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Original Research Article

TRANSULNAR TECHNIQUE AMONG PATIENTS UNDERGONE PERCUTANEOUS CORONARY INTERVENTIONS: A STUDY ON ASSOCIATED COMPLICATIONS

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Abstract: *The objective of this observational study, conducted at the Department of Cardiology in LRH, Peshawar from June 2023 to December 2023, was to assess the complications associated with the transulnar technique in patients undergoing percutaneous coronary interventions (PCI) for ischemic heart disease. A total of 110 patients were included in this study. All patients underwent PCI with the transulnar technique, and complications were assessed post-procedure. The mean age of the patients was 58.75±7.05. The complications observed were minor bleeding in 20 patients (18.2%), ulnar artery occlusion in 9 patients (8.2%), hematoma in 6 patients (5.5%), and stroke in 2 patients (1.8%). The transulnar technique is an effective modality for patients undergoing PCI in terms of complications such as minor bleeding, ulnar artery occlusion, hematoma, and stroke.*

Keywords: Percutaneous Coronary Interventions, Transulnar Technique, Complications, Ischemic Heart Disease

Introduction

Percutaneous Coronary Intervention (PCI) has transformed the treatment of coronary artery disease by offering a less intrusive method to address narrowed or blocked coronary arteries (Bhatt, 2018; Khan and Ludman, 2022). Although the transfemoral method has traditionally been the most often used method for PCI, the transulnar technique has been receiving more attention as a viable alternate access site (Kar, 2019). This method uses the ulnar artery during catheterization, providing possible benefits such as less bleeding issues and more patient comfort. Nevertheless, similar to any medical operation, the transulnar technique presents its own set of difficulties, and comprehending the accompanying problems is crucial for maximizing patient results (Kar, 2017; Shafiq et al., 2020).

The transulnar technique, alternatively referred to as the "ulnar-first" procedure, entails gaining access to the coronary vasculature by means of the ulnar artery situated in the forearm (Shafiq et al., 2020). Advocates of this method contend that it can serve as a feasible substitute for the transfemoral technique, especially in patients with anatomical anomalies. Additionally, the ulnar artery serves as a supplementary blood vessel to the radial artery, potentially decreasing the likelihood of hand ischemia in comparison to the transradial method (Sattur et al., 2017; Vassilev et al., 2008).

A major issue is the possibility of radial or ulnar artery obstruction, which can hinder future access for coronary operations or other types of surgery (Hahalis et al., 2017). Arterial spasm, thrombosis, or the utilization of larger sheath diameters during the surgery can lead to this problem. Gaining insight into the predictors and processes of radial or ulnar artery occlusion is essential for identifying people at high risk and implementing preventive strategies (Roy et al., 2022; Sandoval et al., 2019).

One additional issue that is worth mentioning in relation to the transulnar technique is the possibility of perforating either the radial or ulnar artery. Although uncommon, this complication might result in serious outcomes, including the development of hematoma, pseudoaneurysm, and possibly compartment syndrome. Thorough training and knowledge of the anatomical changes in the blood vessels of the forearm are crucial in order to reduce the likelihood for perforation during catheterization (Andrade et al., 2008; Dainese et al., 2013).

The transulnar technique can be more challenging due to the narrower diameter of the ulnar artery in comparison to the radial artery. Maneuvering catheters via narrower blood vessels might provide technical difficulties, which may result in extended procedural durations and heightened radiation exposure for both patients and healthcare professionals. Given the increasing acceptability of the transulnar approach, it is crucial to thoroughly analyze the challenges linked to this technique. This investigation will assist medical practitioners in making well-informed choices regarding the selection of patients, the technique used during the procedure, and the care provided after the procedure.

Methodology

We conducted this observational study at department of cardiology, Lady Reading Hospital, Peshawar from June 2023 to December 2023 after taking ethical clearance. We selected 110 patients with ischemic heart disease who had percutaneous coronary intervention, having age 45 to 70 years of either gender. Demographics and comorbidities were noted for each patients which include gender, age, diabetes, hypertension, smoking status, previous MI, hyperlipidemia and STEMI. Patients underwent

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percutaneous coronary intervention with transulnar technique, the procedure was performed by an experience cardiologist having experience of more than five years. Complications such as minor bleeding, stroke, ulnar artery occlusion and hematoma were recorded post procedure. All the data was analyzed using SPSS 20.

Results

One hundred and ten patients were selected for this study. Mean age observed was 58.75±7.05 years. Gender wise there were 67 (60.9%) male while 43 (39.1%) female patients.

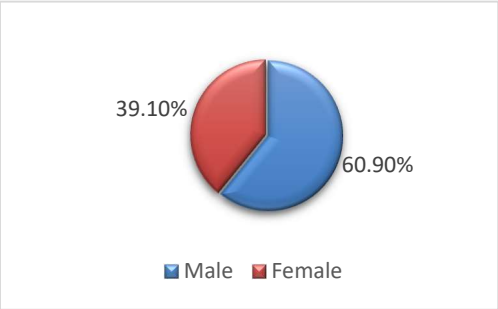

Figure 1 Gender distribution

Table 1 presents the comorbidities patients were presented with, hypertension and diabetes were the most frequent presented comorbidities. Regarding the complications following transulnar approach, minor bleeding was seen in 20 (18.2%) patients, ulnar artery occlusion in 9 (8.2%) patients, hematoma in 6 (5.5%) patients and stroke in 2 (1.8%). In our study 66.4% patients did not show any complications. Complications were stratified against gender but could not yield a notable association.

