



# Feasibility of distal trans-radial access in the setting of acute ST-elevation myocardial infarction

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**Background:** Trans-radial access (TRA) has been recommended as a preferential route for all cardiac catheterization procedures however with few disadvantages. Distal TRA (dTRA) through the “anatomic snuffbox” might be a better alternative, it has proved its efficiency in different cardiac catheterization procedures but very little is known regarding efficacy in acute ST-elevation myocardial infarction (STEMI) patients. The aim of this study is to determine the utility and efficacy of dTRA in acute STEMI settings.

**Methods:** After obtaining the Institutional Review Board (IRB) approval, a retrospective identification of all consecutive acute STEMI cases which were operated on by a single transradial interventional cardiologist through dTRA approach between January 2019 through September 2019 was performed, and 25 consecutive cases were identified, all utilizing the dTRA route for catheterization. Access time as well as other variables were studied.

**Results:** All patients had successful right distal radial artery catheterization without ultrasound guidance (100% success rate). No mortality was reported. All patients upon discharge had no thumb, hand or arm symptoms, no clinical vascular complications, and intact radial artery pulses. Distal radial artery access time was 45±15 seconds.

**Conclusions:** dTRA is feasible, safe, and time-efficient in most cardiac catheterization procedures including acute STEMI settings.

**Keywords:** Distal radial artery approach; snuffbox approach; cardiac catheterization; ST-elevation myocardial infarction (STEMI)

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## Introduction

It is very well established in literature and in particular among cardiologists that time is muscle when it comes to the primary intervention for acute ST-elevation myocardial infarction (STEMI), so all interventional cardiologists work promptly to re-establish blood flow in the culprit myocardial infarction vessel(s), hence decreasing the size of myocardial necrosis, with subsequent improvement in

overall morbidity and mortality (1).

Trans-radial access (TRA) has gained wide acceptance and recommendations by different cardiology societies as a preferred route of access for all cardiac catheterization procedures including acute STEMI due to its favorable safety profile. (2).

Distal trans-radial artery access (dTRA) for cardiac catheterizations has been proposed with little evidence as the preferred route compared to the conventional

**Table 1** Baseline and procedure characteristics

Characteristics	Patients (n=25)
Age (years)	57±11
Male	19 (76%)
Female	6 (24%)
Diabetes mellitus	9 (36%)
Hypertension	12 (48%)
PVD	3 (12%)
Smoking	14 (56%)
History of PCI	5 (20%)
History of CABG	1 (4%)
Ejection fraction (%)	49±7.5
Target-vessel revascularization	
LCX	5 (20%)
LAD	11 (44%)
RCA	5 (20%)
Multi-vessels revascularization	4 (16%)
Number of diseased vessels	
1	14 (56%)
2	8 (32%)
3	3 (12%)
Average access time (seconds)	45±15
Hospitalization stay	3–4 days
Vascular complications	0
Distal protection device (DPD)	4 (16%)
Size of guide	
6F	23
5F	2

PVD, peripheral vascular disease; LCX, left circumflex artery; LAD, left anterior descending; RCA, right coronary artery; PCI, percutaneous coronary intervention; CABG, coronary artery bypass grafting.

trans-radial artery access (cTRA) due to its lower incidence of radial artery occlusion, However, and due to multiple reasons, dTRA has not been the first choice for interventionalists especially in emergent management of acute STEMI (3).

In a previous publication, we showed that performing dTRA in all cardiac catheterization procedures is safe, very

doable and can be done in a timely fashion without the need for ultrasound guidance (4). In this manuscript, we explored the utility of dTRA approach in therapeutic primary intervention in the setting of acute STEMI.

## Methods

A review of 25 consecutive cases of acute STEMI, utilizing the right dTRA route for catheterization performed by a TRA operator, between January 2019 till September 2019 was performed. The Institutional Review Board approval was waived due to the retrospective nature of this study.

The technique for distal radial artery access has been described in a previous publication (4). All the details of performed procedures and patients' information are tabulated (*Table 1*). All appropriate consents were obtained for this review.

Distal radial artery access time is defined as the time-lapse from the point the operator starts feeling for the radial pulse till the end of sheath insertion.

In this review, the Right distal radial artery was utilized in all patients. All cases underwent interventions utilizing stents and only a few preceded by aspiration devices. The average hospital stay was 3–4 days depending on their clinical improvements.

