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ORIGINAL ARTICLE

Effect of Transradial Catheterisation on Patency Rates of Radial Arteries Used as a Conduit for Coronary Bypass

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Background Transradial catheterisation is known to be associated with occlusion of the radial artery with an estimated incidence of 2-10% (1). There are very few studies looking at the patency of radial artery as a bypass graft after utilisation for catheterisation.

Methods We conducted a retrospective review of patients undergoing coronary artery bypass grafting (CABG) utilising a radial artery graft.

Results Long term patency rates were 59% in radial artery grafts utilised for catheterisation prior to CABG, compared to 78% if it were not (p= 0.035).

Conclusion Patency rates of radial artery grafts are significantly lower when the same radial artery was utilised for angiography prior to coronary artery bypass grafting (CABG).

Keywords Graft patency • Radial graft • Coronary artery bypass grafting

Background

Transradial coronary angiography was described by Dr. Lucien Campeau in 1989 [2], and radial access is increasingly being utilised for diagnostic and interventional coronary catheterisations. Our institution adopted this method early in its inception and performed the first transradial cardiac catheterisation in Toledo in 1994. Worldwide, radial access is quickly becoming the preferred approach given its improved safety, patient satisfaction and ease of use. The 2015 European Society of Cardiology (ESC) guidelines recommend using radial over femoral access whenever feasible for coronary angiography and percutaneous coronary intervention (PCI) (Class IA) in patients with acute coronary syndromes other than ST elevation myocardial infarction (STEMI) [3]. In contrast, occlusion of the RA after catheterisation is a known complication and has a reported incidence ranging from 2-10% [1]. Studies utilising optimal coherence tomography have indicated that intimal tears and medial dissections after radial catheterisation can occur with an incidence as high as 35% and 67% respectively [4]. While these may be of insignificant clinical consequence in situ, if the same RA is utilised as a conduit for bypass soon after catheterisation, it could affect graft patency rates and thereby gain increasing clinical significance. Additionally, with the resurgence in the use of RA grafts for CABG and evidence for improved outcomes with total arterial revascularisation, radial catheterisation's effect on graft patency rates becomes

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an important question [5]. There is a paucity of data in the literature looking at the outcomes of a radial graft if the artery had been utilised for angiography prior to CABG. Currently, the best evidence available to answer this question demonstrated that radial catheterisation prior to CABG reduced early graft patency and caused intimal hyperplasia in the RA, but had no effect on early clinical outcomes [6]. We sought to analyse our institution's experience with RA grafts over the past 15 years to determine whether radial catheterisation had an effect on short- and long-term patency rates.

Materials and Methods

The study was conducted as a retrospective chart review of all patients who underwent CABG utilising at least one RA as a bypass graft from 2000-2015 at our institution. It was approved by the institutional review board.

Study Population

Patients who had follow-up imaging of their bypass grafts during the study time period were included. Follow-up imaging included coronary angiography and CT angiography done either for recurrent symptoms or CT angiography to check for graft patency in asymptomatic patients during follow-up. Of the 659 patients who received a radial graft, 215 underwent follow-up imaging and met inclusion criteria. A total of 221 radial grafts were analysed as some patients had bilateral radial arteries utilised for CABG (Figure 1). Of these grafts, 27 were utilised for angiography prior to CABG (Group 1), and 194 were not (Group 2). Subjects in whom it could not be clearly identified whether the RA was utilised for angiography prior to its use as a graft were excluded. If both radial arteries were utilised as grafts, they were considered two separate grafts and placed in respective groups per defined criteria. The baseline patient characteristics in the two groups are shown in Table 1. There was no significant

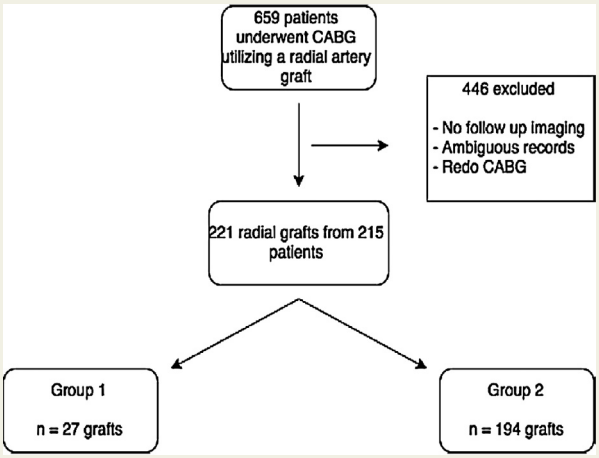

Figure 1 Study flow chart.

difference seen in baseline demographics, comorbidities, urgency of CABG or degree of severity of native vessel stenosis. Non-severe native vessel stenosis was defined as < 50% left main stenosis or <70% stenosis in the remaining epicardial vessels.

Study Outcomes

The primary outcome was radial graft patency rates in the two groups on follow-up imaging. Graft patency was defined as <50% stenosis and absence of string sign [7], atretic graft or occlusion. Follow-up imaging included invasive coronary angiography or computerised tomographic angiography (CTA) irrespective of indication. Jump grafts in which an RA had been grafted to two native vessels sequentially were considered as one entity and lack of patency criteria in either limb was counted as loss of patency.

Secondary outcomes included patency rates of non-radial grafts in the two groups, time to imaging and time to patency or loss of patency. Time to CABG was defined as the time in

Table 1 Baseline demographics *

	Group 1 (n=27)	Group 2 (n=194)	*p* value
Age (years)	62.7 ± 9.3	63.1 ± 10.8	0.13
Male	23 (85%)	153 (79%)	0.45
Hypertension	22 (79%)	157 (80%)	0.95
Diabetes	10 (37%)	79 (40%)	0.71
Smoker	21 (78%)	132 (68%)	0.30
PVD	8 (30%)	36 (19%)	0.18
Dyslipidaemia	24 (89%)	147 (76%)	0.13
LVEF < 50%	7 (26%)	78 (40%)	0.15
Urgent/Emergent CABG	15 (55%)	119 (61%)	0.56
Insignificant native stenosis	5 (19%)	36 (19%)	0.99

*Values are mean ± standard deviation or number of occurrences with percentage in parentheses.
PVD = peripheral vascular disease; LVEF= left ventricular ejection fraction

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