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Cardio-Renal Syndrome: Frequency and Associated Factors in the Abidjan Heart Institute's Medical Department

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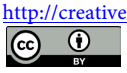

Abstract

Introduction: Cardio-renal syndrome (CRS) is a pathophysiological disorder of the heart and kidneys in which acute or chronic dysfunction of one organ can lead to acute or chronic dysfunction of the other. In Africa, particularly in Côte d'Ivoire, the incidence of cardio-renal syndrome is not precisely known. The aim of this study was to assess the frequency of CRS and to contribute to a better understanding of the condition in the medical department of the Abidjan Heart Institute. **Materials and Methods:** We conducted a prospective analytical study including all patients with heart failure hospitalised in the medicine department of the Abidjan Heart Institute from March to October 2020. Data were analysed using SPSS software version 22. **Results:** We included 111 patients in the study. The incidence of CRS was 64%, with a predominance of males (sex ratio 1.8). The mean age was 53 ± 15 years. Patients' medical history was dominated by hypertension (56.8%), diabetes (15%), dyslipidaemia (18%), obesity (17.1%) and smoking (14.4%). The main causes of heart failure were dilated cardiomyopathy (22.8%) and ischaemic heart disease (21.4%). Symptomatology was mainly congestive heart failure (42.8%). Mean evaluated clearance (MDRD) was 39.9 ± 17.1 ml/min/m^2. Doppler echocardiography showed a decrease in left ventricular ejection fraction in 74.3% of patients. Factors statistically associated with the occurrence of cardio-renal syndrome were: age > 60 years ($p = 0.04$), diabetes ($p = 0.03$), arterial hypertension ($p = 0.001$) and Hb < 10 g/dl ($p = 0.02$). In terms of evolution, total recovery of renal function was observed in 41.4% of cases and 58.6% progressed to chronic kidney disease (CKD). One patient died. **Conclusion**: The cardio-renal syndrome is a reality and marks an important point in the evolution of cardiac and renal diseases. It is highly frequent in the medical department of the Abidjan Heart Institute, as well as a high rate of CKD.

Keywords

Cardio-Renal Syndrome, Heart Failure, Renal Failure

1. Introduction

Heart failure is the clinical expression of several advanced cardiovascular diseases. It remains one of the main circumstances in which advanced heart disease is discovered, and is a major public health problem in Africa in general and Côte d'Ivoire in particular [1]. According to the European Society of Cardiology (ESC), out of a population of 900 million in 51 European countries, at least 15 million patients suffer from heart failure [2] [3]. In Africa, we have intra-hospital data, notably in Senegal where Affangla and al found a prevalence of 14.28% [4], and in Togo where Machihudé Pio and al found 25.6% [5]. Renal damage during heart failure is frequent, leading to longer hospital stays and a poor prognosis [6]. The prevalence of combined cardiac and renal dysfunction, whether acute or chronic, is currently difficult to estimate, but nevertheless represents a large proportion of hospitalised patients. Numerous epidemiological studies showed that patients with acute or chronic heart failure develop secondary renal failure, and vice versa [7]. A study carried out in a nephrological setting in Abidjan reported a predominance of type IV CRS according to the classification proposed by Ronco in 65.7% of cases (end-stage CRF leading to chronic heart disease in mostly young, hypertensive subjects), followed by type I in 20% of cases. In this study, the etiologies of heart disease were dominated by hypokinetic dilated cardiomyopathy in 34.4% and hypertrophic cardiomyopathy in 58.6% [8].

With the aim of contributing to a better understanding of renal impairment in heart failure patients, we conducted this study to describe the profile of CRS in cardiology.

2. Material and Method

2.1. Material

Our study took place in the medicine department of the Abidjan Heart Institute. It was a prospective, cross-sectional, analytical study that took place from 15 March to 11 October 2020. The study population consisted of patients hospitalised for heart failure in the said department.

We included patients hospitalised for heart failure with renal function tests performed during their hospitalisation and who agreed to participate in our study after obtaining informed consent. Patients whose medical records were incomplete for the parameters sought (absence of clinical/paraclinical diagnostic evidence of heart failure) were not included (**Figure 1**).

2.2. Method

Patient data were collected using a standardised survey form.

