Impact of Renal Impairment on Coronary Vasculature among Patients Undergoing Primary Percutaneous Coronary Intervention and its Effect on Hospital Stay Outcome

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Abstract

Background: The decrease in glomerular filtration rate is independently associated with increase of cardiovascular disease and cardiovascular death. Cardiovascular causes, mainly myocardial infraction are responsible for half of deaths in Chronic Kidney Disease (CKD) patients.

Aim of Study: To study impact of renal impairment on coronary vasculature among patients undergoing primary PCI and its effect on hospital stay outcome.

Methods: A prospective observational study conducted from June 2016 to November 2016, at Cardiovascular Medicine Department, Tanta University Hospitals in Gharbia Governorate, Egypt. The study enrolled 138 consecutive adultpatients of both genders who were diagnosed with definite ST-segmentelevation myocardial infarction within 12 hours from the time ofsymptoms onset and were treated by primary percutaneous coronaryintervention. EGFR was calculated and the patient were divided into four groups according to the severity of the renal impairment.

Results: The current study showed that reduced renal function either estimated by eGFR was associated with significantly lower rates of suboptimal perfusion assessed by angiographic and by electrocardiographic criteria.Both the epicardial coronary artery flow and the myocardial perfusion were both reduced with reduced renal function when compared to the group with normal kidney functions.

Conclusion: CKD is not uncommon finding among patients with STEMI and the rate of no reflow showed significant increment with worsening of renal function. Both epicardial coronary flow and myocardial perfusion are reduced in CKD patients with STEMI and CKD was independently and inversely associated with the rate of procedural success.

Key Words: *Chronic kidney disease – Percutaneous coronary intervention – ST elevation myocardial infarction – Primary percutaneous coronary intervention.*

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Introduction

MYOCARDIAL Infarction with persistent ST Segment Elevation (STEMI) is responsible for significant morbidity and mortality worldwide. According to the GRACE study 38% of patients presented with acute coronary syndrome have STEMI [1].

The prevalence of Chronic Kidney Disease (CKD) among patients with STEMI is 30% [2]. The decrease in glomerular filtration rate is independently associated with increase of cardiovascular disease and cardiovascular death. Cardiovascular causes, mainly myocardial infraction are responsible for half of deaths in CKD patients [3].

Renal function, atherothrombosis extent, and outcomes in high-risk patients (REACH) registry showed that the number of arterial beds affected increased with severity of CKD. However, patients with severe CKD were less likely to receive medications of proven benefit. Severe CKD was an independent correlate of all-cause mortality, cardiovascular mortality, myocardial infarction, congestive heart failure, peripheral arterial revascularization and amputation [4].

The ANIN registry is a single center prospective all-comer registry conducted at the Institute of Cardiology in Warsaw, included all STEMI patients treated with primary PCI, demonstrated that any decrease in renal function was associated with adverse outcomes including 30-days mortality, major bleeding and procedural failure even with normal serum creatinine. It was recommended that estimated Glomerular Filtration Rate (eGFR) should be considered a continuous parameter, which

influences prognosis of STEMI patients without any specific cut-off value [5].

Patients and Methods

The study was conducted as observational study from June 2016 to November 2016, at Cardiovascular Medicine Department, Tanta University Hospitals in Gharbia Governorate, Egypt.

The study included 138 consecutive adult patients of both genders who were diagnosed with definite STEMI within 12 hours from the time of symptoms onset and were treated by primary PCI. An informed consent was taken from allparticipants.

Patients included in this study fulfilled all of the following criteria of acute myocardial infarction:

- Persistent anginal chest pain lasting for more than 20 minutes.

- ST-segment elevation of >1mm in two or more standard leads or 2mm in two or more contiguous precordial leads, or the presence of new left bundle branch block.

- Primary percutaneous intervention with clear angiographic data enough to enable evaluation of the severity of coronary artery disease.

Exclusion criteria were:

Patients who received thrombolytic therapy.

All included patients were subjected to detailed history taking and clinical examination including measurement of vital signs and detection of signs of heart failure/hemodynamic instability according to Killipclassification.

Surface eelectrocardigram and venous sampling for laboratory data, includingserum cardiac biomarkers (cardiac troponin I & CKMB), complete blood count, lipid profile, random blood sugar, urea & creatinine, were done.

