Endoscopic versus Open Vein-Graft Harvesting for CABG

**To the Editor:** When patients in a surgical clinical trial are assigned to a surgical provider and randomly assigned to a particular approach (e.g., open or endovascular vein-graft harvesting), under conditions of clinical equipoise it is assumed that each provider can be expected to perform either procedure with similar safety. However, a review of the adverse events for individual providers in the trial by Zenati et al. (Jan. 10 issue) (Table S17 in the Supplementary Appendix, available with the full text of the article at NEJM.org) shows potentially important differences in safety. Although not surprising, these results illustrate the potential for a surgeon’s outcomes to vary across different surgical approaches, since many of the providers with the lowest incidences of adverse events for one approach rank among the least safe for the other approach (Fig. 1). For example, the incidence of adverse events among providers in the safest-performing quartile for open harvesting was nearly 4 times as high when they used the endoscopic approach (5.1% vs. 20%, \(P=0.002\)), and a similar phenomenon was seen in the safest-performing quartile for endoscopic harvesting. These findings indicate that by participating in a trial, a patient may be randomly...

**Figure 1. Analysis of Adverse Events According to Individual Vein-Graft Harvester.**

We used data from Zenati et al.\(^1\) (Table S17 in the Supplementary Appendix of their article) to plot the difference between each individual vein-graft harvester’s incidence of adverse events (the composite of death, myocardial infarction, or repeat revascularization) and the mean incidence of adverse events in the cohort for each approach. Positive values in the figure indicate an incidence of adverse events that was better than the mean for the cohort (mean in the open-harvest group, 15.5%; mean in the endoscopic-harvest group, 13.9%). Providers who were in safest-performing quartile for open harvesting (in blue font: M1, A1, P5, M2, F2, G1, and F1) had a significantly lower incidence of adverse events for open harvesting than for endoscopic harvesting (5.1% vs. 20%, \(P=0.002\)). Providers who were in the safest-performing quartile for endoscopic harvesting (in orange font: G2, B1, J2, E1, N2, H1, and D3) had a significantly lower incidence of adverse events for endoscopic harvesting than for open harvesting (3.1% vs. 18.5%, \(P=0.01\)). The analysis included only those harvesters who performed more than 10 procedures, because of the substantial variability in outcomes among those who performed fewer procedures (97% of patients in the trial were included in the analysis). The figure emphasizes the differences in safety for each harvester for the two approaches. However, when the absolute incidences of adverse events were plotted for each provider (not shown), the top quartile for open harvesting also differed significantly from the bottom quartile for open harvesting (3.9% vs. 29.3%, \(P<0.001\)). The same phenomenon was seen for endoscopic harvesting (2.6% vs. 28.8%, \(P<0.001\)).
assigned to an approach that is not the surgeon’s safest approach, a nuance that is unlikely to be discussed in the consent process of the more than 80 upcoming randomized surgical trials. If every patient’s surgical provider in the trial by Zenati et al. had used only that provider’s safer approach, the overall incidence of adverse events could have been 8.9% rather than 14.6%. Perhaps future trial designs could include steps to maximize safety by ensuring surgical proficiency for all tested approaches (including assessment of experience thresholds, training, and previous adverse outcomes).

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TO THE EDITOR: In their report of the Randomized Endovenous Graft Prospective (REGROUP) trial, the authors claim that a higher level of surgical expertise among the vein-graft harvesters resulted in better outcomes than in previous studies. However, the operators’ technical performance in this trial was not outstanding. First, the vein-graft harvesting time to some extent mirrors the operators’ expertise, and the mean (±SD) endoscopic harvesting time (57.5±24.4 minutes) in this trial was longer than that in other published studies.1,2 Second, 5.6% of patients in the endoscopic-harvest group underwent conversion to open harvesting in this trial, a percentage that was higher than the minimum expertise prerequisite (i.e., <5% conversion over >100 procedures) and inferior to the percentage (1.6%) in a series of 1400 patients reported in 1999.2 Finally, the quality of the harvested conduit remains the key issue reflecting surgeons’ performance and expertise, on which the trial was focused; unfortunately, however, neither intraoperative data nor follow-up data evaluating graft quality were available.

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TO THE EDITOR: Zenati and colleagues studied endoscopic as compared with open vein-graft harvesting for coronary-artery bypass grafting (CABG) and found no significant difference between the two techniques in the incidence of major adverse cardiac events. Previous studies have shown lower graft patency in association with endoscopic harvesting,1,2 which the authors attribute to vein trauma caused by inexperienced harvesters. The current trial therefore included only “expert” endoscopic harvesters.

The authors do not mention an important source of traumatic vein injury — how the veins were handled after removal. We showed almost 40 years ago that the pressure at which veins are distented must be controlled to prevent serious endothelial damage.3,4 The composition of the fluid used for distention and storage is also influential.

The trial by Zenati et al. was conducted over a 3-year period at 16 Veterans Affairs hospitals. Unless the techniques of vein handling after harvesting were stipulated by protocol, it is likely that they varied. Nonstandardized vein-handling techniques would have introduced a major uncontrollable variable that is known to affect the outcome of CABG and may explain the varying results among studies of endoscopic as compared with open vein-harvesting techniques.

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TO THE EDITOR: The saphenous vein is the most commonly used conduit for CABG. Considerable vascular damage to the graft occurs when it is harvested by open methods. In their trial, Zenati et al. found no significant difference between open and endoscopic vein harvesting in the risk of major adverse cardiac events among patients undergoing CABG. An atraumatic, no-touch open surgical technique provides a superior saphenous vein graft that is similar in patency to the left internal thoracic artery at up to 16 years after surgery. Whereas no-touch grafts maintain a normal architecture, those harvested by open and endoscopic methods have damage to many regions of the vessel — damage that affects graft patency. Patients who receive no-touch vein grafts were not included in the trial by Zenati et al.; however, a short-term study showed no-touch grafts to be superior to endoscopically harvested grafts with respect to early graft patency. Although wound healing is better when endoscopic harvesting is used than when no-touch harvesting is used, the main issue for patients undergoing CABG is whether wound healing is more important than graft patency.

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gery due to the increasing preference for percutaneous coronary intervention.

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