

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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(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

associated with significant morbidity and mortality that is reported to be much higher than in Dr. Verdant's large series. In a review of the literature looking at 618 patients from 20 studies, Jahromi and colleagues² found mortality rates ranging from 8% to 17% and 0%–7% rates for paraplegia, depending on the use of distal perfusion and procedural technique. No statistically significant difference was noted between the operative techniques for survival, but patients treated with distal perfusion had a lower neurological event rate than those who were not. These results appear to reflect those in the literature and the outcomes in our centre with open repair. As Dr. Verdant's superior results are not formally published other than in abstract form,³ I would ask him some questions regarding this series of 122 patients described as having a mortality rate of 5% and a paraplegia rate of 0.8%. First, does this represent the complete institutional experience with blunt aortic injury, namely, consecutive patients treated by all surgeons in that centre? Second, what was the follow-up of these patients? Did it include 30-day mortality as well as longer-term survival? If this represents a consecutive series of patients treated for this injury with reasonable postoperative follow-up, then I agree with Dr. Verdant that in his centre with recognized expertise in the treatment of aortic disease open repair is the appropriate treatment. The reality, however, is that most centres are not as capable and cannot duplicate his results with open repair. For this reason, most centres have been willing to accept some long-term uncertainty with stent graft placement in what is often a younger patient for a much lower perioperative mortality and paraplegia risk. Certainly the patients and families of patients treated in our centre feel strongly in favour of endovascular repair when presented the treatment options often because of, rather than in spite of, their 30–40-year life expectancy.

Although I appreciate the refresher on what constitutes a durable aortic anastomosis, I am not sure how it is relevant here where we are comparing apples and oranges (stent graft v. suture lines). I feel that patient outcomes are the critical consideration here and, despite Dr. Verdant's outstanding results, the reality is that in most centres patient outcomes are

better with endovascular repair. Despite Dr. Verdant's statement, we have by no means claimed triumphant success for what is and will continue to be a serious and complicated management problem with significant perioperative morbidity and mortality.

I also believe we were misquoted as declaring the subclavian artery "useless" and I feel that comment on subclavian coverage is indicated. Although we were also accused of imitating other authors by describing this technique, it was only reported in a few series (reported in the original manuscript) at the time the manuscript was submitted to the *Canadian Journal of Surgery*, which was almost 2 years before its eventual publication. At that time, when so few series were reported, we felt that contributing our numbers to the literature was critical in what was at that time a very new approach to managing this problem. This technique is now commonly used in treating thoracic aortic pathology, and it is by no means taken lightly. Although we stated that it is well tolerated by most patients, we would only consider it if this additional landing zone were required to exclude the aortic injury.

In the interim, since the manuscript submission in late 2003, we have continued to treat all of our traumatic aortic injuries with an endovascular approach with good success and no aortic-related death or paraplegia. Before the development of this technique, this problem was managed by cardiac surgery with outcomes published elsewhere.⁴ At this point, in our centre traumatic aortic injuries are primarily managed by vascular surgery. However, I feel the ideal approach to these injuries would be consultation with both cardiac and vascular surgery in conjunction with the trauma surgeon to decide on what the most appropriate treatment is for the patient and also to decide on the timing of the intervention based on coexisting injuries. This is important, because the decisions can be complex and certainly some injuries will be better managed with open repair and others with endovascular repair. This is by no means a closed book, and long-term data will be important just as in the infrarenal aorta where the outcomes with endovascular repair are being published quite regularly and show significantly lower perioperative

mortality.^{5,6}

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Preoperative fasting

In the October issue of the journal (*Can J Surg* 2005;48:409-11),¹ a group of surgeons reviewed the recent Cochrane analysis² on preoperative fasting in adults to prevent perioperative complications. They agreed that the intake of clear oral liquids 2–3 hours preoperatively improved patient well-being. Despite these facts, their impression is that in North America, a fast of nil by mouth (NPO) after midnight remains standard practice in most institutions. Furthermore, they argued against the modern guidelines, stating that the old "NPO after midnight routine" allowed "the greatest flexibility to the operative team." We challenge this statement and propose that this fear of perioperative complications is unsubstantiated. It is our experience that changing to modern