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Avoiding Sternotomy To Enhance The Use Of Bita Grafts In Diabetic Patients

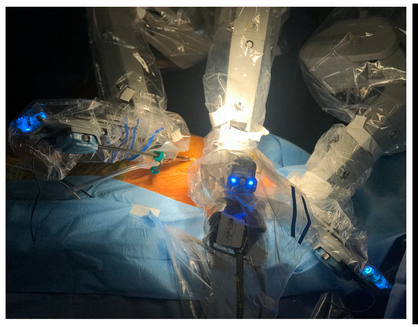
The Value Of Robotic TECAB In Multiarterial Grafting

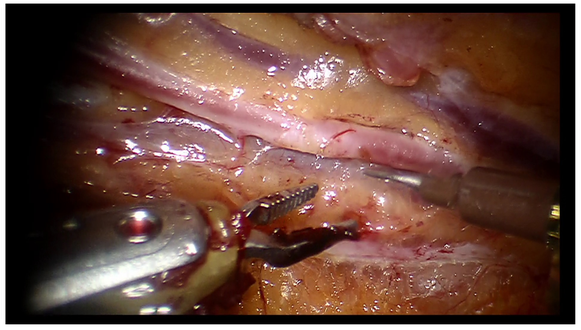
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Objective: Diabetics, who present with coronary artery disease at a younger age benefit the most from multiarterial grafting. However the use of bilateral internal thoracic arteries (BITA) in coronary artery bypass grafting (CABG) via sternotomy is less than 5% in the US general population due to concerns of sternal wound infection. Robotic off-pump coronary bypass grafting (TECAB) avoids sternotomy, maintains the proximity of the RITA to the heart (enhancing its reach), and improves post-operative recovery and length of stay (LOS). This study evaluates outcomes in our diabetic patients undergoing robotic TECAB with two internal thoracic artery grafts.

Methods: A retrospective analysis of 101 diabetic patients undergoing BITA TECAB (constituting 18% of 570 TECAB patients) between 7/2013-12/2020 at a single institution was performed. Pre-operative, intraoperative and post-operative results at 30 days and at mean follow-up of 38.0 ± 23.3 months, were analyzed.





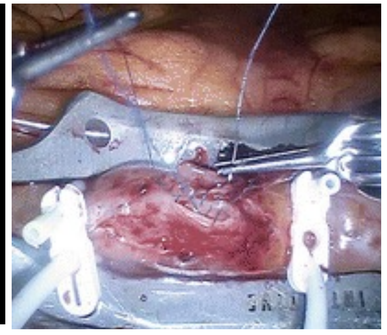


Table 1a. Patient Demographics

Variable	N=101
Age, yr, mean ± SD	67.0 ± 10
Female gender, n (%)	24 (24)
STS score, mean ± SD	2.16 ± 3.07
Diabetes Mellitus, n (%)	101 (100)
Insulin-Dependent Diabetes, n (%)	19 (19)
BMI≥30, n (%)	51 (50)
Hypertension, n (%)	92 (91)
Peripheral vascular disease, n (%)	15 (15)
Chronic renal failure, n (%)	31 (31)
Renal failure on dialysis, n (%)	5 (5.0)

Triple-Vessel Disease, n (%)	78 (77)
COPD, n (%)	8 (8.0)
Congestive heart failure, n (%)	26 (26)
Ejection fraction, mean ± SD	51.3 ± 13.1
Ejection fraction <40%, n (%)	27 (27)
Atrial fibrillation, n (%)	11 (11)
Prior MI, n (%)	29 (29)
Prior PCI, n (%)	38 (38)
Prior cerebrovascular accident, n (%)	19 (19)
Previous cardiac surgery, n (%)	0 (0.0)

Table 2. Intraoperative Results

Variable	N=101
BITA Use, n (%)	101 (100)
Mean grafts per patient, mean ± SD	2.15 ± 0.4
Operative time (min), mean ± SD	321 ± 55
LITA flow, mL/min, mean ± SD	77 ± 39
RITA flow, mL/min, mean ± SD	72 ± 35
Intraoperative blood transfusion, n (%)	10 (9.9)
Cardiopulmonary bypass, n (%)	1 (1.0)
Conversion to sternotomy, n (%)	0 (0.0)

