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Acute Kidney Injury during Decompensated Heart Failure in Cardiology of Ignace Deen University Hospital Center, Conakry

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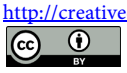

Abstract

Introduction: Heart failure (HF) is a significant public health issue. The objective of this study was to investigate acute kidney injury in the cardiology department. **Material and Methods:** We conducted a cohort study in the cardiology department over a period of 6 months, from January 1 to June 30, 2024. We included all patients hospitalized for decompensated heart failure (HF) whose diagnosis of acute kidney injury (AKI) was confirmed by a sudden increase in creatinine associated with a urinary anomaly according to the KDIGO classification. The data was collected using SPSS version 29.0. **Result:** Of a total of 112 patients during the study period, 36 patients (32.14%) developed AKI, while 76 patients (67.86%) had normal creatinine levels. The mean age was 36.77 ± 12 years, with a range from 16 to 85 years. There were 19 (52.78%) men and 17 (47.22%) women, the sex ratio was 0.89. There were 23 (63.89%) cases of global heart failure and 8 cases of left heart failure (22%), with creatinine levels elevated in 36 patients. Acute kidney injury (AKI) was observed in 26 patients (72.22%) who were at stage 1, then 8 (19%) patients at stage 2, and 3 (9%) at stage 3. **Conclusion:** AKI is common during decompensated heart failure; diagnosis and management should be early to improve cardiac complications.

Subject Areas

Nephrology

Keywords

Heart Failure, Acute Kidney Injury, KDIGO

1. Introduction

Heart failure (HF) is a real public health issue, the prognosis of patients can be improved in emergency situation, it often coexists with many comorbidities that could explain the sudden decline in renal function [1]. The decrease in glomerular filtration rate (GFR) is a predictive factor of mortality and cardiovascular events in patients with HF.

Acute kidney injury (AKI) in cardiovascular disease results from a hemodynamic change and neurohormonal activation. In clinical practice, the cardio-renal interaction is very complex. Indeed, the presence of renal dysfunction and cardiovascular events is due to the coexistence of traditional risk factors (hypertension, diabetes, obesity, dyslipidemia, smoking) and non-traditional risk factors (inflammation, mineral-bone disorder, anemia, and malnutrition) [2] [3].

The collaboration between nephrology and cardiology is primarily based on the monitoring of organ function (heart and kidney) in the context of preventing dysfunction that can affect both organs. The aim of this study was to investigate AKI during decompensated heart failure in the cardiology department of Ignace Deen Hospital.

2. Materials and Methods

We conducted a prospective cohort study in the cardiology department over a period of 6 months, from January 1st to June 30, 2024. This study was done in single center because this is the only center with a management of heart disease. It concerned all patients with decompensated heart failure who were diagnosed of acute kidney injury (AKI) and was established on a sudden increase in creatinine. We used the Kidney Disease Improving Global Outcomes (KDIGO) definition, which consider any increase in creatinine of 0.3 mg/dl (26.3 μmol/L) within 48 hours, or any increase in baseline creatinine of 1.5 times that occurred within 7 days, along with a diuresis of 0.5 ml/kg/h. In our context, the baseline creatinine was obtained at the first screening before the patient included. We are screening creatinine 3 times. The classification of AKI was made into 3 stages.

Stage 1: creatinine is ≥26 μmol/L during 48 hours or an increase in baseline creatinine of 50 to 99% over 7 days with a urine output < 0.5 ml/kg for 24 hours or anuria for 6 hours.

Stage 2: any increase in baseline creatinine of 100% to 199% over 7 days with a urine output < 0.5 ml/kg for 24 hours or anuria for 12 hours.

Stage 3: any increase in creatinine ≥ 200% or a level of ≥354 μmol/L during 48 h or ≥50% of baseline creatinine. Decompensated heart failure was diagnosed based on clinical signs (dyspnea, tachycardia, presence of mitral suffering, and gallop rhythm), signs on the electrocardiogram, and on the transthoracic echocardiogram (TTE). The TTE was performed in the cardiology department after obtaining patient consent and the cooperation of the head of the cardiology department. The variables were analyzed using SPSS version 29.0. Qualitative variable is expressed as percentages, while quantitative variable is presented as mean

and standard deviation. Risk factors were assessed through relative risk and P value. We considered the risk is significant when RR > 1 and P value < 0.05. Approval for the study was obtained from the hospital ethics committee. Verbal consent for participation in the cohort study was obtained from the patients. To ensure confidentiality, an identification number was assigned to each patient included in the study.

