

## Left Radial versus Femoral Coronary Angiography in Post CABG Patients

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### Abstract

**Background:** Coronary angiography via TRA approach (TRA) has gained growing acceptance and operator preference in recent years, based on a reduction in vascular complications and mortality.

**Aim of Study:** This study was aimed to Compare left radial versus femoral artery approach during coronary angiography in patients post CABG especially in fluoroscopy time and contrast amount.

**Patients and Methods:** Our study was a single center, retrospective cohort study was done on 100 patients to compare procedural variables especially fluoroscopy time and contrast amount of TRA versus TFA catheterization in patients who had previously undergone CABG surgery. In the period between February 2020 and February 2021, 100 patients who had previously undergone CABG surgery and had received diagnostic or interventional cardiac catheterizations at our institute were included in the study population.

**Results:** Our results observed in Table (1) cleared that, the number of male patients in TFA access group was 35 (70%), while, the number of males in TRA group was 37 (74%).

**Conclusion:** Our study concluded that the fluoroscopy time and contrast amount were of lower levels in the TRA access than TFA access.

**Key Words:** CABG patients – Radial versus femoral coronary angiography.

### Introduction

**CORONARY** angiography via TRA approach (TRA) has gained growing acceptance and operator preference in recent years, based on a reduction in vascular complications and mortality [1] when compared with TFA approach (TFA) [2].

However, it has been suggested that these advantages come at the cost of increased procedure time and fluoroscopy dose [3].

Considering the significant morbidity and mortality benefits, increased patient preference and cost effectiveness, the European Society of Cardiology now advocates the TRA as the default access route for coronary angiography [4]. Since the introduction of the TRA access for cardiac catheterization and percutaneous coronary intervention (PCI), several studies have demonstrated that such access is associated with lower rates of vascular and bleeding complications [5,6]. Although coronary artery bypass grafting (CABG) patients comprise a significant portion of the coronary artery disease (CAD) population, this subpopulation was often excluded or under represented in TRA access studies [6,7].

A few observational studies have suggested that TRA PCI in patients who had previously undergone CABG surgery is feasible and safe, although it may require more sophisticated techniques compared to TFA PCI [8].

The RADIAL-CABG trial suggested that in patients with a history of CABG, TRA diagnostic coronary angiography was associated with greater amounts of contrast used, longer procedure time, increased number of access crossover, and higher radiation exposure of operators when compared to TFA angiography [9].

Some parts of the world, including the United States, have been slower to adopt this practice. In 2009, less than 5% of coronary procedures were performed via TRA, however this figure has increased substantially in recent years, with estimates that around 20% of procedures are now performed radially [10].

### Patients and Methods

#### *Study design and patient population:*

Our study was a single center, retrospective cohort study was done on 100 patients to compare

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procedural variables of TRA versus TFA catheterization in patients who had previously undergone CABG surgery. In the period between February 2019 and February 2020, 100 patients who had previously undergone CABG surgery and had received diagnostic cardiac catheterizations at our institute were included in the study population.

Patients with acute coronary syndrome, chronic liver or kidney disease were excluded from our study.

The study was approved by the Cardiology institutional review board.

#### Procedure description:

TFA catheterization was performed via the right or left common femoral artery while TRA catheterization was performed via the left radial artery.

Intra-arterial heparin and nitroglycerin were administered via radial sheath to prevent arterial spasm and thrombosis in TRA cases. At the end of each TRA procedure, a TRA band was applied to achieve patent hemostasis.

#### Endpoints:

The primary study endpoint was the volume of contrast used during diagnostic coronary angiography. Secondary end points include fluoroscopy time and procedure time until the end of the diagnostic procedure (defined as the interval between administration of local anesthesia for obtaining vascular access and removal of the last diagnostic catheter). Endpoints were assessed for the whole study sample regardless of the indication for catheterization.

#### Data collection:

Demographics and clinical characteristics of patients along with the various endpoints of the study were retrospectively collected from the patient's electronic records.

#### Statistical analysis:

Categorical variables were presented as percentages and compared using the chi-square as appropriate. Continuous variables were presented as mean  $\pm$  standard deviation (SD). The volume of contrast used during the procedure (primary endpoint), fluoroscopy time and total procedure time are continuous variables and they were assessed by the Mann-Whitney U test. Analysis was done using SPSS version 24.0 statistical software. Statistically significant differences were assumed with a  $p$ -value  $<0.05$ .

## Results

Our results observed in Table (1) cleared that, the number of male patients in TFA access group was 35 (70%), while, the number of males in TRA group was 37 (74%).

The mean age of patients in TFA group was 68.25 year, while, in TRA group was 66.69 year.

The number of grafts in TFA access was 3.95, while, in TRA group it was 3.90.

The number of hypertensive patients in the TFA group was 29 (58%) while hypertensive patients were 26 (52%) in the TRA group.

The number of diabetic patients was 25 (50%) in the TFA group while they were 27 (54%) patients in the TRA group.

The number of patients with dyslipidemia was 37 (74%) in the TFA group while they were 36 (72%) in the TRA group.

Smokers were 31 (62%) in the transfemoral group and 35 (70%) in the TRA group.

Table (1): Demographic characters of the patients.

