Emergent infrahepatic vena cava stenting for life-threatening perforation

Geert de Naeyer, MD, and Ivan Degrieck, MD, Aalst, Belgium

During a lumbar vertebral fusion, a box cage perforated the inferior vena cava wall and migrated toward the right atrium. This case report describes the use of a Talent endoluminal stent-graft to control the subsequent life-threatening bleeding and to prevent further migration of the box cage into the right atrium, with the risk of pulmonary embolization. It shows that the use of minimal invasive endovascular stent-grafts to control for massive vena cava bleeding might be a less invasive procedure and, in similar cases, could be a life-saving alternative to open surgery. (J Vasc Surg 2005;41:552-4.)

Massive bleeding from inferior vena cava (IVC) lesions is a surgical emergency that usually requires invasive open surgical repair.\(^1\)\(^2\)\(^3\) In this case report, we describe the use of a Talent endoluminal stent-graft (Medtronic Inc, Minneapolis, Minn) to control massive life-threatening bleeding after perforation of the infrahepatic vena cava by a box cage used for lumbar vertebral fusion. This case report shows that the use of minimal invasive endovascular stent-grafts in vena cava bleeding might be a less invasive procedure and could be a life-saving alternative to open surgery.

CASE REPORT

During a posterior lumbar interbody fusion at the L3-4 level in a 51-year-old woman, 2 box cages (carbon cylindrical cages with a diameter of 5 mm and filled with bone grafts) were manually screwed into the intervertebral space at the L3-4 level. Suddenly significant venous bleeding existed. A fluoroscopic control with injection of contrast dye via the wound was performed. This showed opacification of the IVC and perforation of the left-sided box cage through the IVC wall, with subsequent migration approximately 2 cm downstream in the IVC. The perforation occurred because of a malpositioning of the right-sided box cage, which pushed the left side through the IVC wall. Because of the major bleeding, with cardiovascular instability, the decision was made to perform an emergent endovascular stenting with a Talent thoracic aortic stent-graft (44 mm). Two Talent balloons were inserted into the IVC through the intervertebral space by using the existing surgical incision. The first balloon was directed downstream and inflated subocclusively to prevent migration of the box cage but to allow some residual blood flow toward the right atrium. The second balloon was directed upstream and inflated to reduce the blood flow from the lower body and to achieve acceptable hemostasis. The wound was closed with the 2 balloons in situ (Figs 1 and 2), and the patient was repositioned into the decubitus position and transferred to the cardiovascular surgery operating room.

From Onze-Lieve-Vrouw Ziekenhuis.

Reprint requests: Geert de Naeyer, MD, Onze-Lieve-Vrouw Ziekenhuis, Surgery, Moorselbaan 164, Aalst 9300, Belgium (e-mail: geertdenaeyer@yahoo.com).

DISCUSSION

Life-threatening bleeding from the IVC can occur from blunt abdominal trauma, penetrating injuries, and iatrogenic trauma, especially during abdominal or retroperitoneal operations.\(^4\) Until recently, repair of hemodynamically important vena cava tears required open surgical techniques with invasive surgical handling. In the literature, mortality rates for emergent open vena cava repair after traumatic laceration vary from 38.6% to 80%.\(^1\)\(^3\)\(^5\) Mortality rates after iatrogenic vena cava lesions might be lower, but data are lacking on this subject.

Recently, Wang et al\(^6\) reported on another life-threatening bleeding episode from an IVC tear during spinal fusion surgery; this was disclosed via emergent exploratory laparotomy. Unfortunately, their patient died as a result of multiple organ failure.

Today, routine and successful use of stent-grafts for arterial pathology has made surgeons handler with the material and techniques of endovascular procedures.\(^7\) Even so, endograft stenting for venous pathology remains limited for treating inferior and superior vena cava stenosis and obstruction.\(^8\)\(^9\)

Still, for the repair of life-threatening vena cava inferior bleeding, we have found only 2 case reports. Erzurum
et al\textsuperscript{10} reported the use of an Aneurix aortic extension cuff (Medtronic Inc, Minneapolis, Minn) to control life-threatening bleeding from lesions in the retrohepatic IVC during an attempted resection of a retroperitoneal leiomyosarcoma. Watarida et al\textsuperscript{11} reported the use of a fenestrated stent-graft for a traumatic juxtahepatic IVC injury. However, the use of balloon catheters introduced via the tear to control major bleeding from the IVC was recommended by Ravikumar and Stahl\textsuperscript{12} in the 1980s. The presence of the bone cage in the vena cava with the risk of further migration, the existing intervertebral access, and the hemodynamic instability made us decide to perform this procedure.

However, there are some limitations. This procedure of endovascular stent-grafting needs visualization by venography. Most patients with major IVC lesions present with hemodynamic instability that necessitates urgent laparotomy without time for venography, which is needed for the endovascular technique. Despite the oral coumarine therapy, which should be continued indefinitely, the vena cava wall thrombi can be a risk of progressive IVC narrowing and pulmonary embolization. There is also no information regarding use of arterial endograft material for venous endovascular procedures. Thus, a risk of perforation of the vena cava wall with subsequent bleeding should be considered.\textsuperscript{13} Close follow-up of these patients is strongly advised.

CONCLUSION

Although lacerations or perforations of the IVC might be rare, they are extremely serious and possibly lethal problems because of their difficulty in diagnosis, technical problems with repair, and massive bleeding. Although further experience with and follow-up of such cases is needed to determine the pitfalls and tricks of this technique, we believe that endovascular stent-graft placement for IVC injury is safe, effective, and the procedure of choice in experienced and organized centers.

REFERENCES


