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ORIGINAL ARTICLE

Prevalence of Upper Extremity Function following Transradial Percutaneous Coronary Intervention

RAHMAN ULLAH[1], MUHAMMAD HAROON ABDULLAH[2], AAN-E-ARSHAD SH[3], ZEESHAN SHOUKAT[4], SHARAFAT HUSSAIN[5], HAJRA TARIQ[6]

[1]*MBBS, FCPS Cardiology, Registrar in Cardiology, MTI Lady Reading Hospital, Peshawar*
[2]*Demonstrator Physiology department, Amna Inayat Medical College, Lahore*
[3]*House Officer, Shaikh Zayed Hospital, Lahore*
[4]*Cardiologist, Shaikh Zayed Hospital, Lahore*
[5]*Cardiologist, D.H.Q Hospital, Layyah*
[6]*PGR Medicine, DHQ hospital, Mirpur AJK*
Correspondence to: Muhammad Haroon Abdullah, Email: haroon.abdullah11@yahoo.com

ABSTRACT

Background and Aim: The most frequently used technique for percutaneous coronary intervention (PCI) is the transradial approach (TRA). The purpose of the present study was to determine the prevalence of upper extremity function following transradial percutaneous coronary intervention.

Patients and Methods: This cross-sectional study was conducted on 280 patients hospitalized for percutaneous coronary intervention in the Cardiology Department of MTI Lady Reading hospital, Peshawar and Lahore General Hospital from March 2022 to December 2022. Patients with palpable radial artery and non-occlusive flow confirmed by Doppler ultrasound examination were enrolled. Patients were divided into two groups: Group-I (underwent transradial approach (TRA)) and Group-II (treated with transfemoral PCI (TF-PCI). All the clinical outcomes were measured after 6 months follow-up. SPSS version 27 was used for data analysis.

Results: Of the total 280 patients, the Group-I and Group-II had 220 and 60 patients respectively. During follow-up, the Group-I patients had higher incidence of upper extremity dysfunction (UED) (34.8%) than control or group-II patients (12.8%). Wrist extension, flexion, and elbow extension was the prime reasons for the upper extremity dysfunction. Smokers were three time at higher risk of developing upper extremity dysfunction.

Conclusion: It has been observed that UED appears to occur twice as frequently in group-I as in group-II. Reduced rate of site complication and enhanced patient's satisfaction has been found in group-I as compared to group-II.

Keywords: Upper extremity function, percutaneous coronary intervention, transradial approach

INTRODUCTION

Globally, cardiovascular disease (CVD) is the primary cause of mortality. Percutaneous coronary intervention are used for successful accomplishment of coronary artery disease essential components that are medical treatment and revascularization [1]. Majority of mortality cases are caused by coronary artery disease. It is possible to restore enough blood flow through the coronary arteries by attempting to place a catheter into a peripheral artery. This includes permitting vessels to be introduced to exposed coronary arteries by placing the arterial scaffolds [2]. For percutaneous coronary intervention, the transradial artery approach provides shorter hospitalization, patient's relief from pain, safer hemostasis access, and quicker ambulation [3, 4]. Additionally, the lower rate of mortality is the significant advantage of TRA throughout the coronary artery disease whole spectrum [5]. The upper extremity dysfunction (UED) associated issue might be underestimated by symptom's late onset, failure to recognize complications, and unwillingness to identify and report difficulties [6, 7].

Upper extremity functional issues have a wide range of social and economic repercussions that have a significant impact on aspects of patients' life [7-9]. The UED impairment cause severe complications in terms of routine performance, daily activities, and occupational health during the percutaneous treatment strategy. Transradial access (TRA) has numerous important advantages over typical transfemoral access (TFA). Despite the widespread use of TRA by cardiac intervention lists and personal preference, neuro-interventional have been inactive to implement this technique [10, 11]. Patients who undergo for neuroendovascular treatments are more susceptible to neurological issues and access site, whereas wound infections and vascular spasm were more likely to be experience in TRA patients [12]. Femoral artery catheterization is an inherently uncomfortable treatment that can result in bleeding, vascular damage, and arterial closure. Radial artery catheterization is a fundamentally beneficial replacement for investigating extensive, neck vasculature, and painful aortic arches experiencing identical results [13, 14].

METHODOLOGY

This cross-sectional study was conducted on 280 patients hospitalized for percutaneous coronary intervention in the Cardiology Department of MTI Lady Reading hospital, Peshawar and Lahore General Hospital from March 2022 to December 2022. Patients with palpable radial artery and non-occlusive flow confirmed by Doppler ultrasound examination including any kind of cardio-intervention, carotid artery stents, and thrombectomies for acute ischemic stroke were enrolled. Patients were divided into two groups: Group-I (underwent transradial approach (TRA)) and Group-II (trans-femoral PCI (TF-PCI). All the clinical outcomes were measured after 6 months follow-up. Pain was assessed using the Numeric Rating Scale for Pain (NRSP), upper extremity limitations were assessed. The Statistical Package for Social Sciences (SPSS) version 27 was used to analyze all of the data. The Chi-squared test was used to analyze the upper extremity values.

RESULTS

Of the total 280 patients, the Group-I and Group-II had 220 and 60 patients respectively. During follow-up, the Group-I patients had higher incidence of upper extremity dysfunction (UED) (34.8%) than control or group-II patients (12.8%). Wrist extension, flexion, and elbow extension was the prime reasons for the upper extremity dysfunction. Smokers were three time at higher risk of developing upper extremity dysfunction. Baseline details of all the participants.

