Type II endoleak repair after endovascular abdominal aortic repair using a computed tomography-guided percutaneous transabdominal approach

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The current treatment of type II endoleaks includes either transarterial or sac puncture techniques. Sac puncture can be further divided into translumbar, transabdominal, and transcaval approaches.[1] However, transabdominal techniques for the treatment of type II leak are not well established. Herein, we report a case of a type II endoleak repaired in a 76-year-old woman using a computed tomography-guided percutaneous transabdominal approach. This type of transabdominal repair is easy and safe because punctures to the aneurysm sac are visualized in real time by computed tomography. It is possible to selectively embolize persistent blood flow in arteries in either the sac or main artery. (J Vasc Surg Cases 2015;1:236-8.)

CASE REPORT

Consent was obtained from the patient to publish this case report along with the images. A 76-year-old woman underwent endovascular repair of a 6.6-cm infrarenal abdominal aortic aneurysm with an Excluder (W. L. Gore & Associates, Flagstaff, Ariz) stent graft. Endoleaks were not detected by computed tomography (CT) at the time of discharge. Follow-up CT images obtained 6 months after discharge showed the presence of a new type II endoleak from lumbar arteries that persisted and increased in sac diameter 2 years after the infrarenal aortic aneurysm repair (Fig 1). Aortography and superior mesenteric arteriography revealed poor connections of the lumbar arteries, thus making it difficult to attempt the catheter embolization of the aorta with lumbar arteries. Transabdominal sac puncture can cause abdominal complications including infection of the endograft if mispuncture through the intestine occurs. However, the translumbar approach can also be difficult because of anatomic problems. We decided to attempt a CT-guided coil embolization to the aneurysm sac. The subject was thin, so there was no intestinal tract between the sac and the abdominal wall. Therefore, an 18-gauge needle was inserted transabdominally into the aneurysm sac, guided by real-time CT (Fig 2, *A*). Intra-aneurysmal angiography showed blood flow between the sac and lumbar arteries. We first performed coil embolization of a point farther from the entrance of the sac (detachable coil GDC; Boston Scientific for Stryker Neurovascular, Tokyo, Japan) and next performed coil embolization of the lumbar artery (Fig 2, *B*) to eliminate blood flow. At follow-up 1 month, 9 months, and 15 months after surgery, CT angiography was free of endoleaks (Fig 3).

Fig 1. Computed tomography (CT) image showing a new type II endoleak after endovascular abdominal repair.

DISCUSSION

Abdominal aortic aneurysms are treated by either open abdominal aortic aneurysm repair or endovascular aneurysm repair (EVAR). EVAR is normally selected when a laparotomy proves to be difficult, which is often the case in elderly patients, in patients after a laparotomy, in patients

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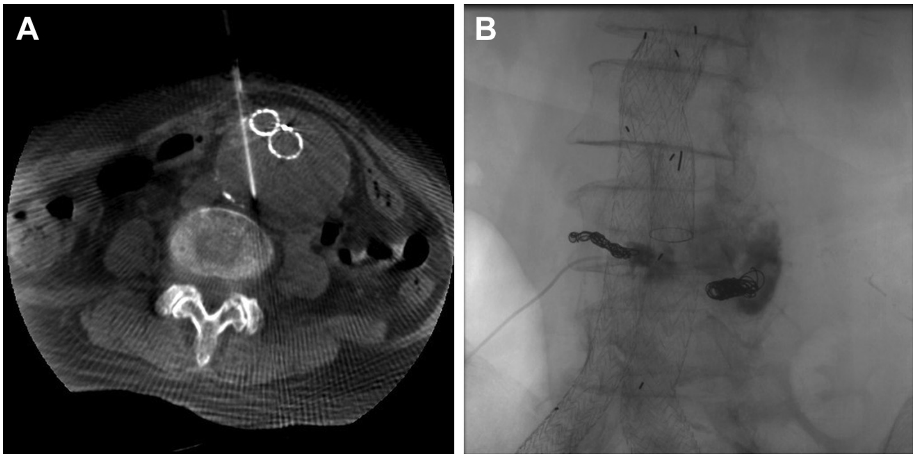

Fig 2. A, An 18-gauge needle was placed transabdominally in the aneurysm sac, guided by real-time computed tomography (CT). **B,** Angiography showing coiling in the sac and lumbar artery after treatment of the new type II endoleak.

