

References

1. Puskas JD, Williams WH, Duke PG, Staples JR, Glas KE, Marshall JJ, et al. Off-pump coronary artery bypass grafting provides complete revascularization with reduced myocardial injury, transfusion requirements, and length of stay: a prospective randomized comparison of two hundred unselected patients undergoing off-pump versus conventional coronary artery bypass grafting. *J Thorac Cardiovasc Surg.* 2003;125:797-808.
2. Angelini GD, Taylor FC, Reeves BC, Ascione R. Early and midterm outcome after off-pump and on-pump surgery in Beating Heart Against Cardioplegic Arrest Studies (BHACAS 1 and 2): a pooled analysis of two randomised controlled trials. *Lancet.* 2002; 359:1194-9.
3. Ascione R, Lloyd CT, Underwood MJ, Lotto AA, Pitsis AA, Angelini GD. Economic outcome of off-pump coronary artery bypass surgery: a prospective randomized study. *Ann Thorac Surg.* 1999;68:2237-42.
4. van Dijk D, Mierich AP, Jansen EW, Nathoe HM, Suyker WJ, Diephuis JC, et al. Early outcome after off-pump versus on-pump coronary bypass surgery: results from a randomized study. *Circulation.* 2001;104:1761-6.
5. Diegeler A, Doll N, Rauch T, Haberer D, Walther T, Falk V, et al. Humoral immune response during coronary artery bypass grafting: a comparison of limited approach, "off-pump" technique, and conventional cardiopulmonary bypass. *Circulation.* 2000;102(19 Suppl 3):III95-100.
doi:10.1016/S0022-5223(03)00802-X

Reply to the Editor:

Drs Ascione and Angelini have written to emphasize the contributions they have previously made in conducting and reporting randomized clinical trials of off-pump coronary artery bypass grafting (CABG) versus CABG with cardiopulmonary bypass (CPB). Indeed, these authors and their co-workers have made numerous contributions to our understanding of patient outcomes with these two surgical techniques. Among their contributions is a series of publications reporting various outcome variables from two groups of selected patients randomized to undergo OPCAB or conventional CABG/CPB. As they have noted in their own letter to the Editor, the first of these groups of patients was selected to exclude those requiring grafts to the distal branches of the left circumflex artery, whereas the second group was selected to exclude patients with previous stroke and renal failure, as these were con-

sidered potentially confounding variables. Both studies reported important advantages of OPCAB over conventional CABG/CPB and were landmark publications. Neither rigorously documented the completeness of revascularization. Indeed, BHACAS 2 reported that 70% of CPB patients versus 56% of OPCAB patients had 3 grafts or more; this difference (the manuscript does not state whether this was a statistically significant difference) was especially noted in grafts to the lateral wall of the left ventricle. The mean number of grafts per patient in each group was not reported.¹

In the SMART trial,² my coauthors (to each of whom I am grateful) and I sought to demonstrate that OPCAB could be safely applied to the general population of patients referred for elective surgical coronary revascularization and that an equivalently optimal revascularization could be achieved in both groups. Patients were not excluded on the basis of any coronary anatomy, ventricular dysfunction, or comorbidities, including prior stroke or renal failure. Indeed we believed it important to randomize "all comers," and we did so. Thus, this trial compared outcomes among truly unselected patients referred for non-emergency CABG. (Among the numerous demographic variables tracked, incidence of prior stroke was regrettably different between the randomized groups. This is a simple function of sample size.) We believed it important to document the optimal revascularization that should be performed for each patient before randomization. The grafts actually performed were then compared with those intended, creating a formal index of completeness of revascularization (ICOR), which was found to be virtually identical between groups. The ICOR was also similar between groups for the lateral wall of the left ventricle, documenting that OPCAB with modern stabilizing devices could provide complete revascularization of all areas of the heart in unselected patients. Other end points, including serum levels of myocardial enzymes, transfusion requirement, and length of stay, strongly favored the OPCAB group, consistent with the findings of previous randomized trials in selected patients.

