<20 mm, conical aorta). In the presence of any of these technical restrictions, open surgical treatment should be considered to avoid major preoperative or postoperative complications related to endovascular repair, such as stent-graft collapse or inadvertent coverage of the supra-aortic trunks.

The selection bias reported by Verdant with respect to the number of free ruptures in our study is wrong. Actually, a free rupture was observed in 5 patients in the open repair group and in 4 patients in the endovascular repair group.

The conclusion of our other work in the same issue of the Journal, "Surgical conversion after thoracic endovascular aortic repair,"³ noted that complications may occur after thoracic endovascular aortic repair, either as a result of device failure or from other adverse events, and we stated that these events may necessitate conversion to open repair. Open conversion can be performed with encouraging results by a team experienced in the management of diseases of the thoracic aorta. With the increasing use of thoracic endovascular aortic repair, more and more patients will be seen with indications for surgical conversion. This article's conclusion does not appear to us to be in complete contradiction with our study of the repair of traumatic transection of the thoracic aorta.

Ludovic Canaud, MD
Pierre Alric, MD, PhD
Department of Thoracic and
Vascular Surgery
Arnaud de Villeneuve Hospital
Montpellier, France

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DOES ANASTOMOSIS DEVICE OR EPIAORTIC ULTRASONOGRAPHY REDUCE THE RISK OF POSTOPERATIVE STROKE AFTER CORONARY ARTERY BYPASS GRAFTING? To the Editor:

I read with interest the recent study by Emmert and colleagues¹ on the beneficial effects of off-pump coronary artery bypass grafting (OPCAB). I share with them their enthusiasm regarding OPCAB and strongly believe in its benefits. Emmert and colleagues¹ showed that OPCAB is associated with a significantly lower risk of postoperative stroke, as also shown in a number of previous studies. They stated that this difference may be mainly related to the use of the HEARTSTRING anastomosis device (MAQUET Cardiovascular LLC, San Jose, Calif), because the rate of stroke with this method (0.7%) was similar to that among patients who underwent OPCAB with total arterial revascularization without the need for proximal anastomosis (0.8%). In contrast, patients who underwent OPCAB with partial clamping had a stroke rate of 2.3%, similar to those who underwent conventional coronary artery bypass grafting (2.4%). Emmert and colleagues¹ suggested that the use of the HEARTSTRING anastomosis device was the main determinant of improved results during OPCAB. Although this could be true, they failed to investigate the main determinant of postoperative stroke itself. In fact, even if the mechanisms leading to postoperative cerebrovascular events after cardiac surgery are multifactorial,² atherosclerosis of the ascending aorta is certainly the most powerful risk factor.³ Emmert and colleagues¹ did not use

epiaortic ultrasonography to evaluate the status of the ascending aorta in these cases. Thus a number of their patients with severe atherosclerosis of the ascending aorta, involving the lateral or anterior walls of the aorta,³ or stage III disease,⁴ were probably exposed to cerebral embolism after either aortic crossclamping or partial cross clamping. We have previously observed in our institutional series that postoperative stroke rate was significantly lower when the operation was performed by OPCAB surgeons who routinely used epiaortic ultrasonographic scanning for planning the revascularization strategy than with conventional coronary artery bypass grafting surgeons did not use epiaortic ultrasonographic scanning (0.4% vs 3.9%; $P = .015$).⁵ Because a recent meta-analysis showed that pooled rate of immediate postoperative stroke after OPCAB with the use of the HEARTSTRING device was 1.9% (95% confidence interval, 0.8%–4.5%), it seems reasonable to consider the status of the ascending aorta to be the most important determinant of postoperative stroke. The potential clinical benefits and costs of using the HEARTSTRING device during OPCAB should be investigated in patients with stage III ascending aortic disease, as graded by intraoperative epiaortic ultrasonography, because the use of aortic partial clamping in these patients is not safe. The use of the HEARTSTRING device is probably not appropriate in patients with no disease (stage I) or mild disease (stage II) of the ascending aorta.

