

Treatment of a traumatic aortic bifurcation injury with an iliac branch endoprosthesis

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ABSTRACT

We present the case of a 62-year-old man who sustained a traumatic distal aortic injury associated with an adjacent lumbar vertebral body fracture resulting from a 20-ft fall. Given the site of injury, an iliac artery branched endograft was deployed off-label to preserve the aortic bifurcation and cover a limited amount of healthy aorta to preserve the collaterals. The procedure was successful, with no intraoperative complications or evidence of an endoleak. The aortic bifurcation and distal iliac arteries remained widely patent by computed tomography angiography at the follow-up examination without evidence of sequelae. (*J Vasc Surg Cases and Innovative Techniques* 2020;6:317-9.)

Keywords: Endovascular; Iliac branch endoprosthesis; Off-label; Stent; Trauma

Sudden traumatic deceleration injuries can be associated with aortic and retroperitoneal organ injury at sites of fixation. Often and dramatically, this mechanism results in thoracic aortic transection and catastrophic hemorrhage distal to the left subclavian artery and ligamentum arteriosum.¹ In the abdomen, the aorta and renal arteries can be injured with or without adjacent vertebral fractures, leading to dissection, thrombosis, and, less frequently, transection.² We report such a case in which a lumbar vertebral fracture resulted in an injury to the aortic bifurcation, leading to pseudoaneurysm formation. Written informed consent was obtained previous to the submission of this manuscript and is available upon request.

CASE REPORT

The patient was a 62-year-old man who had fallen from 20 ft. after losing his balance on a ladder while changing a light bulb. The patient immediately experienced back pain and was evaluated on scene by emergency personnel. He remained hemodynamically stable and was brought to our facility as a trauma activation. In the emergency room, computed tomography angiography was ordered as part of his workup, which demonstrated a saccular pseudoaneurysm arising posterior and to the left of the most distal aspect of the abdominal aorta, extending slightly into the left common iliac artery, with an adjacent small hematoma (Fig 1).

Additional injuries included a comminuted fracture of the L4 vertebral body, minimally displaced L1–L4 transverse process fractures, and a transversely oriented dissection flap within the mid to distal superior mesenteric artery, which did not appear to be flow limiting.

Because of the short segment of aortic injury, involvement of the aortic bifurcation, and a normal aortic diameter, we ultimately elected to deploy an iliac branch endoprosthesis (IBE; WL Gore and Associates, Flagstaff, Ariz) to cover the aortic defect, preserve the hypogastric and external iliac arteries, and minimize coverage of the adjacent normal aorta and its branches. The off-label use of this device was discussed with the patient, and he had provided written informed consent to proceed to the hybrid operating room.

After general anesthesia had been induced, percutaneous ultrasound-guided access of the common femoral arteries was obtained, and the arteriotomies were preclosed with the assistance of Proglide devices (Abbott, Chicago, Ill) using a modified Seldinger technique. We upsized access to bilateral 16F sheaths and then introduced the IBE through the right iliac system with the assistance of a stiff wire. The IBE (23 mm × 10 cm) was partially deployed, with the “hypogastric” contralateral gate positioned within the left common iliac artery. The contralateral gate was then cannulated and extended using an Excluder limb (16 mm × 7 cm; WL Gore and Associates). Intraoperative angiograms before and after endovascular repair are shown in Fig 2. The patient was discharged after evaluation and treatment of his traumatic injuries and was seen in the clinic at 1 and 4 months after the procedure. Surveillance computed tomography angiography demonstrated an intact repair, preserved iliac and lumbar flow, and no evidence of endoleak (Fig 3).

DISCUSSION

In the present clinical case, we have described the use of an IBE to treat a localized, traumatic injury of the aorta extending into the proximal left common iliac artery. The advantages of using an iliac artery branched stent graft include easy deployment, localized coverage of the area of injury, preservation of the lumbar branches, preservation of a normal aortic bifurcation if further

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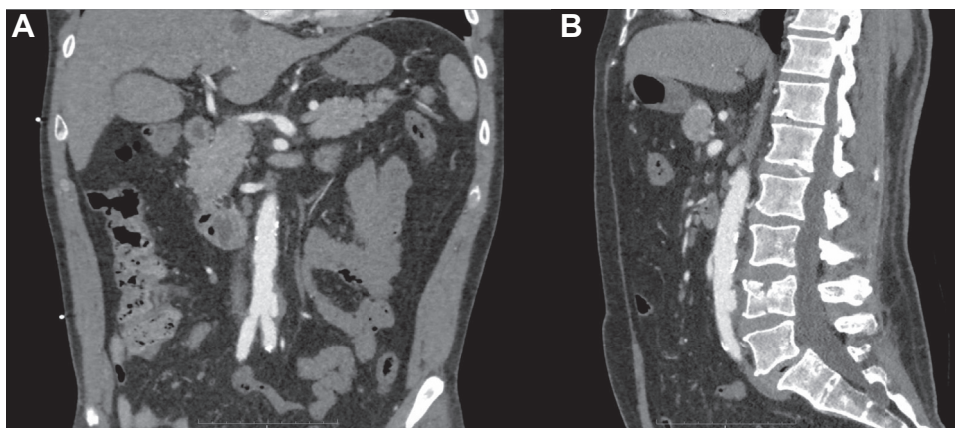


Fig 1. **A**, Coronal and **B**, sagittal depictions of the traumatic distal aortic injury adjacent to a lumbar vertebral body fracture.

