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Clinical Research

ACUTE KIDNEY INJURY IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY IN A TERTIARY CARE HOSPITAL

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ABSTRACT Contrast induced nephropathy(CIN) is the term used to describe Acute kidney injury (AKI) that occurs 48 hours after the intravenous injection of contrast media and after other nephrotoxic variables have been evaluated. Contrast induced nephropathy is a serious threat to the health of patients .It is the third leading cause of hospital-acquired AKI. The precise pathogenesis of contrast induced nephropathy is not clear till date. Many theories such as direct cytotoxicity, hypoxia and ischemia of medulla of kidney, and oxidative stress caused by iodine contrast medium have been put forwarded. Unfortunately, effective therapy of contrast induced nephropathy is very limited at present. As it is said prevention is better than cure therefore, effective prevention of contrast induced nephropathy is of great significance. Several preventive options such as hydration before procedure, antagonistic vasoconstriction, and antioxidant drugs can prevent contrast induced nephropathy. Here we will discuss a brief review of current knowledge about the features of iodine contrast medium, incidence in tertiary care, pathogenesis, risk factors, prevention and treatment.

KEYWORDS : Contrast induced nephropathy, Contrast Media, Acute Kidney Injury, Incidence, Risk Factors.

INTRODUCTION-

A sudden reduction in kidney function that happens over a few days or a week is known as an acute kidney injury (AKI). Reduced renal perfusion pressure, radiation exposure, pharmacological treatments, and major surgery are some of the complicated factors that contribute to AKI.[1] AKI is a disease that affects around 50% of patients in ICU and is associated with significant rates of mortality and morbidity; therefore the key to recovery is early diagnosis. Reduced urine output (oliguria) and high blood creatinine levels, a marker of renal excretory function, are two factors that define kidney function in a clinical environment.[1]

Contrast-induced nephropathy is the term used to describe AKI that occurs 48 hours after the intravenous injection of contrast media and after other nephrotoxic variables have been evaluated.[2] Contrast agents are injected into the body through blood vessels in order to change the image contrast of local tissues, enhance the development effect, as well as improve disease diagnosis and treatment. In recent years, with the extensive application of computed tomography (CT) in clinical diagnosis, iodine-containing contrast agents have become an indispensable part of diagnosis and have been widely used in clinical practice[3]. However, some studies have shown that 11–40% of patients with iodine contrast medium lands up in acute kidney injury known as contrast induced nephropathy (CIN).[4,5]

Contrast medium is increasingly used in both diagnostic and therapeutic procedures in the modern era of interventional cardiology. This results in increasing incidence of iatrogenic renal function impairment. CM makes the arteries radio opaque and help in viewing with fluoroscopy. The ideal contrast medium would achieve a very high concentration in tissues without producing any adverse effects. Unfortunately, this has not been possible and so far, all CM have adverse effects. Kidneys being the primary portal of excreting waste products of metabolism and foreign chemicals.

AIM:

A study on incidence and adverse effects of contrast agents on renal function based on serum creatinine and creatinine clearance was done in patients without a pre-existing renal disease.

MATERIALAND METHODS:

This was a hospital based observational study, conducted in the department of pharmacology and cardiology, MGM Medical College, Aurangabad. Individuals >18 age, both gender Symptomatic or Asymptomatic patients undergoing Coronary angiography were included. Exclusion criteria were also followed. Iodixanol or iohexol was administered at the volume of 80 – 100 ml per participants. Blood samples were collected by standard techniques before the procedure and 48 hours after the procedure for serum creatinine levels. Renal function was assessed by estimating creatinine clearance (eGFR) using the dry chemistry method (vitros-5600) in pathology Department. MGM Hospital. Urine output was measured using Urometer (polymed). eGFR was calculated using the following CKD - EPI eGFR calculator. Data were represented in the form of Tables. P-Value of <0.05 was considered statistically significant.

Methods Study Design: Hospital based observational study

RESULTS:

Total 153 study subjects were included in this study; in this 98 (64%) were male and 55 (36%) were female participants. The male female ratio in this study was 1.5, M:F ratio CIN developed ratio was 1.9.

Out of 153 study subjects, CIN was found in 15% the incidence increased with age, 27% were identified as hypertensive, 27% smokers, 8% alcoholics; statistically there was no significant difference. The mean eGFR before the procedure was 82.56 ± 23.77, which decreased to 78.84 ± 28.26 after the procedure. This decrease was statistically significant.