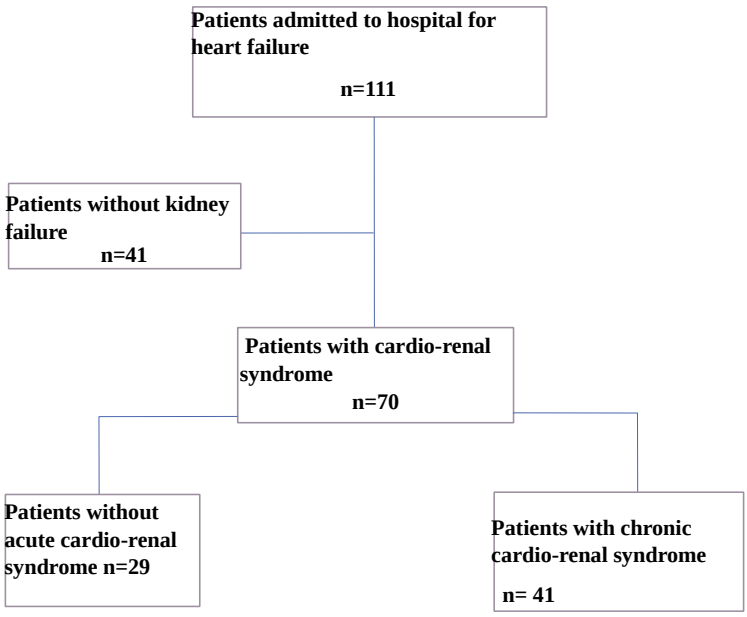

Figure 1. Flowchart.

The dependent variable was renal failure during heart failure.

The independent variables were:

- Socio-demographic data (age, gender).
- Medical history (urological, nephrological, cardiovascular, pleuropulmonary, infectious, gastroenterological, gynaecological-obstetrical, toxicological, life-style, etc.).
- Surgical and family history.
- Clinical characteristics: weight, height, body mass index (BMI), blood pressure, temperature, pulse, respiratory rate, oxygen saturation, oedema of lower limb, signs of left heart failure (dyspnoea/orthopnoea, acute pulmonary oedema (APO), tachycardia, pre-systolic gallop sounds, proto diastolic, mitral murmur, B2 burst, alternating pulse), signs of right heart failure (stress hepatica, dyspnoea, tachycardia, Harzer's sign, pre systolic right gallop, B2 burst at pulmonary focus, hepatomegaly, hepato jugular reflux, ascites), signs of congestive heart failure.
- Decompensation factors (diet deviation, poor compliance with treatment, bronchopneumonia, intercurrent infections, hypertensive crisis, ARF, ischaemic crisis).
- Biological characteristics (blood count, CRP, creatininemia, blood urea, blood sugar, natremia, blood potassium, chlorine, calcemia, phosphorus, daily proteinuria, transaminases, lipid profile, proteinogram, BNP, troponin I, C, etc.).
- Morphological characteristics (ECG: sinus rhythm, atrial fibrillation (AF), LVH, cardiac Doppler ultrasonography: LV size in diastole, LV filling pressure/LVR, PAPS, functional/organic MI, OI, LVEF: lowered and severely impaired mean), chest X-ray (cardiomegaly), renal ultrasonography (kidney size, cortico-medullary differentiation), coronary angiography (normal/abnormal).

- Diagnosis: etiological, lesional.
- Management:

Medications (diuretics, ACE inhibitors/ARB II, beta-blockers, digitalics, anti coagulants, antiplatelet agents, antibiotics, statins), haemodialysis, cardiac surgery.

- Progression:

Cardiac: improvement in congestion, improvement in LVEF.

Renal: control of urea, creatininemia, GFR, diuresis.

Infection: regression of biological inflammatory syndrome (CBC, CRP).

Definition of operating terms

Systolic heart failure (SHF) was considered when there was a combination [9] of symptoms (dyspnea), signs (tachycardia, polypnea, pulmonary rales, pleural effusion, jugular turgidity, peripheral oedema, hepatomegaly), and objective evidence of a structural or functional abnormality of the heart at rest (cardiomegaly, 3rd heart sound, heart murmur, abnormality on the echocardiogram, elevation of natriuretic peptides) confirmed on echocardiography, a LVEF < 50%.

