

Clinical and Evolutionary Profile of Patients with Rheumatic Valvulopathy Operated Versus Not Operated in Chad

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Abstract

Introduction: The aim of this study was to describe the clinical and evolutionary profile of patients with rheumatic valvulopathy, operated versus non-operated in Chad. **Patient and methods:** This was a prospective, multicenter cohort study carried out in the cardiology departments of the National Reference University Hospital Centre, cardiology Department, Renaissance University Hospital Center, and Bon Samaritan University Hospital, of N'Djamena city. It was spread over a six-year period, from January 1, 2015, to December 31, 2020. Were included in the study, all patients who had been seen on an outpatient basis and/or hospitalized for rheumatic valvular disease in the aforementioned in the aforementioned during the study period. The clinical and evolutionary characteristics of operated patients were compared with those of non-operated patients using, as required, Pearson's chi2 test, Fisher's exact test or Student's t-test. The threshold of statistical significance was $p < 0.05$.

Results: A total of 80 patients (22%) had undergone surgery out of the 364 included. Valve replacement by mechanical prosthesis accounted for 77% of procedures, and valve plasty for 45%. The mean age of operated patients was 33 vs. 31 for non-operated patients ($p = \text{not significant NS}$). Female gender was found in 57% of operated patients vs. 52% of non-operated patients ($p = \text{NS}$). Dyspnea on exertion was present on admission in 65% of operated patients vs. 82% of non-operated patients ($p < 0.001$). LVEF in operated patients was 61% vs 59% in non-operated patients ($p = \text{NS}$), mean LV end-diastolic diameter was 53.2 mm vs. 54.7 mm ($p = \text{NS}$)

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and PAPs were 43 mmHg vs 54 mmHg ($p=0.0001$). During follow-up, 36% of operated patients vs. 47% of non-operated patients had a hemodynamic complication ($p=0.07$), 12% of operated patients had a thromboembolic complication vs. 5% of non-operated patients ($p=0.01$), 13% of operated patients had atrial fibrillation vs. 15% of non-operated patients ($p=0.12$). Ten (10) deaths (12%) were recorded among operated patient's vs 28 deaths (10%) among non-operated patients ($p=NS$).

Conclusion: Morbidity and mortality in patients with rheumatic valvular disease remain high, even in patients undergoing surgery. even in patients who have undergone surgery. While there is a need to make surgery accessible to as many patients as possible, good therapeutic education and improvement of the patient's care pathway are essential. Those are the keys to effective, safe care.

Keywords: Morbi-mortality; Rheumatic valvulopathy; Surgery.

Introduction

Sub-Saharan Africa continues to bear the brunt of rheumatic valvulopathy, with its high morbidity and mortality, particularly in the under 30 years old [1]. According to the WHO, the prevalence of rheumatic valvulopathy is estimated at 15.6 million people worldwide, predominantly among disadvantaged populations, with some 2,33,000 deaths per year [2-4]. Rheumatic fever is endemic in these regions, with a high overall incidence that has remained relatively stable over time, albeit with considerable regional heterogeneity [5].

Despite the considerable progress made in recent years in the field of diagnosis and treatment, multiple serious complications, the main ones being atrial fibrillation, infective endocarditis, thromboembolic complications, and heart failure, all of which have a serious impact on the outcome of these conditions in the context [2,6]. These heart diseases entail, in addition to very high morbidity and mortality, considerable financial and social costs [7]. Valve repair surgery, which can improve quality of life for these patients, is unfortunately not accessible to many. The low socio-economic status of most of the patients limits the access to surgical treatment when indicated. Foreign

evacuations are then the only recourse, but that are not easily conceivable due to the prohibitive cost.

In many cases, it is thanks to non-governmental organizations providing medical humanitarian aid that the therapeutic project can be carried out successfully. For the past 10 years, the "Emmergency-salam Center for Surgery", has been operating on Chadian patients suffering from this condition in Khartoum, Sudan. Little is known about the prognosis of patients with rheumatic valve disease who undergo surgery. The aim of this study was to describe the clinical and evolutionary profile of patients with rheumatic valvulopathy, operated versus non-operated in Chad.

Patient and methods

Type and period of study

This was a prospective, observational, multicenter cohort study carried out in Chad's three cardiology departments, all located in N'Djamena: the cardiology departments of the National Reference University Hospital Centre, cardiology Department, Renaissance University Hospital Center and Bon Samaritain University Hospital. It was spread over a period of six (06) years, from January 2015 to January 2021.

