



THE FREQUENCY OF NEPHROPATHY IN DIABETIC PATIENTS WITH ACUTE CORONARY SYNDROME UNDERGOING PERCUTANEOUS CORONARY INTERVENTION SECONDARY TO CONTRAST MEDIUM

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Submission Date : 14-09-2019

Revision Date: 24-09-2019

Publication Date: 25-12-2019

Author's Contribution

SI:Conducted the study and wrote the article. SA:Helped in review the article. IA:Re-arranged data and corrected article. NH:Tables and figures. RR and MGA made corrections and did the proof reading.

All authors declare no conflict of interest.

This article may be cited as: Iqbal S, Abbas S, Ahmad I, Hameed N, Riaz R, Ahmed MG. The frequency of nephropathy in diabetic patients with acute coronary syndrome undergoing percutaneous coronary intervention secondary to contrast medium. (J Cardiovasc Dis 2019;15(4):91 - 94)

ABSTRACT

INTRODUCTION: The major cause of mortality worldwide is development of cardiovascular disease. Most of the patients present with Acute coronary syndrome (ACS). Early revascularization is associated with reduced cardiovascular mortality. The contrast medium used in patients undergoing early revascularization treatment by percutaneous coronary intervention (PCI) is usually non-ionic. There is risk of developing contrast associated nephropathy in patients undergoing percutaneous intervention. Patients with diabetes and chronic kidney disease are at high risk for developing nephropathy following the procedure.

MATERIAL AND METHODS: This observational, descriptive study was carried out over a period of six months from August 2017 to February 2018 in the department of Cardiology, Faisalabad Institute of Cardiology, Faisalabad (FIC). A total of 207 patients of both gender with ACS having diabetes undergoing PCI were included. Patients having serum creatinine > 1.1 mg/dl, known allergy to contrast agent, risk factors other than diabetes, on oral hypoglycemic agents like metformin, taking nonsteroidal anti-inflammatory drugs and aminoglycosides, previous percutaneous coronary intervention, cardiogenic shock (systolic B.P < 90 mm Hg on inotropic support), active infection (TLC > 1,000 l cu. mm), INR > 1.4 and pregnant females were excluded. Contrast induced nephropathy was assessed after 72h of PCI.

RESULTS: Mean age was 45.811 ± 7.76 years. Majority of the patients were males (73.9%, n=153). Contrast induced nephropathy was seen in (9.2%, n=19) patients with diabetes and presenting with acute coronary syndrome who underwent PCI.

CONCLUSION: Nephropathy secondary to contrast medium used during PCI is quite high.

KEYWORDS: Acute coronary syndrome, Diabetes, Percutaneous coronary intervention, Contrast induced nephropathy.

(J Cardiovasc Dis 2019;15(4):91 - 94)

INTRODUCTION

Cardiovascular diseases are of major concern for health authorities these days. Most of the patients in cardiac emergency present with acute coronary syndrome (ACS) that includes unstable angina, NSTEMI and STEMI. Early reperfusion therapy includes thrombolysis or PCI. Early invasive therapy with PCI during hospital admission is preferred approach but is linked with the development of nephropathy secondary to use of contrast medium.¹⁻²

Nephropathy secondary to use of contrast medium is labeled as increase of serum creatinine level of 0.5mg/dl from the base line values up to 72 hours after its administration. The frequency of developing nephropathy in patients undergoing coronary intervention is not un-common. A study have shown the development of nephropathy after percutaneous coronary intervention in diabetics and patients with chronic kidney disease is quite frequent i.e 50%.³ Nephropathy after percutaneous coronary intervention is associated with increased risk of major adverse cardiac event and end-stage renal disease. It has been estimated that there is three-fold increase in the risk of nephropathy secondary to use of contrast medium.⁴⁻⁵

In diabetic patients there is no preventive therapy to modify the risk of developing nephropathy after PCI, so it is very important to risk stratify the patients who have to undergo coronary interventions and subsequent risk of developing nephropathy. Previous data have shown that there is 7.1% chance of nephropathy due to contrast medium in diabetic patients. Another study has shown it to be 59.4%.^{3,6}

It is a common practice to perform coronary interventions in patients with acute coronary syndrome, so this study was planned to determine the frequency of nephropathy secondary to contrast medium after coronary intervention.

MATERIALS AND METHODS:

This descriptive observational, cross-sectional study was conducted at Faisalabad Institute of cardiology, from August 2017 to February 2018 with 95% confidence interval and absolute precision of 3.5%. The age range was 30-65 years regardless of gender having diabetes mellitus and acute coronary syndrome undergoing PCI were included in study.

Patients having serum creatinine more than 1.1 mg/dl, known allergy to contrast agent, with risk factors other than diabetes, taking metformin, nonsteroidal (NASIDs) anti-inflammatory drugs,

aminoglycosides or acetylcysteine before or after percutaneous coronary intervention, with cardiogenic shock (systolic B.P < 90 mm Hg on inotropic support), an active infection (TLC > 11,000 l cu. mm), INR > 1.4 and pregnant females were excluded from study.

