



Late mortality after cardiac interventions over 10-year period in two Cameroonian government-owned hospitals

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Background: Cardiac surgery is a growing activity in Sub-Saharan Africa, however, data related to long-term mortality are scarce. We aimed to analyze outcome data of cardiac interventions in two hospitals in Cameroon over 10 years' period.

Methods: we conducted a retrospective analytical and descriptive study at the Douala General Hospital and Yaoundé General Hospital. All patients operated between January 2007 and December 2017, or their families were contacted by phone between January and April 2018 for a free of charges medical examination.

Results: Of a total of 98 patients operated during the study period, 8 (8.2%) were lost to follow-up. Finally, 90 patients [49 (54.4%) women and 41 (45.6%)] men were included. The mean age was 49±22 years (range, 13–89 years). The surgical indications were valvular heart diseases in 37 (41.1%) cases, congenital heart diseases in 11 (12.2%) cases, chronic constrictive pericarditis in 4 (4.4%) cases, and intra cardiac tumor in 1 (1.1%) case. Valve replacement was the most common type of surgery carried out in 37 (41.1%) cases—mostly with mechanical prosthesis. Pacemaker—mostly dual—chambers were implanted in 36 (40.0%) patients. The median follow-up was 26 months. The overall late mortality was 5.7%, and the overall survival rates at 5 and 10 years were 95.5% and 94.4% respectively. The overall survival rates at 5 and 10 years for mechanical valve prosthesis were 93.3% and 90% respectively. The survival at 10 years was 100% for patients with bioprosthesis. The survival rates at 10 years were 94.1% and 100% respectively for dual and single chamber pacemaker.

Conclusions: Long-term outcome of cardiac surgery in hospitals in Cameroon are acceptable with low mortality rate. However, outcome metrics beyond mortality should be implemented for a prospective data collection.

Keywords: Late mortality; cardiac surgery; outcomes; Cameroon

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Introduction

Cardiovascular diseases (CVDs) remain the leading cause of death worldwide (1), with its burden disproportionately affecting Sub-Saharan Africa (SSA) region (1-3). Some of these CVDs require surgical management, but resources to provide optimal care are still very limited (4,5). To overcome these challenges, medical evacuations and humanitarian missions have been carried out over many years in several SSA countries (4-8). Early mortality after open heart surgery (OHS) in SSA has been estimated between 0% to 16% depending on the indication (5-9). However, the long-term mortality after cardiac surgery in this setting is not well known. Yangni-Angate *et al.* reported an overall mortality of 8.7% 5 years after valvular surgery. Survival at 25 years were 78% and 97% respectively for ventricular septum defect and atrial septum defect (7). Cardiac surgery started in Cameroon since 1985, and most public hospitals still rely on humanitarian missions (10-12). The short-term mortality rates were respectively 3.6% (10), 9% (11), and 7.4% (12). Data on the late mortality are scarce in our setting. The aim of this work was to study the long-term mortality rate of cardiac surgery in Cameroon.

Methods

This retrospective descriptive and analytical study was carried out in the cardio-surgery and intensive care unit of the Douala and Yaoundé General Hospitals between January 2007 and December 2017. The two hospitals are tertiary health facilities located in the economic (Douala) and political (Yaoundé) capitals of Cameroon. All patients who underwent cardiac surgery during humanitarian missions were included in this study. From January 2018 to April 2018, all patients or their relatives were contacted through phone for a free of charges medical examination. Incomplete medical files, patients and families lost to follow-up were excluded. Data collected included demographics, presenting symptoms, indication for surgery, operative procedure and late mortality (mortality occurred later than 30 days after surgical procedure). Data were analyzed using the software Epi-info version 7.1 (Centers for Disease Control and Preventive, Atlanta, Georgia, USA). We present qualitative data as frequencies and percentages. The 5- and 10-year survivals were computed using Kaplan-Meier survival analysis. This study was approved by the Institutional Research and Ethics Committee of the Douala University

and all participants provided written informed consent. We carried out this study in accordance with the declarations of Helsinki.