Study population

This study involved a consecutive series of patients who consulted and/or were hospitalized at one of the three centers for rheumatic valvulopathy. Patients over 15 years old who consented to participate in the study, and in whom the organic diagnosis of valvulopathy was confirmed by Doppler echocardiography, were included. This aetiological diagnosis of rheumatic valvulopathy was made on the basis of a personal history of rheumatic fever and/or the presence of a murmur on cardiac auscultation, but above all on the basis of the echocardiographic diagnostic criteria laid down by the World Heart Federation (WHF). These criteria considered abnormalities in valve morphology, sub valvular apparatus and Doppler study [8].

Patients with rheumatic fever without valvular leakage were not included in the study, patients with incomplete or unavailable echocardiographic data, valvular patients of non-rheumatic etiology.

Study variables and data collection techniques

The variables studied were sociodemographic characteristics, clinical data on patient admission, and electrical and echocardiographic data. The various medical and surgical treatments were also recorded. The evolutionary data concerned the different evolutionary complications (hemodynamic, rhythmic, thromboembolic, and infectious complications), as well as the occurrence of death. These data were recorded for each patient on a pre-determined data collection form. These forms were completed by the physicians. The

assessment of the severity of valvular lesions, left ventricular systolic dysfunction (LVEF \leq 50%) and left ventricular dilatation (LVEDD \geq 55 mm) was performed. A second echocardiographic evaluation of each patient was carried out by an external cardiologist (Salam Center). In the event of discrepancies concerning the etiology or severity of lesions, a direct exchange between the two sonographers was carried out to refine the final result.

The data source was the Chad rheumatic valve disease registry, which was available in the cardiology department of the National Reference University Hospital Centre.

Ethical considerations

Patient consent had been obtained. However, a patient's refusal to take part in the study did not affect male or female subsequent care. The confidentiality of the data collected was guaranteed.

Data analysis

Data analysis was performed using Epi Info software version 7.1. Quantitative parameters were presented as mean \pm standard deviation, and qualitative parameters as percentages. Pearson's Chi test was used to compare proportions. When application conditions were not observed, Fisher's exact test was used. The Student's t-test was used to compare two means. The threshold of statistical significance was $p < 0.05$.

Results

Socio-demographic aspects

A total of 364 patients with rheumatic valve disease were included in the study, and 80 patients (22%) had undergone valve surgery.

The mean age of operated patients was 32.6 ± 14.1 years vs. 30.9 ± 14.4 years for non-operated patients ($p=NS$). Female gender was found in 57% of operated patients vs. 52% of non-operated patients ($p=NS$). Fifty-one operated patients (64%) lived in urban areas

vs. 201 non-operated patients (71%) in urban areas ($p=0.27$). Thirty-nine operated patients (49%) were out of school vs. 161 of non-operated patients (57%) ($p=0.25$). Table 1 shows the socio-demographic characteristics of the patients.

Variables	Workforce (%)			p-value
	Total	Operated	Non-operated	
Mean age (years)	$31,2 \pm 14,4$	$32,6 \pm 14,1$	$30,9 \pm 14,4$	0,34
Sex				
Female	193(53)	46(57,5)	147(51,8)	0,38
Male	171(47)	34(42,5)	137(48,2)	
Residence				
Urban	252(69,2)	51(63,7)	201(70,8)	0,27
Rural	102(30,8)	29(36,2)	83(29,2)	
Education level				
No schooling	200(54,9)	39(48,7)	161(56,7)	0,25
Educated	164(45,1)	41(51,2)	123(43,3)	
Exercise-induced dyspnea	284(78)	50(62,5)	234(82,4)	0,0003
Palpitations	254(69,8)	55(68,7)	199(70,7)	0,89
Precordialgia	149(40,9)	19(23,7)	130(45,8)	0,0002
Heart failure	214(50,8)	24(30)	190(66,9)	<0,0001

Table 1: Sociodemographic and clinical aspects of the 364 patients.