Table 1-Gender Wise Patients In The Study

Gender	No. of patients	Percentage
Male	98	64%
Female	55	36%
Total	153	100%

Age wise, The first group of 18–40-year-old patients of age was 14 (9%), the second group of 41–60-year-old patients of age was 51 (33%), the third group of 61–80-year-old patients of age was 81 (53%), and the fourth group above 81-year-old patients of age was 7 (5%). The mean age of the study was 61.71+13.34.

Table No 3 Distribution Of The Data On The Basis Of Comparison Of Before The Procedure eGFR And After The Procedure eGFR And Serum Creatinine.

	Before the procedure MEAN ± SD	After the procedure MEAN ± SD	MEAN DIFFERENCE	t-VALUE	p-VALUE
Serum creatinine	0.977 + 0.297	1.35 + 2.02	0.373	2.3275	P =0.0213 S
eGFR (mL/min/ 1.73 m^2)	82.56 ± 23.77	78.84 ± 28.26	3.72	2.38	P=0.0183 S

Table No .2: Age – Group Of Patients In The Study

Age- group	No. of patients	Percentage
18-40 years	14	9%
41-60 years	51	33%
61-80 years	81	53%
Above 81 years	7	5%
Total	153	100%
Mean age in the study + SD*	61.71 + 13.34	

DISCUSSION:

Contrast-induced acute kidney damage (CI-AKI) is an abrupt renal function decline caused by intravascular injection of iodinated contrast media, formerly known as contrast-induced nephropathy (CIN). This definition is problematic due to the exclusion of other nephrotoxic factors.

The study investigates demographics of coronary angiography patients, assesses acute kidney injury, and evaluates contrast agent safety during the procedure.

The study involved 153 patients with coronary angiography, and 15% of them had CIAKI, as revealed by 23 out of 153 patients.

Abdalla MA et al. (2019) conducted a study involving 163 patients undergoing coronary angiography, where the incidence of contrast-induced acute kidney injury (CI AKI) was found to be 31.9% (52/163). In their study, out of 153 subjects, 98 (64%) were males and 55 (36%) were females, with a mean age of 61.71±13.34 years.

Similarly, Ying Guo et al. (2022) In AKI conducted a study with 2487 patients, of which 1898 were males and 589 were females, with an average age of 64.30 ±11.13 years.

The study divided patients into five groups based on their serum creatinine levels. Group 1 had values between 0 and 0.5 mg/dl, while Group 2 had values between 0.6 and 1.1 mg/dl. Group 3 had values between 1.1 and 1.5 mg/dl, while Group 4 had values between 1.6 and 1.8 mg/dl.

The study examined comorbidities in the patient population, revealing 27% hypertension, 14% diabetes mellitus, and 11% tobacco addiction among 42 smokers, 88% alcoholics, and 11% tobacco chewers.

Understanding comorbidities and addiction can improve patient care and resource allocation, predicting successful outcomes and identifying patients needing specialized care.

The study categorized patients into four groups based on their estimated glomerular filtration rate (eGFR). The first group had a higher eGFR, while the second group had a lower eGFR. The third group had a moderately decreased eGFR, while the fourth group had a severe decreased eGFR. These changes were linked to the incidence of acute kidney injury.

Research shows longer hospital stays can increase infections, physical deconditioning, psychological impact, financial burden, and daily life disruption, dependency on caregivers, isolation, anxiety, depression, and negatively impact patient quality of life.

The majority of patients undergoing coronary angiography (84.31%) were hospitalized for 1 to 5 days, indicating a common trend of short hospital stays in this population.

The study found that 10.45% of patients required longer hospitalizations, while 5.22% stayed for 6 to 10 days and 11 days or more.

The study found a significant increase in serum creatinine levels after a kidney procedure, indicating a clinically relevant change in kidney function post-procedure, as indicated by a statistically significant increase.

The procedure significantly decreased the mean eGFR from 82.59 to 78.84 ± 28.26, indicating a decline in kidney function.

The study found that 23 patients, including males and females, experienced increased serum creatinine levels and decreased eGFR after exposure to iodinated contrast agents.

The procedure significantly impacts kidney function, causing changes in serum creatinine levels and eGFR, necessitating monitoring for potential complications and improved patient outcomes.

Limitations: small study
Short follow up

CONCLUSIONS:

With these findings we conclude that overall increase in the incidence of Contrast induce nephropathy (CIN) with age, comorbidities and addictions.

Conflict Of Interest- Nil

Ethical Approval And Consent- Taken

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