

ORIGINAL ARTICLE

Radial Versus Femoral Access in Percutaneous Coronary Intervention in Acute Coronary Syndrome

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ABSTRACT

Background: Although it safeguards patients from hemorrhagic disorders during cardiac procedures, the radial route is technically more challenging than the femoral approach.

Aim: To evaluate the hypothesis that radial approach is the preferred strategy in ACS patients, and identifying independent predictors of the choice to choose radial access.

Methods: Between August 2021 and January 2022, this prospective study was conducted in the interventional cardiology unit of Hayatabad Medical Complex Peshawar. The study included all ACS (unstable angina or myocardial infarction) patients who had previously had invasive diagnostic or therapeutic cardiac procedures. Patients who opted out of the trial were excluded.

Results: Those in group 1 had a lower mean GRACE score (112±31 versus 127±40; p<0.001), improved renal function according to creatinine level (0.9±0.3 versus 1.1±1.0; p < 0.001) and a reduced prevalence of indications of left ventricular failure (6% versus 21%, p 0.003) when compared to patients in group 2. There was no difference in the groups at the time of admission for the type of ACS heart rate (69±15 Vs 75±16), systolic arterial pressure (148±31 Vs 151±33), positive troponin 59(79.7%) Vs 51(68.9%), electrocardiographic ischemia 23(31%) Vs 19(25.7%), three-vessel disease (30, 40.5%) VS 25(33.8%)

Practical implication: The variables that determined the preference for radial approach reflect the clinical status and severity of the patients, demonstrating that the convenience of the approach is more valued in extremely complex patients than its antihemorrhagic effectiveness.

Conclusion: The trend for radial access to be preferred over femoral access during coronary intervention was not primarily influenced by the patient population's risk of bleeding.

Keywords: Angioplasty, Coronary Artery Disease, Radial Artery, Femoral Artery.

INTRODUCTION

The primary revascularization method used in acute coronary syndromes (ACS) is percutaneous coronary intervention (PCI), which is less intrusive than surgical methods and effective at preventing further coronary events¹. However, there are risks associated with PCI, the most common of which is access site bleeding. Due to its higher practicability, femoral access has long been the preferred site for PCI².

In response, radial access has been the favoured method in recent years because to its effectiveness in reducing haemorrhage^{3,4}. However radial approach is a challenging strategy, needing more technical ability and experience⁵. Due to the enhanced practicability and reproducibility of femoral access and the lower risk of radial haemorrhage associated with radial access, both techniques are consequently viable for PCI^{6,7}.

In the ideal clinical trial scenario, where intervention occurs at random and excludes the influence of medical judgement, efficacy is the inherent quality of the treatment. The therapy's relevance in the actual world, where the basis for allocation is medical judgement, is represented by effectiveness⁸. When patients who are at a high risk of experiencing the outcome that the intervention in question is meant to stop, receive priority care, effectiveness is therefore maximised. For patients assigned to this intervention who have a higher risk of bleeding, radial access would be more beneficial⁹.

Getting new operators trained is an emerging problem in catheterization labs. More experienced operators started using femoral access, which is more difficult to manage, especially if bleeding complications occur. Almost all catheterization laboratories prefer radial access for accessing patients, which is the first choice for cardiology fellows without any background in femoral access¹⁰.

The rationale of this study is that there is scarcity of data on comparison of both techniques in the country with only few studies comparing the two in the last 5 years. Despite the fact that the two

techniques are amongst the most commonly employed techniques by surgeons across the country. Ours is an era of evidence based practices and hence the results of this study will help to establish the better technique out of the two methods backed by local evidence for percutaneous coronary intervention ultimately leading to better management of these patients.

MATERIAL AND METHODS:

This prospective study was conducted in Interventional Cardiology Unit, Hayatabad Medical Complex Peshawar from August 2021 to January 2022. Sample size was 148. Sampling technique used was non-probability consecutive sampling.

Inclusion criteria: The study included all ACS patients who had previously had invasive diagnostic or therapeutic cardiac procedures.

Exclusion criteria: Type 1 or Type 2 minor bleeding as well as Type 4 cardiac surgery-related bleeding were excluded from the analysis. Patients who opted out of the trial were excluded.

Data collection & analysis: BARC (Bleeding Academic Research Consortium) types 3 or 5 were used to describe major bleeding. To evaluate the initial bleeding risk, the CRUSADE score was applied. Depending on the methods, the mean, standard deviation or median and interquartile range were used to characterise numerical quantities. By using the student t test, the normality of numerical data was confirmed. Absolute and relative frequencies were used to characterise categorical variables. By using the unpaired Student's t test, the CRUSADE score was compared between the radial and femoral groups. The predictors of the radial access between The chi-square test or the unpaired Student's t test was used to compare the two groups. Each test's cutoff for statistical significance was set at p <0.05. The statistical package SPSS 23.0 was utilised for the analysis.

RESULTS

A total of 148 patients were involved; their ages ranged from 35 to 70, with a mean of 52.5. There were 90(60.8%) men and 58(39.2%) were female. Patients were split evenly between two groups (74 patients in each group). Those in group 1 got radial artery access,

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while patients in group 2 underwent (femoral artery access). Invasive coronary angiography revealed that 55(37.1%) had triple-vessel disease or left coronary artery blockage, while 17(11.5%) patients had double vessel disease and 76(51.3%) had single vessel disease (Table 1).

Table-1: Vessel involvement

Vessel involved	Frequency	Percentage
Single vessel	76	51.3%
Double vessel	17	11.5%
Triple vessel	55	37.1%

Patients in group 2 had a higher risk of bleeding (37±15) than patients in group1 (30±14) according to analysis of the CRUSADE score (p 0.02). These numbers indicate a 7% and 4% bleeding risk, respectively (Table 2).