All included patients were subjected to primary PCI for the Infarct Related Artery (IRA) according to the European Society of Cardiology (ESC) guidelines. Coronary angiography was performed under local anesthesia fromthe femoral approach according to the standard technique, and the following data is gathered:

Pain to door and door to balloon time,the culprit vessel, the presence or absence of other vessels affection and number of vessels affected and severity of CAD assessed by Gensini score as follows:

The points were assigned according to the percentage of luminal narrowing: 1 point for 1%-25% occlusion, 2 for 26%-50%, 4 for 51%-75%, 8 for 76%-90%, 16 for 91%-99%, and 32 points for a complete occlusion. Each of these points are compounded by multiplications factors accounting for the differences in the location of obstruction, such as 5 for left main artery, 2.5 for proximal left anterior descending and left circumflex arteries, and 1 for proximal right coronary artery.

Finally, the total Gensini score for each patient was expressed as the sum total score of each CAD lesion [6].

The intervention details including use of thrombus aspiration, Percutaneous Transcatheter Coronary Angioplasty (PTCA) with or without stent placement or direct stenting and type of stent used.

Occurrence of no reflow and any procedural complication were recorded including dissection and perforation.

The initial TIMI flow and Myocardial Blush Grade (MBG) were assessed initially, immediately after stent placement and at the end of the procedure by the operating cardiologist. Myocardial blush grading was performed visually in the catheterization lab on a cinefilmat 25 frames/second. No digital techniques were applied. Assessment of myocardial blush grade was done in the same views for the infarct related artery for standardization and for minimizing superimposition of non-infarcted territories in the assessment of the MBG. The left lateral view was used to assess lesions involving the left coronary artery while the right anterior oblique view was used to asses lesions involving the right coronary artery.

TIMI classification used was:

TIMI 0 (no perfusion): No antegrade flow beyond the point of occlusion.

TIMI 1 (penetration without perfusion): The contrast material passes beyond the area of obstruction but "hangs up" and fails to opacify the entire coronary bed distal to the obstruction for the duration of the cine angiographic filming sequence.

TIMI 2-(partial perfusion): The contrast material passes across the obstruction and opacifies the coronary bed distal to the obstruction. However, the rate of entry of contrast material into the vessel distal to the obstruction or its rate of clearance from the distal bed (or both) are perceptibly slower

than its entry into or clearance from comparable areas not perfused by the previously occluded vessel-e.g., the opposite coronary artery or the coronary bed proximal to the obstruction.

TIMI 3-(complete perfusion): Antegrade flow into the beddistal to the obstruction occurs as promptly as antegrade flow into the bed proximal to the obstruction, and clearance of contrast material from the involved bed as rapid as clearance from an uninvolved bed in the same vessel or the opposite artery [7].

Myocardial Blush Grade (MBG) used was:

Grade 0: No myocardial blush or contrast density.

Grade 1: Minimal myocardial blush or contrast density.

Grade 2: Moderate myocardial blush or contrast density but less than that obtained during angiography of a contralateral or ipsilateral non-infarct-related coronary artery.

Grade 3: Normal myocardial blush or contrast density, comparable with that obtained during angiography of a contralateral or ipsilateral non-infarct-related coronary artery [8].

Procedural outcome assessed by:

A- Final TIMI flow.

B- Final MBG.

C- Successful reperfusion defined angiographicaly as TIMI 3 flow with MBG ≥2 (Steg at, 2012) or electro-cardiographic by ST-segment resolution ≥70% within 4 hours following the procedure (Sorajja et al., 2005).

The studied patients were divided according to eGFR into:

Group 1: Normal renal function group (eGFR ≥90mL/min/ $1.73m^2$).

Group 2: Mild renal impairment (eGFR 60-89 ml/min/$1.73m^2$).

Group 3: Moderate renal impairment (eGFR 30-59ml/min/ $1.73m^2$).

Group 4: Sever renal impairment (eGFR <30 ml/min/$1.73m^2$). (National Kidney Foundation, 2002).

eGFR was estimated using MDRD formula:

eGFR = 186 X (serum creatinine) – 1.154 X age – 0.0203 (X 1.210 if black) (X 0.742 if female).

Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation and chi-square test by SPSS V.20. Numerical data was presented as mean and Standard Deviation (SD) and categorical data was presented as number and percentage. Chi-squared test was used for statistical analysis. When the chi-squared test was not appropriate, the likelihood ratio test was applied. The level of significance was adopted at $p<0.05$.

Subjects were informed about the purpose and procedure of the study and benefits of sharing in it. Ethical considerations of the study were carried out according to that of Declaration of Helsinki [9].

Results

The studied patients were divided according to eGFR into Group I which included 25 patients with mean ± SD age 49.5±9.07 and 22 were male and 3 were female. Diabetes was present in 9 patients and hypertension was observed in 21 patients, Group II include 55 patients with mean age 56 and 43 were male and 12 were female, and diabetes was present in 32 patients and hypertension was observed in 37 patients, Group III was 43 patients with mean age 64 and 25 were male and 18 were female diabetes was present in 31 patients and hypertension was observed in 26 patients, Group IV was 15 patients with mean age 58 and 12 were male and 3 were female diabetes was present in 6 patients and hypertension was observed in 8 patients. Tables (1,2).

Table (3) reveals that systolic blood pressure levels were as the following: 137.0±26.2mmHg in Group I, 135.5±23.9mmHg in Group II, 136.7±28.3mmHg in Group III, and 86.0±21.9mmmHg in Group IV. The diastolic blood pressure levels were as the following; 82.8±14.7mmHg in Group I, 80.8±14.4mmHg in Group II, 82.4±15.0mmHg in Group III, and 40.0±10.0mmHg in Group IV. The eGFR level had a statistically significant effect on systolic and diastolic blood pressure.

Regarding the Creatinine Clearance (CrCl) level, it had the following means; 0.92 ±0.11 in Group I, 1.0±0.1 in Group II, 1.5±0.4 in Group III, and 3.7±1.5 in Group IV. The differences in creatinine clearance levels between groups were statistically significant. The Contrast Induced Nephropathy (CIN) had the highest percentage in Group IV (80%), followed by Group III (62.8%), then Group II (30.9%), and lastly Group I (4%). The occurrence in CIN was statistically significant as regards the eGFR groups.

The Initial Killip class IV had the highest percentage in Group IV (33.3%). The difference in Killip class distribution among EGFR groups was statistically significant.

Table (4) shows that three vessels affection was the highest among Group IV (33.3%). Regarding two vessels affection, the highest percentage was also among Group IV. One vessel affection was the highest among Group I (60%). However, that difference wasn't statistically significant.

Group IV had the highest vessel affection level as regards LAD, and RCA, and CX (80%, 73.3%, and 73.3%, respectively). EGFR level had a statistically significant effect on the affected vessel (*p*=0.001 *). Subgroup analysis revealed that Group IV, Group III, and Group II were statistically significant different when compared to other groups.

No statistically significant difference was observed in the number of affected vessels, the use of G2P, and pain to door time as regards EGFR level.

Table (5) shows that all patients in Group IV had intial TIMI score "0". The eGFR had no statistically significant effect on the theintial TIMI score (*p*=0.192).

As regards the final TIMI score, Group IV represented the highest percentage of TIMI score grade 1 followed by group Group III (20% and 9.3%, respectively). The eGFR had a statistically significant effect on the final TIMI grade. eGFR level had a statistically significant effect on the final TIMI grade. The subgroup analysis revealed that Group IV had a statistically significant difference from the remaining groups (*p*=0.001).

Table (6) showed the severity of coronary lesions by Gensisni score among the eGFR groups the result was statistically significant with highest among Group IV with mean ± SD 106.9±24.8 and 67.55±34.36 in Group III and 52.54±28.6 in Group II and 50.68±24.3 in Group I.

Table (7) showed that there was statistically significant difference between the MBG between the four groups, Group IV showed the lowest MBG with 40% grade 0 and 46.7% grade 1 while Group III showed 11% grade 0, 32% grade 1 and 39.5% grade 2 and 16% grade 3 Group II showed 5% grade 0, 29% grade 1, 38% grade 3 and 27% grade 3 Group I showed 0% grade 0 and 8% grade 1 and 28% grade 2 and 64% grade 3.

