Risk scores: coronary artery bypass grafting with and without cardiopulmonary bypass

Enio Buffolo[1]

DOI: 10.5935/1678-9741.20120086

The work "With or without CPB? Impact of risk scores in CABG surgery" [1], published in this issue, brings about great contribution of still controversial aspects of the benefit of avoiding the use of cardiopulmonary bypass in CABG (coronary artery bypass graft).

After 30 years of its description and initial results in systematic series of cases [2,3], only years later, in 1995, with the description of even less invasive technique known as "MIDCABG" (Minimally Invasive Coronary Artery Bypass Graft) [4,5], the alternative off-pump coronary artery bypass received special consideration and international focus, occupying the main topic of discussion at specialty congresses.

The contribution of Brazilian heart surgery in this field was extensive and internationally recognized, demonstrating the feasibility of the technique, its benefits and, subsequently, extension of the procedure through creative maneuvers to a large group of patients [6-8]. It should be noted that these contributions were demonstrated at the time when stabilizers were not yet available, and the facilitation of the procedure was obtained by pharmacological stabilization, surgical maneuvers and perfusates [9].

Despite the intuitive advantages to avoid revascularization without cardiopulmonary bypass, turning the procedure into a thoracotomy, there are controversial opinions regarding the indication of this technique in various clinical scenarios, with respect to patient selection, results, patency of the grafts, benefits and disadvantages [10-14].

In reality, these controversies are fueled by biases in patient selection, inadequate training and longer learning curve.

In the literature, the data are compared in retrospective non-randomized single or multicenter studies and the results reported as an advantage for either method. There are few prospective and randomized studies, often with sample sizes that do not allow conclusions about which often bring more confusion than clarification.

The approach of this work is original and creative for it uses comparisons among alternative revascularization considering known and approved risk scores as the Bernstein-Parsonnet and EuroSCORE (European System for Cardiac Operative Risk Evaluation).

Based on a ROC curve (Receiver Operating Characteristic) of predicted and observed risk, the study identifies the benefits of revascularization without cardiopulmonary bypass in high risk patients: 17.75 in Parsonnet (OR 7.4 for a P <0.0001) and> 4.5 in EuroSCORE (OR 5.4 for a P <0.0001).

The results are very impressive and give the off-pump revascularization an indisputable advantage for high risk patients and did not detect significant differences in patients without comorbidities [15].

In recent guidelines of the European Society of Cardiology (ESC) and European Association for Cardiothoracic Surgery (EACTS), 2010, we noticed the recognition of the procedure without cardiopulmonary bypass with special technique and preferred in patients with relevant comorbidities, especially chronic renal failure [16,17].

The authors study is the first to demonstrate in expressive sample that in order to detect differences, we have to add to the selection criteria predicted risk, which will have great impact in the planning and selection of alternative revascularization, with effect on real world strategies. The limitations consist in the fact that this is a retrospective, non-randomized unicenter study, but the sample with significant sampling allows both groups to admit that the conclusions are valid as institutional truth; however not allowing to extrapolate to other centers in which the conditions of structure and training teams may not be the same.

1. Full Professor at Paulista School of Medicine, UNIFESP, São Paulo, SP, Brazil.

Abbreviations, acronyms and symbols	
EACTS	European Association for Cardiothoracic Surgery
ESC	European Society of Cardiology
EuroSCORE	European System for Cardiac Operative Risk Evaluation
MIDCABG	Minimally Invasive Coronary Artery Bypass Graft
ROC	Receiver Operating Characteristic
STS	Society of Thoracic Surgeons

Another important observation concerns the use of not updated risk scores: Bernstein-Parsonnet and EuroSCORE logistic I 2000 - 1999, being that, currently, the most used are the STS and EuroSCORE II.

This observation, however, does not invalidate the study proposal, which highlights a finding in a lot of quality information into the real world. What could possibly change if they used the Society of Thoracic Surgeons (STS) risk calculator or EuroSCORE II it would be the cut-off level and not contestation of the results.

SEE ALSO ORIGINAL ARTICLE
ON PAGES 503-511

Moreover, the work gives way to the introduction of a specific risk for myocardial revascularization without cardiopulmonary bypass, which in our opinion it would be different from the risks available, which do not distinguish between technical situations that are not similar.

I would like to congratulate the authors that offer a valuable complement to their previous contributions [18,19] and introduce a systematic assessment of procedures from deviations of ROC curves, based on previously known risks.

REFERENCES

1. Mejía OAV, Lisboa LAF, Puig LB, Moreira LFP, Dallan LAO, Jatene FB. Com ou sem CEC? Impacto dos escores de risco na cirurgia de revascularização miocárdica. Rev Bras Cir Cardiovasc. 2012;27(4):503-11.

