

Publication

Intraoperative transit time flow measurement in on-pump coronary artery bypass graft surgery: Single center experience

Authors:

Kaya U et al.
 Dep. of Cardiovascular Surgery, Atatürk University, Turkey
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Abstract

Background

This study aims to evaluate the effects of graft dysfunction detected by intraoperative transit time flow measurement on the outcomes of on-pump coronary artery bypass graft surgery.

Methods

A total of 1,240 patients (856 males, 384 females; mean age 57.4±12.1 years; range, 47 to 74 years), who underwent isolated on-pump coronary artery bypass graft surgery via median sternotomy performed by the same surgical team, were reviewed retrospectively. With the introduction of transit time flow measurement into practice at our clinic in 2006, all patients regularly underwent transit-time flow measurement during surgery in order to evaluate the graft patency. Interpretation of the data obtained using the transit time flow measurement in patients who underwent surgery has

directed our decision as to whether to perform graft revision. Patients were evaluated for early- and late-period mortality/morbidity, perioperative and postoperative myocardial infarction, and intraaortic balloon requirement.

Results

A total of 3,596 grafts in the perioperative period was evaluated using transit-time flow measurement. Anastomosis/graft revision, new anastomosis/patch plasty to distal native artery or free left internal mammary artery graft was performed in 146 grafts of 143 patients in whom transit time flow measurement showed insufficient patency. Four of six patients who developed peri/postoperative myocardial infarction were found to have perioperative hypotension, ST elevation, and wall motion abnormality on transesophageal echocardiography before closure of the sternum. The flow was corrected by extending the short

length of the grafts with insufficient flow after transit time flow measurement and it was recorded that transit time flow measurements were at normal values at these four grafts. Two patients developed acute myocardial infarction in the postoperative period and stent was applied in one vessel of each patient; however, one of these patients died.

Sixteen patients were inserted intra-aortic balloon pump, four of which being in the preoperative period. Revision surgery was performed due to bleeding in 56 patients and sternal infection in 12 patients. Of all patients, 28 (2.3%) died in the early postoperative period.

Conclusion

We believe that transit time flow measurement may be an important tool in evaluating graft function and contribute to eliminate the causes of graft failure during surgery.

Medistim comments

Becit et al. published a study from this center in 2007, including 200 patients, where outcomes were compared with and without TTFM. After this study, intraoperative TTFM became a routine procedure.

The center has a high volume CABG procedures and is a good reference for successful regular use of the VeriQ™. All parameters were evaluated, and several TTFM measurements were done during the procedures, including directly before chest closure.

The graft revision rate was 4,1%, affecting 11,5% of the patients. The most common causes for graft revisions were kinked graft, graft length and twisted graft. All reasons for graft revisions are identified, some using an interesting technique to check for stenosis in the anastomosis area. This center is not using high frequency ultrasound yet.

Note that a 4 mm probe has been used on a LIMA-LAD graft, and the ACI (Acoustic Coupling Index) is very low. A good vessel/probe size

match is important to avoid over- or underestimation of the flow. Qmean (mean flow) is highly dependent on correct probe size, while PI is less so. PI was found to be the only parameter that significantly predicts early graft failure. A correct vessel/probe matching could contribute to Qmean values that are more accurate.

Acoustic Coupling Index (ACI):		
Green	50-100%	Good
Yellow	30-50%	Suboptimal
Orange	10-30%	Unacceptable
Red	0-10%	No measurement