

Comparison of Radial versus Femoral Approach for Primary Percutaneous Intervention in the Patients with Acute ST-Segment Elevation Myocardial Infarction (STEMI)

ASAD ASLAM KOREJO¹, ZUHAIB ZAHOOR SOOMRO², SHEHLA CHANNA³, GUL HASSAN BROHI⁴, ASAD ALI⁵, JAWAID AKBAR SIAL⁶

¹Consultant Cardiologist/Post-fellow Non-Invasive Cardiology, NICVD, Karachi

²Assistant Professor of Cardiology, Ghulam Muhammad Mahar Medical College Sukkur

³Assistant Professor of Obstetrics & Gynaecology, LUMHS, Jamshoro

⁴Assistant Professor of Cardiology, LUMHS, Jamshoro

⁵Post-fellow, Cardiac Electrophysiology, NICVD Karachi

⁶Professor of Cardiology & Interventional Cardiologist, NICVD Karachi

Correspondence to Dr. Asad Aslam Korejo E-mail: asadaslamkorejo@gmail.com Cell 0336-3131886

ABSTRACT

Aim: To compare the outcome of radial versus femoral approach for primary percutaneous intervention in the patients with acute ST-segment elevation myocardial infarction.

Study design: Descriptive cross sectional study.

Place and duration of study: Department of Adult Cardiology, National Institute of Cardiovascular Diseases, Karachi from 29th March 2016 to 29th October 2017.

Methodology: Two hundred and fifty patients fulfilling selection criteria were selected. The demographics of patients (name, age, gender and duration of STEMI) were obtained. Cases were randomly divided in two equal groups. In group A, PCI was done through radial artery and in group B, PCI was done through femoral artery. Local anesthesia was given, then time of arrival of patient was noted and after PCI performed, again time was noted. Total procedural time was measured. I

Results: In group A (radial) mean age of patients was 59.94 with standard deviation 9.15. In group B (femoral) mean age was 59.63±8.91. In group A, 38 (30.4%) were females and 87 (69.6%) were males while in group B, 54 (43.2%) were female and 71 (56.8%) were male patients. In group A, 120 (96%) showed no bleeding and 5 (4%) showed bleeding and in group B, 117 (93.6%) showed no bleeding and 8(6.4%) showed bleeding. Overall 237 (94.8%) showed no bleeding and 13 (5.2%) showed bleeding in patients (P=0.57)..

Conclusion: Radial access for STEMI is related with diminished bleeding, better endurance and clinical advantage. It keeps up utilization of the radial approach as a best option in PCI following appropriate preparing.

Keywords: Percutaneous coronary intervention (PCI), STEMI, Transradial, Transfemoral, Myocardial infarction

INTRODUCTION

Myocardial infarction is a typical introduction of coronary artery sickness. The WHO assessed in 2004, that 12.2% of overall mortality was from ischemic coronary illness.¹ Worldwide, in excess of 30 lac cases have ST segment elevation myocardial infarction (STEMI) and 40 lac have NSTEMIs annually.² STEMI happen about twice as regularly in male compared to female.³ Deaths from ischemic heart disease (IHD) have eased back or declined in most big league salary nations, albeit cardiovascular incidents actually represented one out of three of all deaths in the USA in 2008.⁴ For instance, mortality from cardiovascular sickness have diminished very nearly a third somewhere in the USA.⁵ Ischemic heart disease turning into frequent reason for mortality in the developing countries.⁶

Cases with STEMI need quick diagnosis and reperfusion treatment to improve endurance. Compared with femoral access, radial access appeared to lesser bleeding complications and, in some trials, to reduce mortality in STEMI cases going through primary percutaneous coronary intervention.⁷⁻⁹ However, radial

access can be all the more in fact testing and may delay reperfusion particularly among operators and centers with limited experience in radial access.^{10,11}

Without a reasonable causal mechanism, the case of a mortality advantage for radial access over femoral access in cases going through essential PCI stays a subject of discussion. Femoral approach is commonly applied for PCI intervention. Radial approach is not commonly practiced. Through literature, it is noticed that radial approach is however related with more procedural time but has less complications as compared to femoral approach. But there is no local evidence available in this regard. So we wanted to conduct this study to confirm whether femoral approach is better or radial approach can be implemented in future. So that in future we may be able to implement the results of this study and implement the utilization of radial approach for PCI in cases with acute STEMI. This will update the local guidelines as well as improve our practice.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at Department of Adult Cardiology, National Institute of Cardiovascular Diseases Karachi from 29th March 2016 to 29th October 2017. A total of 250 cases; 125 cases in each group is selected. Patients of age range 40-80 years of

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either gender undergoing PCI after acute STEMI were included and patients with renal (creatinine >1.2mg/dl) or liver problem (AST>40IU, ALT>40IU), anemia (Hb <10mg/dl) or INR >2 excluded. Informed consent and demographics of patients (name, age, gender and duration of STEMI) was obtained. Patients were arbitrarily separated in two equivalent groups by utilizing lottery strategy. In group A, PCI was injected through radial vein and in group B, PCI was injected through femoral vein. Local anesthesia was given. Then time of arrival of patient was noted and after PCI implantation again time was noted. Total procedural time was measured. If excessive bleeding occurs, then bleeding complication was labeled. All the data was recorded. The data was entered and analyzed through SPSS-21. Independent sample t-test was used to compare the mean procedural time in both groups. Chi-square was applied to compare bleeding complication in both groups. P-value ≤0.05 was considered as significant.

