

Compression of endograft limb after translumbar embolization of a type II endoleak using *n*-butyl cyanoacrylate

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ABSTRACT

Cyanoacrylate “glue” has been used in a variety of surgical disciplines. In vascular surgery, it has been used to seal type II endoleaks after endovascular aneurysm repair. In this case, we report a rare complication after translumbar injection of *n*-butyl cyanoacrylate to occlude a persistent type II endoleak. The cyanoacrylate resulted in significant compression of the right iliac graft limb with reduced distal perfusion. (J Vasc Surg Cases and Innovative Techniques 2018;4:327-30.)

Keywords: EVAR; Type II endoleak; Glue embolization

Endovascular aneurysm repair (EVAR) has become the preferred technique for aortic aneurysm repair, accounting for 80% of cases.¹ However, EVAR has a higher rate of reintervention because of aneurysm-related complications, thus requiring closer follow-up than for open repair.² The most common causes for reintervention after EVAR are endoleaks and graft migrations.^{2,3} Endoleaks are classified into five types. Type II endoleaks, the most common, occur in 20% to 30% of EVAR cases.^{3,4} Fortunately, type II endoleaks have a relatively benign course as many occlude spontaneously, and those that do not are usually not associated with aneurysm sac expansion. However, some type II endoleaks are associated with sac growth and rarely aneurysm rupture. Most authorities prefer to observe stable endoleaks with serial computed tomography angiography (CTA) and intervene only after significant sac enlargement.⁵ Unfortunately, recurrence of type II endoleaks after technically “successful” interventions is high (up to 80%), thus requiring continuous long-term surveillance.^{6,7} In this report, we present a case of graft limb compression and limb ischemia after embolization of a type II endoleak with cyanoacrylate glue. The patient was consented before manuscript preparation and gave full permission for the publication and reproduction of all textual and visual material relating to the clinical case.

CASE REPORT

The patient is a 74-year-old white man with known hypertension, type 2 diabetes mellitus, hyperlipidemia, coronary artery disease, and paroxysmal atrial fibrillation. He underwent endovascular repair of his 5.4 × 5-cm symptomatic abdominal aortic aneurysm 8 years ago. Repair was accomplished using a 26-mm Excluder (W. L. Gore & Associates, Flagstaff, Ariz) aortobi-iliac stent graft. A month later, on his first postoperative CTA scan, a type II endoleak was visualized in the distal aortic aneurysm sac secondary to retrograde flow from the inferior mesenteric artery (IMA) and a pair of lumbar arteries at the level of the third lumbar vertebral body. Because of persistence associated with sac expansion, this endoleak was sealed 2 years later with coil embolization for the proximal IMA and right lumbar artery and Gelfoam (Pharmacia and Upjohn, Kalamazoo, Mich) slurry occlusion for the left lumbar artery. Postprocedure CTA demonstrated resolution of the endoleak and subsequent decrease in aneurysm size. Three years after this embolization, CTA revealed



Fig 1. Computed tomography (CT) image in delayed postcontrast phase (right) subtle endoleak adjacent to right graft limb. Coils from a prior embolization procedure are present in the adjacent lumbar artery.

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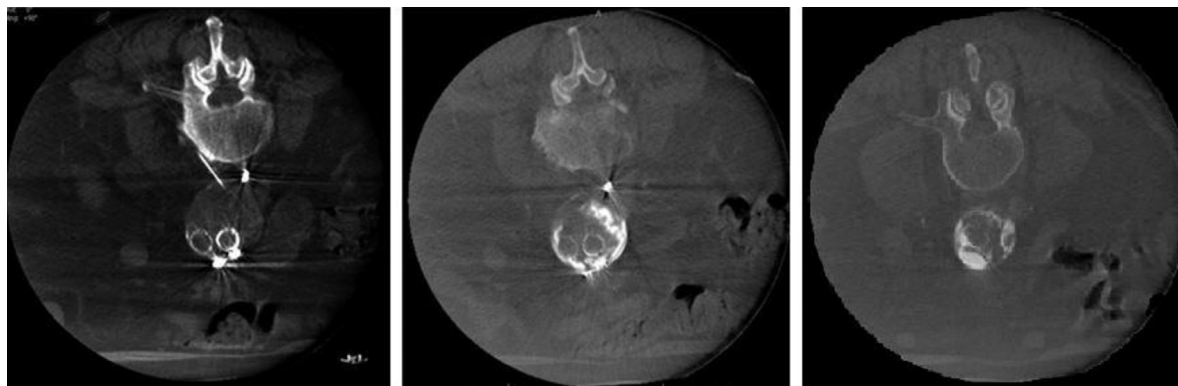


Fig 2. Cone beam computed tomography (CT) images (patient prone) before (*left*; showing translumbar needle access) and then after (*middle*) sac injection with TruFill *n*-butyl cyanoacrylate (n-BCA) Liquid Embolic System (Codman & Shurtleff, Raynham, Mass). More caudal image (*right*) shows cyanoacrylate compression of the right iliac graft limb causing significant luminal narrowing.