Regarding the systolic functions of the study patients, Group IV had the lowest ejection fraction% mean ± SD (42.07±10.51). The eGFR had a statistically significant effect on the ejection fraction (*p*=0.002), subgroups analysis showed that Group III (moderate renal dysfunctions) and Group IV (severe renal dysfunction) had statistically significant lowest value of systolic functions from other groups (*p*=0.001*).

Table (9) reveals that Group IV had the highest complication rate as the following; dialysis was indicated in 33.3%, hemorrhage occurred in 13.3% of Group IV, and death occurred in 40%. Regarding recurrent MI, it occurred in one case representing 2.3% of Group III.

Table (1): Distribution of the study patients into groups according to EGFR.

Study groups	EGFR	n.	&
Group I	>90	25	18.1
Group II	60-89	55	39.9
Group III	30-59	43	31.2
Group IV	<30	15	10.9

Table (2): Demographic and risk factors of the eGFR groups.

Variables	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)	Sig. test	*p.*
Age:						
Mean ± S.D	49.56±9.07	56.42±10.27	64.09±8.98	58.73±10.65	F 12.413	0.001 *
Sex:						
Male	22 (88.0%)	43 (78.2%)	25 (58.1%)	12 (80.0%)	χ^2 8.930	0.030*
Female	3 (12.0%)	12 (21.8%)	18 (41.9%)	3 (20.0%)		
DM	9 (36.0%)	32 (58.2%)	31 (72.1%)	6 (40.0%)	χ^2 10.255	0.017*
HTN	21 (84.0%)	37 (67.3%)	26 (60.5%)	8 (53.3%)	χ^2 5.333	0.149
Smoking	19 (76.0%)	32 (58.2%)	24 (55.8%)	4 (26.7%)	χ^2 9.379	0.025*

* : Statistically significant.   DM   : Diabetes Mellitis.
χ^2 : Chi square test.   HTN : Hypertension.
F   : One way Analysis of Variance (ANOVA).

Table (3): Vital data and renal function of the studied groups.

Variables	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)	Sig. test	*p.*
SBP:						
Mean ± S.D	137.0±26.2	135.5±23.9	136.7±28.3	86.0±21.9	F	0.001*
Comparing groups	p_1 0.575	p_2 0.585	p_3 0.001*	p_4 0.001*	17.180	
DBP:						
Mean ± S.D	82.8±14.7	80.8±14.4	82.4±15.0	40.0±10.0	F	0.001*
Comparing groups	p_1 0.542	p_2 0.587	p_3 0.001*	p_4 0.001*	8.114	
Pulse:						
Mean ± S.D	84.7±16.6	82.09±16.4	87.6±17.9	81.6±21.8	F 0.926	0.430
Cr CL ml/min:						
Mean ± S.D	0.92±0.11	1.0±0.1	1.5±0.4	3.7±1.5	F	0.001*
Comparing groups	p_1 0.326	p_2 0.001 *	p_3 0.001*	p_4 0.001 *	95.875	
CIN:	1 (4%)	17 (30.9%	27 (62.8%)	12 (80.0%)	χ^2	0.001*
Comparing groups	p_1 0.435	p_2 0.001 *	p_3 0.001*	p_4 0.001*	34.259	
Initial Killip class:						
I	19 (76.0%)	44 (80.0%)	30 (69.8%)	1 (6.7%)	χ^2	0.001*
II	6 (24.0%)	10 (18.2%)	11 (25.6%)	5 (33.3%)	68.295	
III	0 (0%)	1 (1.8%)	2 (4.7%)	4 (26.7%)		
IV	0 (0%)	0 (0%)	0 (0%)	5 (33.3%)		
Comparing groups	p_1 0.520	p_2 0.566	p_3 0.001*	p_4 0.001*		

* : Statistically significant.
χ^2 : Chi square test.
F   : One way Analysis of Variance (ANOVA).
 Significance between groups by post Hoc LSD.
p 1: For comparing between Group I and Group II.
*p*2 : For comparing between Group II and Group III.

p_3 : For comparing between Group III and Group IV.
p_4 : For comparing between Group I and Group IV.
SBP : Systolic Blood Pressure.
DBP : Diastolic Blood Pressure.
CIN : Contrast Induced Nephropathy.
CrCl : Creatinineclearence.

