Endovascular stent grafting of a complicated type B aortic dissection with approach through the innominate artery using a side-branch graft

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Abstract

Endovascular stent grafting has emerged as an effective method for the treatment of complicated acute type B aortic dissections. In cases where access to the aorta cannot be established through the iliofemoral trunks, the axillary arteries are used as an alternative route. Often, however, these arteries are too small to accommodate the device sheath. We report the case of an 82-year-old female with complicated type B aortic dissection treated with deployment of an endovascular stent-graft through an 8 mm Dacron graft sewn to the innominate artery.

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1. Introduction

Endovascular stenting of the descending thoracic aorta has gained popularity in recent years as an effective method for repair of thoracic aortic aneurysms. More recently, many reports in the literature have suggested the efficacy of this method in the treatment of complicated type B acute aortic dissections [1–3]. Access to the aorta is commonly established through the femoral arteries, but occasionally other routes, such as the iliac or axillary arteries, need to be used [3]. We report the case of an 82-year-old female who presented with a contained rupture of a type B dissection and was treated with endovascular stenting. The presence of severe occlusive aortoiliac disease and the small size of the axillary arteries prompted the use of the innominate artery as a route to access the aorta. The procedure was performed using a side-branch graft sewn to the innominate artery.

2. Case report

An 82-year-old female with a history of chronic renal failure [(creatinine 2.6 mg/dl) 198.2 SI Units] presented with an acute onset of chest pain radiating to the back. In the emergency department, she was diagnosed by computed tomography (CT)-scan as having a type B aortic dissection complicated by a periaortic hematoma involving the proximal descending thoracic aorta, with evidence of extravasation of contrast outside the aortic lumen (Fig. 1a,b). At that point, we were called in for consultation.

The anatomy was considered favorable for endovascular treatment. Despite ‘anti-impulsive’ therapy, the pain relapsed overnight, with increasing intensity. Given the emergent circumstances and the risk of further damage to kidney function from contrast nephropathy, we decided that assessing access at the time of an angiogram procedure represented a better option than repeating the angiographic CT-scan.

At the time of the procedure, systemic heparinization (1 mg/kg) was administered. Invasive blood pressure monitoring was obtained with bilateral radial artery and left femoral artery lines. The right common femoral artery was exposed. The artery was small and massively calcified. A distal aortic angiogram was performed, and critical narrowing of the aortic bifurcation was shown. The left axillary artery was exposed through an infraclavicular incision, but it also was shown to be too small to accommodate the device sheath. The right axillary artery appeared of the same size or smaller on a preoperative CT-scan, and therefore it was also considered as an unsuitable option.

Partial upper sternotomy was performed. The aortic arch and the innominate artery were free from atheroma, as shown by epiaortic ultrasound. An 8 mm Dacron graft was sewn to the innominate artery using a side-biting clamp. The procedure was completed through this route with antegrade deployment. The major entry site at the level of the mid-thoracic aorta was visualized on a transesophageal echocardiogram.
Coverage of the entry site was completed by landing a 34 mm×10 cm Gore® TAG® endograft (W.L. Gore and Associates Inc, Flagstaff, AZ, USA) through a 22-Fr device sheath (Fig. 2). Post-deployment angiography showed complete exclusion of the false lumen and disappearance of the areas of contrast extravasation. Complete exclusion of the false lumen in the descending thoracic aorta was confirmed by TEE. After withdrawing the device sheath, the Dacron side-branch graft was ligated, leaving a very short stump.

A postoperative CT-scan (Fig. 1c,d) three weeks after the procedure showed re-expansion of the true lumen and complete collapse of the false lumen, with disappearance of the blushes of contrast outside the aorta. The postoperative course was uncomplicated. The patient was discharged home with complete recovery and free from any neurological and neurovascular complications. Twenty months after the operation, she was in good condition with no relapses of her chest pain.

3. Discussion

The goal of thoracic endovascular aneurysm repair in the treatment of acute aortic dissections is to obtain stenting of the true lumen with coverage of the major entry site, allowing exclusion of the false lumen and restoration of 

Fig. 1. (a, b) Computed tomography (CT)-scan showing dissection of the descending thoracic aorta with periaortic hematoma and extravasation of contrast outside the aortic lumen. (c, d) Postoperative CT-scan images showing re-expansion of the true lumen in the descending thoracic aorta and complete collapse of the false lumen. No contrast extravasation can be seen.

Fig. 2. Operative technique using a Dacron side-branch graft sewn to the innominate artery.
normal blood flow in the aorta and its branches [1, 3, 4]. Routinely, the endovascular procedure is performed with access through the femoral or iliac arteries, but the presence of severe occlusive peripheral vascular disease can prevent the completion of the endovascular procedure through this standard route [3].

In the case presented, the axillary arteries were too small to accommodate the device sheath, and therefore access to the true lumen was established through the innominate artery, performing a partial upper sternotomy. Sewing an 8 mm Dacron graft to the take-off of the innominate artery facilitates stenting maneuvers, reduces blood loss during the procedure and reduces the risk of damage to the native vessels. We use a similar technique for intraoperative placement of intra-aortic balloon pump in patients with occlusive peripheral vascular disease [5]. When endovascular treatment is completed, the Dacron graft is ligated and left as a short stump. This technique, although technically demanding, may be preferred to open surgical repair in circumstances where endovascular stenting cannot be completed with access through the peripheral arteries.

4. Conclusion

In summary, the innominate artery can be used as an alternative access route for the endovascular treatment of thoracic aortic pathologies in cases where access from the distal aorta or the axillary arteries is not available, allowing endovascular therapy for patients who are poor candidates for an open procedure. The procedure can be completed using a side-branch graft sewn to the innominate artery.

References