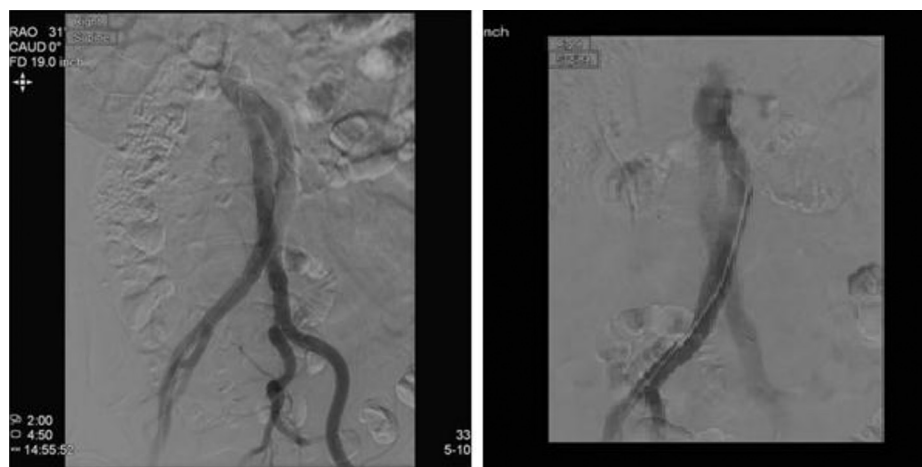


Fig 3. Pelvic angiography showing compression by the radiopaque cyanoacrylate with resultant severe stenosis (*left*) and return of normal caliber after angioplasty (*right*).

a new high-density area posterior to the proximal right iliac limb suggestive of a recurrent ill-defined type II endoleak (Fig 1). After a stable 3-year course, follow-up CTA revealed a 7% increase in aneurysm sac volume with persistence of the previously identified endoleak. At this point, the decision was made to pursue further intervention to exclude this endoleak. The patient was taken to the interventional radiology suite, where bilateral common femoral access was established. Angiography was performed to verify the site of the endoleak (seen on diagnostic computed tomography [CT] adjacent to the proximal right iliac limb), which was presumed to be due to the persistent retrograde flow from the left L3 lumbar artery. Endoleak was not angiographically apparent.

Several attempts to cannulate the left L3 lumbar artery through a transarterial approach were unsuccessful. The aortic sac was then directly punctured through a left translumbar access (Fig 2). After the aneurysm sac was successfully accessed, a mixture of TruFill *n*-butyl cyanoacrylate (n-BCA) Liquid Embolic System (Codman & Shurtleff, Raynham, Mass) mixed with lipiodol in a 1:5 ratio (1 mL TruFill and 5 mL lipiodol) was

injected as close as possible to the known endoleak flow channel and successfully sealed the area (Fig 2). However, subsequent cone beam CT images revealed significant compression and luminal collapse of the right iliac graft limb (Fig 2). The patient was asymptomatic, but the right femoral and pedal pulses were no longer palpable. Balloon angioplasty with a 12-mm balloon of the right iliac limb was performed (Fig 3). Repeated angiography and cone beam CT demonstrated no significant residual stenosis (Figs 3 and 4), and pressure measurements across the previous area of compression found no pressure gradient between the aortic component of the graft and the distal right iliac graft limb. Follow-up physical examination demonstrated easily palpable right femoral and pedal pulses.