RESULTS

The mean age was 59.94±9.15 years in group A while in group B was 59.63±8.91 years. The mean duration of STEMI was 17.7±7.4 hours in group A and 16.9±8.5 hours in group B (Table 1). There were 38 (30.4%) females and 87 (69.6%) were males in group A while in group B, 54 (43.2%) were females and 71(56.8%) were males. In group A, 94 (75.2%) between 40-65 years and 31(24.8%) having age 65-80 years. In group B 97(77.6%) having age of 40-65 and 28(22.4%) were having age of 65-80 years (Table 2).

According to bleeding, 120 (96%) patients have no bleeding and 5 (4%) patients have bleeding in group A while in group B, 117 (93.6%) patients have no bleeding and 8 (6.4%) patients have bleeding. Statistically the difference between radial and femoral groups regarding bleeding was non-significant (P=0.57) [Table 3]. Regarding duration procedure, 42.06±9.26 minutes in group A and in group B, 46.27±11.28 minutes and the difference was statistically significant (P=0.019) [Table 4].

Table 1: Descriptive statistics of age and STEMI

| Variable | Radial Group | Femoral Group |
|---------------|--------------|---------------|
| Age (years) | 59.94±9.15 | 59.63±8.91 |
| STEMI (hours) | 17.7±7.4 | 16.9±8.5 |

Table 2: Distribution of gender and age between groups (n=250)

| Gender | Radial Group | Femoral Group |
|--------------------|--------------|---------------|
| Gender | | |
| Male | 87 (69.6%) | 71 (56.8%) |
| Female | 38 (3.4%) | 54 (43.2%) |
| Age (years) | | |
| 40-65 | 94 (75.2%) | 97 (77.6%) |
| 66-80 | 31 (24.8%) | 28 (22.4%) |

Table 3: Comparison of bleeding between groups (n=250)

| Bleeding | Radial Group | Femoral Group |
|----------|--------------|---------------|
| Yes | 5 (4%) | 8 (6.4%) |
| No | 120 (96%) | 117 (93.6%) |
| P value | 0.57 | |

Table 3: Comparison of duration of procedure between groups (n=250)

| Duration of procedure | Radial Group | Femoral Group |
|-----------------------|--------------|---------------|
| | 42.06±9.26 | 46.27±11.2 |
| P value | 0.019 | |

DISCUSSION

Despite the accepted benefits of the radial approach, it is used infrequently for primary PCI in some regions, partly because of concerns that it may delay reperfusion. Radial access is related with less ratio of bleeding, transfusions, and vascular complications.¹² Randomized trials comparing radial and femoral access for STEMI patients going through primary PCI have shown lower rates of bleeding and a remarkably less mortality. However, the mortality reduction in these trials has been questioned¹³ and awaits confirmation in ongoing trials, such as the SAFARI-STEMI trial comparing radial and femoral access using contemporary pharmacotherapy. Furthermore, the radial access is related with the expectation to absorb information, and requires crossover to femoral access in 4% to 6% of the cases. As a result, there has been concern that radial access may lead to delay in reperfusion in primary PCI.^{14,15} In the RIFLE-STEACS trial, radial access was associated with a remarkably more time from arterial puncture to balloon inflation, but the difference was <1 minute. In a meta-analysis, the procedure time was <2 minutes more with radial access.¹⁸ Our results show that in real-world clinical practice, as in the randomized trials, the overall difference in treatment time between both groups is small and unlikely to be clinically relevant.