Table 1: Comorbidities

Comorbidities		N	%
Diabetes	Yes	43	39.1%
	No	67	60.9%
Previous MI	Yes	25	22.7%
	No	85	77.3%
STEMI	Yes	13	11.8%
	No	97	88.2%
Hypertension	Yes	51	46.4%
	No	59	53.6%
Smoking	Yes	27	24.5%
	No	83	75.5%
Hyperlipidemia	Yes	37	33.6%
	No	73	66.4%

Table 2: Complications of transulnar approach

Complications of transulnar approach	Frequency	Percent
Minor bleeding	20	18.2
Ulnar artery occlusion	9	8.2
Hematoma	6	5.5
Stroke	2	1.8
No complication	73	66.4
Total	110	100.0

Table 3: Association of complications of transulnar approach with gender

		Gender		Total	P value
		Male	Female		
Complications	Minor bleeding	13	7	20	0.95
		65.0%	35.0%	100.0%	
	Ulnar artery occlusion	5	4	9	
		55.6%	44.4%	100.0%	
	Hematoma	3	3	6	
		50.0%	50.0%	100.0%	
	Stroke	1	1	2	
		50.0%	50.0%	100.0%	
	No complication	45	28	73	
		61.6%	38.4%	100.0%	
Total		67	43	110	
		60.9%	39.1%	100.0%	

Discussion

Translunar percutaneous coronary intervention (PCI), is a minimally invasive procedure designed to relieve blockages or narrowings in the coronary arteries, thus promoting unrestricted blood flow to the heart. The origin of these blockages can be attributed to the accumulation of lipid-rich plaques in the arteries, which subsequently reduces the blood flow to the heart muscle. Atherosclerosis is the accumulation of plaque that is high in lipids, and when it occurs in the coronary arteries, it is known as coronary artery disease (CAD). Individuals suffering from CAD commonly experience chest pain or shortness of breath when engaging in physical activity. During acute myocardial infarction, the rupture of plaque in the coronary artery causes platelets to clump together and form a blood clot, which then blocks the artery. This results in immediate chest heaviness, sweating, and nausea. Performing urgent percutaneous coronary intervention (PCI) via a translunar technique is frequently necessary in order to minimize myocardial damage (Andrade et al., 2008; Pursnani et al., 2012).

Coronary artery disease occurs when plaque builds up in the coronary arteries, leading to the narrowing and blockage of these arteries, which in turn restricts blood flow to the heart (Palmerini et al., 2015).

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The decision to do percutaneous coronary intervention (PCI) using a transluminal technique depends on multiple considerations. Patients with stable angina symptoms that do not respond to the most effective medical treatment can benefit from percutaneous coronary intervention (PCI), which alleviates chronic angina symptoms even with optimal medical management. Immediate percutaneous coronary intervention (PCI) using a transluminal technique is necessary for the treatment of an acute ST-elevation myocardial infarction (STEMI), which indicates complete blockage of the coronary artery. For cases of acute ST-elevation myocardial infarction (STEMI), it is essential to perform catheterization as soon as the patient arrives to prevent more harm to the heart muscle. Patients with non-ST-elevation myocardial infarction (NSTEMI) or unstable angina (which are types of acute coronary syndromes) are promptly referred to the cardiac catheterization lab within a timeframe of 24 to 48 hours (Movahed et al., 2010; Palmerini et al., 2015).

Although PCI with a transulnar route is a commonly used technique that carries certain risks, significant procedural problems are rare. The mortality rate associated with angioplasty is 1.2% (Meier et al., 2003). In our study we found that the complications linked with PCI with transulnar approach were minor bleeding in 18.2% patients, ulnar artery occlusion in 8.2% patients, hematoma in 5.5% while stroke in 1.8% patients. Our findings are similar to a study which reported minor bleeding 23.7%, ulnar artery occlusion in 8.5% patients and hematoma in 2.5% patients.(RAHMAN et al.) Another study demonstrated that hematoma was observed in 13.3% patients, lunar artery perforation 2.2%, while stroke in 2.2% patients (Sallam et al., 2014).

Conclusion

From our study we conclude that transulnar technique in patients undergoing PCI is an effective modality in terms of complications such as minor bleeding, ulnar artery occlusion, hematoma and stroke. Majority of our patients did not show any postoperative complications.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned.
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

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Coordination of collaborative efforts.
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Coordination of collaborative efforts.
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript
MUHAMMAD AMIN (PGR)
Data entry and Data analysis, drafting article.
HASSAN ALI (PGR)
Data acquisition, analysis.
Coordination of collaborative efforts
WASIM SAJJAD (Fellow Interventional Cardiology)
Data acquisition, analysis.

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