Renal Dysfunction as An Independent Predictor of Total Mortality after Acute Coronary Syndrome: The Thai ACS Registry†

Khorawit Sooklim MD*,
Suphot Srimahachota MD*, Smonporn Boonyaratavej MD*
Rungsrit Kanjanavanit MD**, Napa Siriviwattanakul MD***,
Chumpol Piamsomboon MD****, Rangson Ratanaprakarn MD*****

† *On behalf of the Thai Acute Coronary Syndrome Registry (TACSR) Group*
* *Division of Cardiology, Department of Medicine, Faculty of Medicine, King Chulalongkorn Memorial Hospital, Bangkok*
** *Division of Cardiology, Department of Medicine, Maharaj Nakorn Chiang Mai Hospital, Chiang Mai*
*** *Division of Cardiology, Department of Medicine, Rajavithi Hospital, Bangkok*
**** *Division of Cardiovascular Disease, Department of Medicine, Phramongkutklao Hospital, Bangkok*
***** *Samitive Heart Institute, Samitivej Hospital, Bangkok*

Background: *Renal insufficiency in the acute coronary syndrome (ACS) is associated with poor cardiac outcome. In Asian populations, there are no data available for these associations.*
Material and Method: *Data was from the Thai ACS registry, only a new case of ACS. Clinical characteristics, treatment strategies, in-hospital mortality and 1-year mortality were compared for patients with normal or mild renal dysfunction (estimated glomerular filtration rate [eGFR] > 60 ml/minute/1.73 m^2, n = 809 [44.5%]), moderate renal dysfunction (eGFR 30-60 ml/minute/1.73 m^2, n = 706 [38.9%]), and severe renal dysfunction (eGFR < 30 ml/minute/1.73 m^2, n = 301 [16.6%]).*
Results: *Of the 1,816 patients with mean follow-up 10.8 months, the mean age was 65 years, and 59.2 percent of the groups were male. Patients with severe renal dysfunction were significantly older, less likely to be male (45.2%, p < 0.001) and had a greater prevalence of diabetes (63.1%, p < 0.001) and hypertension (85.4%, p < 0.001). In-hospital and 1-year mortality were 13.5% and 22.5% respectively. According to discharge diagnosis, unadjusted hazard ratios for overall in-hospital mortality was statistically significant only in ST elevation MI subgroup, hazard ratio was 2.73 (95% CI, 1.72 to 4.34) and 6.27 (95% CI, 3.78 to 10.4) for moderate and severe renal dysfunction group, respectively. The risk of death for all types of ACS at 1-year follow up increased when eGFR decreased below 60 ml/minute/1.73 m^2, the adjusted hazard ratio was 1.66 (95% CI,1.22 to 2.23) and 1.91 (95% CI,1.34 to 2.72) for moderate and severe renal dysfunction group, respectively.*
Conclusion: *From Thai ACS registry, renal dysfunction at presentation is an independent predictor for the overall 1- year mortality and appeared to associate with an increase in hospital mortality in the subsets with STEMI.*

Keywords: *Acute coronary syndrome registry, Renal dysfunction, Mortality*

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Acute coronary syndrome (ACS) included the spectrum of conditions from unstable angina, non-ST segment elevation myocardial infarction (NSTEMI), and ST segment elevation myocardial infarction (STEMI). This serious cardiovascular condition causes major morbidity and mortality throughout the world including Thailand. These syndromes thereby represent a wide spectrum of conditions from the standpoint of diagnosis, treatment and shared common underlying pathophysiological mechanisms. Renal function, as measured by estimated glomerular filtration rate (eGFR), has been shown in epidemiological studies and clinical

Correspondence to : Srimahachota S, Division of Cardiovascular Diseases, Department of Medicine, King Chulalongkorn Memorial Hospital, Bangkok 10330, Thailand. Phone & Fax: 0-2256-4291, E-mail: s_srimahachota@yahoo.co.th

trials to be an independent predictor of survival[1-7]. A breakpoint for increased risk of restenosis, recurrent myocardial infarction (MI), congestive heart failure (CHF) and cardiovascular death occurs below and eGFR of 60 mL/min/1.73 m^2, which roughly corresponds to a serum creatinine of more than 1.5 mg/dL in the general population[8]. This prognostic value has never been studied in Thai ACS patients.

