft is an important sign of graft complication and can either indicate infection (by gas forming organisms) or communication with an air containing structure such as bowel or both. In our case, the graft had a pseudoaneurysm formation at the level of anastamosis with iliac artery with occlusion of its lumen. It had perforated into the bowel and showed evidence of infection on culture. The possible reason for the entry of extraperitonealised graft into the intraperitoneal cavity and perforation into the bowel could be cut end of the graft/sutures eroding the peritoneum/bowel wall and/or post procedure adhesions/graft infection/perigraft inflammation with subsequent focal bowel wall necrosis. However, it is still difficult to decide whether graft migration into bowel was the cause of infection or vice versa, though the possibility of former is more likely, as the patient did not have fever and there was no intraoperative pus (both these have been mentioned in the case report by Kentaro Honda et al. [5]).

Conclusion

CT angiography is the investigation of choice for post procedural evaluation of abdominal vascular grafts. As a radiologist, one has to pay attention to the possible complications related to surgical grafts such as occlusion, kinking, infection, rupture, etc. Air within the graft lumen is an alarming finding which may not always indicate infection by gas forming organism but also can also be a sign of an equally dreaded complication such as communication with bowel or bowel perforation which was present in our patient. CT angiography demonstration of graft occlusion, pseudoaneurysm, presence of air within the graft and graft embedment within small bowel with resultant bowel perforation in this rare case prompted immediate surgical intervention.

Teaching point

Presence of air within a mesenteric surgical vascular graft can be a signature of an unusual complication like communication of graft lumen with an air containing structure such as bowel, apart from infection by gas forming organism. Radiologist involved in care of mesenteric graft patients must be aware of this complication also, apart from the other well narrated and previously described complications in literature.

REFERENCES

[1] Lopera JE, Trimmer CK, Lamba R, Suri R, Cura MA, El-Merhi FM. MDCT angiography of mesenteric bypass surgery for the treatment of chronic mesenteric ischemia. AJR 2009;193:1439–45 PMID:19843765.
[2] Shanley CJ, Ozaki CK, Zelenock GB. Bypass grafting for chronic mesenteric ischemia. Surg Clin North Am 1997;77:381–95 PMID:9146720.
[3] Moneta GL. Screening for mesenteric vascular insufficiency and follow-up of mesenteric artery bypass procedures. Semin Vasc Surg 2001;14:186–92 PMID:11561279.
[4] Paul Shih M-C, Angle JF, Leung DA, Cherry KJ, Harthun NL, Matsumoto AH. CTA and MRA in mesenteric ischemia: part 2, normal findings and complications after surgical and endovascular treatment. AJR 2007;188:462–71 PMID: 17242256.
[5] Kentaro Honda, Yoshitaka Okamura, Yoshiharu Nishimura, Shunji Uchita. Migration of the ringed ePTFE graft into the small intestine. J Vasc Surg 2013;57:525 PMID:23337861.
[6] Gustavo Oderich S, Rafael Malgor D, Joseph Ricotta J II. Open and endovascular revascularization for chronic mesenteric ischemia: tabular review of the literature. Ann Vasc Surg 2009;23:700–12 PMID:19541451.