3. Result

Among a total of 112 patients during the study period, 36 patients (32.14%) developed acute kidney injury (AKI), and 76 patients (67.86%) had normal creatinine with good outflow in chart. The average age of the patients was 58.38 years, with an extreme range from 16 to 85 years. There were 19 (52.78%) men and 17 (47.22%) women, and sex ratio is 0.89. There were 23 (64%) cases of global heart failure, 8 cases of left heart failure (22%), and creatinine was elevated in 36 patients. AKI was observed in 26 patients (72%) who were at stage 1 of KDIGO, 8 (19%) at stage 2, and 3 (9%) in stage 3 (See Table 1).

Table 1. Characteristics of patients with AKI during the decompensated heart failure in the cardiology department of Ignace Deen Hospital from January 1 to June 30, 2024.

Variables	Number (%)
Mean Age	36.77 ± 12 years
Sex	
Men	19 (52.78%)
Women	17 (47.22%)
Biology	
Creatinine	321 ± 21 µmol/l
Hemoglobine	10.21 ± 4 g/dl
Heart Failure	
Right ventricular	5 (14%)
Left ventricular	8 (22%)
Global heart failure	23 (64%)
KDIGO	
Stage 1	26 (72%)
Stage 2	7 (19%)
Stage 3	3 (9%)
Outflow mean	450 ± 187 ml

Comorbidities were dominated by hypertension in 32 patients, and diabetes in 10 patients (Table 2).

In the analysis, we found that patients on diuretic have a 4 times higher risk of

developing acute kidney injury during heart decompensation, while patients exposed to sepsis have a 6 times higher risk of developing AKI during decompensated heart failure, see Table 3.

Table 2. proportion of comorbidities patients with AKI during the decompensated heart failure in the cardiology department of Ignace Deen Hospital from January 1 to June 30, 2024.

Variables	Number (%)
Hypertension	32 (88%)
Diabète	10 (27%)
Dyslipidémie	6 (16%)
Fibrillation atriale	3 (8%)
Sepsis	1 (2%)

Table 3. Analysis of the risk factors associated with patients with AKI during the decompensated heart failure in the cardiology department of Ignace Deen Hospital from January 1 to June 30, 2024.

Parameters	Classification	AKI yes	AKI no	RR (IC 95%) P value
Age	<60 ans	7	42	0.35 (0.17 - 0.70)
	>60 ans	29	34	P = 0.0032
Diuretic	Yes	26	12	4.57 (2.61 - 7.98)
	No	10	64	P = 0.0032
Hypertension	Yes	12	50	0.50 (0.31 - 0.82)
	No	24	26	P = 0.00001
Diabetes	Yes	17	30	1.72 (1.16 - 2.53)
	No	8	46	P = 0.0059
Sepsis	Yes	3	1	6.33 (0.68 - 58.79)
	No	33	75	P = 0.1045

RR = risk relative, P value.

4. Discussion

Patients with heart failure presents sign of organic decompensation in emergency situation that may include AKI. When the outflow < 500 ml/24h associated with heart failure (HF) is severe and requires transfer to a cardiology intensive care unit. We found the prevalence of 32.14% in the cardiology department of Ignace Deen Hospital. This prevalence is higher than the 25% reported by Yinebeb Mezgebu *et al.* in Ethiopia [4]. On the one hand, the size of our sample is small, and on the other hand, this can be explained by the lack of health insurance in our context. Due to the lack of coverage, many patients who arrive with a cardiological emergency can not stay in hospital because of cost care. The echocardiography

and angiography are expensive in our context without insurance; the patients we received don't have insurance.

In our study, comorbidities were present in patients with AKI, hypertension, diabetes, and sepsis, which made patient management difficult. These comorbidities are considered risk factors for renal decompensation in patients with heart failure [5] [6]. Three patients in stage 3 of AKI according to KDIGO, without good diuresis, were hemodialyzed to avoid mortality, with a diuresis of less than 100 ml/24h despite a high dose of diuretic.

The indication of hemodialysis was (pulmonary edema, resistant to diuretic, anuria, hyperkaliemia). Other studies also show that anemia, diastolic dysfunction, and hyponatremia lead to AKI [7] [8]. We did not record severe cardiac decompensation due to anemia, as most patients had a good hemoglobin level. we don't have death related to AKI during our study because patient received in emergency case, the alert was done and all the team reaction in same time. Transthoracic echocardiography is a key paraclinical examination in the search for cardiac decompensation; it allows for easy diagnosis of cardiac decompensation. In our context, this examination is not covered by hospitalization price, which caused delays in the diagnosis of patients. During this study, there was no angiography available in our hospital to search for ischemic heart diseases.

5. Conclusion

Acute Kidney Injury (AKI) is a common complication in patients with heart failure decompensation. The factors leading to decompensation are classic, they must be prevented in patients suffering from heart failure to avoid the occurrence of AKI. Further studies would be necessary with statistical analysis to assess the associated mortality risk with AKI, because hospitalization and rehospitalization rates are too high in patients, which could lead to a high mortality risk.

Conflicts of Interest

The authors declare no conflicts of interest.

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