The objective of the present study was to evaluate the prognostic impact of eGFR on in-hospital, 1-year mortality, and adverse cardiovascular composite outcome in a large, non-selective, and broad spectrum of patients with ACS.

Material and Method

Study sample

This was a sub-study of Thai Acute Coronary Syndrome Registry, on behalf of The Heart Association of Thailand under the Royal Patronage of H.M. the King. The present study was a prospective cohort analysis of Thai patients who were hospitalized for the first ACS. Seventeen hospitals (13 government and 4 private) in Thailand were participating in the registry. The present study included phase I (1 August 2002 to 30 April 2004) only in King Chulalongkorn Memorial Hospital and all patients in phase II (1 May 2004 to 31 October 2004) of the registry. Patients, entered in the registry, had to be at least 15 years old and patients who presented with chest pains or symptoms suggestive of ACS with ST-T change within 14 days. Data were collected at each site by trained nurses using a standardized case report form. Demographic characteristic, medical history, presenting symptoms, diagnosis, cardiac marker and initial serum creatinine level, medical treatment, revascularization and variety of hospital outcome data were collected.

Measures of kidney function

Serum creatinine is commonly used to estimate creatinine clearance, however, it is a poor predictor of glomerular filtration rate.

Patients were categorized according to the eGFR at baseline with the use of the four-component abbreviated MDRD[10] equation incorporating age, race, sex, ad serum creatinine level eGFR = 186 x (serum creatinine level [in milligrams per deciliter])$^{-1.154}$ x (age [in years])$^{-0.203}$.

Degree of renal function was stratified according to stages of renal dysfunction, adapted from the National Kidney Foundation[9]. The eGFR was classified into three groups: normal or minimal renal dysfunction (> 60 ml per minute per 1.73 m^2; n = 809), moderately renal dysfunction (30-60 ml per minute per 1.73 m^2; n = 706) and severe renal dysfunction (< 30 ml per minute per 1.73 m^2; n = 301).

Outcomes

The present study's primary end points were death from any causes, and the secondary end points were death from cardiac causes, congestive heart failure, and cerebrovascular events. Death was identified from death certification from Department of Provincial Administration, Ministry of Interior, Royal Thai government.

Statistical analysis

All continuous data were expressed as mean $\pm$ standard deviation and categorical data were expressed as frequencies and percentages. Analysis of variance was used for the analysis of continuous variables and Chi-square test or fisher' exact test, as appropriate, were used to compare categorical and dichotomous variables.

In-hospital mortality and survival time were calculated from the date of admission to the hospital for ACS to date on which the data were censored or on which end point (including in-hospital death) was reached.

One-year mortality was estimated and plotted as Kaplan-Meier curves, stratified according to the eGFR and the log-rank test was used for comparison between groups. A Cox proportional-hazards regression model was used to evaluate the independent effect of the eGFR on patients' survival. Covariates were selected for a final model by a stepwise forward variable-selection procedure. The data were censored if a patient was still alive at the end of the present study, or was lost to follow-up. Hazard ratios with 95 percent confidence intervals were calculated for all pair wise comparisons. A p-value < 0.05 was considered statistically significant.

All data analyses were performed with SPSS software (version 13.0). The institutional Ethic Committee of each collaborating institution approved the present study.

Results

The present study included 1,908 patients who had ACS. The authors excluded 98 patients from the present study because of no initial serum creatinine level (52 patients) and nationality was non-Thai population (46 patients).