Another important finding in our analysis was that treatment time difference between radial and femoral access varied based on the proportion of primary PCI patients that were done using trans-radial route. No distinction in the time from arrival to the catheterization research facility to first device deployment was seen among the third of hospitals that used radial access most much of the time. This may reflect a high level of proficiency with radial access and appropriate case selection for radial access at these hospitals. In contrast, radial access was associated with a 15 minute delay at the third of hospitals that used radial access for primary PCI least frequently. In a previous meta-analysis, the difference in procedural times between radial and femoral access was significantly larger in the trials where radial access was not the preferred route by operators.¹⁶ These findings suggest that the best outcomes may be achieved when radial access is used at centers that have more experience with radial access. However, among the STEMI cases in RIVAL, trans-radial was related with the less mortality even after change of operator and center experience. It is thusly conceivable that radial access may improve results even at centers with less radial experience.¹⁷

In a study, it has been reported that the mean procedural time with femoral approach was 27 (21-34) minutes while with radial approach was 30 (24-39).¹⁸ Another study reported that the mean procedural time was 34.56±14.2 in the radial group vs. 33.12±12.56 min with the femoral group (P=0.215).¹⁹ In another trial, mean procedure

time was 44 ± 18 minutes with radial approach and 51 ± 21 minutes with femoral approach in STEMI patients undergoing PCI.²⁰ But in one trial, complications related to vessels were remarkably low in the radial compared to the femoral group (1.4% vs. 7.2%; $p=0.0001$).²¹ Another trial supported the evidence and reported that compared with femoral approach, radial approach was related with reduced risk of bleed (1.4% vs. 2.9%; $p=0.01$).²² The other trial reported that more bleeding related complications were seen with femoral access than radial access (5.9% versus 2.8%; $P<.004$).²³

In cases with acute coronary syndrome, procedure area associated bleeding addresses about one third of the absolute bleeding occasions, and this worth spans about half of total in STEMI cases.²⁴ Therefore, the transradial approach, which practically takes out procedure site associated bleeding, can straightforwardly affect on results after primary PCI for STEMI. In the RIVAL-STEMI, Mehta et al¹⁶ reported a half of decrease in mortality for one month related to all possible risks. Better outcomes were related with expert hands. In contrary, in the RIFLE-STEACS, Romagnoli et al⁸ noticed a half relative decrease in deaths in corresponding with a huge decrease in remarkable bleeding.

Henceforth, patient expenses are diminished with the transradial access. We likewise noticed a non-significant 26% decrease in deaths by one month and decrease of 36% at half year in the transradial cases. This data must be significant on clinical grounds, but objective of the study was not to evaluate mortality. It ought to be noticed that few expiries in the femoral cases could be because of continuous bed rest compared with ambulation in the transradial cases at its earliest.²⁵ There has been some hesitance to embrace radial access on account of potential issues, for example, late reperfusion brought about by longer persistent planning, longer an ideal opportunity to acquire vascular access, and conceivably more troublesome catheter control by means of the radial artery. Without a doubt one can say that the more skillful and practically sound will be the operator with transradial procedure, the more cases will profit by the utilization of this methodology.²⁶

In meta-analysis by Karrowni²⁷ of 12 studies with $n=5,055$ concludes that radial methodology was related with diminished danger of mortality (2.7% versus 4.7%, $p<0.001$) and diminished danger of significant dying (1.4% versus 2.9%; $p=0.01$). Transradial procedure was likewise connected with decrease in danger of complications (2.1% versus 5.6%; $p<0.001$). Stroke hazard was comparable between the two methodologies (0.5% versus 0.5% $p=0.87$). The technique time was somewhat more in the transradial than in the transfemoral one (mean contrast: 1.52 min; $p=0.01$). In STEMI cases going through essential PCI, the radial methodology was related with ideal results and ought to be the favored methodology for experienced administrators. LeMay²⁸ concludes that utilization of both access for patients with STEMI alluded for primary PCI and identified no distinction in endurance or other clinical end focuses at 30days, albeit little, total contrasts in end focuses can't be conclusively invalidated given the untimely end of the preliminary. Malik²⁹ in his study in the analysis of 17 randomized controlled trials with 12,118 randomized

patients, in STEMI cases without cardiogenic shock, there is an unmistakable mortality advantage with the Trans radial approach over trans-femoral approach. Further examinations are expected to check whether this mortality advantage continues over the long haul. There are few obstacles observed by clinicians in trans-radial approach related to vascular complications as spasm, injury, impediment, or vascular inconsistencies with subsequent inability to arrive at the aorta. These skills can be obtained by suitable planning and training³⁰.

Although our results further extend the findings of the randomized trials into real world clinical practice, several limitations need to be acknowledged. Access site was not randomized, and there was notable difference between the cases who underwent radial procedures and those who had femoral procedures. It is possible that centers that perform few radial procedures may have only used radial access when femoral access was not possible (e.g. severe peripheral vascular disease). Furthermore, we did not collect information on access site crossover, and patients in whom radial access failed would have been included in the femoral group in this analysis. However, because the crossover rate is only 4% to 6% for patients undergoing primary PCI using radial access, it is unlikely this had a substantial impact on the findings. And the results may not be generalizable to operators with lower volumes.

CONCLUSION

The use of the radial artery over the femoral artery in PCI to get better results in STEMI cases. Transradial access for STEMI by experienced skilful hands is related with less bleeding and longer survival. Radial approach is having superior net clinical benefit because of lesser incidence of bleeding and reduced access site complications as compare to transfemoral group.

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