Acute renal failure (KDIGO 2012) [10]

Stage 1: Increase > 26 μmol/L (3 mg/L) in 48 h or >50% in 7 days/<0.5 ml/kg/h for 6 to 12 h;

Stage 2: Creatininaemia × 2 in 7 days/<0.5 ml/kg/h ≥ 12 h;

Stage 3: Creatininaemia × 3 in 7 days or creatininaemia > 354 μmol/L (40 mg/L) in the absence of a previous value or need for dialysis/<0.3 ml/kg/h ≥ 24 h or anuria ≥ 12 h.

Glomerular filtration rate was assessed using the MDRD (modified diet in renal disease) formula.

Cardio-renal syndrome [11] is a cardiac and renal dysfunction in which acute or chronic dysfunction of one of the organs can induce acute or chronic dysfunction of the other organ.

CRS type 1: is defined as any acute renal dysfunction occurring following acute cardiac decompensation, and which has progressed towards improvement in renal function GFR > 60 ml/min/m^2 [6].

CRS type 2: is defined as primary chronic cardiac damage responsible for secondary chronic renal failure [6].

CRS type 3: is defined as primary acute renal failure leading to secondary acute cardiac failure which will improve once renal function is restored [6].

CRF type 4: corresponds to primary chronic renal failure leading to secondary chronic heart disease via left ventricular hypertrophy, diastolic heart disease and/or an increased risk of cardiovascular events, which are the leading cause of death in patients with chronic renal failure [6].

CRS type 5: is characterised by the combination of renal failure and heart failure secondary to an acute or chronic systemic disease. Chronic systemic diseases include, but are not limited to, diabetes, amyloidosis and vasculitis, while severe sepsis is the most common acute systemic disease [6].

The type of CRS was obtained from the Ronco classification [6].

Overweight was defined as a body mass index (BMI) between 25 - 29 kg/m^2 and obesity as a BMI > 30 kg/m^2.

Anemia was defined as haemoglobin level < 12 g/dl in women, 13 g/dl in men.

Left ventricular ejection fraction (LVEF) was defined as preserved if LVEF > 50%, moderately reduced if between 40% - 49% and impaired if <40%.

Cardiomegaly was defined as a cardiothoracic index (CTI) > 0.5.

Statistical analysis

Statistical analysis was performed using SPSS version 22 software and the analysis module available with Excel software. Normally distributed quantitative variables were described with means ± standard deviation and other quantitative variables with medians, maximums and minimums. Qualitative variables were presented in the form of numbers and frequencies. The usual tests were used for statistical analysis: Student's t test for quantitative variables; Chi2 test for qualitative variables. A significance level of $p < 0.05$ was used.

Ethical issues

Verbal informed consent was obtained from all patients prior to data collection. Confidentiality was strictly respected during data collection. The information collected for this study was treated anonymously.

3. Results

At the end of our data collection, we recruited 111 patients with heart failure, 70 of whom had renal failure, representing a CRS frequency of 64%. We will describe the patients with CRS (n = 70).

From a sociodemographic point of view (Table 1), the mean age of patients with CRS was 53 ± 15 years, with a male predominance (68.6%). The main cardiovascular risk factors were arterial hypertension (72.85%), sedentary lifestyle (34.3%), dyslipidaemia (21.4%), diabetes (18.6%), obesity (18.6%) and smoking (14.3%). We noted a history of acute renal failure (ARF) in 22.8%. The etiologies of heart failure (Table 2) were dominated by dilated cardiomyopathy (22.8%), ischaemic heart disease (21.4%) and undetermined causes (21.7%) (Figure 2).

Clinically (Table 2), on admission the majority presented with left heart failure (81.4%), and 15.7% had a MAP < 80 mmhg.

Table 1. Chronic kidney disease classification (KDIGO).

Stages	Description	GFR (mL/min/1.73m^2)
1	CKD with normal renal function	>90
2	CKD with mild renal failure	60 - 89
3A	Mild to moderate renal failure	45 - 59
3B	Moderate to severe renal failure	30 - 44
4	Severe renal failure	15 - 29
5	End-stage renal failure	<15

Table 2. General characteristics of patients.