We look forward to reporting angiographic graft patency and longer term outcomes from these randomized cohorts as those data become available, building on

the important foundation that Drs Ascione, Angelini,¹ Van Dijk,³ Diegeler,⁴ Czerny,⁵ Zamvar,⁶ and others have laid.

"I prefer nothing more than that I should be true to myself and they to themselves."

—Julius Caesar, letter to Cicero, quoted in Cicero, *Letters to Atticus*, 9.16.2.

John D. Puskas, MD
Associate Professor of Surgery
(Cardiothoracic)
Emory University
Crawford Long Hospital
Atlanta, GA 30308

References

1. Angelini GD, Taylor FC, Reeves BC, Ascione R. Early and midterm outcome after off-pump and on-pump surgery in Beating Heart Against Cardioplegic Arrest Studies (CHACAS 1 and 2): a pooled analysis of two randomized controlled trials. *Lancet.* 2002; 359:1194-9.
2. Puskas JD, Williams WH, Duke PG, Staples JR, Glas KE, Marshall JJ, et al. Off-pump coronary artery bypass grafting provides complete revascularization with reduced myocardial injury, transfusion requirements, and length of stay: a prospective randomized comparison of two hundred unselected patients undergoing off-pump versus conventional coronary artery bypass grafting. *J Thorac Cardiovasc Surg.* 2003; 125:797-808.
3. Van Dijk D, Mierich AP, Jansen EWL, Nathoe HM, Suyker WJ, Diephuis JC, et al. Early outcome after off-pump versus on-pump coronary bypass surgery: results from a randomized study. *Circulation.* 2001;104:1761-6.
4. Diegeler A, Hirsch R, Schneider F, Schilling LO, Falk V, Rauch T, et al. Neuromonitoring and neurocognitive outcome in off-pump versus conventional coronary bypass operation. *Ann Thorac Surg.* 2000;69:1162-6.
5. Czerny M, Baumer H, Kilo J, Zuckermann A, Grubhofer G, Chevtchik O, et al. Complete revascularization in coronary artery bypass grafting with and without cardiopulmonary bypass. *Ann Thorac Surg.* 2001;71:165-9.
6. Zamvar V, Williams D, Hall J, Payne N, Cann C, Young K, et al. Assessment of neurocognitive impairment after off-pump and on-pump techniques for coronary artery bypass graft surgery: prospective randomized controlled trial. *BMJ.* 2002;325:1268-71.
doi:10.1016/S0022-5223(03)00803-1

Abdominal tumors with cavoatrial extension**To the Editor:**

We congratulate Chiappini and associates¹ on their outstanding results in the treatment

of cavoatrial tumors with hypothermic circulatory arrest. We previously reported on a similar series of 12 patients operated on between 1990 and 1995,² and we take this opportunity to outline several aspects not described in the previously published review.

Two of our patients died (multiorgan failure). Both showed a preoperative ejection fraction less than 30% and no cardiac condition amenable to surgical correction. Left ventricular dysfunction may therefore represent a relative contraindication for operation (at least, for prolonged circulatory support and deep hypothermic techniques). We had a substantially higher rate of postoperative complications. A serum creatinine level rise of more than 2 mg/dL was observed in 5 of 12 cases, although this condition was present before the operation in 3 of the 5, and dialysis was never required. Transient jaundice occurred in 9 of 12 patients. It can be speculated that tumor thrombus may impair hepatic venous drainage, and thus hepatic "functional reserve," despite normal results of preoperative liver function tests.

From a technical standpoint, we agree that hypothermic circulatory arrest is the optimal approach. We performed an atriotomy before cavotomy in all cases to gain open distal access and reduce embolic risks. This preceded en bloc tumor resection through the inferior vena cava (IVC). If the thrombus is unusually adherent to the IVC, infiltration should be suspected and a more aggressive resection considered; in our experience, 1 such patient died of local tumor recurrence. In addition, if circulatory support is not used, specific maneuvers may be hazardous; clamping of the porta hepatis can produce acute spleen rupture in patients without chronic portal hypertension.³ Chiappini and associates¹ used the chevron incision, whereas we preferred a median sternotomy in all cases. The former is optimal to expose right-sided lesions, which are much more common because of the IVC location and shorter length of the renal vein. However, we encountered left-sided tumors with IVC extension in 25% of our patients.