Clinical and paraclinical aspects

On admission, exertional dyspnea was present in 50 operated patients (62%) vs. 234 (82%) of non-operated patients ($p<0.001$). Palpitations were present in 55 operated patients (69%) vs. 199 non-operated patients (71%) ($p=0.89$). Among operated patients, 24 (30%) had heart failure vs. 190 (67%) in the non-operated group ($p<0.0001$). Atrial fibrillation was present in 19 operated patients (24%) vs. 75 non-operated patients

(26%) ($p=0.66$). The mean left ventricular ejection fraction (LVEF) of operated patients was $61\% \pm 9\%$ vs. $59\% \pm 11\%$ for non-operated patients ($p=NS$), the mean LV telediastolic diameter (LVEDD) of operated patients was 53.2 ± 12.8 mm vs. 54.7 ± 13.2 mm ($p=NS$). The echocardiographic characteristics of the patients are shown in Table 2. Depending on the type of valve damage, 72 patients (90%) operated with mitral insufficiency, five patients (6%) with mitral narrowing and three patients (4%) with aortic insufficiency.

Variables	Workforce (%)			p-value
	Total	Opereted	No-opereted	
Atrial fibrillation	94(26)	19(24)	75(26)	0,66
Mean DTDVG(mm)	54 ± 13	53 ± 13	55 ± 13	0,36
DTDVG>55 mm	183(50)	34(42)	149(52)	0,06
Mean DTSVG(mm)	36 ± 12	36 ± 11	36 ± 12	0,6
DTSVG>45 mm	65(18)	14(17)	51(18)	0,4
Mean FEVG(%)	59 ± 11	61 ± 9	59 ± 11	0,15
FEVG<45%	49(13)	3(4)	36(13)	0,03
Mean DTOG	48 ± 13	48 ± 13	49 ± 13	0,7
DTOG>50 mm	164(45)	34(42)	130(46)	0,38
Mean PAPS(mmHg)	52 ± 23	43 ± 16	54 ± 24	0,0001
PAPS>35 mmHg	250(69)	39(49)	211(74)	0,003

Table 2: Paraclinical characteristics of 364 patients.

Therapeutic aspects

Diuretics were used in 72 operated patients (90%) vs. 275 non-operated patients (97%) ($p < 0.01$). Beta-blockers were used in 63 operated patients (79%) vs. 176 non-operated patients (62%) ($p < 0.005$).

Converting enzyme inhibitors (CEIs) or angiotensin II receptor blockers (ARBs) were used in 57 operated patients (71%) vs. 217 of non-operated patients (76%) ($p < 0.34$). Twelve operated patients (15%) had anti-arrhythmic treatment vs. 111 non-operated patients (39%) ($p < 0.001$). Anti-vitamin K (AVK) therapy was prescribed in 66 operated patients (82%) vs. 136 non-operated patients (48%) ($p < 0.001$).

Evolutionary aspects

The mean follow-up time for operated patients was 21 ± 13 months vs. 17 ± 14 months ($p = \text{NS}$). Hemodynamic complications were observed in 29 operated patients (36%) vs. 132 of non-operated patients (47%) ($p = 0.07$). Ten operated patients (12%) had thromboembolic complications vs. 14 non-operated patients (5%) ($p = 0.01$). Infective endocarditis was noted in three (03) operated patients (4%) vs. 21 non-operated patients (7%) ($p = 0.24$).

The authors recorded 10 deaths (12%) among operated patients vs. 28 deaths (10%) among non-operated patients ($p = 0.24$). The different evolutionary modalities are summarized in Table 3.

Variables	Workforce (%)			p-value
	Total	Operated	Non operated	
Average follow-up time (months)	18 ± 13	21 ± 13	17 ± 14	0.28
Rehospitalization	207(57)	41(51)	167(59)	0.73
Hemodynamic complication	161(44)	29(36)	132(47)	0.07
Atrial fibrillation	40(15)	8(13)	32(15)	0.12
Thromboembolic complication	24(7)	10(12)	14(5)	0.01
Prosthesis dysfunction	5(1)	5(8)	-	-
Major hemorrhage	10(5)	3(4)	7(5)	-
Infective endocarditis	24(7)	3(4)	21(7)	0.24
Death	38(10)	10(12)	28(10)	0.24

Table 3: Different evolutionary modalities observed in the 364 patients.

Discussion

This prospective, multicenter cohort study enabled the researchers to compare the clinical and evolutionary profile of patients with rheumatic valve disease who underwent surgery with those who did not. These profiles differed little from one group to another. It also enabled the researchers to observe the difficulties that the populations face in accessing quality care (particularly surgical management of patients suffering from rheumatic valvulopathy) in the context. Only 22% of the patients had access to reconstructive surgery for valve lesions, while most of the patients were at the operative stage.