Characteristics	Total N = 111	With CRS N = 70	Without CRS N = 41	OR (CI 95%)	P value
Gender					
Male	72 (64.8%)	48 (68.6%)	24 (58.5%)	1.2 (0.8 - 1.5)	0.19
Female	39 (35.1%)	22 (31.42%)	17 (41.5%)	0.7 (0.4 - 1.3)	
Age (years)					
≤39	24 (21.6%)	6 (8.6%)	18 (43.9%)	0.6 (0.4 - 0.8)	0.00
[40 - 59]	47 (42.3%)	33 (47.1%)	14 (34.1%)	1.3 (0.8 - 2.2)	0.12
≥60	40 (36%)	30 (42.8%)	10 (24.4%)	2.1 (1.2 - 3.8)	0.04
FRCV					
Hypertension	66 (59.4%)	51 (72.85%)	15 (36.5%)	1.9 (1.2 - 3)	0.00
Diabetes	15 (13.5%)	13 (18.6%)	2 (4.9%)	3.8 (0.9 - 16)	0.03
STROKE	5 (4.5%)	4 (5.7%)	1 (2.4%)	2.3 (0.3 - 20)	0.38
Obesity	18 (16.2%)	12 (17.1%)	6 (14.6%)	1.1 (0.4 - 2.8)	0.47
Other chronic conditions					
ARF	17 (15.3%)	16 (22.9%)	1 (4%)	94 (1.3 - 68.1)	0.02
Clinical parameters					
Overall CI	72 (64.8%)	-	-	-	-
Left CI	19 (17.1%)	12 (16.6%)	7 (17%)	0.9 (0.8 - 1.2)	0.52
Right CI	11 (9.9%)	6 (8.3%)	5 (12.1)	1.1 (0.8 - 1.4)	0.29
Normal MAP	13 (11.7%)	11 (40.1%)	2 (4.9%)	0.7 (0.5 - 0.9)	0.07
Biological parameters Haemoglobin (g/dl)					
>12	65 (58.5%)	45 (64.3%)	20 (48.8%)	1.3 (0.9 - 1.7)	0.08
[10 - 12]	32 (28.8%)	20 (28.6%)	12 (29.3%)	0.9 (0,7 - 1,3)	0.55
<10	14 (12.6%)	5 (7.14%)	9 (22%)	0.5 (0.3 - 1)	0.02
Morphological parameters					
HVG (Yes)	39 (35.1%)	27 (38.6%)	12 (29.3%)	1.15 (0.9 - 1.5)	0.2
ACFA (Yes)	25 (22.5%)	18 (25.7%)	7 (17.1%)	1.2 (0.8 - 1.6)	0.2
ESV (Yes)	13 (11.7%)	8 (11.4%)	5 (12.2)	0.9 (0.6 - 1.5)	0.5
Cardiomegaly	72 (64.8%)	69 (98.6%)	3 (3.6%)	1.03 (0.9 - 1.08)	0.39
Preserved LVEF	28 (25.2%)	18 (25.7%)	10 (24.4%)	0.9 (0.7 - 1.3)	0.53
Lowered mean LVEF	11 (9.9%)	8 (11.4%)	3 (7.3%)	1.5 (0.4 - 5.5)	0.36
Impaired LVEF	83 (74.7%)	52 (74.3%)	31 (75.6%)	0.9 (0.8 - 1.2)	0.5
High PRVG	68 (61.2%)	58 (82.8%)	10 (24.4%)	0.8 (0.5 - 1.2)	0.2

In terms of laboratory tests (Table 2), 7.1% had haemoglobin levels below 10 g/dl and hyponatremia was found in 81.4% of patients. The mean glomerular filtration rate was 39.9 +/− 17.1 ml/min/m^2 with a minimum of 2.5 and a maximum of 88 ml/min/m^2 SC. In terms of morphology (Table 2), 74.3% had an impaired LV ejection fraction.

