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The danger of conversion

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'The great danger of conversion in all ages has been that when the religion of the high mind is offered to the lower mind, the lower mind, feeling its fascination without understanding it, and being incapable of rising to it, drags it down to its level by degrading it.' (George Bernard Shaw)

The debate as to which surgical revascularization technique (on- or off-pump) is superior is currently ongoing. In this issue of the EJCTS, Mukherjee et al. [1] enrich the discussion by exploring the effect of conversion from off-pump to on-pump on the results of off-pump coronary artery bypass (OPCAB). The authors performed a multivariate analysis including some 18 870 patients from 17 studies published between 1998 and 2008. A total of 920 patients underwent intra-operative conversion from planned OPCAB to on-pump. Overall, conversion increased mortality by an odds ratio (OR) of 6.18, while emergency conversion further raised the OR of mortality to 6.99. However, when compared with risk-matched on-pump coronary artery bypass (ONCAB) groups, overall conversion produced a nonsignificant OR for mortality, while only emergency conversion produced a significant OR of 4.48. The authors conclude that conversion from OPCAB to ONCAB surgery significantly increases the chance of an adverse outcome, and emergency conversion confers a significant rise in mortality.

The authors have to be congratulated for having addressed a less-explored area in the outcome analysis after off-pump surgery. The fact that only 17 out of the 96 studies that were screened reported conversion from off- to on-pump and the associated outcomes highlight the fact that this is a largely underreported entity. Mortality data were provided for the emergency conversion subgroup in only 9 of the 17 studies and for the elective conversion subgroup in only 3/17 studies. Only 2/17 studies provided mortality data for both emergency and elective subgroups. This is a disappointing finding as an important outcome variable is obviously infrequently reported.

The authors point out, that the reported conversion rate is usually higher in randomized trials as opposed to retrospective analysis, which may be attributable to better monitoring and documentation in randomized trials or simply reflect less selection bias.

Conversion is certainly underreported and potentially impacts outcomes. The published results of many OPCAB studies leave the reader therefore with a level of uncertainty. Most often it is

not indicated if the results are presented based on an 'intention to treat' (which would then rightfully include the converted on-pump patients) or 'as treated' (which would largely exclude converted patients because they were operated on-pump). It is obvious that with the latter approach results may look more favorable for OPCAB.

Conversion from on- to off-pump, when reported, has an incidence in the range from 0% to 15%. Conversion may be an emergent or elective event, depending on the degree of urgency involved. It may become necessary for hemodynamic instability in a patient with very poor left ventricular function in whom OPCAB was intentionally chosen to decrease the overall surgical risk. On another occasion it may be caused by arrhythmia due to intolerance of temporary target vessel occlusion. Conversion may not always represent a technical mishap but rather a strategic and planned bailout in a complicated case and, as such, be part of the overall revascularization strategy. The reason and the threshold for conversion may differ substantially for different surgeons and also for different institutions. As pointed out by Kaya et al. [2], the risk for conversion can be minimized if patients are selected properly. The use of a predefined algorithm for OPCAB in acute coronary syndromes leads to a zero conversion rate, albeit at the cost of a substantial number of planned on-pump procedures.

While conversion is essentially harmful, it may also increase costs. By means of a decision-analysis model and Monte Carlo simulation, it was calculated that OPCAB is less costly and more effective than on-pump CABG if the conversion rate is below 8.5%, whereas costs increase exponentially if the probability of conversion is higher [3].

Since conversion may be associated with adverse outcomes, the authors suggest that the risk of conversion should be explained as part of the consenting process for OPCAB. Although this is certainly a desirable measure, it is unlikely that the complexity of this entity can be made understandable to patients easily. It is already difficult to explain to the patient the risks and benefits between the different revascularization procedures such as coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI). Having the patient to choose between off- and on-pump surgery requires an even deeper understanding of the procedure. While not even all cardiologists do understand the fundamental difference between surgical revascularization techniques, this is clearly beyond the

possibilities for most patients. It will be very challenging to explain to a patient the following: OPCAB is proposed to you in order to reduce the periprocedural risk but should on-pump surgery become necessary during the procedure, your risk will actually exceed that of a primary on-pump procedure. Having difficulties understanding this sentence? So will the patient!

The authors rightfully point out that training is essential and that the conversion rate is especially high in low-volume OPCAB centers and for surgeons inexperienced with OPCAB. Their conclusion that the conversion rate should be monitored as a quality metric that reflects both training and surgical performance, and that training programs should provide trainees with a large-enough supervised OPCAB case load to traverse their learning curves, can therefore only be supported and has proven to be effective [4].

In addition, the rate and reason for conversion should be reported obligatory as an event in all trials and registries dealing with OPCAB surgery to enhance the understanding of this potential complication. In this context, it would be desirable also to define the level of urgency for conversion. The professional societies should therefore release a position statement similar to

the recently issued VARC criteria for reporting transcatheter valve procedure-related results and complications. Only then, reliable information on the true incidence and potential implications of conversion will be known.

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