Table (4): Interventional data among the studied groups,

Variables	EGFR groups				Sig. test	*p.*
	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)		
No of the affected vessels:						
1	15 (60.0%)	22 (40.0%)	16 (37.2%)	1 (6.7%)	χ^2	0.066
2	6 (24.0%)	21 (38.2%)	15 (34.9%)	9 (60.0%)	11.836	
3	4 (16.0%)	12 (21.8%)	12 (27.9%)	5 (33.3%)		
Affected vessels:						
LAD	19 (76.0%)	44 (80.0%)	35 (81.4%)	12 (80.0%)	χ^2	0.001*
RCA	13 (52.0%)	33 (60.0%)	23 (53.5%)	11 (73.3%)	30.593	
CX	5 (20.0%)	14 (25.5%)	19 (44.2%)	11 (73.3%)		
Leftt main	0 (0.0%)	2 (3.6%)	1 (2.3%)	0 (0.0%)		
Comparing groups	p_1 0.620	p_3 0.001*	p_3 0.001 *	p_4 0.001*		
Use of GIIbIIIa	6 (24.0%)	12 (21.8%)	12 (27.9%)	3 (20.0%)	χ^2 0.636	0.888
Pain to door time:						
Mean ± S.D (in hours)	6.32±5.66	5.6±2.56	6.79±2.04	6.73±3.10	F 1.187	0.379

* : Statistically significant.
χ^2 : Chi square test.
F   : One way Analysis of Variance (ANOVA).
p_1 : For comparing Group I with other groups.
p_2 : For comparing Group II with other groups.
p_3 : For comparing Group III with other groups.

p_4 : For comparing Group IV with other groups.
LAD   : Left Anterior Descending.
RCA   : Right Coronary Artery.
LCX   : Left Circumflex.
GIIbIIIa : Glycoprotein IIbIIIa.

Table (5): TIMI score before and after PCI among the studied groups.

Variables	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)	Sig. test	p.
TIMI Initial:						
0	23 (92.%)	47 (85.5%)	38 (88.4%)	15 (100.0%)	χ^2	0.192
1	1 (4.0%)	5 (9.1%)	0 (0%)	0 (0%)	8.720	
2	1 (4%)	3 (5.5%)	5 (11.6%)	0 (0%)		
TIMI final:						
1	2 (8.0%)	5 (9.1%)	4 (9.3%)	3 (20.0%)	χ^2	0.020*
2	2 (8.0%)	3 (5.5%)	9 (20.9%)	7 (46.7%)	21.333	
3	21 (84.0%)	47 (85.5%)	30 (69.8%)	5 (33.3%)		
Comparing groups	p_1 0.270	p_2 0.010*	p_3 0.190	p_4 0.001*		

* : Statistically significant.   p2: For comparing Group II with other groups.
χ^2 : Chi square test.   p3: For comparing Group III with other groups.
p_1 : For comparing Group I with other groups.   p4: For comparing Group IV with other groups.

Table (6): Gensini score among EGFR groups.

Gensini score	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)	Sig. test	p.
Mean ± S.D	50.68±24.3	52.54±28.6	67.55±34.36	106.9±24.8	5.204	0.002*
Comparing groups	p_1 0.795	p_2 0.014*	p_3 0.001*	p_4 0.001*		

* : Statistically significant.   p1: For comparing between Group I and Group II.
F : One way Analysis of Variance (ANOVA).   p2: For comparing between Group II and Group III.
Significance between groups by post Hoc LSD.   p3: For comparing between Group III and Group IV.
                                                         p4: For comparing between Group I and Group IV.

Table (7): MBG grade among the studied groups.

MBG grade	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)	Sig. test	p.
0	0 (0.0%)	3 (5.5%)	5 (11.6%)	6 (40.0%)	χ^2	0.001*
1	2 (8.0%)	16 (29.1%)	14 (32.6%)	7 (46.7%)	43.721	
2	7 (28.0%)	21 (38.2%)	17 (39.5%)	2 (13.3%)		
3	16 (64.0%)	15 (27.3%)	7 (16.3%)	0 (0.0%)		
Comparing groups	p_1 0.379	p_2 0.010*	p_3 0.019*	p_4 0.001*		

* : Statistically significant. p_3 : For comparing Group III with other groups.
χ^2 : Chi square test. p_4 : For comparing Group IV with other groups.
p_1 : For comparing Group I with other groups.   MBG : Myocardial Blush Grade.
p_2 : For comparing Group II with other groups.

