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INCIDENCE OF CONTRAST-INDUCED NEPHROPATHY IN PATIENTS UNDERGOING PERCUTANEOUS CORONARY INTERVENTION AS OPPOSED TO CORONARY ARTERY ANGIOGRAPHY

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ABSTRACT

Contrast-induced nephropathy (CIN) may sometimes be a serious complication of coronary angiography (CAG) and percutaneous coronary intervention (PCI). Aim: to study the incidence of CIN in patients undergoing PCI as opposed to coronary angiography alone. Methods: This is a prospective analytical study that has included 123 patients undergoing coronary angiography or PCI, all underwent an objective exam, hematochemical measurements. The patients were divided into two groups depending on the type of procedure. The incidence of CIN (defined as an increase in creatinine level equal or more than 25% from baseline values within 48-72 hours after the coronary procedure) was compared in the two groups. Results: CIN took place in 28 patients, 10 of them were in the PCI group. No significant difference was noted in the incidence of CIN in the PCI and CAG group (22% vs 23% respectively with a p value of 0.9) Conclusion: No association was found between PCI and increased incidence of CIN as opposed to coronary angiography.

KEYWORDS: Contrast-induced nephropathy, Coronary angiography, Percutaneous coronary intervention.

INTRODUCTION

Coronary angiography is the gold standard test for determining the presence and extent of coronary atherosclerosis (CAD), and as with all invasive procedures there are some patient-related or procedure-related complications for this test.

The complications vary widely from minor problems with short-term sequelae to life-threatening conditions that can cause irreversible damage if urgent care is not provided.

Fortunately, the associated risks have decreased significantly since the beginning of arterial angiography to date due to the development of instrument design, improved periprocedural measures and increased experience of diagnostic centers and practitioners.

Contrast-induced nephropathy (CIN) may sometimes be a serious complication of coronary angiography with significant short- and long-term sequelae. However, it can be mitigated by appropriate risk stratification, choosing appropriate contrast media along with preventive measures.

CIN is usually defined as a severe deterioration in renal function characterized by an increase in serum creatinine levels typically more than 0.5 mg / dL or more than 25% of baseline levels within 72 hours of exposure to the contrast media after excluding alternative explanations for renal failure.[1]

Contrast-induced nephropathy (CIN) is associated with increased costs, morbidity and mortality. Prevention is the key to reduce the incidence of CIN and it begins with identification of the high risk patients.

According to several reports, the incidence of CIN ranges from 0 to 24%.[2]

Several risk factors for CIN have been identified such as chronic kidney disease, diabetic nephropathy, high dose of contrast agent, first generation hyperosmolar ionic contrast agents and advanced heart failure.

Some studies reported percutaneous coronary intervention to be a risk factor for CIN. Many explanations have been suggested such as the relatively longer duration of procedure, greater dose of contrast agent, hemodynamic complications or promotion of the development of atheroemboli.

However, the association between PCI and CIN incidence in comparison with coronary angiography is not well established yet.

AIM OF STUDY

The aim is to study the incidence of CIN in patients undergoing PCI as opposed to coronary angiography alone.

MATERIALS AND METHODS

This is a prospective analytical study conducted in The Division of Cardiology, Tishreen University Hospital between July 2017 and July 2018.

The study included patients undergoing coronary angiography or percutaneous coronary intervention.

We excluded patients who had a previous exposure to the contrast media within 7 days of the current procedure. Patients who received high dose of contrast agent (>200 ml) during the procedure were also excluded.

Finally, we had a sample of 123 patients (78 with coronary angiography and 45 with PCI).

Patients were assessed at the time of the procedure; a detailed medical history was taken including information related to:

Age, Sex. Smoking, associated diseases, past medical history and cardiac symptoms. All patients underwent comprehensive clinical examination

Laboratory tests were performed for patients prior to the procedure, including:
Complete blood count, serum creatinine, urea, glucose and CRP

These tests were performed in the Central Laboratory of Tishreen University Hospital where serum creatinine was performed using Mindray - BS -380 according to the Modified Jaffe method.

