Predictors of early graft patency following coronary artery bypass surgery

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Purpose

Coronary artery bypass graft (CABG) surgery is the standard of care in the treatment of advanced coronary artery disease. CABG provides excellent short- and intermediate-term results in the management of stable coronary artery disease; its long-term results are affected by failure of venous graft [1].

Early occlusion (before hospital discharge) affects the long-term results. Early occlusion has been found to occur in 7 to 10% of coronary grafts [1]. Previous studies have mainly evaluated the predictors of late graft patency [2, 3].

The aim of this study was to evaluate pre-operative, intraoperative, and perioperative factors associated with early graft patency in patients who underwent successful CABG.

Methods and Materials

Between March 2007 and March 2008, 107 consecutive patients (81 men, 26 women, mean age 60 ± 9 years) who underwent CABG were included in this study. The enrolled patients underwent 16-slice computed tomography (CT) angiography one week after CABG.

The study protocol was approved by the institution’s ethics committee and written informed consent was obtained from all patients.

Exclusion criteria were: serum creatinine >1.5 mg/dL, allergy to contrast material, hyperthyroidism, and inability to give informed consent.

A total of 366 grafts (250 venous grafts and 116 arterial grafts) were evaluated, all of which could be assessed for patency and occlusion using 16-slice CT. Six patients (5.6%) had two grafts, 54 (50.5%) had three grafts, 43 (40.2%) had four grafts, and four (3.7%) had five grafts. Based on the multislice computed tomography (MSCT), acute graft occlusion was detected in 32 (8.7% of all) grafts, including 26 of 250 (10%) in venous grafts and six of 116 (5%) in arterial grafts. All patients received aspirin, 325 mg daily, immediately after CABG.

Multidetector computed tomography angiography protocol

Patients were scanned using a 16-section multidetector CT scanner (SOMATOM Sensation 16, Siemens) Patients were positioned in the gantry supine position with ECG gated scan. Scan parameters were 140 kV, 0.4-second rotation speed, 400 mA, Pitch averaged 0.3.
The scan range from the thoracic inlet through the lung bases. Beta-blockers, for heart rates exceeding 70 beats per minute. A nonionic, iodinated, low-osmolar contrast medium with saline chaser were used.

Results

The study population consisted of 107 consecutive patients with CABG who completed the MSCT protocol. Among the arterial grafts, 107 (96.4%) of 111 grafts to the left anterior descending artery (LAD) were classified as patent, whereas one (33%) of the three grafts in the left circumflex (LCX) region and one (50%) of the two grafts in the right coronary artery (RCA) territory were found to be occluded. In the venous category, eight (13.8%) of the 58 grafts to LAD were found to be occluded. In the LCX region, nine (8.5%) of the 106 grafts were classified as occluded, while the remaining 97 (91.5%) grafts were patent. The venous grafts to RCA were occluded in nine (10.5%) of the 86 grafts.

Pre-operative predictors of early graft patency

The baseline clinical and demographic characteristics were similar between the patients with patent and occluded coronary grafts. The only differences observed were related to the baseline fasting blood sugar (FBS) and partial thromboplastin time (PTT).

The patients with patent coronary grafts had lower serum FBS level (119 ± 30 vs. 141 ± 65 mg/dL, \( p = 0.02 \)) and longer PTT (34 ± 11 vs. 30 ± 2 s, \( p = 0.04 \)).

Intraoperative and perioperative predictors of early graft patency

There were no differences in patency rate of coronary grafts in terms of surgical technique (onpump vs off-pump), saphenous vein graft (SVG) location (bypass to LAD, RCA, or LCX), urgency of surgery, need for packed cell transfusion, operative bleeding, and post-operative cardiac arrest (Table 3).

However, pump time was significantly long pump time (119 ± 43 min vs. 102 ± 32 min, \( p = 0.04 \)). The patients with longer pump time required more coronary grafts (pump time >20 min for 3.5 grafts vs. pump time < 120 min for 2.9 grafts, \( p = 0.02 \)).
Conclusion

The present study demonstrated that patients with successful CABG and patent coronary grafts within the first week after surgery are those who had optimal FBS level and a pump time of less than two hours.

References


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