Finally, all late deaths in our series were related to metastatic cancer. Chiappini and associates¹ reported that 4 of 13 patients had distant metastases identified before the operation. Although obstructive symptoms

may be successfully palliated, we believe that an operation is contraindicated in such cases. This does not apply to patients who require associated pulmonary tumor embolism.

Marco Pocar, MD, PhD

Francesco Donatelli, MD

Cattedra di Cardiocirurgia

Università degli Studi di Milano

Milan, Italy

References

1. Chiappini B, Savini C, Marinelli G, Suarez SM, Di Eusanio M, Fiorani V, et al. Cavoatrial tumor thrombus: single-stage surgical approach with profound hypothermia and circulatory arrest, including a review of the literature. *J Thorac Cardiovasc Surg.* 2002;14:684-8.
2. Donatelli F, Pocar M, Triggiani M, Moneta A, Lazzarini I, D'Ancona G, et al. Surgery of cavo-atrial renal carcinoma employing circulatory arrest: immediate and mid-term results. *Cardiovasc Surg.* 1998;6:166-70.
3. Baniel J, Bihle R, Wahle GR, Foster RS. Splenic rupture during occlusion of the porta hepatis in resection of tumors with caval extension. *J Urol.* 1994;151:992-4.
doi:10.1016/S0022-5223(03)01219-4

Reply to the Editor:

My colleagues and I thank Pocar and Donatelli for their appreciation of our article. None of our patients showed a low preoperative ejection fraction like that seen in 2 patients in their study, and we agree that left ventricular dysfunction may represent a relative contraindication for operation with prolonged circulatory support and deep hypothermic techniques. Early postoperative outcomes in our study population confirm that cardiopulmonary bypass with deep hypothermic circulatory arrest carries reduced risks of warm renal and hepatic ischemia.

As do Pocar and Donatelli, we prefer to perform atriotomy before cavotomy to gain open distal access and reduce embolic risks. In our experience the chevron incision is the best surgical approach, providing the safest and widest exposure for removing these tumors and tumor thrombus.

We agree with Pocar and Donatelli regarding the contraindication of surgery for patients with diffuse metastatic cancer because of the high risk/benefit ratio.

Bruno Chiappini, MD

Department of Cardiovascular Surgery

Policlinico S. Orsola-Malpighi

University of Bologna

Bologna, Italy

doi:10.1016/S0022-5223(03)01220-0

Partial left ventriculectomy in patients with neoplasms and severe heart failure who are not candidates for cardiac transplantation

To the Editor:

I read the article of Casarotto and colleagues¹ with great interest. The article described a patient with Castleman disease who was treated with chemotherapy, leading to a dilated cardiomyopathy. Because of the neoplasm, cardiac transplantation was contraindicated. Because of a progressive severe heart failure, the patient had to be supported with a Novacor (World Heart Corporation, Ottawa, Ontario, Canada) left ventricular assist device (LVAD). After a total of 1512 days, the patient had no signs of a relapse of Castleman disease and underwent orthotopic heart transplantation.

The number of patients with severe heart failure after chemotherapy for neoplasms should not be underestimated: from 1990 to 1996, cardiac transplantation was performed in 89 selected patients in the United States for this indication.² The number of patients in whom cardiac transplantation cannot be performed because there is no proof of cure of the neoplasm is probably much higher. Therefore these patients are not so rare as might be supposed, and alternative treatment concepts are necessary.

Recently, I introduced a canine model for research on partial left ventriculectomy (PLV).^{3,4} Heart failure was induced by intracoronary doxorubicin administration, leading to a dilated cardiomyopathy with histologic myocardial changes similar to those described by Casarotto and colleagues.¹ PLV was performed by resecting the interpapillary segment of the left ventricle (group 2). Measurement of hemodynamic and echocardiographic parameters demonstrated an improvement of left ventricular function relative to a control group without PLV (group 1; Table 1).

PLV thus may also work in chemotherapy-induced heart failure, and I propose it as an alternative treatment option. PLV has some advantages relative to LVAD implan-