Successful management of a combined ruptured Stanford type B aortic dissection and malperfusion syndrome with an endoluminal graft

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Abstract
Thoracic endografting has been recently approved in the USA for the treatment of thoracic aortic aneurysms. The application of endoluminal graft therapy to treat acute type B dissection has been shown to be effective but is still not considered standard of care. We describe the use of an endoluminal graft to treat a patient with an acute type B dissection associated with malperfusion and thoracic aortic rupture.

Keywords: Acute type B dissection; Malperfusion syndrome

1. Introduction
Thoracic aortic dissections is a catastrophic event which if left untreated may be life threatening. Thoracic endoluminal graft (ELG) is emerging as an important treatment strategy in the management of Stanford type B dissection. The capacity for stent grafting of the thoracic aorta to improve long-term survival by preventing subsequent aortic rupture has yet to be established.

2. Clinical summary
A 56-year-old male developed sudden severe interscapular back pain at rest unresolved for 24 h requiring visit to the emergency room. Due to a markedly elevated renal function a magnetic resonance imaging (MRI) of the chest performed demonstrated a Stanford type B dissection (Fig. 1a) with rupture into the right chest (Fig. 1b). The presence of malperfusion syndrome from a compressed true lumen and acute thoracic aortic rupture was felt to be compelling reasons for surgical management. Due to the high morbidity and mortality associated with open surgical repair, endoluminal graft therapy under an investigational device exemption research protocol was preferred. A thoracic aortogram and an intravascular ultrasound were used to determine the entry point of the dissection, the status of the true and false lumen and the aortic rupture point and under fluoroscopic guidance.

Two thoracic GoreTag (W.L. Gore & Associates, Flagstaff, AZ, USA) 34 mm×20 cm devices were deployed at the level of the left subclavian artery all the way to the celiac axis. Completion angiogram demonstrated accurate deployment of the thoracic endograft with no endoleak, intravascular ultrasound showed true lumen expansion with thromboses of false lumen with exclusion of both the entry point of dissection and the point of aortic rupture. Postoperative CT-scans demonstrated true lumen expansion, thrombosis of false lumen with no endoleak (Fig. 1c,d). He made a full recovery with normalization of renal function within two days of procedure and continues to do well at six months post procedure with a normal renal function.

3. Discussion
Stanford type B dissection is a lethal disease which continues to be associated with an overall mortality of 27.4% as reported by the International Registry of Acute Aortic Dissection (IRAD) study [1]. The standard of care for the acute management of Stanford type B dissections is medical therapy with 20% of patients requiring surgical intervention for life threatening complications such as uncontrolled hypertension, ongoing chest pain despite medical therapy, progression of dissection, aneurysmal enlargement, rupture and visceral or extremity ischemia. Stent graft implantation for Stanford type B dissections has been highly successful to implant technically and is associated with shorter operating time, less blood loss, shorter hospital stay, avoidance of cardiopulmonary bypass and aortic cross-clamping, less risk of paraplegia and associated with a lower morbidity.
and mortality when compared to historical controls [2].

Currently there is no stent graft approved for type B dissection and all cases treated at our institution have been treated with a Gore–TAG excluder device (Gore & Associates, Flagstaff, AZ) alone or sometimes in combination with a Gianturco Cook Z stent (Cook, Bloomington, IN). We believe that as much true lumen expansion should be obtained with the stent graft including coverage of the entry point. Sizing of the stent graft is performed with an intravascular ultrasound and we usually over size the stent graft by 10–20% of the uninvolved proximal thoracic aorta. We do not routinely place a spinal drain in patients with type B dissections and our paraplegia rate in over 110 cases performed to date for type B dissection is well below 2%.

Currently there is an FDA approved phase one clinical trial for acute type B dissection using a specific dissection stent graft system ([Fig. 2a,b], Zenith Dissection Endovascular System developed by Cook Inc., Bloomington, IN) which is an uncovered stent graft system. The device’s unique Z-stent exerts a minimal radial force that allows gradual apposition of the dissection septum and re-expansion of the true lumen. The stent graft system can be deployed across branch visceral vessels without resulting in loss of branch vessel flow which is an advantage over the covered stent grafts currently available. Another advantage of the Zenith dissection endovascular system is that access of branch vessels involved with a dynamic dissection flap can easily be treated with a branch vessel stent graft, even when the stent graft is deployed across viscera and renal branch vessels. Our patient benefited from endoluminal graft therapy firstly by re-expanding the collapsed true lumen with resulting improvement in distal flow to the various organs, leading to restoration of normal renal function. The resulting false lumen thrombosis should prevent aneurysmal dilatation with eventual stabilization of the aorta. Secondly, we were able to manage the acute rupture of the descending aorta into the right chest by excluding the area of rupture, thereby saving the patient from exsanguinations into the right chest.

In conclusion, acute type B dissection with malperfusion syndrome is associated with increased morbidity and mortality. Stent graft systems currently available can be applied to treat such patients with satisfactory results, however, long-term data from an ongoing prospective, multicenter, randomized trial, Investigation of Stent graft in patients with a type B Aortic dissection (INSTEAD) [3], will further shed more light on the indications and role of endoluminal graft therapy in the management of this lethal disease.

References


eComment: Can we use endovascular graft stenting in all type B dissections?

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According to the MRI angiography, this is just a thoracic descending aortic dissection with rupture [1]. Using endovascular graft stenting should be the first choice. But, if dissection spreads toward the celiac axis, SMA and renal arteries, can we use endovascular graft stenting bravely. We can say ‘NO’ if the dissection spreads from the visceral arteries, sometimes endovascular graft stenting duration is for a long time. Surgical therapy can be better than endovascular graft stenting especially for thoracic aortic rupture.

Secondly, the benefit of spinal drainage is confirmed by so many studies [2]. Thirdly, why did you use CT after procedure, you can use MRI angiography again because the patient had a renal dysfunction.

References