FREQUENCY OF RADIAL PULSE LOSS IN PATIENTS UNDERGOING TRANS-RADIAL CORONARY CATHETERIZATION

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ABSTRACT:

BACKGROUND: *The advent of coronary intervention through radial artery approach is taking lead due to its superiority over the trans-femoral approach when considered regarding future complications.*

AIMS & OBJECTIVE: *The objective of this study was to know the frequency of radial pulse loss in patients undergoing trans-radial coronary intervention / catheterization (TCC).*

MATERIAL & METHODS: *We performed this study in the department of Cardiology, Punjab Institute of Cardiology, Lahore from August2016 toFebruary2017. One hundred and thirty patients with coronary artery disease were included for trans-radial catheterization. The enrolled patients were followed for one month for radial artery assessment.*

RESULTS: *The mean of age of patients was 56.62±19.26 years. 63(48.5%) were male and 67(51.5%) female patients. Loss of radial pulse was seen in 17(13.1%) patients. The increased frequency of loss of radial pulse was observed in younger age groups. However in the older age groups those who were more than 50 years, none of them had loss of radial pulse. i.e. p-value= 0.000.Gender did not show any statistically significant correlation for loss of radial pulse i.e. p-value=0.151.BMI of the patients was significantly associated with loss of radial pulse. Highest prevalence of loss of radial pulse was seen in patients with normal BMI i.e. p-value= 0.007.*

CONCLUSION: *A low frequency was observed for loss of radial pulse in patients undergoing trans-radial coronary catheterization.*

KEY WORDS: *Loss of radial pulse, Trans-Radial Coronary catheterization, BMI, Gender*

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INTRODUCTION:

Revascularization for coronary artery disease has greatly progressed in the past two decades. Percutaneous coronary intervention (PCI) is one of the well known and advanced method of revascularization in patients with ischemic heart disease (IHD)[1]. The radial artery is common vascular approach site for diagnostics and therapeutic coronary interventions. Past studies have revealed that trans radial coronary catheterization(TCC) has decreased incidence of not only bleeding complications and procedural discomfort, but also morbidity and hospitalization as compared to the trans femoral approach.[2]

Trans radial coronary catheterization allows early ambulation and reduces procedure related expenditures. The RIFLE-STEACS showed a decrease in cardiac mortality (2% vs 5.2%), the prevalence of bleeding complications (7.8% vs 12.2%) and the length of hospital stay (5 days' vs 6 days)[3] in STEMI patients in trans radial vs trans femoral intervention.

Even though the trans-radial cardiac catheterization is not free from challenges and complications. Trans radial catheterization has more technical difficulty with longer learning curve and is related to radial artery spasm and radial artery occlusion (RAO) particularly in females and elderly patients[4]. The frequency of radial artery occlusion is relatively underestimated.[5] Few risk factors are associated with radial artery occlusion. One predictor is inadequate anticoagulation during the procedure.[6] Another factor is female gender due to small diameter of radial artery with greater propensity to contract. In addition the presence of peripheral arterial disease is also associated with increased incidence of radial artery loss.[7]

Radial artery loss is a complication of trans-radial interventions leading to permanent occlusion of the radial vessel. The estimated frequency is 1-10% and has been described as the "Achilles heel" of the trans radial technique[8].

Ligthart J et al10observed 9% loss of pulse after radial artery catheterization. It can be asymptomatic or may cause symptoms due to ischemia like pain in hand, claudication etc.[9]

Trans-radial approach has become the procedure of choice in our setup. No comprehensive study has been done locally in last 5 years to determine the frequency of this complication. If this study shows greater frequency of radial artery loss , it may encourage us to promote the need to improve radial artery puncture and closure skills, better understand the risk factors associated with it and try to develop a new set of precautionary measures to prevent this complication from happening.[10]

MATERIAL AND METHODS:

This was a descriptive case series carried out at Punjab institute of Cardiology, Lahore from August 8th 2016 to February 7th 2017. A sample size of 130 cases with 5% margin of error, 95% confidence level taking expected percentage of loss of pulse i.e. 9% in patients undergoing trans-radial catheterization. Inclusion criteria were age 20 to 85 years, both gender and agreement to return 1 month after procedure to evaluate radial artery patency. Exclusion criteria were patients with chronic kidney disease (serum creatinine $>$ 1.5mg/dl), expected intra-aortic balloon pulsation or right heart catheterization, systemic vasculitis and peripheral arterial disease (history and examination), previous catheterization from same radial artery, history of trauma to hand/ arm, unhealthy radial artery (examination). An informed consent was obtained from all patients. All baseline information like demographic data was noted. The radial artery puncture site closed by a pressure bandage. On follow-up after one month, the patients were examined for the loss of pulse (according to operational definition). In case of no symptoms of limb ischemia, the patient was managed conservatively. If patient shows any sings of limb ischemia, he/she was referred to vascular surgeon for further evaluation and management. All this information was recorded and confidentiality of data was ensured. Data was assessed using version 20.0 of SPSS. Quantitative variable like age and BMI was measured by mean $\pm$ standard deviation. Qualitative variables like gender distribution and final outcome variable i.e. loss of pulse was recorded and presented as frequency and percentages. Data was stratified for age, gender, BMI, to deal with effect modifiers. Post-stratification chi-square test was applied taking p-value $\leq$ 0.05 as significant.