Table 1. Baseline characteristic of the patients according to the estimated GFR

Variables	GFR (mL/min/1.73 m^2)			All (n = 1816)	p-value
	< 30 (n = 301)	30-60 (n = 706)	> 60 (n = 809)		
Age - yr					
Mean (SD)	69.8 (10.6)	68.8 (10.1)	60.2 (12.2)	65.2 (11.9)	<0.001*
Range	42-99	34-94	26-95	26-99	
Male sex - (%)	45.2	53.4	70.0	59.4	<0.001
Medical History - (%)					
DM	63.1	44.8	35.7	43.8	<0.001
HT	85.4	73.2	52.2	65.9	<0.001
Dyslipidemia	64.1	67.7	71.1	68.6	0.204
Family history	6.8	8.8	15.0	11.2	<0.001
Smoking history - Currently smoking (%)	14.3	16.7	29.8	22.1	<0.001
Clinical presentation - (%)					
Chest pain	82.1	83.9	92.0	87.2	<0.001
Cardiac dyspnea	53.2	40.7	20.4	33.7	<0.001
Shock	15.3	9.9	6.7	9.4	<0.001
Post cardiac arrest	5.6	5.1	4.0	4.7	0.394
Diagnosis - (%)					<0.001
ST-elevation MI	23.6	30.7	47.8	37.2	
Non ST-elevation MI	65.8	44.3	29.9	41.5	
Unstable angina with ST-T change	10.6	24.9	22.2	21.4	
Initial serum creatinine level (mg %)					
Mean (± SD)	4.05 (2.87)	1.48 (0.29)	0.95 (0.20)	1.67 (1.61)	<0.001*

* One-Way ANOVA

** GFR denotes glomerular filtration rate, SD standard deviation, DM diabetes mellitus, HT hypertension, MI myocardial infarction and SD standard deviation

Demographic characteristics

Table 1 shows baseline characteristics of the patients with a diagnosis of ACS at the time of hospitalization according to the eGFR. There were 1,816 patients in the final analysis, 59.4 percent of the group were men, 5 percent were 45 years of age or less, 15.2 percent were 45 to 54 years old, 23.5 percent were 55 to 64 years old, and 33.2 percent were 65 to 74 years old, and 23.1 percent were 75 years old or more. Patients with severe renal dysfunction were significantly older, more likely to be women, and had a greater prevalence of diabetes and hypertension.

Cardiac dyspnea and shock prior to admission were observed more frequently as the degree of renal dysfunction worsened. In patients with severe renal dysfunction, diagnosis of STEMI were seen less often as renal impairment increased, in contrast to the diagnosis of NSTEMI.

The mean length of hospital stay was 9.2 days for patients with normal or minimal renal dysfunction, 10.9 days for patients with moderate renal dysfunction, and 12.4 days for those with severe renal dysfunction. Diagnoses of STEMI, NSTEMI and UA with ST-T change were 37%, 42% and 21% of the patients, respectively. STEMI were likely to have normal or minimal renal dysfunction, in contrast to patients with NSTEMI, of which more presented with severe renal dysfunction.

The mean follow-up after ACS was 0.91 years (25^{th}-75^{th} 0.02-1.45 years). The vital, follow-up status data were incomplete in 546 patients (31.1%). The baseline characteristic were indifferent between groups, except, patients with unknown vital status at follow-up and were more likely to be older (age > 60 years old: 72.5% vs. 67.4%), more likely to be diagnosed of UA with ST-T change (25.6% VS 19.4%), less likely to have shock prior to admission (5.4% vs. 11.2%) and post cardiac arrest prior to admission (2.8% vs. 5.6%).