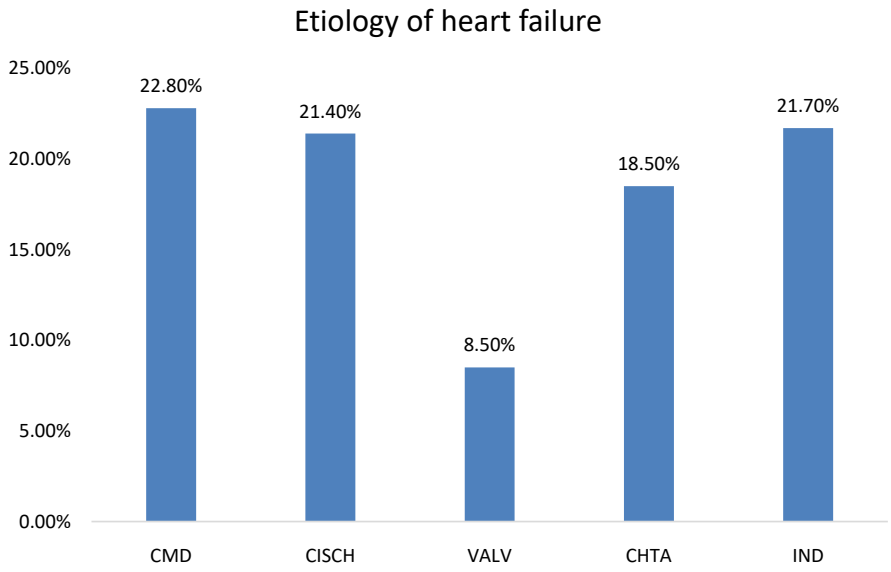

Figure 2. Distribution of patients according to heart failure etiology. CMD = Cardiomyopathy, CISCH = Ischaemic heart disease, VALV = Valvulopathies, CHTA = Hypertensive heart disease, IND = Indeterminate heart disease.

The majority (97.3%) of patients were admitted in the context of acute cardiac decompensation, and the most common causes of cardiac decompensation were failure to comply with treatment (64.3%), bronchopneumonia (41.4%), myocardial ischaemia (28.6%), the natural course of the disease (11.4%), and discontinuation of treatment (2.8%) (**Figure 3**). We observed a predominance of type 2 cardio-renal syndrome at 57.1% (**Figure 4**).

In univariate analysis, we compared the group with CRS (n = 70) with the group without CRS (n = 41) (**Table 2**). Factors such as age > 60 years [OR (95% CI) = 2.1 (1.2 - 3.8), p = 0.04], hypertension [OR (95% CI) = 1.9 (1.2 - 3), p = 0.001], diabetes [OR (95% CI) = 3.8 (0.9 - 16), p = 0.03] and a history of acute renal failure [OR (95% CI) = 9.4 (1.3 - 68.1), p = 0.02] were associated with the risk of cardio-renal syndrome.

In terms of morphology, the proportion of patients with impaired LVEF was greater in the SCR group than in the no SCR group, with a non-significant difference (p = 0.36) (**Table 2**). Similarly, the proportion of patients with elevated LV filling pressure (LVFP) was greater in the CRS group than in the non-CRS group, with a non-significant difference (p = 0.2). The factors associated with remission of the cardio-renal syndrome (**Table 3**) were: age < 39 years p = 0.001; OR (95% CI) = 0.6 (0.4 - 0.8), beta-blocker therapy p = 0.01; OR (95% CI) = 0.47 (0.25 - 0.90) antiplatelet therapy p = 0.04; OR (95% CI) = 0.33 (0.10 - 0.99) and preserved left ventricular ejection fraction FeVG > 50% p = 0.04; OR (95% CI) = 0.5 (0.29 - 0.831)

In multivariate analysis after logistic regression, only arterial hypertension p = 0.05; OR (CI95%) = 3.5 (1.4 - 8.5) remained statistically associated with the occurrence of cardio-renal syndrome (**Table 4**).