Table (8): Ejection fraction among the studied groups.

Variables	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)	Sig. test	p.
Ejection fraction %:						
Mean ± S.D	54.17±7.44	50.55±9.39	51.60±10.42	42.07±10.51	5.204	0.002*
Comparing groups	p_1 0.520	p_2 0.566	p_3 0.001*	p_4 0.001*		

* : Statistically significant.   p1: For comparing between Group I and Group II.
F : One way Analysis of Variance (ANOVA).   p2: For comparing between Group II and Group III.
Significance between groups by post Hoc LSD.   p3: For comparing between Group III and Group IV.
                                                         p4: For comparing between Group I and Group IV.

Table (9): Distribution of complication among the studied groups.

Variables	EGFR groups				χ^2	p.
	Group I (n=25)	Group II (n=55)	Group III (n=43)	Group IV (n=15)		
Dialysis	0 (0%)	0 (0%)	0 (0%)	5 (33.3%)	42.541	0.001*
Hemorrhage	1 (4%)	3 (5.5%)	0 (0%)	2 (13.3%)	5.036	0.169
Death	0 (0%)	3 (5.5%)	4 (9.3%)	6 (40.0%)	20.053	0.001*
Recurrent MI	0 (0%)	0 (0%)	1 (2.3%)	0 (0%)	2.225	0.527

*: Statistically significant. χ^2 : Chi square test.   F: One way Analysis of Variance (ANOVA).

Discussion

In patients with Acute Coronary Syndrome (ACS), CKD represents a potent and independent risk factor for adverse outcomes. Although the mechanism of such adverse outcomes is not completely understood, it is believed to be due to interaction between extensive comorbidities and traditional risk factors which are highly prevalent in the CKD patients' population and the unique pathology of CKD [10].

This work enrolled patients admitted to Tanta University Hospitals by STEMI and treated by primary PCI from June 2016 to December 2016 to evaluate the effect of CKD on the angiographic outcomes in those patients.

Among CKD patients, the majority were males. They were older than the group with normal renal functions with significantly higher proportion of females when compared to the normal renal function group. This can be attributed to the gradual decline of renal function which is a recognized feature of the aging process despite presence of wide variability in the rate of decline among individuals [11].

This agrees with Kim et al., [12] who found that among patients undergoing primary PCI, CKD patients were older and more likely to be females.

The current study showed significant difference in prevalence of smoking among different groups. This agree with, Polanska-Skrzypczyk et al., (2013) [5] who stated that CKD patients were less likely to have a positive history of smoking.

Hypertensions as well as DM were more prevalent with progressive decline in kidney functions. The relationship between high blood pressure and kidney disease is complex [13]. This can be attributed to hypertension being a risk factor for CKD and a contributor to its progression (Toto, 2005) [14], or the development of hypertension as a consequence of CKD. Decrements in renal function is associated with parallel increments in arterial blood pressure [14].

Among the patients with reduced renal function, only 23% were known to be CKD. Owing to the nature of CKD being asymptomatic and clinically silent till its late stages [15]. The current study showed that the Initial Killip class IV had the highest percentage in Group IV (33.3%). The difference in Killip class distribution among EGFR groups was statistically significant. This agrees with the findings of Polanska-Skrzypczyk et al.,

(2013) [5] and Kim et al., (2010) who found that patients with CKD had a significantly higher killip class on admission.

The location of STEMI in CKD group was not significantly different when compared the normal renal function group with Anterior STEMI representing around 60% of cases in both groups.

Polanska-Skrzypczyk et al., [5] demonstrated that decline of renal function didn't have an effect on localization of STEMI although non-anterior infarction was more common in both normal renal function group and CKD group.

On the contrary Kim et al., (2010) [12] demonstrated that with decline in the renal function the left anterior descending artery became less involved with more involvement of the right coronary artery.