Treatment

The pharmacological treatment during hospitalization and discharge of patients with ACS is

Table 2. Treatment during index of hospitalization, according the estimated GFR

Variables	GFR (mL/min/1.73 m^2)			All (n = 1,816)	p-value
	< 30 (n = 301)	30-60 (n = 706)	> 60 (n = 809)		
Aspirin - (%)	89.0	95.0	96.4	94.7	<0.001
Statin - (%)	71.1	81.7	85.7	81.7	<0.001
Beta-blocker - (%)	41.9	59.8	67.7	60.4	<0.001
ACEI - (%)	28.6	63.3	69.3	60.2	<0.001
ADP inhibitor - (%)	53.8	58.4	63.2	59.7	0.012
Nitrate - (%)	80.7	83.3	69.3	60.2	0.506
LMWH - (%)	60.1	65.3	68.9	66.0	0.021
Heparin - (%)	25.6	20.7	20.0	21.2	0.120
Calcium channel blocker - (%)	30.6	17.6	10.9	16.7	<0.001
GP IIb/IIIa inhibitor - (%)	5.6	6.7	13.8	9.7	<0.001
A2A - (%)	4.0	8.5	6.8	7.0	0.035
Procedures					
Coronary angiogram - (%)	35.9	46.9	59.8	50.8	<0.001
PCI - (%)	19.3	26.3	37.0	29.9	<0.001
CABG - (%)	5.3	5.2	7.0	6.1	0.285

* GFR denotes glomerular filtration rate, ADP inhibitor adenosine diphosphate inhibitor, ACEI angiotensin-converting enzyme inhibitor, GP IIb/IIIa glycoprotein IIb/IIIa, LMWH low molecular-weight heparin, A2A angiotensin II receptor antagonist, PCI percutaneous coronary intervention, and CABG coronary artery bypass graft

listed in Table 2. Aspirin was prescribed in more than 90 percent of the patients. Patients with severe renal dysfunction received risk modifying cardiovascular drugs, such as, aspirin, ACEI, beta-blockers, ADP inhibitors and statins less than other groups. Coronary angiogram and PCI were performed less frequently when eGFR worsened. Coronary artery bypass graft was performed in 6 percent of patients with no difference between groups according to the eGFR.

Mortality

The overall in-hospital and 1-year mortality were 13.5 percent and 22.5 percent, respectively (Table 3). Renal dysfunction was associated with increasing in-hospital and 1-year mortality rates. The composite cardiovascular end point and its individual components, except death from cardiovascular cause and stroke, were statistical significantly more common among patients with a lower eGFR at baseline than among those with the highest eGFR (Table 3).

Using the group with an eGFR of more than 60 ml per minute per 1.73 m^2 as the reference group yielded adjusted hazard ratios for death from any cause that increased as eGFR declined (Table 4). Adjusted hazard ratio for death from any cause were 1.66 (95% confidence interval (CI), 1.22 to 2.23) and 1.91 (95% CI, 1.34 to 2.72) for moderate and severe renal dysfunction group, respectively.

In sub-group analysis, unadjusted hazard ratios for in-hospital death from any cause was statistically significant only in the STEMI group (Table 5), hazard ratio were 2.73 (95% CI, 1.72 to 4.34) and 6.27 (95% CI, 3.78 to 10.4) for moderate and severe renal dysfunction group, respectively. In addition, unadjusted hazard ratios for death from any cause at follow up were statistically significant in all groups of ACS, except in the UA group with moderate renal dysfunction. The highest risk of death was in the STEMI group with severe renal dysfunction, hazard ratio was 7.53 (95% CI, 4.99 to 11.35).

The rate of cumulative survival at follow-up (Fig. 1) was 86.7 percent in the normal or minimal renal dysfunction group, compared with 75.4 percent in the moderate renal dysfunction group and 58.1 percent in the severe renal dysfunction group (overall $p < 0.001$).

