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Access Site Complication among Patients undergoing Percutaneous Cardiovascular Procedures

Mohammed Hakim Shamran Al-Hchaim M.S.c. muhammedh.alhjem@uokufa.edu.iq
https://orcid.org/my-orcid?orcid=0000-0002-2532-148X

Adults Nursing, Faculty of Nursing, University of Kufa**.**

Abstract:

Background: Cardiac catheterization and percutaneous intervention can result in vascular access-site complications. It is important for individuals caring for the patient returning from the cardiac catheterization laboratory to be aware of and recognize the various complications that can occur and how they should be treated. **Objective:** aimed to assess access site complication among patients undergoing percutaneous cardiovascular procedures, and to find out the association between the patient undergoing Percutaneous Cardiovascular Procedures access site complication and their demographic characteristics. **Methodology**: A descriptive study was carried out through the present study in order to achieve the early stated objectives. The study is conducted in the Center for Cardiac Surgery and Catheterization. A non-probability (Purposive) sample of Twenty nine (29) patients with Cardiac disease. The data were collected through the use of constructed questionnaire, which consisted of three parts, the first part was concerning socio-demographic characteristics, and the second part was concerning with medical history. Finally, the last part of questionnaire which include (Access Site Complication). **Results**: results of the study show that the patients with percutaneous cardiovascular procedures have many complications occur at the site of access or occur as general complication. **Conclusion:** the study concluded that access site of patients with percutaneous cardiovascular procedures associated with many complication which include (bleeding, thrombosis, ecchymosis, hematoma and puncture infection).. **Recommendation:** According to the findings, the study recommends that the catheter should be performed only by trained personnel, enhance the methods of sterile techniques in cardiac surgery unit to decrease infection by improving the nursing practice through training course and health directorate should apply continuous education activities to improve nurses' practice toward access of percutaneous cardiovascular procedures.

Key wards: Access Site, Complication, Percutaneous, Cardiovascular, Procedures.

Introduction

Cardiac catheterization and percutaneous intervention can result in vascular access-site complications. It is important for individuals caring for the patient returning from the cardiac catheterization laboratory to be aware of and recognize the various complications that can occur and how they should be treated (Bhatty et al., 2011). Major vascular complications (VCs) of ilio–femoral arterial access after percutaneous coronary interventions are infrequent, but are associated with increased mortality and morbidity (Schahab et al., 2020). The spread of percutaneous arterial catheterization in diagnostic and therapeutic procedures has led to a parallel increase of vascular complications at the access site. The incidence of these events is between 0.2–1% (Minici et al. 2020). Coronary, electrophysiological, peripheral and valvular diagnostic and interventional percutaneous cardiovascular procedures (PCP) constitute the cornerstone of invasive cardiovascular disease (CVD) management. Even though the radial artery access has proven to be associated with fewer complications (Goel et al., 2020). Femoral access is still widely used, and it is particularly needed for high-risk procedures requiring large-bore sheaths (Kinnaird et al., 2018). Postprocedural hemostasis of femoral access site is usually achieved either by manual compression or, increasingly, by the use of vascular closure devices. Though rare, percutaneous arteriotomy for PCP can lead to serious access site complications (ASC), the most common of which are pseudoaneurysms (PSA), hematomas, arteriovenous fistulas (AVF), dissections and vascular closure device related local stenoses or occlusions. The consequences include prolonged hospital stay, increased patient morbidity and mortality and higher treatment costs (Ortiz et al. 2014).

Nurses are directly responsible for patients undergoing vascular access and they administer care to reduce the complications. With respect to the effect of cannulation technique efficiency on the incidence of aneurysm, high risk of infection, and thrombosis, as well as the effect of following health protocols precisely in the reduction of infection incidence. The importance of nurses' role in preservation of vascular access site can be emphasized. There are high costs and miserable outcomes of vascular access complications and their related mortality (Adib-hajbagheri et al., 2014). Generally there are very few studies in Iraq focusing on PCI complication. So, the present study focuses on a most important topic in nursing studies to fill the gap in nursing research. The problem statement of the current study is the Access Site Complication among Patients undergoing Percutaneous Cardiovascular Procedures.

Methodology:

Design of the Study:

In order to meet the initially stated goals, a descriptive study was carried out through the present study in order to achieve the early stated objectives. The study was began from December, 1st, 2021 to April, 10th, 2022.

The Sample of the Study:

A non-probability (Purposive) sample of Twenty nine (29) patients with Cardiac disease who are admitted to the Center of Heart Disease and Surgery.