Characteristics	TFA access (n=50)	TRA access (n=50)	$p$ -value
<i>Sex:</i>			
Male	35 (70%)	37 (74%)	0.152
Age	68.25 $\pm$ 10.29	66.69 $\pm$ 10.05	0.024
Number of grafts	3.95 $\pm$ 1.02	3.90 $\pm$ 1.20	0.24
Hypertension	45 (90%)	46 (92%)	0.45
Diabetes	25 (50%)	27 (54%)	0.024
Dyslipidemia	37 (74%)	36 (72%)	0.322
Smokers	31 (62%)	35 (70%)	0.452

Values are mean  $\pm$  SD or n (%).

Procedural outcomes are depicted in Table (2). Compared with TRA approach, patients undergoing coronary angiography via TFA access had a more contrast use (69.3ml vs. 42.81) and longer fluoroscopy time (7.20min vs. 4.90min), and there were no major peri-procedural complications.

Table (2): Procedural outcomes.

Characteristics	TFA access (n=50)	TRA access (n=50)	$p$ -value
Contrast volume, ml	69.3 $\pm$ 13.2	42.8 $\pm$ 10.2	0.0012
Fluoroscopy time, min	7.20 $\pm$ 3.11	4.90 $\pm$ 2.24	$<0.001$
Procedure time, min	17.25 $\pm$ 5.24	15.35 $\pm$ 6.22	$<0.32$

Values are mean  $\pm$  SD or n (%).

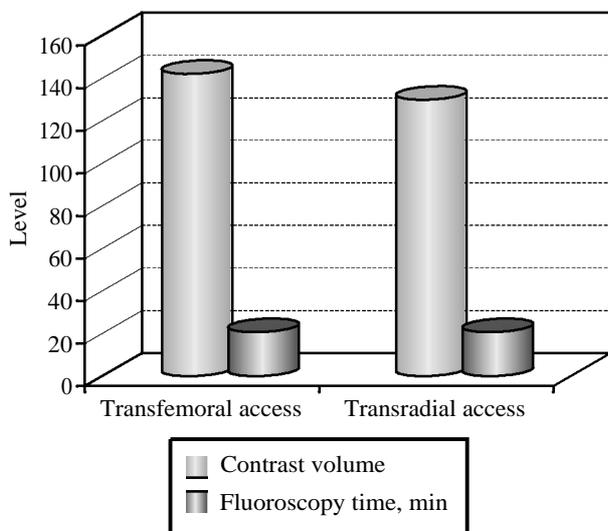


Fig. (1): Fluoroscopy time and contrast volume in TFA and TRA access.

**Discussion**

This retrospective analysis shows that angiography of post-CABG patients can be safely performed via left TRA with significant lowering of both contrast amount and fluoroscopy time and without significant increase in peri-procedural complications.

There is no significant difference regarding the whole procedure time between TFA and TRA coronary angiography.

Although it may also be technically extra challenging, left TRACAG has emerged as a promising method with many feasible blessings over TFA approach especially in patients with previous history of CABG, with easier visualization of LIMA graft

[10].

It is important to reduce procedural time to achieve more patients comfort and more cost effectiveness, previous studies have already shown that TRA is more cost effective than TFA due to earlier ambulation and time to discharge [6].

Moreover, fluoroscopy time remains and important factor regarding the operator's safety due to its direct proportion with increased malignancy

[11].

Despite Michael et al., concluded in a prospective randomized trial comparing TFA and TRA in patients post CABG undergoing diagnostic angiography and/or PCI that TRA resulted in longer procedure times, without statistically significant increase in patient radiation exposure [9]. However, this significant difference decreased in patients

who underwent PCI, only male patients included in that study, with significant crossover rate from radial to femoral route of 17%. This high crossover rate may have been partly attributable to lack of experience of first operators and their underlying inexperience in TRA, and this lack of experience might have been a major contributor to the longer procedural time.

*Conclusion:*

Our study concluded that coronary angiography of post-CABG patients can be safely performed via left TRA with significant lowering of both contrast amount and fluoroscopy time and without significant increase in peri-procedural complications.

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## استخدام الشريان الكعبرى الايسر مقابل شريان الفخذ لعمل قسطرة تشخيصية للشرايين التاجية فى المرضى الذين سبق لهم إجراء جراحة قلب مفتوح لعمل وصلات جراحية للشرايين التاجية

تمت الدراسة بالمعهد القومى للقلب فى الفترة من فبراير ٢٠٢٠ وحتى فبراير ٢٠٢١ وشملت ١٠٠ مريض مقسمين إلى مجموعتين حيث تم عمل قسطرة تشخيصية عن طريق الشريان الكعبرى الايسر للمجموعة الأولى وشريان الفخذ الايمن أو الايسر للمجموعة الثانية مع مقارنة كمية الصبغة المستخدمة ووقت التعرض للاشعة فى المجموعتين.

وأظهرت النتائج انخفاض كمية الصبغة المستخدمة فى المجموعة التى استخدم فيها الشريان الكعبرى الايسر مع انخفاض وقت التعرض للاشعة بنفس المجموعة مقارنة بالمجموعة الأخرى مع عدم حدوث مضاعفات مؤثرة.

وبناء على هذه النتائج فقد استخلصت هذه الدراسة أنه يمكن إجراء قسطرة تشخيصية على الشرايين التاجية فى المرضى الذين سبق لهم إجراء جراحة قلب مفتوح لعمل وصلات جراحية للشرايين التاجية عن طريق الشريان الكعبرى الايسر بشكل آمن مع استخدام صبغ أقل والتعرض للاشعة بشكل أقل مقارنة بالطرق التقليدية.