The effects of independent predictors of in-hospital mortality from any cause were examined by the cox proportional-hazards model. Table 6 summarizes independent predictors of in-hospital mortality. The most powerful predictors of in-hospital mortality were history of shock prior to admission, congestive heart failure (killip 4), and arrhythmia during hospitalization. Patients

Table 3. End point events occurring during hospitalization and at 1-year follow up

End point	GFR (mL/min/1.73 m²)			All (n = 1816)	p-value
	< 30 (n = 301)	30-60 (n = 706)	> 60 (n = 809)		
During hospitalization					
Death from any cause - (%)	25.6	14.0	8.5	13.5	<0.001
Composite end point - (%)[ß]	73.1	56.9	37.7	51.0	<0.001
Death from cardiac cause - (%)	68.8	76.8	60.9	69.8	0.085
Pumping failure - (no.)	36	51	26	113	
Mechanical complication - (no.)	2	4	8	14	
Arrhythmia - (no.)	15	21	8	44	
Congestive heart failure - (%)	67.4	52.3	34.1	46.7	<0.001
Killip 2 - (%)	41.2	44.3	58.2	48.1	
Killip 3 - (%)	26.8	26.4	19.0	24.1	
Killip 4 - (%)	32.0	29.3	22.8	27.8	
Cerebrovascular accident - (%)	1.3	3.8	1.5	2.4	0.005
Ischemic stroke - (no.)	3	22	9	34	
Hemorrhagic stroke - (no.)	1	3	1	5	
Ischemic + Hemorrhagic stroke - (no.)	0	1	2	3	
Major bleeding	10.3	5.5	3.7	5.5	<0.001
Length of hospital stay (mean[days], SD)	12.4 (12.2)	10.9 (13.3)	9.2 (11.6)	10.4 (12.4)	<0.001*
1-year follow up					
Death from any cause - (%)	41.9	24.6	13.3	22.5	<0.001

* One-Way ANOVA
** GFR denotes glomerular filtration rate and SD standard deviation
[ß] Composite end point consists of cardiovascular death, congestive heart failure and cerebrovascuar accident

Table 4. Results of Cox proportional-hazards model of death from all causes at 1-year follow up*

Estimated GFR	Adjusted HR	95% CI	p-value
> 60 mL/min/1.73 m² [†]	1.00		
30-60 mL/min/1.73 m²	1.66	1.22-2.23	0.004
< 30 mL/min/1.73 m²	1.91	1.34-2.72	0.007

***** The analyses were adjusted for age, sex, the presence or absence of diabetes, hypertension, dyslipidemia, smoking, family history of CAD, dyspnea, chest pain, shock prior to admission, and cardiac arrest prior to admission, congestive heart failure, Killip classification (> 1), arrhythmia, major bleeding, revascularization (PCI or CABG) and medical treatment (ASA, ACEI, β-blocker and statin)
[†] This group served as the reference group

who received medication (ACEI, beta-blockers and statins) and revascularization during hospitalization (PCI and CABG) was associated with reduction in risk.

Table 7 summarizes independent predictors of mortality from any cause at mean follow up 10.8 months. Patients aged more than 60 years old, history of cardiac arrest prior to admission, STEMI, congestive heart failure (killip 4) and arrhythmia during hospitalization (combined of heart block and ventricular tachycardia/ventricular fibrillation) were the most powerful predictors of mortality at follow up. There was a reduced risk of death from any cause if the patients received aspirin, ACEI, beta-blocker, statin and revascularization during hospitalization PCI or CABG).

Discussion

The present study clearly delineates and extends a previous study of the relation between renal

Table 5. Unadjusted hazard ratio of death from all cause according to diagnosis and eGFR

eGFR (mL/min/1.73 m^2)	Unadjusted Hazard Ratio (95% CI)		
	UA	NSTEMI	STEMI
In-hospital			
> 60†	1.00	1.00	1.00
30-60	1.51 (0.43-5.37)	0.85 (0.54-1.34)	2.73 (1.72-4.34)*
< 30	3.06 (0.67-13.84)	1.23 (0.79-1.95)	6.27 (3.78-10.40)*
1-Year follow up			
> 60†	1.00	1.00	1.00
30-60	1.75 (0.89-3.44)	1.45 (1.01-2.07)*	3.36 (2.32-4.86)*
< 30	4.16 (01.67-10.38)*	2.46 (1.70-3.55)*	7.53 (4.99-11.35)*