Table-I Baseline details of patients

Variables	Group-I (TRA) N=220	Group-II (TFA) N=60	P-value
Age (yrs.)	56.4±8.6	52.4±8.2	0.539
Male % (N)	78.6 (220)	21.4 (60)	0.569
BMI (Kg/m^2)	22.4±3.8	20.2±4.9	0.463
Smoking status N (%)			
Current	45 (20.5)	12 (20)	0.601
Ex-smokers	146 (66.4)	37 (61.7)	0.72
Never smoked	29 (13.1)	11 (18.3)	0.69

Figure-1 illustrate the comparison of different comorbidities of coronary artery disease in both groups. Complication site following percutaneous coronary intervention evaluated after day1, 3 weeks, and 6 months in both groups are shown in Table-II.

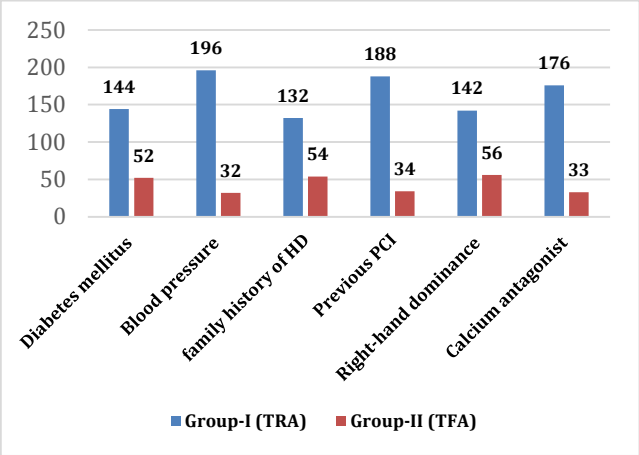

Figure-1 comparison of different comorbidities of coronary artery disease in both groups

Table-II Complication site following percutaneous coronary intervention evaluated after day1, 3 weeks, and 6 months

Groups	Minor hematoma	Major hematoma	Minor bleeding	RAS	RAO
Group-I Day 1 3 weeks 6 months	 102 (46.4) 60 (27.3) 4 (1.81)	 110 (50) 48 (21.8) 0 (0)	 38 (17.3) 16 (7.3) 2 (0.9)	 20 (9.1) 15 (6.81) 13 (5.90)	 7 (3.2) 5 (2.3) 4 (1.8)
Group-II Day 1 3 weeks 6 months	 18 (30) 8 (13.3) 3 (5.0)	 22 (36.7) 12 (20) 0 (0)	 8 (13.3) 0 (0) 0 (0)	 4 (6.7) 2 (3.3) 1 (1.6)	 6 (10) 4 (6.7) 2 (3.3)

DISCUSSION

The present study mainly focused on the upper extremity function after transradial percutaneous coronary artery intervention and found that Upper Extremity Dysfunction appears to occur twice as frequently in group-I as in group-II. Reduced rate of site complication and enhanced patient's satisfaction has been found in group-I as compared to group-II. In individuals with acute coronary artery disease, transradial artery access (TRA) is associated with less bleeding and vascular issues than transfemoral artery access (TFA). PCI through TRA may be associated with more accurate estimations of life expectancy and lower expenses. All patients experienced transradial artery issues such as hematomas, bleeding, and both large and small bleeding episodes were connected to an increased risk of short- and long-term mortality [15, 16]. After two weeks and six months, there was a clinically significant decrease in elbow extension strength in both limbs.

The radial nerve innervated the elbow extension by triceps brachii muscle is critical for mobilization and weight bearing [17]. The lack of sufficient exercise for four weeks referred as long-term inactivity results a strength reduction in 17% cases. Maximum strength, on the other hand, was retained [18].

The UED of both short and long term is caused by intervention and induced in part by a temporary suspension of immediate physical activity following myocardial infarction. With the impairment of TFA and contralateral arm both lead to an overall decline in muscle condition. During the intervention, the forearm extremity circumference expanded considerably over time. However, a comparable rise was seen in the contralateral extremities, implying a (secondary) systemic reason, such as a calcium channel blocker side effect or heart failure [19]. Contrary, the UED following TR-PCI increased considerably regardless of whether the procedure was transradial or transfemoral.

The contralateral extremity diameters and forearm extremity during the intervention, there were significant increased implying a second reason for cardiac arrest and side effect of calcium channel [20]. For PCI through transradial artery, the RAO and hand muscle had no significant changes found in the present investigation. No finger or hand loss has been reported after TR surgery for PCI [21, 22].

The UED development occurred more frequently in smokers than in nonsmokers. Smoking reduces muscle mass and strength, increases the likelihood of musculoskeletal discomfort, and influences cardio metabolic risk by reactive oxygen species, promote inflammation, and skeletal muscle degeneration culminatination [23]. Previous studies show the several indications and symptoms for TRA for PCI in terms of heart disease and high blood pressure. Limited studies has been investigated the impact of chronic patient problems including obesity and smoking on nerve transfer results [24, 25].

CONCLUSION

It has been observed that UED appears to occur twice as frequently in group-I as in group-II. Reduced rate of site complication and enhanced patient's satisfaction has been found in group-I as compared to group-II.

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