After ethical committee approval, patients presenting in ER department fulfilling the inclusion criteria were enrolled and consents were taken. Non-ionic contrast with low osmolality was used in percutaneous coronary intervention. Serum creatinine levels were recorded at admission and then after 72 hours of percutaneous coronary intervention. Contrast induced nephropathy was assessed. All the information was collected on proforma.

STATISTICAL ANALYSIS:

SPSS 20 was used to analyze the data. Mean and standard deviation for quantitative variables like age, amount of contrast used, serum creatinine level at baseline, serum creatinine level after 72 hours and difference were calculated. Then frequency and percentage was determined for qualitative variables like gender and contrast induced nephropathy. Effect modifiers like age, gender and amount of contrast used were controlled by stratification. Chi-square test was applied after stratification. Less than 0.05 p-value was taken as significant.

RESULTS:

The patients ranged from 30 to 65 years and their mean age was 45.811 ± 7.76 years, mean serum creatinine at base line was 0.644 ± 0.15 mg/dl and after 72 hours was 0.836 ± 0.21 mg/dl and mean difference was 0.1922 ± 0.19 mg/dl while mean contrast used was 159.782 ± 13.63 ml. Stratification of patients with respect to age, gender and amount of contrast used was done as shown in table no. 1.

There were more males (73.9%, n=153). Contrast induced nephropathy was seen in patients (9.2%, n=19) with diabetes and acute coronary syndrome who underwent PCI. Female patients were found to have higher frequency of CIN

Table No. 1 Basic characteristics of patients with nephropathy

Characteristics		Frequency of Contrast induced nephropathy		P value
		Yes	No	
Age	45.811±7.76			
Gender				
Male	73.9% (n=153)	7.8% (n=12)	92.2%(n=141)	0.263
Female	26.1% (n=54)	13% (n=7)	87%(n=47)	
AGE groups				
30-50	77.78% (n=161)	7.5%(n=12)	92.5%(n=149)	0.108
51-65	22.22% (n=46)	15.2% (n=7)	84.8%(n=39)	
Contrast Volume				
≤175ml	88.89%(n=184)	0.5%(n=1)	99.5%(n=183)	0.0001
≥175ml	11.11%(n=23)	78.3%(n=18)	21.7%(n=5)	



(13%) as compared to male (7.5%). Two groups of patients were made according to age. 77.78% patients were in 30-50 years and 22.22% were in 51-65 years. However, it was found that CIN was higher (15.2%) in patients with age more than 50 years while it was less observed in younger patients (7.5%). Those patients in which >175ml of contrast was used (11.11%) were having significantly higher frequency of contrast induced nephropathy (78.3%)

DISCUSSION:

In the current study 9.2% of the study population developed nephropathy secondary to contrast medium in diabetic patients with ACS who underwent percutaneous coronary intervention, which is quite similar to data of past studies^{7,8}. Rihal et al reported a frequency of 3.3% in a series of approximately 7000 patients who underwent coronary intervention.⁹ Different authors have recognized a chance of developing contrast nephropathy after coronary procedures which ranged from 5-15%.¹⁰ The strict criteria of exclusion in our study may be a reason of low frequency of contrast nephropathy when compared with other studies^{10,11}. The studies in the past have included patients of previous chronic kidney disease and creatinine level more than 1.1 mg/dL which were not included in our study. The dose of contrast used during coronary intervention was also low as compared to other studies. Most of the patients who developed contrast nephropathy had a self limiting course and did not require dialysis. This observation was also noted in a research by Lautin et al.¹²⁻¹⁵ There are multiple causes of reduced frequency of contrast nephropathy.^{16,17} The results of this study will also benefit to apply the collected data to south Asians

because of similarity in metabolism and genes.¹⁸

Hypertension is a precipitating cause of renal disease because it may lead to atherosclerosis of aorta and renal arteries. It has been suggested that some athero-embolization of renal artery and vasoconstriction may be the underlying cause of nephropathy related to contrast medium. Hypertension is responsible for injury of endothelium.¹⁹⁻²⁰

Parfrey et al. concluded that patients with adequate renal function and having diabetes does not have increased frequency of contrast nephropathy. He also showed that good hydration, good control of diabetes and low dose of contrast medium do not increase the frequency of contrast nephropathy.²¹⁻²²

Currently the contrast nephropathy is defined by relative increase in serum creatinine level as compared to its baseline value. Serum creatinine level does not reflect the exact kidney function and it may be recommended that glomerular filtration rate (GFR) rate should be calculated who undergo coronary intervention. A new marker known as Cystatin C is now considered to be a reliable index for GFR estimation.²⁴

The limitations in this study are: Data was collected from a single specialty hospital, number of patients should have been more. So this study should be performed at a larger scale including multiple health care units.

CONCLUSION:

Nephropathy due to contrast medium is a known complication of coronary intervention which can be prevented by proper hydration and using less amount of contrast. Pre procedure risk stratification should be done to prevent its occurrence.



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