* Statistical significant, $p < 0.05$
** eGFR denotes estimated glomerular filtration rate, CI confidence interval, UA unstable angina with ST-T change, NSTEMI non ST elevation MI, STEMI ST elevation MI
† This group served as the reference group

Table 6. Results of Cox proportional-hazards model of in-hospital death from all causes*

Factors	Adjusted HR	95% CI	p-value
History of shock prior to admission	1.75	1.25-2.44	0.001
History of cardiac arrest	1.53	1.06-2.20	0.022
Congestive heart failure			
Killip 1	1.00†		
Killip 2	1.17	0.75-1.83	0.482
Killip 3	1.59	1.01-2.52	0.046
Killip 4	1.92	1.26-2.92	0.002
Arrhythmia during hospitalization			
No arrhythmia	1.00†		
Heart block (HB)	2.34	1.40-3.89	0.001
Ventricular arrhythmia (VT or VF)	2.75	1.99-3.81	<0.001
HB + VT/VF	7.96	4.50-14.07	<0.001
PCI	0.69	0.50-0.97	0.030
CABG	0.30	0.17-0.54	<0.001
Beta-blocker	0.45	0.32-0.63	<0.001
Statin	0.34	0.25-0.46	<0.001
ACEI	0.28	0.21-0.38	<0.001

† This group served as the reference group
* The analyses were adjusted for age, sex, diagnosis, the presence or absence of diabetes, hypertension, dyslipidemia, smoking, family history of CAD, dyspnea, chest pain, shock prior to admission and cardiac arrest prior to admission, congestive heart failure, Killip classification (> 1), arrhythmia, major bleeding, revascularization (PCI or CABG) and medical treatment (ASA, ACEI, β-blocker and statin)
** HR denotes hazard ratio, CI confidence interval, HB heart block (only second degree AV block or third degree AV block), HR hazard ratio, VT ventricular tachycardia, VF ventricular fibrillation, PCI percutaneous coronary intervention, CABG coronary artery bypass graft and ACEI angiotensin converting enzyme inhibitor

dysfunction and adverse clinical outcomes among patients with broad spectrum of ACS.

According to discharge diagnosis, unadjusted analysis showed only STEMI (not for all types of ACS) patients with moderate and severe renal dysfunction were associated with increased risk of in-hospital death from all causes. These findings are in agreement with the study of Gibson et al[11] who studied

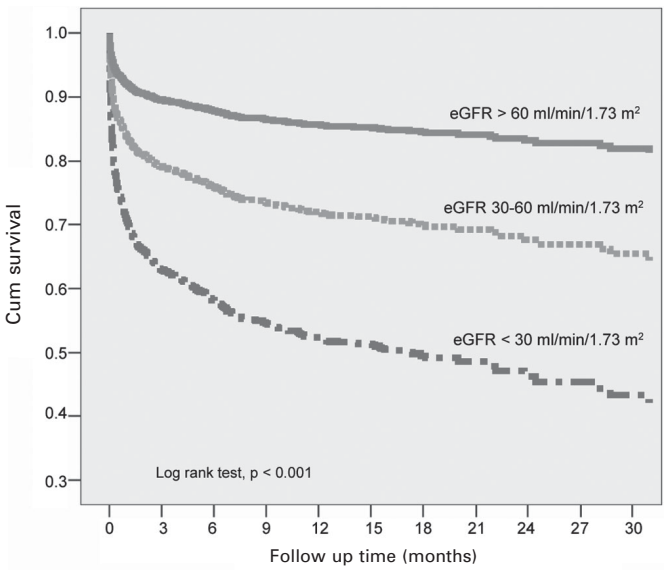

Fig. 1 Kaplan-Meier estimates of the cumulative survival at 1-year follow up, according to the estimated GFR at baseline

Table 7. Results of Cox proportional-hazards model of death from all causes at 1-year follow up*