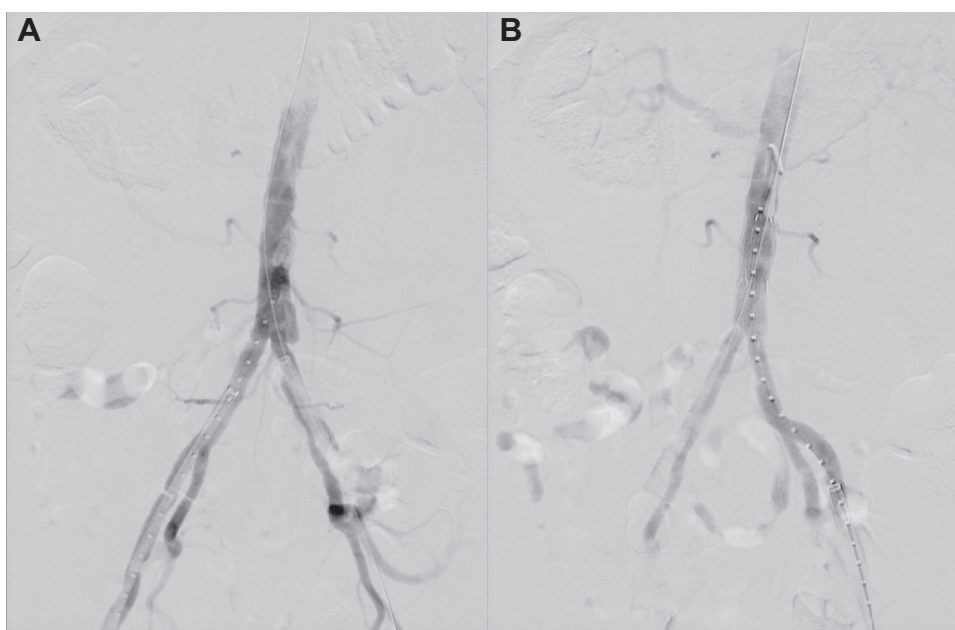


Fig 2. Digital subtraction arteriograms demonstrating the location of the distal aortic injury before **(A)** and after **(B)** deployment of the iliac branch endoprosthesis in an aortoiliac configuration.

endovascular procedures would be required, and the availability of smaller diameter devices.

The availability of an IBE is a somewhat newer development in endovascular aneurysm repair and has been shown to be effective in preservation of the iliac artery bifurcation during abdominal aortic aneurysm and common iliac artery aneurysm repair.³⁻⁸ Two studies have reported using an IBE to treat abdominal aortic aneurysms with a small neck.^{9,10} These reports found its use to be effective and durable. However, the proximal diameter of the WL Gore IBE is fixed at 23 mm; thus, the widespread applicability of this technique is limited. However, the present patient had a distal aortic diameter of 19 to 20 mm, allowing for oversizing of ~15%.

Other options for endovascular repair for this type of aortic injury include the use of a traditional aortic endograft with its longer length of coverage or covered stent grafts in a “kissing” configuration. We elected to forego these options to conserve as much of the native aortic bifurcation as possible without coverage of the collaterals. Open repair would also be an option, although it would be more invasive and might have a greater complication rate owing to the adjacent lumbar spine fractures and hematoma.

CONCLUSIONS

Traumatic distal aortic injuries represent challenging pathologic entities, given the limited range of endovascular devices available. In the present case report, we

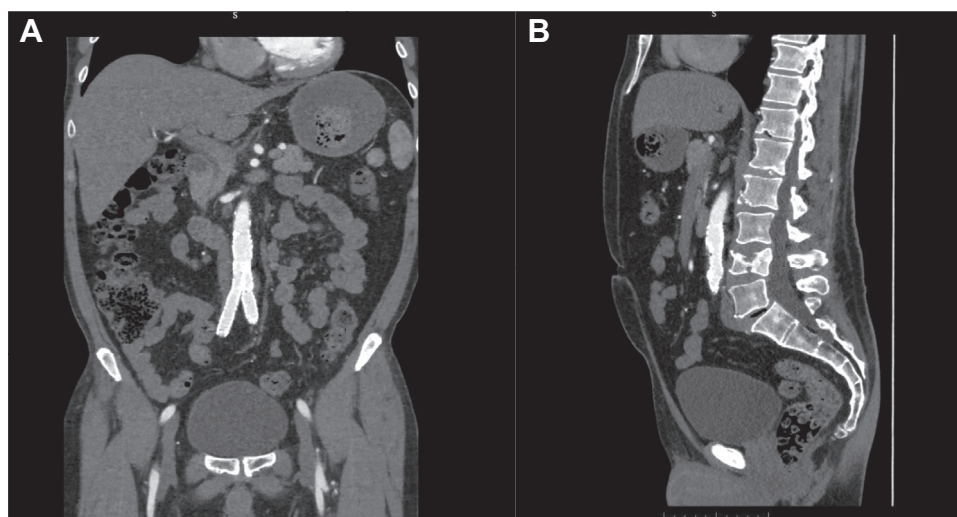


Fig 3. Surveillance computed tomography angiogram 4 months after the procedure demonstrating the iliac branch endoprosthesis without evidence of endoleak or migration in the coronal (**A**) and sagittal (**B**) projections.

have described successful implantation of a WL Gore IBE in an aortoiliac configuration to treat a full-thickness distal aortic injury secondary to a traumatic deceleration injury.

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