Results

Demographics and clinical characteristics are shown in *Table 1*. Of a total of 98 patients operated during the study period, 8 (8.2%) were lost to follow-up. We finally included 90 patients (54.4% women; mean age 49±22 years). The majority of patients (71.1%) lived in Douala. Hypertension (21.1%) was the most frequent co-morbidity. Dyspnea was the most frequent presenting symptom (66.7%), and heart murmur (48.9%) the most frequent physical sign. The surgical indications are listed on *Table 2*. Valvular heart diseases were the most frequent condition (41.1%)—with isolated mitral in 59.4%, isolated aortic valve in 32.5%, and aorto-mitral involvement in 8.1%. The other indications were cardiac rhythm disorders in 36 (40.0%) patients, congenital heart diseases in 11 (12.2%) cases, chronic constrictive pericarditis in 4 (4.4%) cases, and intra cardiac tumor in 1 (1.1%) case. Surgical procedures are summarized in *Table 3*. Valve replacement was the most common type of surgery carried out in 37 (41.1%) cases—mostly with mechanical prosthesis. Among the latter, one patient benefited from a mitral valve replacement redo surgery 6 years after a reparation. Pacemaker—mostly dual-chambers were implanted in 36 (40.0%) patients. The median follow-up was 26 months. The causes of death are listed in *Table 4*. The overall late mortality rate was 5.7%, and the overall survival rates at 5 and 10 years were 95.5% and 94.4% respectively (*Figure 1*). The overall survival rates at 5 and 10 years for mechanical valve prosthesis were 93.3% and 90% respectively, whereas the survival rate at 10 years was 100% for patients with bioprosthesis (*Figure 2*). The Survival rates at 10 years were 94.1% and 100% respectively for dual and single chamber pacemaker (*Figure 3*).

Discussion

The aim this work was to study the long-term mortality of patient operated in Cameroon during humanitarian missions. This is the first of its kind in our setting. It is important to emphasize at this point the role of “the Cameroonian association of patients who benefited from cardiac surgery” which is well organized, and helped us to

Table 1 Socio-demographic and clinical characteristics

Characteristics	n	%
Place of residence		
Douala	64	71.1
Yaounde	12	13.3
Others	14	15.6
Mensual salary		
≤50,000 fcfa (75 euros)	38	42.2
50,000–100,000 fcfa (75–150 euros)	14	15.6
100,000–200,000 fcfa (150–300 euros)	25	27.8
<200,000 fcfa (300 euros)	13	14.4
Co-morbidity		
Hypertension	19	21.10
Diabetes	6	6.70
Stroke	2	2.2
Gout	2	2.2
Obesity	1	1.1
Symptoms		
Dyspnea	60	66.7
Syncope	18	20.0
Dizziness	17	18.9
Chest pain	8	8.9
Palpitation	4	4.4
Clinical signs		
Heart murmur	44	48.9
Bradycardia	6	6.7
Muffled cardiac sound	3	3.3
Legs oedema	3	3.3
Tachycardia	1	1.1
Jugular vein turgidity	1	1.1

Table 2 Surgical indications

Indications	n	%
Valvulopathy	37	41.1
Mitral valve stenosis	9	24.3
Mitral valve regurgitation	4	10.8
Aortic valve regurgitation	5	13.5
Aortic valve regurgitation	4	10.8
Mitral valve regurgitation and stenosis	6	16.2
Aortic valve regurgitation and stenosis	3	8.1
Multiple valve lesion	6	16.2
Heart rhythm disorder	36	40.0
Complete atrioventricular block	24	66.7
Atrial fibrillation	6	16.7
Mobitz 2 block	4	11.1
Wenckebach bloc	2	5.6
Congenital heart diseases	11	12.2
Pericarditis	4	4.4
Intracardiac tumor	1	1.1
Anevrysme aortique	1	1.1

Table 3 Surgical procedures

Procedures	n	%
Valvular replacement	37	41.1
Mechanical prothesis	30	33.3
Bioprosthesis	7	7.8
Tyrone davis	1	1.1
Pacemaker	36	40.0
Dual chambers	32	35.6
Single chamber	4	4.4
Congenital heart diseases reparation	11	12.2
Pericardial	4	4.4
Drainage	2	2.2
Pericardiectomy	2	2.2
Myxoma resection	1	1.1