Factors	Adjusted HR	95% CI	p-value
Age > 60 years	1.98	1.49-2.63	<0.001
Cardiac arrest	1.63	1.17-2.28	0.004
Diagnosis			
Unstable angina	1.00†		
Non-ST elevation MI	1.50	1.04-2.16	0.029
ST-elevation MI	1.96	1.33-2.89	0.001
Congestive heart failure			
Killip 1	1.00†		
Killip 2	1.71	1.26-2.32	0.001
Killip 3	1.93	1.38-2.71	<0.001
Killip 4	3.06	2.21-4.22	<0.001
Arrhythmia during hospitalization			
No arrhythmia	1.00†		
Heart block(HB)	1.33	0.84-2.08	0.221
Ventricular arrhythmia (VT or VF)	2.25	1.70-2.97	<0.001
HB + VT/VF	5.51	3.17-9.60	<0.001
PCI	0.58	0.45-0.76	<0.001
CABG	0.55	0.35-0.86	0.009
Aspirin	0.49	0.36-0.68	<0.001
Beta-blocker	0.56	0.45-0.71	<0.001
Statin	0.42	0.33-0.52	<0.001
ACEI	0.48	0.38-0.60	<0.001

† This group served as the reference group

* The analyses were adjusted for age, sex, diagnosis, the presence or absence of diabetes, hypertension, dyslipidemia, smoking, family history of CAD, dyspnea, chest pain, shock prior to admission and cardiac arrest prior to admission, congestive heart failure, Killip classification (> 1), arrhythmia, major bleeding, revascularization (PCI or CABG) and medical treatment (ASA, ACEI, β-blocker and statin)

** Abbreviated as in Table 6

patients with STEMI, identified the graded association between renal dysfunction on the presentation with increased 30 days mortality. Furthermore, from the GRACE[12] study, using data from nearly 12,000 patients with all types of ACS, creatinine clearance is an important independent predictor of hospital death. Those with moderate (eGFR 30-60 ml/min) and severe renal dysfunction (eGFR < 30 ml/min) were almost two (odds ratio 2.09, 95% CI 1.55 to 2.81) and four times (odds ratio 3.71, 95% CI 2.57 to 5.37) more likely to die compared to patients with normal or minimal renal dysfunction (eGFR > 60ml/min). It also demonstrated that patients with ACS and renal dysfunction were less likely to be treated with aspirin, beta-blockers, ACEI, and statins. Furthermore, they underwent coronary angiography and PCI less frequently during the index of hospitalization. Therefore, not using management strategies demonstrated improvement in outcomes. These findings are consistent with other published studies[6,13-15]. From the present study, there were several potential explanations why patients with renal dysfunction at presentation of ACS have unfavorable outcomes; excess co-morbidities (old age, DM, HT) and under use of cardioprotective therapies (therapeutic nihilism).

Major bleeding was observed more often as renal dysfunction worsened. These findings are probably a result of decreased platelet function, and consistent with data from several other studies[11,12].

Limitations

The present study has several limitations. First, the authors cannot comment on the effect of worsening renal function during hospitalization on the risk of adverse outcomes. Second, the authors did not address the influence of cardiovascular pharmacological treatment in the aspect of doses, type of drugs, and compliance during hospitalization and discharge. Third, although the MDRD equation is a reliable means of estimating the GFR as the serum creatinine level is influenced by nonrenal factors, the accuracy of the use of the MDRD equation for non-white populations (including Thai) other than black is unknown. Finally, this analysis is a non-randomized, retrospective in nature and as such, it is possible that both identified and unidentified confounders may have influenced the outcomes. The authors used multivariable analysis in an attempt to reduce the bias inherent in this type of study.

Conclusion

Renal dysfunction at presentation is an independent, graded association with higher in-hospital (STEMI) and 1-year mortality in patients with a broad range of ACS.