DISCUSSION

The approach for the treatment of type II endoleaks is to occlude both the inflow and outflow vessels and not just the main feeding vessel because of the multisource nature of most type II endoleaks. To achieve this end, a

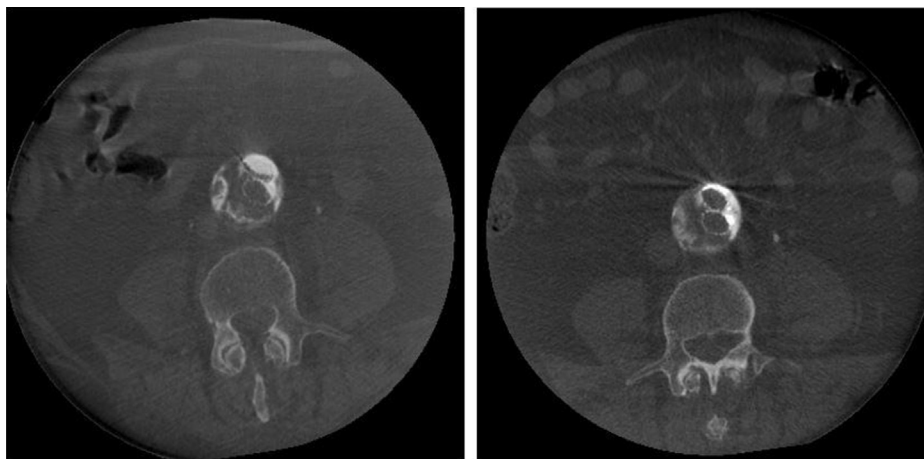


Fig 4. Cone beam computed tomography (CT) images before and after angioplasty showing return of normal right graft limb caliber.

variety of treatment options have been devised, including transarterial embolization, direct sac puncture (through a transabdominal, translumbar, or transcaaval approach), open or laparoscopic ligation, and conversion to open repair for truly refractory cases. Embolic materials employed include coils, n-BCA, ethylene vinyl alcohol copolymer, Gelfoam, and thrombin. The transarterial and translumbar techniques are the most commonly used and have been shown to be similarly effective.⁸ Most interventionists prefer to use platinum and stainless steel coils for endoleak embolizations, but it can be time-consuming and sometimes impossible to seal all feeding vessels with coils.⁹ Liquid embolic agents have been useful in treating type II endoleaks. n-BCA, a Food and Drug Administration-approved liquid embolic agent for treating cerebral arteriovenous malformations, was used in this case.¹⁰

Cyanoacrylates belong to a family of strong and fast-acting adhesives that have diverse uses in the field of surgery. They have been used as homeostatic agents in peptic ulcer disease to control intractable bleeding from ulcers, as tissue sealing agents in congenital inguinal hernias, for reinforcement of alimentary tract anastomosis, for treatment of gastric varices, for skin closure, and in numerous other applications.¹⁰⁻¹² n-BCA, a form of cyanoacrylate, has been extensively studied and used as a safe and effective treatment option for type II endoleaks after EVAR.^{3,13} The most common complication after the use of cyanoacrylate to occlude type II endoleaks is the recurrence of the endoleak itself. However, other serious complications related to inadvertent occlusion of nontargeted arteries have been rarely documented. Such complications include ischemic skin ulceration, ischemic colitis due to microembolization to the periphery of the IMA and collaterals supplying the colon, and ischemic sciatic neuropathy and footdrop after reflux of cyanoacrylate into the peripheral branches of the internal iliac artery supplying the lumbosacral

plexus and the sciatic nerve.¹⁴⁻¹⁸ Compression of an endograft limb and subsequent limb ischemia after the injection of n-BCA or any other embolic agent for the treatment of type II endoleak is another rare complication. It was likely due to proximity to the endograft limb of the catheter used to deliver n-BCA into the aneurysm sac or the rapid delivery of the n-BCA into the aneurysm sac.

To note, at the time of the first procedure (intervention for the first endoleak), the sac was cannulated through a right iliolumbar collateral. Sac injection showed the right and left L3 lumbar arteries and the IMA to be involved in the leak. The IMA was selectively cannulated and coil embolized, but the left L3 lumbar artery could not be selected. After coil embolizing the IMA and therefore protecting the colon, the interventional radiologist used Gelfoam (his preference at the time) as a means of embolizing the outflow left L3 lumbar artery before coil embolizing the right L3 lumbar artery on the way out. Other options would have been multiple coils or glue within the sac, which may have prevented the need for reintervention later on.

CONCLUSIONS

This case report describes an unusual complication after translumbar injection of n-BCA to occlude a persistent type II endoleak after EVAR, resulting in compression of the endograft limb and subsequent limb ischemia. Fortunately, this complication was detected immediately by cone beam CT imaging and confirmed by targeted physical examination. Rapid re-expansion of the graft limb by balloon angioplasty prevented any ischemic sequelae in the affected limb.

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