Table 2: CRUSADE score of bleeding in both groups

CRUSADE score	Frequency	Percentage	P value
Group 1	30 ± 14	4%	0.02
Group 2	37±15	7%	

Previous history of stroke in group1 patients was 5(6.7%) and in group2 6(8.1%), myocardial revascularization surgery in group1 2(2.7%) and ingroup2 8(10.8%),diabetes mellitus in group1 was 11(14.9%) and in group2 13(17.6%), smoking in group1 was 9(12.1%) and in group2 12(16.2%), previous history of heart failure or bleeding in group1 was 4(5.4%) and in group2 this ratio was 2(2.7%) (Table 3).

Table-3: Co morbidities

Co-morbid	Group 1	Group 2	P value
History of stroke	5(6.7%)	6(8.1%)	0.078
Myocardial revascularization	2(2.7%)	8(10.8%)	0.051
Diabetes mellitus	11(14.9%)	13(17.6%)	0.600
Smoking	9(12.1%)	12(16.2%)	0.716
Heart failure or bleeding	4(5.4%)	2(2.7%)	0.641

Those in group 1 had a lower mean GRACE score (112 ± 31 versus 127±40; p < 0,001), improved renal function according to creatinine level (0.9 ± 0.3 versus 1.1 ±1.0; p<0.001) and a reduced prevalence of indications of left ventricular failure (6% versus 21%, p 0.003) when compared to patients in group 2. There was no difference in the groups at the time of admission for the type of ACS heart rate (69±15 Vs 75±16), systolic arterial pressure (148±31 Vs 151±33), positive troponin 59(79.7%) Vs 51(68.9%), electrocardiographic ischemia 23(31%) Vs 19(25.7%), three-vessel disease 30(40.5%) VS 25(33.8%) and coronary angiography revealing haemoglobin levels(13.0±1.7 Vs 12.5±1.8) (Table 4).

Table 4: Outcome of the study

	Group1	Group2	P value
GRACE score mean	112±31	127±40	0.001
Creatinine level	0.9±0.3	1.1±1.0	0.001
Lt ventricular failure	6%	21%	0.003
ACS heart rate	69±15	75±16	0.710
Systolic arterial pressure	148±31	151±33	0.801
Positive troponin	59 (79.7%)	51(68.9%)	0.611
Electrocardiographic ischemia	23 (31%)	19(25.7%)	0.700
Three vessel disease	30 (40.5%)	25(33.8%)	0.814
Hemoglobin level	13±1.7	12.5±1.8	0.601

DISCUSSION

When compared to the femoral access group in the current study, a decreased baseline risk of bleeding was seen in patients who underwent coronary procedures using the radial route. This data defies the hypothesis that patients at higher risk for this consequence will use the access associated with a lower incidence of bleeding more frequently, which is what makes the risk-treatment paradox exist¹¹.

In order to understand the potential causes of this phenomena in light of its unpredictable outcomes, a thorough analysis of the cognitive process involved in medical decision-making is required. There are probably several elements that each have an impact on this. Even while the primary goal of the radial approach, which is to stop bleeding, may be the basis for such a decision, other considerations may also play a role in the decision-making process. The success of their methods comes naturally to interventionists. Intuitively, treatments that are regarded as being technically more challenging are assumed to have a lesser chance of success. The operator wants to avoid the access that is thought to be more challenging in an effort to simplify the task. If necessary, a change from radial to femoral vascular access is another choice. These findings, however exploratory, imply that the doctor's judgement may be more strongly impacted by a sense of self-protection than by a desire to protect the patient. This is extremely conceivable because failure in the intervention is typically viewed as a medical failure, whereas bleeding is typically recognised as a natural consequence. These potential pathways should be investigated in more detail^{12,13}.

Cognitive biases have an impact on intuitive probabilistic estimate in uncertain conditions. For example, while treating less complex patients, we aim for cognitive comfort, yet in doing so we frequently undervalue the risk of more complex patients, reducing the potential benefits of the procedure for these patients¹⁴. As a result, individuals with more severe diseases receive less care than is necessary. This results in a risk-treatment contradiction, which is typical of this intuitive decision-making process¹⁵. In situations where the most complex technique also proves to be the most effective, the risk-treatment paradox has been discussed. For example, in atrial fibrillation, those at low risk of embolic events receive anticoagulant medication more frequently than those with high risk¹⁶. There hasn't been any correlation between risk and the decision to use an intrusive method in the context of ACS. A study by Wimmer et al on PCI similarly documented this pattern by demonstrating that patients who were more likely to experience problems at the femoral access site were less likely to benefit from the radial access approach.¹⁷Other earlier research assessed the factors that went into the decision to use radial access, but no multivariate analysis was done on any of them to reduce confounding bias^{18,19}.

Using probabilistic models to evaluate the risk is one possible adjustment method after the risk-treatment conundrum is identified in a given context. In other words, the physician is compelled to make decisions based on probability when scores are used to allocate more complex resources. The CRUSADE scores are the best proven models for ACS haemorrhage.

Limitation: Our results were obtained using a small sample size in a single centre. A multicenter study with a sizable sample size is desperately needed to overcome with the best outcomes.

CONCLUSION

Because this approach had a negative correlation with baseline bleeding risk, highlighting a risk-treatment contradiction, the decision to use radial access was not largely motivated by its prospective advantage in bleeding prevention. The variables that determined the preference for radial approach reflect the clinical status and severity of the patients, demonstrating that the convenience of the approach is more valued in extremely complex patients than its antihemorrhagic effectiveness.

Conflict of interest: Nil

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