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การใช้การทำงานของไตในการพยากรณ์โรคในผู้ป่วยที่เป็น acute coronary syndrome (ACS)

กรวิชญ์ สุขลิ้ม, สุพจน์ ศรีมหาโชตะ, สมนพร บุณยะรัตเวช, รังสฤษฏ์ กาญจนะวณิชย์, นภา ศิริวิวัฒนากุล, ชุมพล เปี่ยมสมบูรณ์, รังสรรค์ รัตนปราการ

ภูมิหลัง: *จากการศึกษาเมื่อไม่นานมานี้พบว่าการทำงานของไตที่ผิดปกติจะมีความสัมพันธ์กับ outcome ในผู้ป่วยที่เป็น ACS แต่สำหรับประเทศไทยและในภูมิภาคตะวันออกยังไม่มีข้อมูลยืนยัน*

วัตถุประสงค์: *เพื่อศึกษาการใช้การทำงานของไตในการพยากรณ์โรคที่เป็น*

วัสดุและวิธีการ: *เป็นการเก็บข้อมูลผู้ป่วยที่มารับการรักษาด้วย acute coronary syndrome (ACS) จากการลงทะเบียนผู้ป่วยในโครงการ Thai Acute Coronary Syndrome Registry โดยดูลักษณะต่าง ๆ ทางคลินิก การให้การรักษาและอัตราตายในโรงพยาบาล และที่ 1 ปี โดยเปรียบเทียบการทำงานของไตที่ปกติหรือผิดปกติเล็กน้อย (estimated GFR {eGFR} > 60 ml/minute/1.73 m^2, n = 809 [44.5%]) การทำงานของไตผิดปกติปานกลาง (eGFR 30-60 ml/minute/1.73 m^2, n = 706 [38.9%])และในกลุ่มที่มีการทำงานของไตผิดปกติมาก (eGFR < 30 ml/minute/1.73 m^2, n = 301 [16.6%])*

ผลการศึกษา: *จำนวนผู้ป่วย ACS จำนวน 1,816 คน โดยมีค่าเฉลี่ยในการติดตามผู้ป่วย 10.8 เดือน พบว่า อายุเฉลี่ยเท่ากับ 65.2 ปี เป็นเพศชาย 59.2% ผู้ป่วยที่มีการทำงานของไตผิดปกติมากมีอายุเฉลี่ยมากกว่า (69.8 ปี เทียบกับ 68.8 ปี และ 60.2 ปี, p < 0.001) เป็นเพศชายน้อยกว่า (45.2% เทียบกับ 53.4% และ 70.0%, p < 0.001) และมีอุบัติการณ์ของการเป็นเบาหวานมากกว่า (63.1% เทียบกับ 44.8% และ 35.7%, p < 0.001) อัตราตายในโรงพยาบาลและที่ 1 ปี เท่ากับ 13.5% และ 22.5% ตามลำดับ เมื่อใช้การวินิจฉัยเมื่อออกจากโรงพยาบาล พบว่า unadjusted hazard ratio สำหรับอัตราตายรวมในโรงพยาบาล ในผู้ป่วยที่เป็น STEMI เท่ากับ 2.73 (95% CI, 1.72-4.34) และ 6.27 (95% CI, 3.78-10.4) สำหรับผู้ป่วยที่มีการทำงานของไตผิดปกติปานกลางและผิดปกติมากตามลำดับ อัตราตายรวมในผู้ป่วยทุกแบบของ ACS เพิ่มขึ้นเมื่อ eGFR ลดลงต่ำกว่า 60 มล/นาที/ 1.73 $ม^2$) โดยมีค่า adjusted hazard ratio เท่ากับ 1.66 (95% CI, 1.22-2.23) และ 1.91 (95% CI, 1.34-2.72) ในผู้ป่วยที่มีการทำงานของ ไตผิดปกติปานกลางและผิดปกติมากตามลำดับ*

สรุป: *การทำงานของไตที่ผิดปกติเป็น independent predictor สำหรับอัตราตายในโรงพยาบาลในผู้ป่วย STEMI และอัตราตายเมื่อติดตามผู้ป่วยไป 1 ปีของผู้ป่วย ACS ทั้งหมด*