Table 4 Causes of death

N°	Age (year)	Sex	Surgical indications	Surgical procedures	Post-operative survival	Suspected causes of death
1	19	M	Mitral valve regurgitation and stenosis	MVR	8 years 4 months	Prosthetic valve endocarditis
2	77	W	–	Pacemaker	4 years	Cardiac arrest
3	51	M	Aortic valve regurgitation and aneurysm of the ascending thoracic aorta	Bentall	4 months	Cardiac arrest
4	35	M	Mitral valve stenosis	MVR	6 weeks	Prosthetic valve thrombosis
5	71	W	Complete atrioventricular block	Pacemaker	3 years 4 months	Cardiac arrest

M, men; W, women; MVR, mitral valve replacement.

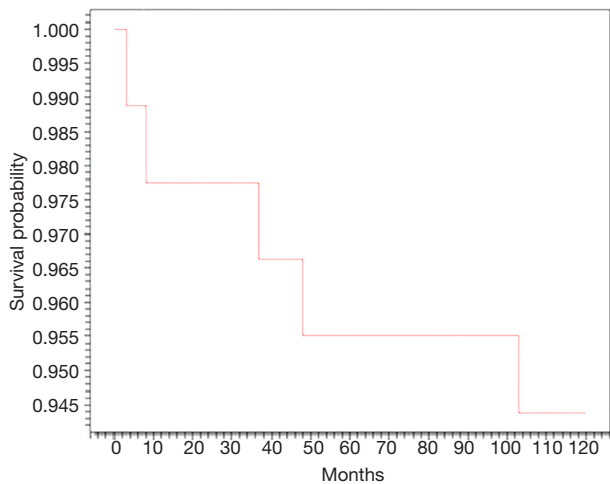


Figure 1 Kaplan-Meier overall mortality curve.

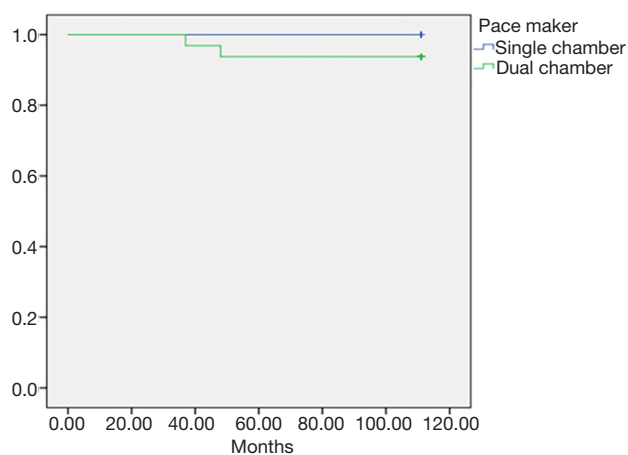


Figure 3 Kaplan-Meier survival curve for pacemaker.

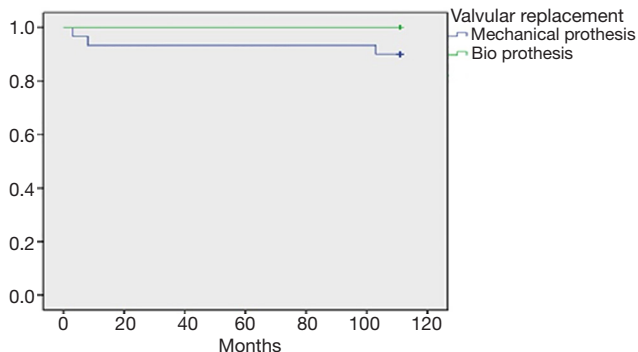


Figure 2 Kaplan-Meier survival curve for valve replacement procedure.

contact many patients who were lost to follow-up.