Table 3. Postoperative Results

Variable	N=101
Extubation in OR, n (%)	35 (35)
Postoperative blood transfusion, n (%)	15 (15)
Chest tube drainage total, mL, mean ± SD	707 ± 374
Chest tube drainage 24 hours, mL, mean ± SD	575 ± 237
ICU length of stay, days, mean ± SD	1.39 ± 0.80
Hospital length of stay, days, mean ± SD	3.11 ± 1.35
Mortality, n (%)	1 (1.0)
Mortality, O/E	0.49

Table 4. Postoperative Adverse Events

Variable	N=101
Prolonged ventilation (>24h), n (%)	3 (3.0)
Surgical site infection, n (%)	0 (0.0)
Acute kidney injury, n (%)	5 (5.0)
Pericarditis, n (%)	3 (3.0)
Pleural effusion, n (%)	5 (5.0)
Myocardial infarction, n (%)	0 (0.0)
New atrial fibrillation, n (%)	14 (14)
GI complication, n (%)	0 (0.0)
Stroke or TIA, n (%)	1 (1.0)
Re-exploration for bleeding, n (%)	0 (0.0)

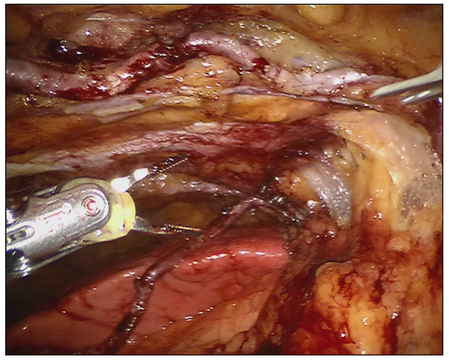
Table 5. Mid-Term Clinical Outcomes

Variable	N=101
Average time to follow-up (months), mean ± SD	40 ± 23
Overall mortality, n (%)	15 (15)
Cardiac-related mortality, n (%)	4 (4.0)
Repeat cardiac surgery, n (%)	2 (2.0)
Myocardial infarction, n (%)	0 (0.0)
Patients with unplanned postoperative angiograms*, n (%)	11 (11)
PCI (non-hybrid), n (%)	5 (5.0)
PCI in culprit vessel, n (%)	3 (3.0)
Freedom from MI, cardiac reoperation, & culprit vessel PCI, n (%)	92 (91)

Table 6. Early Graft Patency

Variable	N=101
Hybrid Revascularization, n (%)	49 (49)
Average time to angiogram, months, mean ± SD	1.8 ± 2.2
Graft patency, n/total grafts (%)	70/72 (97)
LITA Graft patency, n/total grafts (%)	37/37 (100)
RITA Graft patency, n/total grafts (%)	33/35 (94)

Results: Mean age was 67 years. Mean STS risk score was 2.02. Fifty percent of patients had BMI ≥30. Mean ejection-fraction was 51.3% and 38% of patients had previous percutaneous intervention. There were no conversions to sternotomy and 49% underwent staged hybrid revascularization. Intraoperative blood transfusion was required in 10% of patients, while femoral cardiopulmonary bypass was necessary in 1 patient to support gas exchange. The mean LITA flow was 76.5 ± 39 ml/min, while mean RITA flow was 72.1 ± 35.2 ml/min using intraoperative trans-time flow measurement. Extubation in the OR occurred in 35% of patients and mean hospital LOS was 3 days. There were no re-explorations for bleeding. At 30 days there was one death due to carotid stent thrombosis. There were no wound infections. At mid-term follow-up, three patients had a cardiac-related mortality and freedom from MI, cardiac reoperation and culprit vessel PCI was 94%.Early graft patency from patients undergoing hybrid revascularization was 97% (70/72 grafts).



Conclusions: The adoption of TECAB enhances the use of BITA revascularization in diabetic patients. In the hands of a dedicated robotic coronary team, TECAB BITA is feasible and allows more patients to receive the benefit of multiarterial grafting, particularly those at increased risk of wound infection.