Aspirin and Plavix were preloaded 5,000 units intravenous (IV) heparin were administered upon sheath insertion if not given in transport, and another 5,000 IV heparin once percutaneous coronary intervention (PCI) is decided. A cocktail of nitroglycerin and heparin was used to flush the sheath initially and after each catheter exchange. 6/5 French catheters were used. At the end of the procedure, sheaths were removed immediately with 2 hours of pressure dressing done manually and adjusted every 15 minutes until the full cessation of pressure.

## Results

Among the 25 cases of consecutive acute STEMI patients (*Table 1*). All patients had successful right distal radial artery catheterization (100% success rate). No mortality was reported in a procedure or in the hospital. All patients upon discharge had no thumb, hand or arm symptoms, no clinical vascular complications, and intact radial artery pulses, however, duplex ultrasound was not performed.

Distal radial artery Access time as defined" the time-lapse from the point the operator starts feeling for the radial pulse till the end of sheath insertion" was 45±15 seconds.

## Discussion

The revolution of cTRA for cardiac catheterization has been widely accepted. In fact, it is being recommended as class IA due to its safety profile as compared with the femoral artery approach (2). Lower rates of bleeding and vascular complications, renal insult as well as lower rates of mortality in STEMI patients, have been reported in cTRA as compared to the widely used femoral artery approach (2,5,6).

Despite the high quality of the cTRA, it has its own limitations. cTRA has a radial artery occlusion rate of up to 30% (6). A novel dTRA (i.e. anatomical snuffbox) approach was shown to have lower rates of radial artery occlusion of 2.4%, an access success rate of 88% and shorter time to hemostasis (7).

dTRA could be superior to conventional anterior radial artery approach, as it eliminates most of cTRA complications and disadvantages (8), however, its use did not gain wide spread acceptance, primarily because of the steep learning curve and time constraints it poses when compared to other routes of access such as femoral or classic trans-radial artery approaches. Adding to the fact, the recommendations for ultrasound guidance by many groups of interventionalists, which theoretically makes it more time-consuming.

In a previous publication, we showed that routine dTRA for all cardiac catheterization procedures, is feasible, safe and can be done in a timely fashion without ultrasound guidance (4).

Despite the reported feasibility and safety profile of dTRA for percutaneous cardiac procedures, still, there is the sparsity of data utilizing this approach in the setting of acute STEMI, and the fewer reports available did not specifically reflect STEMI. In fact, 87.6% of the reported dTRA procedures in literature were in stable patients, and only 3.8% were acute coronary syndrome (ACS) patients with little if any reported percentage of acute STEMI procedures. Therefore, the efficacy of dTRA use in acute STEMI setting remains unclear (3,7,9-11).

This manuscript is very unique due to the facts we included only STEMI patients, right distal radial artery approach was used exclusively, and—as far as we know—the very first clear definition of dTRA access time. We did demonstrate that this approach can be utilized as safe and efficient in urgent/emergent as much as in routine catheterization procedures, without the need for ultrasound guidance.

In literature, dTRA has been associated with increased rate of cannulation failure (12). However, our cohort has 100% cannulation rate. Limited number of patients and relatively experienced operator may best explain our results. Our operator has a much more experience than what can be considered significant experience (more than 50 procedures) in the literature. Our operator has been performing the dTRA for about 3 years and mainly on non-emergent arterial catheterization.

In conclusion, this manuscript sheds lighter on dTRA in the setting of acute STEMI cases, where time is a muscle, eliminating the doubts and worries regarding the ability to achieve distal radial artery access in a timely fashion with no ultrasound guidance. We admit that the learning curve is steeper than the femoral artery or conventional anterior radial artery approaches but with proper training and practice, this can be achieved. We think this could revolutionize a safer nearly complication-free technique, and more importantly saving the radial artery for future use as needed.

## Limitations

- (I) Retrospective chart review study;
- (II) Limited numbers of patients;
- (III) Single operator;
- (IV) No radial artery Doppler ultrasound was performed during the follow-up.

## Conclusions

Radial, time to go distal, is valid for all cases including acute STEMI. It can be done in a timely fashion without the need for ultrasound guidance. We believe routine distal radial artery approach for acute STEMI is very feasible, safe, and time-efficient. More data is needed to confirm our findings.

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## Footnote

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jxym.2020.03.06>). The authors have no

conflicts of interest to declare.

**Ethical Statement:** The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The Institutional Review Board approval was waived due to the retrospective nature of this study. Individual consent for this retrospective analysis was also waived.

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