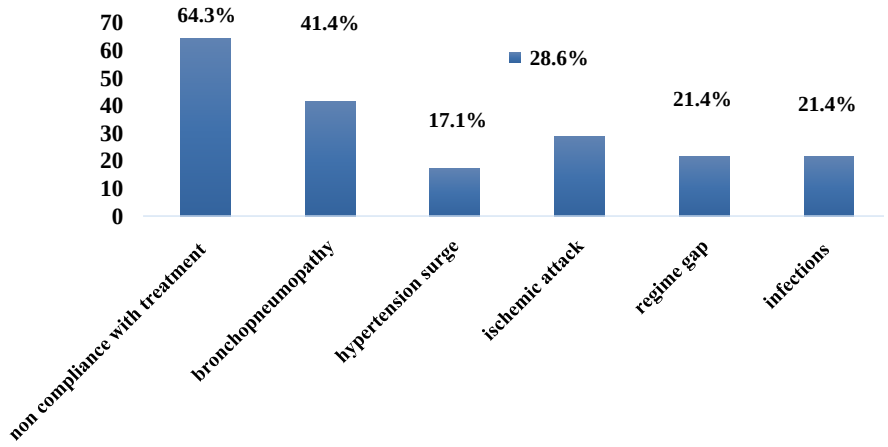

Figure 3. Factors in cardiac decompensation.

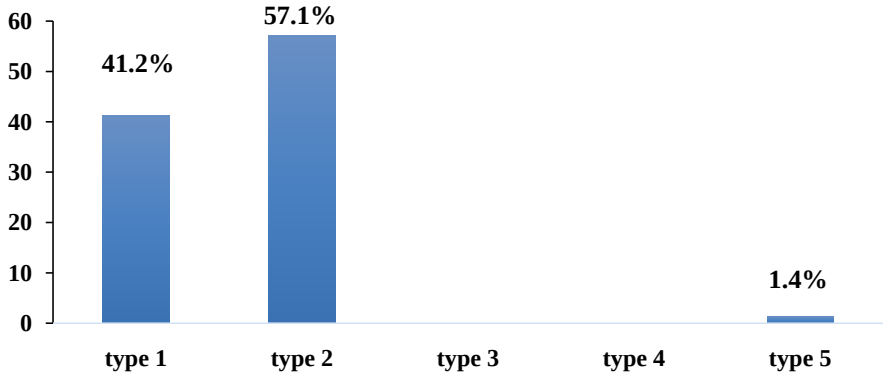

Figure 4. Frequency of types of cardio-renal syndrome according to the Ronco classification.

Table 3. Factors associated with remission of cardio-renal syndrome in univariate analysis.

	Improved renal function n = 29	OR (CI 95%)	P value
Beta-blockers	8 (27.6%)	0.47 (0.25 - 0.9)	0.01
PAAS	5 (17.2%)	0.33 (0.10 - 0.99)	0.04
Statins	2 (6.8%)	2.5 (1.9 - 3.5)	0.06
History of ARF	2 (6.8%)	4 (1.1 - 15)	0.007
ACS	22 (75.9)	0.47 (0.18 - 1.25)	0.05
Preserved LVEF	18 (62.1%)	0.5 (0.29 - 0.83)	0.04

ATCD = Previous history.

Table 4. Factors associated with the occurrence of kidney damage in heart failure in multivariate analysis.

Variables	P value	OR (CI 95%)
Hypertension	0.05	3.5 (1.4 - 8.5)

4. Discussion

The frequency of cardio-renal syndrome in our series was 64%, with a predominance of type 2 cardio-renal syndrome according to the Ronco classification (**Table 1**). According to the American ADHERE registry, at least 65% of patients presenting with acute heart failure have a creatinine clearance of less than 60 ml/min. Our results were well above those of Malick Bodian *et al.* [11], who found a prevalence of 3.7% in a series of 36 cases. This difference can be explained by the criteria used to define renal impairment in this study (creatinine > 12 mg/l in men and >13 mg/l in women), which underestimated the frequency of renal impairment, and also by the delay in biological monitoring of renal function, which tends to improve with treatment. The male gender predominated at 69%, which corroborates with the data of Traoré F. and al in Abidjan in 2018 in a study on the epidemiological and clinical aspects of the cardio-renal syndrome which found a male predominance at 51%. The mean age of our population was 53.09 ± 15.7 years, which is in line with the results of Malick Bodian [11] and al in Senegal in 2016 who found a mean age of 56.9 years. Hypertension, dyslipidemia, diabetes and smoking were the cardiovascular risk factors found in 72.8%, 21.4%, 18.6% and 14.3% respectively. Our results concerning arterial hypertension are in line with those of Affangla DA and al who found arterial hypertension to be a major cardiovascular risk factor in 52.78% of cases [4]. Kelly V. Liang found arterial hypertension, diabetes and atherosclerosis to be the main cardiovascular risk factors implicated in the occurrence of cardio-renal syndrome [9]. The aetiologies of heart failure were dominated by dilated cardiomyopathy (22.8%), followed by ischaemic heart disease (21.4%) and hypertensive heart disease (18.5%). Similarly, Meftah and al [12] found in a study of cardio-renal syndrome in kidney transplant patients that ischaemic heart disease was predominant (32.65%). Yao and al in the Ivory Coast reported in a study of patients suffering from dilated cardiomyopathy (DCM) that 35.2% of them had abnormal coronary angiography. The high proportion of dilated cardiomyopathy (22.8%) and undetermined causes (21.7%) is probably due to the difficulty of conducting aetiological research into heart disease in general in our countries (inaccessibility of coronary angiography for many patients). Congestive heart failure was the predominant clinical presentation in 64.8% of cases. Traoré F and al found a predominance of congestive heart failure at 51% in a retrospective descriptive study [13].

