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Relation between Chronic Kidney Disease and Completeness of Revascularization and Subsequent Impacts on Major Cardiovascular Events in Chronic Coronary Syndrome

H.M.Kabil, S.A.Mostafa, S.I.Farag and M.R.Elfaramawy
Cardiology Dept., Faculty of Medicine, Banha Univ., Banha, Egypt
E-mail: mohammedelfaramawy@hotmail.com

Abstract

Background: When CKD and CAD are present, they are termed a high-risk combination. Few studies particularly focus on CAD in CKD patients despite the high incidence, and it is often an exclusion factor in most trials. Study's goal was to see whether individuals with CCS who had CKD were more likely to have successful revascularization and have severe adverse cardiovascular events in the future. Aim of The work: This study aims to examine the effect of chronic kidney disease on revascularization and MACE in individuals with CCS. Patients and methods: from November 2019 to October of 2021, Benha University Hospitals and Al Ahrar Teaching Hospital will participate in an observational prospective cross-sectional multicenter research of patients with CCS. Patients with CCS who had PCI revascularization were included in the research. Affected individuals are those with an eGFR less than 60 mL/min/1.73m2. Results: a very high rate of incomplete revascularization (P0.001) was seen in this study. There was a statistically significant difference in the prevalence of MACE (P=0.037). Conclusion: individuals with chronic coronary syndrome are more likely to have an incomplete revascularization if they also have chronic renal disease. MACE is also related with inadequate revascularization.

Key words: Chronic kidney disease, chronic coronary syndrome, Major adverse cardiovascular events.

1. Introduction

An atherosclerotic plaque buildup in the epicardial vessels of coronary artery disease (CAD), whether obstructive or non-obstructive, is a degenerative process. Lifestyle changes, pharmaceutical therapy, and invasive procedures may be used to stabilise or reverse the progression of the condition. Acute atherothrombotic events, such as plaque rupture or erosion, may produce an acute atherothrombotic event and make the condition more unstable, even after a lengthy period of stability. However, the condition is long-lasting, typically progressing, and hence dangerous, even if it seems to be in a clinically inactive state at first. There are acute coronary syndromes (ACS) and chronic coronary syndromes (CCS) due to the fact that the CAD process is dynamic and results in a variety of clinical manifestations (CCS). Different stages of coronary artery disease (CAD) are used to define CCS, excluding circumstances where an acute coronary syndrome (ACAS) predominates the clinical picture (i.e. ACS). The combination of chronic kidney disease (CKD) and coronary artery disease (CAD) is considered a risk factor. Few studies particularly focus on CAD in CKD patients despite the high incidence, and it is often an exclusion factor in most trials. The lack of data on how to effectively treat CAD leads to undertreatment of CKD patients. A new angiographic scoring system, the residual SYNTAX Score (rSS), has been developed to evaluate residual CAD after percutaneous coronary intervention (PCI). If you've had a MI or have coronary artery disease that affects more than one vessel, you're more likely to have high rSS. In SCAD patients, the relationship between renal function and rSS has not yet been thoroughly studied. [4]

2. Aim of the work

Patients with CCS are being studied to determine the effect of CKD on the success of revascularization and the occurrence of major adverse cardiac events (MACE).

3.3. Patients and methods:

3.1. Study design

This is observational prospective cross-sectional multicenter study carried out on patients with CCS attending to Benha university hospitals and Al Ahrar teaching hospital from 30 November 2019 till 30 October 2021

3.2. Patients selection

The study included 200 CCS patients who underwent revascularization by PCI. All patients with eGFR < 60 mL/min/1.73m2.

3.3. Inclusion criteria

All patients of both genders, aged ≥18 years, refered for revascularization by PCI after diagnosis of CCS.

3.4. Exclusion criteria

1- Presence of prior coronary artery bypass graft (CABG).
2- Prior PCI.
3- Primary severe valvular heart diseases.
4- Prior valve replacement.
5- Advanced liver disease

All patients were subjected for the following:

Full history taking including age, sex and risk factors (diabetes mellitus, hypertension, dyslipidemia, obesity, smoking, family history of CAD. General examination: including Bp measurement in both arms in 3 successive times and considering the mean of them. Cardiac examination. Serum creatinine “baseline and after 48h of procedure” and calculation of eGFR using the MDRD (Modification of Diet inRenal Disease) Formula. [5] Twelve-lead electrocardiogram was recorded to document absence or presence of ECG ischemic

changes. All echocardiographic parameters were performed using GE vivid S6 echocardiography machine aiming to record the following data: assessment of left ventricular systolic function, calculation of the left ventricular wall motion score index (WMSI): each myocardial segment is assigned a score from 1 to 5. The 17 segment model of myocardial segmentation is recommended, assessment of RV systolic function by tricusbid annular plane systolic excursion (TAPSE), assessment of LV diastolic function using E/A ratio in apical four chamber view by ligning the pulsed wave Doppler across the mitral valve. [6] Calculation of SYNTAX Score (SS). [7]

3.5. Statistical methods

Data are presented as mean+ SD for continous data and as number (%) for categorial data. Between groups comparison was done using student t-test for continuous data and by Chi-square test (or Fischer exact test) for qualitative data. Level of evidence was detected to be significant at P value <0.05. Data were collected and analyzed by SPSS (version 26).

4. Results

I- Demographic and Clinical data:

Patients with CKD ages were (65.78 ± 6.41). The CKD group included 132 male patients (66%) and 68 female patients (34%).

93 patients “46.5%” had hypertension, 81 patients “40.5%” had diabetes and 64 patients “32.0%” were smokers.

36 patients “18%” had obesity, 22 patients “11%” had family history of ischemic heart disease (FH of IHD), 118 patients “59%” had dyslipidemia (Table 1)

Table (1) Baseline Characteristics of the Study Participants.