Fausto Biancari, MD, PhD
Department of Surgery
Oulu University Hospital
Oulu, Finland

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doi:10.1016/j.jtcvs.2011.12.066

Reply to the Editor:

We thank Biancari for his comments on and additions to our article. Although the risk of neurologic complications cannot be completely avoided after surgical revascularization and is most likely associated with the underlying risk profile,¹ we agree that atherosclerosis of the ascending aorta is among the most important predictors for the occurrence of stroke. Epiaortic ultrasonography has been demonstrated to be more accurate than digital palpation in the detection of aortic atherosclerosis² and can be considered the standard of care for the detection and characterization of aortic plaques in the ascending aorta. Despite this knowledge, epiaortic ultrasonography is not established for routine use in most centers.³

The potential benefit of combining off-pump and aortic no-touch techniques has been repeatedly shown to be a significantly reduced stroke rate.⁴ Although in situ grafting may be considered the criterion standard whenever possible, for free graft use requiring proximal anastomosis, our series has clearly shown that the use of the HEARTSTRING device (MAQUET Cardiovascular LLC, San Jose, Calif) yields stroke rates comparable to those achieved with no-touch, in situ techniques.³

We acknowledge the most recent meta-analysis, which included 8 studies with a total of 819 patients with

a pooled stroke rate of 1.9% (95% confidence interval, 0.8%–4.5%) with the use of the HEARTSTRING device⁵; however, it appears that in 6 of these studies (accounting for 88% of all included patients; 719/819), the stroke rate was either 0% (5 studies; n = 305 patients) or 0.5% (1 study; n = 412 patients), whereas in only 2 studies, accounting for only 100 patients (12%; n = 19 and n = 81), were stroke rates substantially higher at 3.7% (accounting for 3 events) and 5.2% (accounting for 1 event).⁵ In contrast, the report of Hilker and colleagues,⁶ representing the largest series of the evaluated studies, supports our findings highlighting the potential benefit of the HEARTSTRING device with regard to a reduction in stroke rate.

We agree that a prospective, randomized trial in combination with the standardized application of epiaortic ultrasonography would be ideal to assess the potential clinical value of clampless devices such as the HEARTSTRING device in reducing neurologic complications.

Maximilian Y. Emmert, MD

Sacha P. Salzberg, MD

Volkmar Falk, MD

Clinic for Cardiac Surgery

University Hospital Zurich

Zurich, Switzerland

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doi:10.1016/j.jtcvs.2012.01.060

SIMULATION OF THORACOSCOPIC SURGERY USING 3-DIMENSIONAL TAILOR-MADE VIRTUAL LUNG To the Editor:

I read the article titled “Simulating video-assisted thoracoscopic lobectomy: a virtual reality cognitive task simulation” by Solomon and colleagues¹ with amazement, and I applaud their efforts to adopt and improve new technology. Their efforts are not only very important in contributing to the education of young thoracic surgeons but are also of help to senior surgeons educating young surgeons. It is important to practice the steps involved in thoracoscopic surgery on one element that was absent in the work by Solomon and associates¹—that is, the ability to simulate anatomic variability.

Thoracic lobectomy for lung cancer has been gaining widespread popularity, particularly in the treatment of early-stage lung cancer, and thoracoscopic segmentectomy has also been conducted in some institutes. However, anatomic variations in the pulmonary vessels carry a potential risk of uncontrollable intraoperative bleeding; therefore, it is necessary to emphasize this issue while educating young surgeons. The education of young thoracic surgeons is undoubtedly important; however, it is far more difficult to teach thoracoscopic surgery than it is to teach thoracotomy surgery. During thoracotomy surgery, senior surgeons can touch the organ directly with forceps or fingers to indicate the point of division. During thoracoscopic surgery, surgeons do not touch the monitor to prevent bacterial