Use of Aortic Cuffs to Treat Thoracic Aortic Emergencies

NOTES

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It is evident that there is growing interest in and experience with use of stent grafts to repair a variety of thoracic aortic pathology. Unlike the abdominal aorta, there is a wider spectrum of pathology that may involve the thoracic aorta. Stent grafts may be utilized to repair not only degenerative thoracic aneurysms, but also acute/chronic dissection, intramural hematomas and penetrating ulcers, acute traumatic aortic disruptions, and pseudoaneurysms from a variety of other causes. The potential benefits of using stent grafts for repair of such lesions is obvious. The morbidity and mortality associated with conventional open surgical repair remains high despite advances in surgical and anesthetic management, use of partial left heart-heart bypass, or other adjuncts. In regard to acute traumatic aortic disruption secondary to blunt trauma, for example, mortality rates of 10 to 30% and paraplegia incidence of 5 to 25% have been observed even in contemporary practice, often related to the frequent presence of other severe associated injuries. The advantage of endoluminal repair includes no need for thoracotomy, single lung ventilation, aortic cross-clamping, or systemic anticoagulation.

Although the use of standard thoracic aortic endografts of varying diameter and length similar to those devices designed for repair of standard degenerative thoracic aneurysms are most appropriate, in emergent circumstances such endografts may not be immediately available. In addition, a center may not have had the appropriate training with thoracic devices and hence access to such technology. In the United States, only the Gore TAG device is approved by the US Food and Drug Administration (FDA), and access remains relatively limited to busy centers at this time. Access to Talent or Cook thoracic endografts remains available only in the context of ongoing FDA trials involving only a handful of centers. Thus, for relatively focal thoracic aortic pathology, use of commercially available abdominal aortic "cuff" endografts may be considered, and in emergent circumstances may be life saving.

We describe use of such cuffs in nine patients treated over the past several years with aortic cuffs to manage a variety of relatively focal thoracic aortic emergencies including five patients with acute traumatic thoracic aortic disruption, two patients with symptomatic penetrating ulcers, and two patients with thoracic aortic pseudoaneurysms secondary to radiation and infection. Two to three Cook, AneuRx, or Gore cuffs were utilized to successfully exclude the lesions, as well as one modified Cook abdominal aortic endograft body. Traumatic aortic disruptions were located far enough distal to the origin of the left subclavian origin so that none of the five patients with traumatic pseudoaneurysms required coverage of the left subclavian artery. Gore delivery system length of 61 cm, as opposed to 55 cm for AneuRx and Cook devices, was a potential advantage, as well as its superior flexibility characteristics. In shorter individuals, standard transfemoral access was feasible, but in half of the treated patients retroperitoneal sac access was necessary owing to delivery system length issues or small access vessels in several young females. Alternatively, if delivery system length is the only issue, cuffs may be deployed into larger sheaths such as a Kelly-Timmerman, and successfully deployed via transfemoral access. Because patients with many of these focal thoracic aortic emergencies are often relatively young, available aortic cuff diameters (20 to 32 mm) were usually sufficient for successful repair. Because aortic cuffs are short (33 to 39 mm length), two to four overlapping cuffs are almost always necessary. Successful repair of emergent problems was achieved in all nine patients. When standard thoracic endografts become more widely available, they will obviously be utilized in such clinical ¬circumstances. Until then, use of aortic cuff endografts which are usually well stocked in active centers may prove extremely efficacious or life saving.

References

1. Amabile P, Collart F, Gariboldi V, et al. Surgical versus endovascular treatment of traumatic thoracic aortic rupture. J Vasc Surg 2004;40:873-9.
2. Bell RE, Taylor PR, Aukett M, et. al. Results of urgent and emergency thoracic procedures treated by endoluminal repair. Eur J Vasc Endovasc Surg 2003;25:527-31.
3. Borsa JJ, Hoffer BK, Karmy-Jones R, et al. Angiographic description of blunt traumatic injuries to the thoracic aorta with specific relevance to endograft repair. J Endovasc Ther 2003;9: 1184-91.
4. Hoffer EK, Karmy-Jones R, Bloch RD, et al. Treatment of acute thoracic aortic injury with commercially available abdominal aortic stent-grafts. J Vasc Intervent Radiol 2002;13:1037-41.
5. Karmy-Jones R, Hoffer B, Meissner MH, et al. Endovascular stent grafts and aortic rupture: a case series. J Trauma 2003;55:805-10.
6. Orford VP, Atkinson NR, Thompson K, et al. Blunt traumatic aortic transection: the endovascular experience. Ann Thorac Surg 2003;75:106-12.
7. Ott MC, Stewart TC, Lawlor DK, et al. Management of blunt thoracic aortic injuries: endovascular stents versus open repair. J Trauma 2004;56:565-70.
8. Rousseau H, Dambrin C, Marcheix B, et al. Acute traumatic aortic rupture: a comparison of surgical and stent-graft repair. J Thorac Cardiovasc Surg 2005;129:1050-5.
9. Sam A, Kibbe M, Matsumura J, Eskandari MK. Case report: blunt traumatic aortic transection: endoluminal repair with commercially available aortic cuffs. J Vasc Surg 2003;38:1132-5.
10. Wellons RD, Milner R, Solis M, et al. Stent-graft repair of traumatic thoracic aortic disruptions. J Vasc Surg 2004;40:1095-100.