Fig 3. The type II endoleak disappeared after computed tomography (CT)-guided percutaneous treatment.

with respiratory complications, and in patients with heart complications. The probability of an endoleak occurring after EVAR is approximately 30%, and type II endoleaks account for about 40%[2] of those. Type II endoleaks are observed over time by imaging and are normally repaired when the diameter of the aortic aneurysm increases or when aortic aneurysms persist for 6 months or longer.[2] Follow-up medical treatments include transcatheter therapies and surgical procedures. Although transarterial and translumbar embolizations with coils and injections of thrombin and fibrin glues have been tried as transcatheter therapies,[3] the success rates of transarterial embolization and translumbar embolization under radioscopy were similar at 78% and 72%, respectively; complication rates were 0% and 3.2%, respectively.[4] Complications included one case of translumbar embolization in which a serious intestinal ischemia occurred and resulted in a laparotomy and another case in which a massive retroperitoneal hemorrhage was identified. Surgical intervention is required when endovascular treatment is ineffective and is reported 0.6% to 4.5% of the time.[5] Although success rates for transarterial and translumbar embolizations are lower than 80%, there have been reports with success rates as high as 100% in recent years for CT-guided translumbar embolizations.[6-9] In addition to translumbar embolization, transabdominal embolization with ultrasound has been reported as a transcutaneous approach.[10]

In our patient, dilation of the aortic aneurysm was caused by a postoperative type II endoleak. Thus, follow-up medical treatment was required. We conducted arteriography and searched for blood flow between the aneurysm in the lumbar artery and the surrounding major arteries; however, the network between the lumbar artery and the major arteries was poor. Thus, we determined that catheter coil embolization of the lumbar artery from the major arteries would prove to be difficult. Therefore, we thought we could expect a more reliable and complete cure if we focused on the aneurysm, so we decided to use CT for real-time visualization and implemented coiling by directly puncturing the aneurysm sac. Catheter coil embolization of the feeding arteries is an effective remedy for type II endoleaks. For cases in which the approach is difficult or in which there are a number of aneurysms, embolizations are difficult and there is a risk that blood flow would persist to the aneurysm. On the other hand, embolizing the aneurysm itself is a method with more certain results. A posterior approach is usually selected for CT guidance. However, the endoleak was located on the right side of the aneurysm in our patient. Thus, we determined that a forward approach was possible, and we punctured the anterior abdominal wall. We thought that an approach from the rear would be difficult because of the presence of inferior vena cava, the fact that the aortic aneurysm was proximal to the abdominal wall, and the fact that it would be easy to puncture the abdominal wall and hit the lumbar artery.

CONCLUSIONS

We have seen reports of sac puncture with ultrasonographic guidance, and this seems to be a simple and effective method in cases in which a rear approach is easy. However, in some cases, puncture from the back proves difficult because type II endoleaks may exist on any side of the aneurysm. Moreover, puncture to the abdominal aorta by an ultrasound-guided forward approach is often difficult because of excess intestinal gas. Puncture to the abdominal aorta by a forward transabdominal approach using CT guidance, which is not affected by the presence of intestinal gas, might be preferable and safer in such cases as presented in this report. Because it could lead to thrombotic changes in the aneurysm itself, we think that intra-aneurysmal repair is the safest and most effective method against type II endoleaks. Furthermore, intra-aneurysmal repairs of type II endoleaks can be used on any kind of feeding artery, such as lumbar arteries and inferior mesenteric arteries. CT adds safety to the approach from the back and also from the front. The CT-guided approach from any direction is possible safely and effectively. By providing real-time observations of intra-abdominal tissues, CT-guided coiling of abdominal aortas might represent a safer option to treat type II endoleaks, thereby making CT-guided coiling of abdominal aneurysms for type II endoleaks after EVAR more suitable than previously reported procedures.

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