The Study Instrument and Method of Data Collection:

The following tools were used to gather the data. The **First Part:** Specifications in terms of demographic data (age, gender, residency, marital status, socio-economic status, education level), are some of the fundamental socio-demographic data that is collected in this section. **Part II. Medical History:** was comprised of (3) items concerned with the medical history of patient which include (Referral type for Percutaneous Cardiovascular Procedures, Associated diseases and finally, smoker status). **Part III**: which include Access Site Complication that divided into Major and Minor complications.

Instrument Validity: A content validity assessment of the research instrument is carried out by a team of professionals with many years of experience working in the nursing sector.

Data Analyses:

The SPSS (Statistical Package for Social Science) version (19) application is used to examine the data.

The outcomes of the research are analyzed and assessed using the following statistical data analysis methods:

a- Tables (Frequencies, and Percentages).
b- Statistical figures (Bar Charts).
c- Statistical mean and standard deviation.
d- Chi-Square

Results

Table I: The observed frequencies and percentages of PCI patients' groups according to socio-demographic data:

Groups		Frequency (total 29)	Percentage (%)
Age (years)	<= 30	1	3.4
	40 - 48	6	20.7
	49 - 57	8	27.6
	58 - 66	5	17.2
	67+	9	31.0
Gender	Male	17	58.6
	Female	12	41.4
Soci-economic Status	Satisfied	8	27.6
	Satisfied to some extent	14	48.3
	Unsatisfied	7	24.1
Educational Level	Do not read and writes	8	27.6
	Read and writes	2	6.9
	Primary school	7	24.1
	Secondary school	6	20.7
	Institute	3	10.3
	College and Postgraduate	3	10.3

PCI: Percutaneous Cardiovascular Procedures **Freq.:** Frequency **%:** percentage

Table 1, shows that the majority of the study sample is within the (67+) of age groups and accounted for (31.0%). also shows the majority of the study sample (58.6%) are males and the remaining are females (41.4%). In addition, the study results indicate that (48.3 %) of patients were exhibit satisfied to some extent in related to socio-economic status. Also the study results indicate that the high percentage (27.6 %) of study sample were don't read and writes in related to the level of education.

Table II: The observed frequencies and percentages of access site complication among PCI patients':

Groups		Frequency (total 29)	Percentage (%)
Pseudoaneurysm	Yes	0	0.00
	No	29	100.0
Arterial dissection	Yes	0	0.00
	No	29	100.0
bleeding	Yes	16	55.2
	No	13	44.8
Thrombosis	Yes	18	62.1
	No	11	37.9
Limb ischemia	Yes	0	0.00
	No	29	100.0
Arterial occlusion	Yes	0	0.00
	No	29	100.0
Ecchymosis	Yes	8	27.6
	No	21	72.4
Hematoma	Yes	7	24.1
	No	22	75.9
Puncture infection	Yes	17	58.6
	No	12	41.4

This table depicts the frequencies of complication in patient with double lumen subclavian catheter: (0.00%) of patients have pseudoaneurysm, Arterial dissection, limb ischemia and atrial occlusion. 16 (55.2%) of patients have bleeding, 18 (62.1%) of patients have thrombosis, 8 (27.6%) of patients have ecchymosis, 7 (24.1%) of patients have hematoma, finally 17 (58.6%) of patients have puncture infection.