Socio-demographics and clinical characteristics

Our data showed that patients who underwent cardiac surgery in Cameroon were young and predominantly female. Such figures have been reported by several authors. This can be explained by the presence of coronary heart disease (CHD) and valvular heart disease in our cohort (6-9). Valvular heart disease remains common among Cameroonians, mainly as a complication of rheumatic valvular heart disease (10-12). The patients presented late, when the valvular destruction is severe making any

reparation quite impossible (7). As expected, valvular replacement was the most frequent surgical procedure. In a previous survey between 1985 and 1990, Kingue *et al.* reported a predominance of bioprosthesis implantation (10). The same policy was adopted in the earlier experience in Ivory Coast (7). These authors highlighted the difficulties associated with managing anticoagulants in SSA health settings (7,10). As this constraint is no longer the case in our setting, most patients benefited from mechanical valve implantation. Nevertheless, our findings stress the need of implementing primary and secondary preventive programmes of rheumatic heart disease (RHD), and improve early diagnosis in SSA (13,14). Not surprising, even if the population was young, the high rate of hypertension observed in our survey is in line with its growing burden faced by many SSA countries (1-3). Although pacemakers' implantation has become a routine activity in three centers in Cameroon, some patients may benefit from cheaper operations during humanitarian mission (15). As previously reported by Tanchou Tchoumi *et al.* (16) in their survey from a private heart center located in North West Cameroon, complete atrioventricular block was the dominant indication, and dual-chamber the most implanted cardiac pacemaker in our series.

Causes of death

Since pathological autopsy is very rare in our setting and only reserved in forensic audit, the probable cause of death was determined by interviewing the caregivers, the family, and consulting the death certificate. This process called verbal autopsy has been developed in many countries to reduce the lack of reliable information on the causes of death (17). In two cases (patients 1 and 4), the death occurred in the hospital. Patient 1 died following a septic choc due to a prosthetic mitral valve endocarditis documented by echography and bacteriology analysis. In case n°4, the patient who was not compliant to anticoagulation after having been discharged from hospital developed a mitral valve thrombosis documented by echography. Despite the initiation of thrombolytic, the patient died few hours after his admission. For the three remaining cases, death occurred at home, and the cause encoded as "cardiac arrest" could be hazardous. Family interview reported that death occurred during sleep in patient 2 and a sudden collapse in patients 3 and 5. Our

small series emphasizes the need for reliable strategy to improve the recording of the causes of death.

Mortality trend

Post hospitalization mortality is not easy to establish in SSA. Geographical distribution and financial constraints, the lack of national or local level outcome metrics are often mentioned as possible reasons (18,19). As a consequence, outcomes data are often focused on short-term results making the present study useful (5-9). After a median follow-up period of 26 months, the overall mortality was 5.7%, which is consistent with other series in SSA even if they didn't include cardiac pacing cases (7,20). The 5 years and 10 years survival rates were respectively 93.3% and 90% for mechanical valve, and 100% for bioprosthesis. Edwin *et al.* in Ghana mentioned a 98.1%, 97% and 94% actuarial survival respectively at 5, 10 and 15 years after mechanical valve replacement in children (20). Yangni-Angate *et al.* reported survival rates of 100%, 100% and 100% at 5, 10 and 15 years respectively for mechanical mitral valve replacement or repair versus 95%, 95%, and 85% for mitral valve replacement with bioprosthesis. For aortic valve replacement with bioprosthesis, survival at 5, 10, and 15 years were 85%, 82%, and 82% at 5, 10 and 15 years respectively versus 82%, 70% and 70% for mechanical prosthesis (7). In the last study, the rate of loss to follow up was up to 20% making our results acceptable. Furthermore, Mirabel *et al.* in Mozambique reported a mortality rate of 9.65% after a median follow-up of 23 months of 518 patients operated for miscellaneous indications (19). For cardiac pacing, after a median follow-up of 26 months, the pacemaker related death was 2%, and the pacemaker non-related death was 9.8% in a Nigeria experience (21). Mayosi *et al.* reported 17% of death after a median follow-up of 104 months in South Africa (22).

Limitations

The main limitation of this survey is its small sample size and its retrospective design, calling for large-scale prospective study on the same topic.

Conclusions

Long-term outcome of cardiac surgery in Cameroonian governmental hospitals are acceptable, with a low mortality

rate. However, outcome metrics beyond mortality should be implemented for a prospective data collection.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: This study was approved by the Institutional Research and Ethics Committee of the Douala University (ID: 1340CEI-UDo/03/2018/T) and all participants provided written informed consent. We carried out this study in accordance with the declarations of Helsinki.

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