Most of our patients consulted for acute decompensation of a known chronic heart failure, and the decompensation factors found were dominated by therapeutic non-compliance (64.3%). Similarly, Coulibaly found non-compliance with treatment to be a major factor in decompensation in 61.5% of patients [8]. Anaemia was present in 40.5% of cases; our results concur with those of Coulibaly in Mali, who found anaemia in 38.5% of cases. Ionic disorders were dominated by hyponatremia in 81.4% of our patients and there was a statistically significant association with the occurrence of cardio-renal syndrome ($p = 0.01$).

Malick Bodian *et al.* [11] found hyponatremia in 61.8% of cases. These results can be explained by the excess of sodium in patients suffering from cardiac and renal decompensation.

Mean LVEF was 33.9% ± 13.6. It was impaired (LVEF < 40%) in 74.3%. Although no statistically significant association was found between the fall in LVEF and the onset of cardio-renal syndrome in our study, Ronco in 2012 found that the clinical impact, assessed by the NYHA stage of dyspnoea, seems to be associated with the degree of impairment of GFR [13].

5. Conclusion

Renal failure is the major complication of stable or decompensating heart failure. In our series, the incidence of renal failure in heart failure was 64%. Most of the patients were men with chronic heart failure admitted to hospital for acute decompensation. The factors associated with the onset of cardio-renal syndrome were: age > 60 years, diabetes, arterial hypertension and a history of acute renal failure. Factors associated with improvement of the cardio-renal syndrome were: age < 39 years, treatment including beta-blockers and antiplatelet agents, and preserved left ventricular ejection fraction.

Contributions of our Study

The cardio-renal syndrome is a frequent entity in cardiology and nephrology.

The predominance of type 2 in the RONCO classification.

The predominance of dilated cardiomyopathy as an etiology for heart failure and the importance of undetermined causes, proving the limitations of investigation in many cases.

Authors' Contributions

METO Diane wrote this article, conducted the study and entered the data. HAZOUME Rodrigue carried out the statistical analysis of the data. EKOU Arnaud directed this work from the protocol to the final draft. YAO Hubert coordinated the study and publication of this article. KONAN Serge D submitted the article online and adapted it to the journal's recommendations. NGUETTA Roland, EKOU Arnaud and their team followed the patients in the medical department of the Abidjan Heart Institute. All the authors contributed to the writing and proofreading of this work.

Conflicts of Interest

The authors declare no conflict of interest.

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Survey Sheet

Topic: prevalence of kidney damage in heart failure

PATIENT IDENTIFICATION

Surname:

First Name:

Phone Number:

Age (years), Gender F (1) M (2), Occupation: active (1) no (2)

Residence:

Ethnicity:

Marital Status: Widowed (V), Married (M), Single (C)

Health insurance: yes (1) no (2)

ANTHROPOMETRIC PARAMETERS

Weight Height BMI

MEDICAL BACKGROUND

CARDIOVASCULAR:

Heart failure yes (1) no (2)

Duration of evolution received treatment:

Coronary heart disease yes (1) no (1)

Valve disease yes (1) no (2)

Venous thromboembolic disease yes (1) no (2)

Arythmia yes (1) no (2)/cardiac conduction yes (1) no (2)

Cardiovascular risk factors:

Hypertension yes (1) no (2) diabetes yes (1) no (2), dyslipidemia yes (1) no (2), smoking yes (1) no (2), physical inactivity yes (1) no (2).