Overall, access to surgery for patients with rheumatic valvulopathy is very limited in

Central and West Africa, as demonstrated by the 2.2% rate reported by the VALVAFRIC study [3]. This low rate of access can be explained by the inadequacy of the technical facilities (no cardiac surgery available) on the one hand and the financial inaccessibility of the patients (no third-party payment system) to appropriate care. So, as in this context, it's the sponsorship structures that help patients with this care. The sociodemographic characteristics of the patients in the series did not differ from those reported in the African literature [3,4,9,10].

The patient were young (mean age 31), predominantly female (53%) and not in school (54.9%). Moreover, there was no statistically significant difference between the socio-demographic characteristics of operated and non-operated patients in the

series. Rheumatic valvulopathy thus rapidly becomes symptomatic at an early age, reflecting the rapid progression of this condition in the context. The clinical pictures showed a progression to an advanced stage of the disease, corroborating data from the African literature [3,11,12]. The majority of patients had moderate to severe valve damage, with LV dilatation in half and elevated pulmonary pressures in 69%. These patients had a very high risk of developing cardiovascular complications. Heart failure was present in 59% of patients on admission, confirming the key role of rheumatic valve disease in the etiopathogenesis of heart failure in Chad and sub-Saharan Africa [13].

The virtually absence of secondary prophylaxis in these patients, combined with the misuse of secondary antibiotic prophylaxis, may partly explain this rapid progression of the disease, which is then only discovered at the stage of complications. However, the deleterious role of many other factors must also be emphasized, namely the low socio-economic level of most patients, the absence of universal health insurance, the traditional view of illness, the inaccessibility of healthcare facilities and the poor organization of the care pathway. These various interrelated factors are not conducive to the early management of these patients and do not guarantee continuity of care once it has been initiated. Moreover, operated patients were less dyspneic at inclusion than non-operated patients ($p < 0.001$). Also on admission, heart failure was less frequent in the operated group than in the non-operated group ($p < 0.0001$). This may be due to a bias in the selection of patients for surgery. Minimizing operative risk often leads sponsors to preferentially select

hemodynamically stable patients. Rheumatic valve disease remains the leading cause of cardiovascular death in children and young adults in developing countries [1].

In the series, the authors recorded high late mortality rates of 12% among operated patients vs. 10% among non-operated patients ($p = 0.24$). Similar mortality rates of between 10% and 15% have been reported in African literature [2,14,15]. Tchoumi, et al. [11], in Cameroon reported even higher mortality rates, 35% after two years' follow-up and 65% after five years [11].

In all patients with rheumatic valve disease, whether or not the patients have undergone surgery, continuity of care and drug therapy is not always guaranteed and represents a real challenge in the context. The low socio-economic level of most patients, the absence of universal health insurance, the traditional view of illness, the inaccessibility of care facilities and the poor organization of the care pathway would not guarantee this continuity of care once it was initiated. These unfavorable survival results in the series can be explained in part by the severity of the clinical picture on admission, but above all by the inadequacy of secondary and tertiary prevention.

Analysis of the results shows that the benefit of surgery in patients with rheumatic valve disease fades rapidly over time. Long-term survival of operated patients was comparable to that of non-operated patients in this study, with a high prevalence of hemodynamic complications (36% vs. 47%; $p = 0.07$). Thromboembolic complications were higher in operated patients (12%) than in non-operated patients (5%) ($p = 0.01$). Valve

replacement by mechanical prosthesis, the treatment option most often chosen in the context, still requires lifelong anticoagulant treatment with a vitamin K antagonist (VKA), which increases not only the risk of thrombosis, but also the risk of major bleeding. As a result, “rheumatic valve surgery with mechanical prostheses transforms a valve disease into a true coagulation disease”. Thrombosis is favored by inappropriate anticoagulant therapy, atrial fibrillation, dilated left atrium and left ventricular dysfunction [16].

In Chad, the possibility of carrying out biological tests to monitor anticoagulation (INR) is very limited, as is the availability of anticoagulant drugs. In some cases, patients

are obliged to travel enormous distances to gain access to cardiologists, all of whom are located in the country’s capital (N'Djamena). Patients’ level of autonomy in managing the anticoagulant therapy with VKAs is mediocre, making it impossible to guarantee efficacy and, above all, the safety of its use [17].

Conclusion

The morbidity and mortality of patients with rheumatic valvular disease remains high, even among those who have undergone surgery. While it is certainly necessary to make surgery accessible to as many patients as possible, it is also essential to ensure that patients receive proper therapeutic education and improved care. Those are the keys to effective, safe care.

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