Endovascular management of traumatic aortic injuries

In the August issue of the journal (*Can J Surg* 2005;48:293-7),[1] Lawlor and colleagues reported 7 cases of acute traumatic rupture of the descending thoracic aorta treated with endovascular stent grafting and claimed a triumphant success (0% mortality and 0% paraplegia rate). This represents a substantial improvement compared with the results published by the same group using the open technique (17% mortality and 16% paraplegia rate) in 12 patients treated over an 11-year period.[2] A glow of enthusiasm has led to a premature conclusion: "early results are most impressive and offer a much better alternative to open repair." Fortunately, a word of caution precedes the conclusion: "Although better long-term follow-up is needed to determine the procedure's durability in what is typically a younger patient population."

In a series of 122 such patients treated with a highly standardized open surgical technique involving a systematic use of distal perfusion, I reported a survival rate of 95%, and 1 patient developed paraplegia (0.8%) related to an unrecognized nonfunctioning Gott shunt.[3] Associated injuries were responsible for all deaths, which were potentially preventable if an initial regimen of pharmacological aortic wall stress reduction had been used followed by a judicious delayed aortic repair. This principle was applied in the last 52 cases, in the same series,[3] perfused with a left heart bypass (left atrio-aortic) combined with a careful monitoring of pump flow and proximal and distal pressures. No mortality and no paraplegia occurred.

During graft interposition in the series of 122 cases, optimal cardiovascular operating room resources were essential, including a team of one anesthesiologist, operating room nurses and perfusionists working together on a daily basis and immediately available around the clock for all kinds of emergency thoracic aortic surgery. This allowed the saving of 3 patients in the series who required an in-extremis thoracotomy for an uncommon presentation: a massive left hemothorax varying from 5000 mL to 16 000 mL.

Reading the very instructive editorial by James W. Pate entitled "Is traumatic rupture of the thoracic aorta misunderstood?"[4] and also inspired by my own experience over the years, I came to the following conclusions: The major difficulty with traumatic aortic rupture is neither the vascular lesion, which is usually stable (97.5% in the series I reported), nor the associated injuries that may take priority over the aortic repair. The major problem seems to be poor surgical leadership and a lack of standardization of the technique of operative repair suspected in many series in which an unjustified high rate of mortality and morbidity is reported.

Rather than referring those patients to centres where staff have more experience with aortic surgery, endovascular grafting has been proposed by many authors as a short-term solution to the variability of surgical results.

Unfortunately, the firm advocates of this new technology have ignored completely 2 fundamental principles for long-term successful implantation of an aortic prosthetic graft:

1. The adventitia, being mostly made of strong collagen fibres and assuring 60% of the tensile strength of the aortic wall, should be circumferentially included in a full-thickness host aorta–graft anastomosis.
2. Permanent anchoring of the graft relies on a strong and indestructible suture line. When one or both principles have been flouted during open techniques, a 25%–33% incidence of false anastomotic aneurysms has been reported.[5]

During intravascular fixation of endoprostheses, no adventitia and no suture line is involved. Errors of the past are then repeated and a high percentage of false aneurysms (endoleaks) is expected to appear in the 3–7 years after implantation.[5]

Moreover, for the purpose of securing proximal anchorage of the prosthesis into the aortic arch, Lawlor and colleagues (in imitation of other authors) have either declared the left subclavian artery "useless" or do not hesitate to proceed prophylactically to extra-anatomical bypasses despite their questionable long-term patency.

This new technology may have loosened an intra-aortic monster with an unpredictable behaviour. The occurrence of serious complications is to be expected in the near future, and their management may require more extensive surgical procedures exposing the patients to a much higher risk of mortality and morbidity than expected with a standard primary open repair performed in experienced hands.

Strictly on the basis of scientific data and historical evidence demonstrating the key role of the adventitia in Dacron graft–host aorta implantation, firm surgical leadership is needed to moderate an unjustified enthusiasm for a very uncertain and unsafe technology when offered to patients with a life expectancy of at least 30–40 years.

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References

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(Dr. Lawlor replies)

In response to Dr. Verdant's commentary regarding our early experience with endovascular management of traumatic aortic injuries (*Can J Surg* 2005;48:293-7),[1] I would first like to congratulate him on his tremendous experience and unparalleled results. As stated in our original publication, traditional open repair of these injuries is