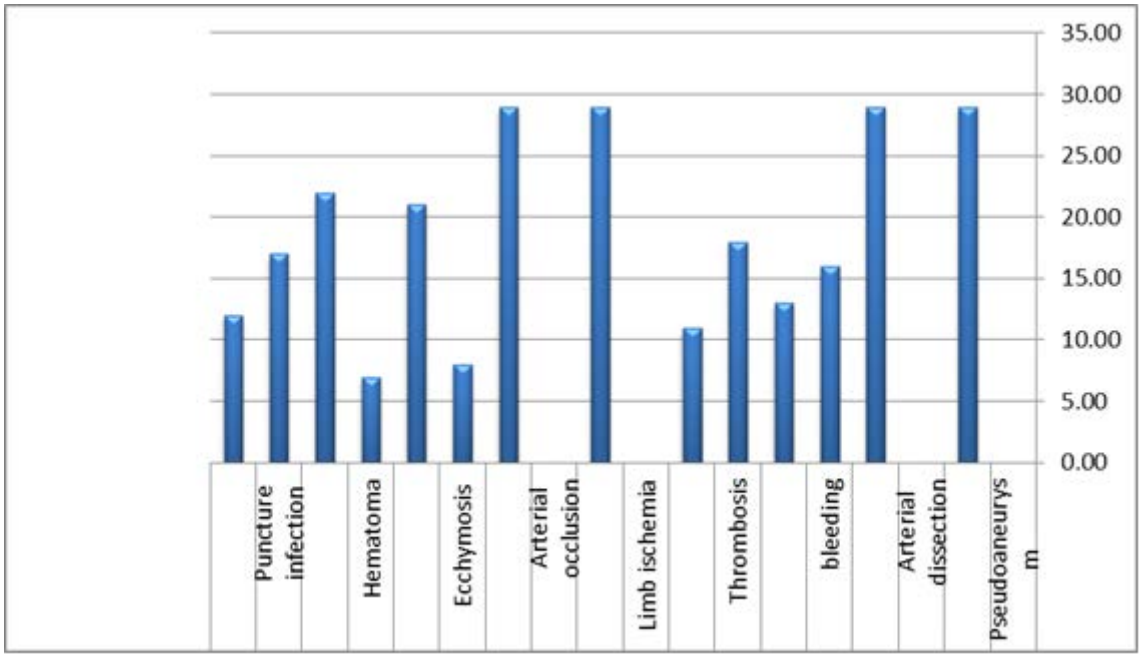

Fig. 1: Access Site Catheter Complication

Table III: Dependence association between Demographic data and access site complications:

	Chi-square (p-value)			
	Age (years)	**Gender**	**Soci-economic Status**	**Educational Level**
Pseudoaneurysm	0.32	0.172	0.742	0.503
Arterial dissection	0.41	0.078	0.843	0.756
Bleeding	0.002	0.158	0.505	0.499
Thrombosis	0.31	0.160	0.073	0.124
Limb ischemia	0.482	0.080	0.370	0.435
Arterial occlusion	0.55	0.172	0.597	0.580
Ecchymosis	0.098	0.329	0.843	0.756
Hematoma	0.002	0.026	0.123	0.310
Puncture infection	0.008	0.080	0.665	0.435

P-value < 0.05: significant relationship

Table (3) This table shows that there is a non-significant association between patients access catheter complication and their demographic data (Gender, Soci-economic Status and Educational Level) at p-value < 0.05.

Except with age the above table show highly significant association between age and (Bleeding, Hematoma and finally Puncture infection) at p-value < 0.05.

Discussion:

Access site complications is an independent predictor of adverse clinical outcomes following PCI. However, access site catheterization is associated with a variety of complications including (pseudoaneurysm, arterial dissection, bleeding, thrombosis, limb ischemia, arterial occlusion, ecchymosis, hematoma and puncture infection**)**.

This result is supported by many previous study (Al Minici, *et al*., 2020; Hetrodt, *et al*., 2021; Rana, *et al*., 2021), they mentioned that many complication occur with insertion of PCI catheter. Also all them mentioned that the most common complication were Pseudoaneurysm (PSA) was the most frequent ASC (67.5%), followed by arteriovenous fistula (13.1%), hematoma (7.8%) and others (11.7%). In advertent arterial puncture in our study was similar to a study by **Zeki Aydin et al 2016** in which it was found that Arterial puncture occurred in 9.7% among on which 13 had resultant subcutaneous hematoma. This might be due to less prominent anatomical landmarks for subcutaneous insertion and deeply located veins requiring steeper angle for catheterization.

The second commonest complication was thrombosis and arterial occlusion 2% cases. Some of the insertion related complications can be reduced with the aid of image guidance during catheter placement. Some of the above mentioned complications are comparatively low in number probably because of the small size and majority of the insertions were carried out by the well-trained personnel.

Also Hetrodt et al., (2021), mentioned pseudoaneurysm was the most frequent Access Site Complication (ASC), in our study group encompassing 67.5% of all ASC. In contrast to other ASC, most PSA require some kind of intervention, by either manual compression or surgical intervention. Another successful and minimal-invasive therapy is the injection of thrombin into the aneurysm sac.

Conclusions:

Vascular access-site problems continue to be a serious challenge for invasive and interventional cardiologists. So the study concluded the following:

1. The results of this study suggest that access site of patients with percutaneous cardiovascular procedures associated with many complication which include (bleeding, thrombosis, ecchymosis, hematoma and puncture infection**).**
2. Access site bleeding complications were more frequent with femoral artery access.
3. The diagnosis of vascular access complication is based on the results of the history and physical examination.

Recommendations:

Based on the study results discussion and conclusions the study recommended that the catheter should be performed only by trained personnel. A number of the insertion related complications can be reduced with the assistance of image guidance during catheter placement. However the use of ultrasound guidance during access catheterization had mixed results in clinical trials, probably for anatomical reasons. Enhance the methods of sterile techniques in to decrease infection by improving the nursing practice through training course. Training of nurses on reducing catheter complications, and most

importantly how the control bleeding and finally, health directorate should apply continuous education activities to improve nurses' practice toward access catheters complication.

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