There was also a non-significant trend towards a longer pain to door time in patients with CKD. This can be explained by frequent absence of classic symptoms of ischemia in CKD patients which delays seeking medical attention [16].

Compared to the general population, CKD patients experience a more dramatic progression of coronary artery disease with higher rate of atypical presentations [17].

Silent or atypical presentations of acute coronary syndromes in CKD can be attributed to higher prevalence of diabetes in this population [13]. It is estimated that the prevalence of silent myocardial infarction was 13% compared with 4% in those without CKD [14]. It was found that patients on regular dialysis who were hospitalized for acute myocardial infarction experienced chest pain less frequently than those who are not on dialysis [18].

With progressive worsening of renal function, there was an increase in the number of major coronary arteries involved in the atherosclerotic process and the severity of the CAD.

The current study showed that with progressive worsening of renal function, there was an increase in the severity of CAD.

This agrees with the findings of Yagi et al., [19] who evaluated the relationship between the severity of Coronary Artery Disease (CAD) assessed by Gensini score and traditional coronary risk factors, metabolic syndrome, and Chronic Kidney Disease (CKD) in patients undergoing elective coronary angiography. Comparing the prevalence of risk factors between patients with single vessel disease and patients with multivessel disease, it was

demonstrated that CKD was the only independent predictor of multivessel disease. Patients with CKD had a 2.9 fold risk of having multivessel disease.

Kim et al., [12] retrospectively evaluated the records of 1192 patients who underwent elective coronary angiography; the severity of CAD was evaluated by Gensini score. Reduced renal function was an independent predictor of both the prevalence and the severity of coronary artery disease even after controlling for traditional cardiovascular risk factors including diabetes, hypertension and dysl-ipidemia.

Furthermore, Coskun el al., [20] demonstrated that even among patients with multivessel disease, the decline in kidney function is directly proportional to the complexity of coronary artery lesions assessed by the syntax score.

The current study showed that reduced renal function either estimated by eGFR was associated with significantly lower rates of suboptimal perfusion assessed by angiographic and by electrocardiographic criteria. Both the epicardial coronary artery flow and the myocardial perfusion were both reduced with reduced renal function when compared to the group with normal kidney functions.

As regards the final TIMI score, Group IV represented the highest percentage of TIMI score grade 3 followed by group Group III (20% and 9.3%, respectively). The EGFR had a statistically significant effect on the final TIMI score. EGFR level had a statistically significant effect on the final TIMI score. The subgroup analysis revealed that Group IV had a statistically significant difference from the remaining groups (p=0.001).

Presence of CKD was associated with lower rates of TIMI flow and MBG assessed at the end of the procedure.

After controlling for covariates both eGFR calculated by MDRD formula was independently and inversely associated with suboptimal perfusion following primary PCI. This goes hand in hand with the findings of Sabroe et al., (2014) [21] who evaluated the impact of CKD on angiographic and clinical outcomes in 4116 patients undergoing 1ry PCI for treatment of STEMI. Patients were divided to two groups with a cutoff CrCl of 60ml/min. Although the initial TIMI flow was similar in both groups the final TIMI flow was significantly lower in the renal insufficiency group. The reduction in CrCl was an independent predictor of mortality. This is in accordance with the findings of Kim et

al., (2010) [12] who found that in patients with moderate and severe renal dysfunction rates of optimal reperfusion (defined as finalTIMI 3 flow) were significantly lower with progressive decline in renal function.

A prospective single center study conducted by Polanska-Skrzypczyk et al., [5] at the Institute of Cardiology in Warsaw (Anin) where all consecutive patients with STEMI treated with 1ry PCI between February 2001 and October 2002 were included in a prospective registry demonstrated an association between CKD and procedural failure defined as TIMI flow <3. After adjustment for covariates independent predictors of procedural failure were decreased eGFR, initial TIMI flow <2 and a positive history of smoking.

Kurtul et al., [22] assessed the relationship between renal dysfunction and no re-flow phenomenon in 673 patients undergoing primary PCI, demonstrated that declining renal function together with higher killip class at presentation and left ventricular ejection fraction as independent predictors of suboptimal perfusion.