RESULTS:

Mean age of patients was 56.62$\pm$19.26 years. Minimum age of patients was 20 years and maximum 85 years. (Table-1) There were 63(48.5%) males and 67(51.5%) females patients. (Table-2) Mean BMI of patients was 26.61$\pm$4.07. Minimum and maximum BMI of patients was 20 and 35.03. (Table-3) Loss of pulse was seen in 17(13.1%) patients (Table-4). Age of patients was significantly associated with loss of radial pulse. The highest frequency of loss of radial pulse was seen in younger age groups. However in the older age groups patients who were $>$50 years among

them none of the patients had loss of radial pulse. i.e. p-value= 0.000 (Table-5).Gender did not show any statistically significant association for loss of radial pulse. i.e. p-value=0.151 (Table-6).BMI of patients was significantly associated with loss of radial pulse. Highest incidence of loss of radial pulse was seen in patients with normal BMI. i.e. p-value= 0.007 (Table-7).

Table-1: Age distribution of patients

N	**130**
Mean	56.62
SD	19.26
Min	20
Max	85

Table-2: Gender distribution of patients

Gender	Frequency	Percent
Male	63	48.5
Female	67	51.5
Total	**130**	**100**

Table-3: Descriptive statistics for BMI

N	***130***
Mean	*26.61*
SD	*4.07*
Min	*20*
Max	*35.03*

Table-4: Frequency of loss of radial pulse.

Loss of pulse	Frequency	Percent
Yes	17	13.1
No	113	86.9
Total	**130**	**100**

Table-5: Frequency of loss of radial pulse; stratified for age, gender and BMI

		Loss of radial pulse		Total	p-value	Chi-Square Test
		Yes	No			
Age Groups	**20-30**	10(58.8%)	12(10.6%)	22	0.000	31.79
	31-40	3(17.6%)	17(15%)	20		
	41-50	4(23.5%)	15(13.3%)	19		
	>50	0(0%)	69(100%)	69		
Gender	**Male**	11(64.7%)	52(46%)	63	0.151	2.066
	Female	6(35.3%)	61(54%)	67		
BMI	**Normal**	9(52.9%)	21(18.6%)	30	0.007	9.826
	Over Weight	4(23.5%)	46(40.7%)	50		
	Obese	4(23.5%)	46(40.7%)	50		

DISCUSSION

These days, two common approaches are used while doing coronary interventions. Out of which trans-radial approach has lesser complications and is more feasible in conservative female patients. The radial artery occlusion is not so uncommon and an estimated occlusion after radial intervention is 1-18% in different studies.[11-13] In RIVAL (Radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes) and RIFLE-STEACS (Radial versus femoral randomized investigation in ST-Elevation acute coronary syndrome studies) trails , there was an appreciable benefit of using radial artery for interventions when compared with femoral approach.[2,14,15]

In our study the loss of radial pulse was seen in 17(13.1%) patients undergoing trans-radial coronary catheterization. Highest frequency for loss of pulse was seen in the patients in the younger age group. i.e. patients who were 20-30 years of age (58.8%). Followed by the patients in the age group 41-50 years (23.5%) and 17.6% in the patients who were in the age group 31-40 years. Loss of radial pulse in patients undergoing trans-radial coronary catheterization was significantly associated with age of patients. However, no statistically significant association was seen between gender and loss of radial pulse. Patients with normal BMI had the highest frequency for loss of radial never followed by the patients who were overweight and obese.
The loss or absence of radial artery can be detected by reverse Bar beau test and duplex ultra -sonogram. Many factors can affect the radial artery patency including gender, BMI, risk factors, size of sheath with ratio of the radial artery internal diameter to the external diameter of the arterial sheath, the diameter of the radial artery, repeated procedures, duration of procedure, number of catheters used, homeostasis procedure[16,17] and anticoagulant dose.[18-20]

Interventions done through radial artery is more feasible for patients due to early mobilization etc.[21,22]

CONCLUSION:

A low frequency was observed for loss of radial pulse in patients undergoing trans-radial coronary catheterization.

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