UROLOGICAL AND NEPHROLOGICAL

Glomerular nephropathy yes (1) no (2)

Duration of evolution

Treatment received

Vascular nephropathy yes (1) no (2)

Duration of evolution

Treatment received

Tubular nephropathy (recurrent urinary tract infections? yes (1) no (2)

Duration of evolution

Treatment received

Obstruction of urinary tract yes (1) no (2)

Duration of evolution

Treatment received

Chronic dialysis yes (1) no (2)

Indication: CKD (1), Vascular Nephropathy (2), Diabetic Nephropathy (3) Indeterminate (4).

INFECTIOUS STATUS

Focal infections angina (1) otitis (2), rhinitis (3), sinusitis (4), dental caries (5), boils (6)

Viral infections hepatitis B (1) hepatitis C (2), HIV (3), Shingles (4)

Tuberculosis yes (1) no (2) pulmonary (1) extra pulmonary (2).

GENERAL ILLNESS

Sickle cell disease: yes (1) no (2)

Gout yes (1) no (2)

Immunological disorders yes (1) no (2), if yes specify…

Malignant diseases yes (1) no (2).

Surgical: yes (1), no (2), if yes specify:

Treatment: IEC/ARAII (1) NSAID (2) furosemid (3), hydrochlorothiazid (4), spironolacton (5).

LIFE HABITS

Narcotics yes (1) no (2) if yes specify:

Self-medication: YES (1) no (2)

If yes, traditional (1) modern (2)

Oral (O) rectal (R) route of administration.

INITIAL EXAMINATION

Physical Examination:

Blood pressure Pulse Temperature respiratory rate

Left Heart failure (1), Right heart failure (2), Overall heart failure (3)

Acute heart failure (1), chronic heart failure (2)

Hydration status: skin fold (1) edema (2)

Acute pulmonary edema yes (1) no (2)

Hepatomegaly yes (1) no (2); Hepatojugular reflux yes (1) no (2); collateral veinous circulation yes (1) no (2)

DECOMPENSATION FACTORS:

Non respect of diet (1) poor adherence to treatment (2) bronchopneumopathies (3) intercurrent infections (4), hypertension flare-up (5) AKI (6) ischemia flare-up (7).

Other (s) to be specified.

BIOLOGY:

Blood sugar….

Blood GRAM…Haemoglobin…. WBC…. PLT….

Ionogram: Na^+…. K^+…. Cl^-…. Calcemia…. Phosphorus….

Urine strips/Proteinuria/Uremia/serum creatinine (GFR)

Proteinogram: albumin

Cholesterol…. HDL…. LDL…TG….

BNP….

Troponin I…… Troponin T….

MEDICAL IMAGING

ECG: sinus rythm yes (1) no (2) atrial fibrillation yes (1) no (2), LVH yes (1) no (2)

Heart Echography:

LVEF…. Diastolic LV size…. LV filling pressure normal (1) high (2)…. PAPS…, organic (1) functional (2) mitral insufficiency,

Organic aortic insufficiency (1), aortic stenosis (2) mitral stenosis (3)

Specify whether the heart failure is with conserved ejection fraction (1), moderately altered (2), and altered (3).

Chest X-ray: Cardio-thoracic index….

Renal ultrasound: kidney size…. Cortico-medullary differentiation preserved yes (1) no (2).

Coronary angiography: normal (1)/abnormal (2), specify:

Scanner

MRI

KIDNEY BIOPSY REPORT

Diagnosis:

Prognosis:

Clinical course: alive (1) dead (2)

Duration of hospitalization

TREATMENT RECEIVED:

Medicated: Diuretics: spironolactone (1) dose … furosemide (2) if yes dose …

NSAID (2) if yes specify dose

CEI/ARB (3) if yes specify dose

Dialysis: yes (1) no (2)

Surgical:

Heart surgery yes (1) no (2)

Evolution of outstanding hospitalization

Day 7 creatinine…, Day 21 creatinine….

DISCHARGE FROM HOSPITALIZATION

Nephrology consultation: yes (1) no (2) and serum creatinine….