The association between on admission eGFR and poor myocardial perfusion was assessed in 80 patients with STEMI treated by primary PCI. Patients were stratified by TIMI Myocardial Perfusion Grade (TMPG). Reduced eGFR together with peak CKMB, left ventricular ejection fraction less than 35%, initial TIMI flow grade <2 and longer pain-to-balloon time were independently associated with poor myocardial perfusion [23].

In the current study that Group IV had the highest complication rate as the following; dialysis was indicated in 33.3%, hemorrhage occurred in 13.3% of Group IV, and death occurred in 40%. Regarding recurrent MI, it occurred in one case representing 2.3% of Group III.

The eGFR level had a statistically significant effect on dialysis and death among the study patients.

This agree with Polanska-Skrzypczyk et al., (2013) [5] who state the rate of complication is higher among CKD group and Kim et al., [12] who also stated that rate of MACE.

CKD predisposes to higher rate of procedural failure via complex coronary anatomy, derangement of micro vascular structure and function together with a hyper coagulable state leading to a heavier thrombus burden.

Conclusion:

CKD is not uncommon finding among patients with STEMI. Both epicardial coronary flow and myocardial perfusion are reduced in CKD patients with STEMI and CKD was independently and inversely associated with the rate of procedural success.

Limitations:

The study had some limitations. This is a single-centre experience and represents a limited number of patients.

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تأثيـر الإعتلال الكلوى على الشرايين التاجيـة فى المرضى المصابين بإحتشاء عضلة القلب الذين يخضعون للقسطرة العلاجية الأولية وتآثيـره على فترة التواجد بالمستشفى

آجريت هذه الدراسـة على تسعين مريضـا تم دخولهم إلى مستشفيات جامعة طنطا فى الفترة بين يونيو إلى نوفمبر من العام ٢٠١٦ وتم تشخيصهم بأنهم مصابون بجلطة فى الشريان التاج للقلب، وتم إخضاعهم للعلاج عن طريق القسطرة القلبية التداخلية الآولية بعد الحصول على الموافقة تم تقسيم المرضى بعد حساب وظائف الكلى إلى آربع مجموعات.

وقد لوحظ عدم وجود إختلاف نو دلالة إحصائية فى العلامات الحيوية والوقت من ساعة الدخول حتى إعادة التروية بين المجموعات المختلفة، وكان الشريان التاجى الآمامى النازل هو المتسبب فى الجلطة فآكثر من ٦٠٪ من المرضى.

لم يختلف نوع التدخل بين المجموعات المختلفة. وكان معدل إنعدام إعادة التروية بعد تركيب الدعامة آكثر فى مرضى القصور الكلوى المزمن مقارنة بمجموعة وظائف الكلى الطبيعية. كان معدل سريان الدم بالشريان التاجى ومعدل تورد عضلة القلب فى نهاية التدخل آقل فى مجموعة القصور الكلوى مقارنة بمجموعة وظائف الكلى الطبيعية بينما لم يوجد إختلاف نو دلالة إحصائية بين المجموعات الفرعية. بينما كان معدل نجاح القسطرة الآولية الذى تم تقييمه عن طريق التصوير الوعائى ٨٨،٥٪ فى مجموعة وظائف الكلى الطبيعية و٥٩٪ فى مجموعة القصور المزمن بوظائف الكلى ولم يوجد فرق نو دلالة إحصائية بين المجموعات الفرعية.

وكان معدل النجاح متمثلا فى إنخفاض قطعة س-تبعد ٤ ساعات من التدخل آقل فى مجموعة القصور المزمن بوظائف الكلى (٦٧٪) مقارنة بمجموعة وظائف الكلى الطبيعية (وبتطبيق التحليل الآحادى آثرت ثلاثة عوامل على معدل نجاح التروية) وجود البول السكرى، مقياس جنسينى، والقصور المزمن بوظائف الكلى). وبعد تطبيق نموذج معامل الإنحدار لتحديد العوامل المستقلة وجد آن القصور المزمن بوظائف الكلى هو العامل المؤثر المستقل الوحيد المؤثر على نجاح التروية ويتناسب مع تناسبا عكسيا. كذلك وجد آن معادلة كوكر وفتجولتو معادلة التعديل المختصر على معادلة آمراض الكلى لهما نفس القدرة على التنبؤ بمعدل التروية الناجحة.