Omnipaque 350 (iohexol 755mg / ml) was the contrast agent used in all patients.

The periprocedure hydration method was open oral intake in all patients.

The type of the procedure and the amount of contrast agent used were recorded.

Serum creatinine was repeated 48-72 hours after the procedure.

Definitions

Anemia was defined as: hemoglobin less than 13 g / dl in men or less than 12 g / dl in women.

Diabetes mellitus was defined as: known Diabetes under treatment, random blood glucose value of ≥200 mg / dl, fasting blood glucose of more than 125 mg/dl.

Advanced heart failure (HF) was defined as: Class III or IV heart failure according to the NYHA classification.

A basal creatinine value greater than 1.5 mg / dl was adopted for the presence of renal disease before catheterization.

Contrast-induced nephropathy was defined as an increase in serum creatinine of ≥25% of the baseline value within 48-72 hours after the procedure.

RESULTS

123 patients were enrolled. 45 patients underwent PCI and 78 underwent coronary angiography (CAG)

Overall, CIN occurred in 28 patients.

The study population was divided into two groups depending on the type of procedure.

We studied the differences between the two groups regarding age, sex, the presence of advanced heart failure (HF), diabetes (DM), chronic kidney disease (CKD) and anemia.

Independent T student test was used to study the difference between the averages of two independent groups, whereas chi-square or Fisher exact were used to study the relationships between qualitative variables. The results were summarized in tables 1,2.

Table 1: Age and sex in the two study subgroups.

	Total	**PCI**	**CAG**	**P value**
Number	123	45	78	
Sex (Female)	42 (34%)	17 (38%)	25 (32%)	0.5
Age (mean)	55.7	59.4	53.6	**0.003**

Table 2: Associated diseases in the two study subgroups.

	Total	PCI	CAG	P value
HF	12 (10%)	7 (16%)	5 (6%)	0.1
DM	39 (32%)	17 (38%)	22 (28%)	0.27
Anemia	52 (42%)	20 (44%)	32 (41%)	0.7
CKD	6 (5%)	4 (9%)	2 (3%)	0.19

The PCI group tended to be older than CAG group. On the other hand, no significant differences were noted regarding sex, associated advanced heart failure, diabetes, anemia or chronic kidney disease between the two groups.

CIN took place in 28 patients (10 patients with PCI and 18 with CAG) with no significant difference between the two groups (p value: 0.9).

Table 3: Incidence of CIN in patients of the two study groups.

	Total	PCI	CAG	P value
CIN	28(23%)	10(22%)	18(23%)	0.9
No CIN	95(77%)	25(78%)	63(77%)	

DISCUSSION

In our study, we excluded patients who received high doses of contrast agent in order to exclude a highly suspected confounding factor.

Patients of the PCI group tended to be older and that is explained by the increased severity of atherosclerotic lesions with age and the resulting need for stenting.

CIN incidence was relatively high (23%) and that could be attributed to the periprocedural hydration method of only oral intake or to the relatively large proportion of anemic patients in the study population (42%).

In our study, we couldn't find significant correlation between PCI and increased incidence of CIN in spite of the PCI group being generally of older ages.

These findings agree with those noted by sharma et al who studied 330 patients undergoing cardiac catheterization and found the incidence of CIN was similar for the PCI and non-PCI subgroup.[3]

On the other hand, another study involving 250 diabetic patients who underwent either coronary angiography or PCI found that 58 patients developed CIN with a total incidence of 23.2%. CIN was found to be more among the patients who had PCI, they were 40 patients (69%). It was less among the coronary angiography patients as they were only 18 patients (31%), showing a highly statistically significant P value of less than 0.01.[4]

CONCLUSION

No association was found between PCI and increased incidence of CIN as opposed to coronary angiography.

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