2. Buffolo E, Andrade JC, Succi JE, Leão LE, Cueva C, Branco JN, et al. Revascularização direta do miocárdio sem circulação extracorpórea: descrição da técnica e resultados iniciais. Arq Bras Cardiol. 1982;38(5):365-73.

3. Benetti FJ. Direct coronary surgery with saphenous vein bypass without either cardiopulmonary bypass or cardiac arrest. J Cardiovasc Surg. (Torino). 1985;26(3):217-22.

4. Benetti FJ, Ballester C, Guido S, Doonstra P, Grandjean J. Video assisted coronary bypass surgery. J Card Surg. 1995;10(6):620-5.

5. Calafiore AM, Giammarco GD, Teodori G, Bosco G, D'Annunzio E, Barsotti A, et al. Left anterior descending coronary grafting via left anterior small thoracotomy without cardiopulmonary bypass. Ann Thorac Surg. 1996;61(6):1658-63.

6. Buffolo E, Andrade CS, Branco JN, Teles CA, Aguiar LF, Gomes WJ. Coronary artery bypass grafting without cardiopulmonary bypass. Ann Thorac Surg. 1996;61(1):63-6.

7. Lima RC, Escobar MAS, Lobo Filho JG, Diniz R, Saraiva A, Cesio A, et al. Resultados cirúrgicos na revascularização do miocárdio sem circulação extracorpórea: análise de 3410 pacientes. Rev Bras Cir Cardiovasc. 2003;18(3):261-7.

8. Lobo Filho JG, Dantas MCBR, Rolim JGV, Rocha JA, Oliveira FM, Ciarline C, et al. Cirurgia de revascularização completa do miocárdio sem circulação extracorpórea: uma realidade. Rev Bras Cir Cardiovasc. 1997;12(2):115-21.

9. Rivetti LA, Gandra SM. Initial experience using an intraluminal shunt during revascularization of the beating heart. Ann Thorac Surg. 1997;63(6):1742-7.

10. Sellke FW, DiMaio JM, Caplan RL, Ferguson TB, Gardner TJ, Hiratzka LF; American Heart Association, et al. Comparing on-pump and off-pump coronary artery bypass grafting: numerous studies but few conclusions: a scientific statement from the American Heart Association council on cardiovascular surgery and anesthesia in collaboration with the interdisciplinary working group on quality of care and outcomes research. Circulation. 2005;111(21):2858-64.

11. Puskas JD, Williams WH, Duke PG, Staples JR, Glass 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(4):797-808.

12. Buffolo E, Lima RC, Salerno TA. Myocardial revascularization without cardiopulmonary bypass: historical background and thirty-year experience. Rev Bras Cir Cardiovasc. 2011;26(3):III-VII.

13. Chu D, Bakaeen FG, Dao TK, LeMaire SA, Coselli JS, Huh J. On-pump versus off-pump coronary artery bypass grafting in a cohort of 63,000 patients. Ann Thorac Surg. 2009;87(6):1820-6.

14. Shroyer AL, Grover FL, Hattler B, Collins JF, McDonald GO, Kozora E, et al. On-pump versus off-pump coronary-artery bypass surgery. N Engl J Med. 2009;361(19):1827-37.

15. Gerola LR, Buffolo E, Jasbik W, Botelho B, Bosco J, Brasil LA, et al. Off-pump versus on-pump myocardial revascularization in low-risk patients with one or two vessels disease: perioperative results in a multicenter randomized controlled trial. Ann Thorac Surg. 2004;77(2):569-73.

16. Sajja LR, Mannam G, Chakravarthi RM, Sompalli S, Naidu SK, Somaraju B, et al. Coronary artery bypass grafting with or without cardiopulmonary bypass in patients with preoperative non-dialysis dependent renal insufficiency: a randomized study. J Thorac Cardiovasc Surg. 2007;133(2):378-88.

17. Caputi GM, Palma JH, Gaia DF, Buffolo E. Off-pump coronary artery bypass surgery in selected patients is superior to the conventional approach for patients with severely depressed left ventricular function. Clinics (Sao Paulo). 2011;66(12):2049-53.

18. Mejía OA, Lisboa LA, Puig LB, Dias RR, Dallan LA, Pomerantzeff PM, et al. The 2000 Bernstein-Parsonnet score and EuroSCORE are similar in predicting mortality at the Heart Institute, USP. Rev Bras Cir Cardiovasc. 2011;26(1):1-6.

19. Mejia OAV, Lisboa LAF, Dallan LAO, Pomerantzeff PMA, Moreira LFP, Jatene FB, et al. Validação do 2000 Bernstein-Parsonnet e EuroSCORE no Instituto do Coração – USP. Rev Bras Cir Cardiovasc. 2012;27(2):187-94.