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ORIGINAL ARTICLE

Composite Y-Grafting Using the Left Internal Thoracic Artery: Survival and Angiography in 198 Cases☆

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Background Extended left internal thoracic artery (LITA) harvesting allows maximal grafting to the anterior and lateral walls with a single ITA conduit. This study evaluates outcomes following the use of a LITA Y graft as the primary grafting strategy.

Methods Patients who underwent LITA composite Y-grafting (n=198) between 1995 and 2009 were identified from a cardiac surgical database. Follow-up (mean 13.1 years) was obtained by cross-reference with the state death registry and local cardiology databases.

Results Operative mortality was zero in the 168 patients who underwent isolated CABG and was 3.5% overall. There were no episodes of perioperative myocardial infarction. Kaplan-Meier 10-year survival was 75.9%. Independent predictors of worse late survival were age, diabetes, chronic obstructive pulmonary disease and pre-existing left ventricular dysfunction. There were 53 episodes of post-discharge angiography at an average of 5.8 years post LITA Y grafting. Twenty cases of LITA Y graft failure were identified, predominantly affecting the free limb (n=15). The ratio of symptom driven angiography to Y graft failure increased over time. Eighteen patients required revascularisation, percutaneous intervention in 15 and re-operative coronary bypass in three.

Conclusions LITA Y grafting is a feasible revascularisation strategy with satisfactory outcomes. These are comparable to other arterial composite graft configurations. A LITA Y allows efficient conduit use without compromising the in situ LITA graft.

Keywords CABG • Arterial grafts • Coronary artery disease • Surgical technique • Coronary artery imaging

Introduction

The superiority of left internal thoracic artery (LITA) grafting to the left anterior descending (LAD) has long been established [1]. Subsequently, bilateral internal thoracic grafting (BITA) has been demonstrated to further improve outcomes [2]. Extended semi-skeletonisation and composite Y-grafting of the LITA affords considerable versatility, and allows maximal grafting to the anterior and lateral walls with a single ITA conduit. The feasibility of extended LITA use has been confirmed by previous reports but with small patient numbers and only short-term follow-up [3,4]. The aim of this

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study was to evaluate perioperative mortality, late survival, and graft patency in a cohort of patients in whom a LITA Y graft was the primary strategy used.

Patients and Methods

Patients

All patients who underwent coronary artery bypass grafting (CABG) with a LITA Y graft (n=198) between 1995 and 2009, were identified from a cardiac surgical database. The aim of the revascularisation strategy in this patient group was to maximise internal mammary artery grafts to the anterior and lateral walls using a single internal thoracic artery. Patients in this cohort fell outside our BITA protocol [5], usually due to double vessel disease or age. Others fell within the BITA protocol but had inadequate RITA length to reach the LITA. In the latter case, the RITA was anastomosed end-to-end to the posterior limb of the LITA Y configuration and these patients were reported in the BITA cohort [5]. Patients were deemed suitable for complete revascularisation of the left anterior descending (LAD) and circumflex territories using a LITA Y-graft if there was minimal distal disease in both arteries and the graftable lateral circumflex artery (LCx) branch was proximal to the mid lateral wall (normally marked by the lateral cardiac vein). Our early experience with this strategy has been previously reported [3]. Patients requiring a second conduit to extend the LITA-Y configuration or to independently graft the right coronary artery (RCA) territory were included in the analysis. Patient and operative characteristics are listed in Table 1. There were 33 concomitant cardiac procedures in 30 (15.2%) patients, 18 of which were mitral repair for ischaemic incompetence or left ventricular reconstruction. In addition, 8 patients underwent combined carotid and coronary surgery. The project was approved by the Western Sydney Local Health District Human Research Ethics Committee. The need for patient consent was waived.

Surgical Technique

Procedures were completed by median sternotomy. The LITA was harvested using a semi-skeletonising technique from the upper border of the first rib to its terminal bifurcation. Medial thymic attachments of the LITA were divided. A lateral pericardiotomy was made at the level of the left atrial appendage down to the left phrenic nerve. Routine cardiopulmonary bypass with intermittent antegrade, blood cardioplegia was used in all cases. In the standard Y-graft configuration the LITA was measured for length to the LAD anastomotic site and divided. The distal free segment of LITA was anastomosed to the target artery. The in situ LITA was then anastomosed to the LAD. Thereafter, the proximal end of the free LITA was anastomosed end-to-side to the in situ LITA to form the composite Y-graft. All anastomoses were constructed with continuous 7/0 polypropylene suture.

The various Y-graft configurations are illustrated in Figure 1. The majority (63%) of Y-grafts were constructed as per arrangement A with a single end-to-side anastomosis per Y limb. Multiple (sequential side-to-side) anastomoses were performed with both the free (B) and in situ limb (C). A single patient received two anastomoses per limb (not

Table 1 Patient (n=198) and Operative Characteristics.

Characteristics	Values
Age, years, mean (range)	61.8 (37-85)
Male	81.8%
Hypertension	42.9%
Dyslipidaemia	39.4%
Smoker	46.0%
Diabetes (Insulin use)	20.2% (5.1%)
COPD	4.0%
PVD	5.6%
CRF, Creatinine >120 (Dialysis)	7.1% (0.5%)
LVEF	
>50	57.6%
30–49	37.9%
<30	4.6%
Left main > 50%	21.7%
Single, double, triple vessel disease	6.6%, 45.0%, 48.0%
Acute coronary syndrome	27.8%
Non-elective	35.4%
Concomitant procedure	15.2%

COPD = chronic obstructive pulmonary disease, CRF = chronic renal failure, LVEF = left ventricular ejection fraction, PVD = peripheral vascular disease

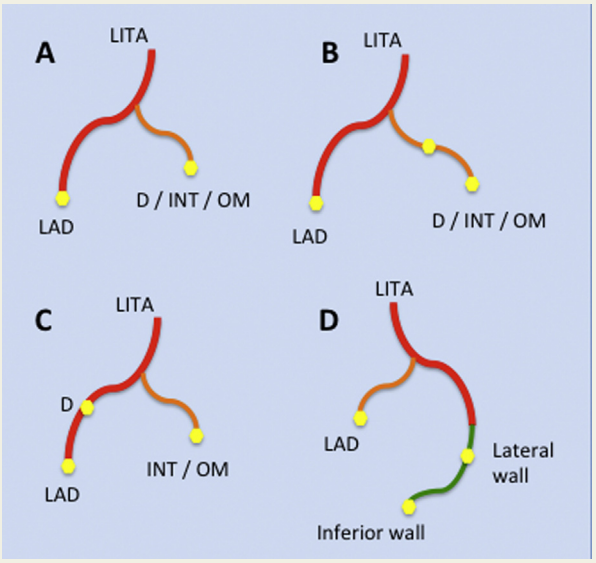

Figure 1 LITA Y-graft configurations (n=198): in-situ LITA (red), free LITA (orange), second conduit (green). A. Single anastomosis per Y-graft limb (n=125). B. Multiple anastomoses free limb (n=29) C. Multiple anastomoses in-situ limb (n=14) D. Second conduit extension of either limb (n=29).

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