		CKD patients (n = 200)
Age (Years)	Mean ±SD	65.78 ±6.41
Gender	Males n (%)	132 (66.0)
	Females n (%)	68 (34.0)
HTN	Yes n (%)	93 (46.5)
DM	Yes n (%)	81 (40.5)
Obesity	Yes n (%)	36 (18.0)
Smoking	Yes n (%)	64 (32.0)
positive family history	Yes n (%)	22 (11.0)
Dyslipidemia	Yes n (%)	118 (59.0)

Independent t test was used for age. Chi-square test was used for gender

II- ECG, Echo and angiographic parameters:

ECG ischemic changes were found in 94 patients “47%”. the patients who had incomplete revascularization were (64 patients “32%” Ejection fraction (EF) was 52.71 ±10.81.

(Table 2)

Table (2) ECG, Echo and angiographic parameters

		CKD (n = 200)
EF	Mean ±SD	50.90 ±10.87
ECG ischemic changes	Yes n (%)	94 (47.0)
Completeness of revascularization	Yes n (%)	136 (68.0)

III- One-year outcome:

Clinical outcomes were available in 198 (99.00%) patients. 2 patients were lost during follow-up period. Contrast induced nephropathy (CIN) had occurred in 33 patients “18.33%”. There were 18 patients on regular hemodialysis and we did not estimate CIN risk for them. Incidence of all-cause mortality was in 18 patients “9%”.

MACE were in 39 patients “19.7%”. Incidence of heart failure (HF) was in 16 patients “8%”.

5. Discussion

CAD is more common in CKD patients and tends to be more widespread and complicated. Heart disease is the major cause of mortality among dialysis patients with chronic kidney disease or end-stage renal disease. The risk of atherosclerosis-related events in individuals with renal disease is increased by the usual risk factors for atherosclerosis as well as by an irregular GFR. It is difficult to treat cardiovascular disease in people with chronic kidney disease because of the prevalence of comorbid illnesses and the risk of adverse effects from treatment procedures. [8]

In individuals with CAD, the ischemia load is a significant prognostic factor. In order to enhance the patient's prognosis, angiographic full revascularization might be used. Previous studies have shown that full revascularization is superior than partial revascularization in individuals who have had PCI. In high-risk patients, particularly those with CKD, the benefits of full revascularization are still in question. [9]

CKD has been shown to have a negative influence on revascularization and subsequent major cardiovascular

events in patients with CCS, according to this cross-sectional observational prospective analysis. In individuals with CCS, CKD was shown to be a risk factor for incomplete PCI revascularization. A significantly significant connection was also identified between the occurrence of MACE and incomplete revascularization at a one-year follow-up. Patients with chronic kidney disease (CKD) were older in this research (P 0.001). According to Cardi et al., 2019, who examined the predictive significance of partial revascularization after PCI in ACS patients with CKD, this was in concordance with the previous study. Patient age was found to be significantly higher in those with CKD (P=0.001). Despite the fact that they identified a statistically significant difference between the control and CKD groups in terms of gender (P=0.004), we found none (P=0.454) between the two groups. There were no significant differences between the CKD and control groups in terms of hypertension (P=0.841), diabetes (P=0.215) and smoking (P=0.459), however there was a very significant connection between the length of HTN and each of the three scores. While Cardi et al. observed significant differences in hypertension (P=0.001), diabetes mellitus and current smoking rates (P=0.001) in their 2019 study, these data do not support their conclusions. Dyslipidemia and FH of IHD differed significantly between the two groups, according to the researchers. P=0.001 showed a very significant difference in the extent of revascularization, and this was also agreed upon.

Cardi et al., 2019 found that MACE and heart failure rates were considerably higher in the CKD group at one-year follow-up (P=0.001 for each), and our results corroborated this (P=0.04 for MACE and P=0.014 for HF). This conclusion was supported by our research. According to our findings, stent thrombosis angina and hemorrhagic episodes were not significantly different between the two groups. According to the authors, the incidence of cardiac mortality and stroke was considerably higher in the CKD group. We disagreed with this conclusion. [10]

According to Hwang et al., 2019 who evaluated the predictive value of angiographic revascularization, they discovered that less residual lesions were related with improved clinical outcomes in patients with chronic kidney disease (CKD) and patients with retained renal function.

De gregorio et al., 2018 observed that full percutaneous coronary revascularization in patients with chronic total occlusion had an excellent long-term prognosis, and we found that our findings were in accordance with theirs. Revascularization of the coronary arteries was shown to be a significant predictor of survival in individuals with and without chronic kidney disease (CKD). [11]

An initial invasive strategy involving coronary angiography and revascularization (if appropriate) was used in the ISCHEMIA-CKD trial to treat 777 patients with advanced kidney disease and moderate or severe ischemia on stress testing, while an initial conservative strategy involving medical therapy alone and angiography was reserved for those in whom medical therapy had failed. Complete revascularization was found to be beneficial in CKD patients, contrary to our findings, but we were comparing complete versus incomplete revascularization rather than conservative treatment, and the second difference was that the ISCHEMIA-CKD trial excluded patients with an EF less than 35% or unacceptable angina as contraindicated by our findings. According to the FAME 2 study, which evaluated the efficacy and negative effects of antianginal medications, revascularization enhanced quality of life and decreased the usage of antianginal pharmaceuticals. [13]

6. Conclusion

Chronic renal disease is linked to a greater frequency of syntactic score and an incomplete revascularization in individuals with chronic coronary syndrome. A increased risk of serious cardiac events is also related with inadequate revascularization. In CCS patients, CKD is a risk factor for incomplete revascularization and MACE.

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