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Heart Valve Surgery in Cameroon: Background and Perspectives

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Abstract

Acute rheumatic fever (ARF) and its sequela, rheumatic heart disease (RHD), remain major causes of morbidity and mortality in low- and middle-income countries, particularly in sub-Saharan Africa. In Cameroon, RHD accounts for a considerable share of pediatric and adolescent heart disease. Severe valvular involvement often requires surgical intervention, but access to cardiac surgery is critically constrained. Since the 1980s, cardiac surgery in Cameroon has evolved from sporadic humanitarian missions to structured initiatives at the Douala and Yaoundé General Hospital and also the Shisong Cardiac Center. This article sheds light on the historical development and current state of cardiac surgery in Cameroon, emphasizing RHD as the leading surgical indication. It highlights both achievements and persistent gaps, and outlines perspectives for sustainability, including national training pathways, diaspora engagement, research and innovation, public-private partnerships, and South-South collaboration. Strengthening local capacity, securing sustainable financing mechanisms such as universal health coverage, and fostering regional cooperation are essential to build autonomous, resilient cardiac surgery programs

in Cameroon. Addressing these priorities will be critical to improving access to timely surgical care and reducing preventable mortality from rheumatic heart disease.

Keywords

Rheumatic Heart Disease, Valvular Surgery, Cardiac Surgery, Cameroon, Sub-Saharan Africa, Universal Health Coverage

1. Introduction

Acute rheumatic fever (ARF), also known as Bouillaud's disease, remains a major public health issue worldwide [1] [2]. It is a delayed autoimmune inflammatory response secondary to an untreated group A streptococcal pharyngitis [1]-[3]. ARF is a post-streptococcal syndrome that can affect the skin, joints, nervous system, and most importantly, the heart [3] [4].

Rheumatic heart disease (RHD) represents the most serious complication of ARF and the principal cause of mortality associated with it [1]. Globally, it is the leading cause of acquired heart disease in children and young adults [5]. RHD is the result of damage to the cardiac valves following one or several episodes of ARF [1] [4] [6]. According to WHO estimates, this disease caused 305,000 deaths in 2015, 60% before age 70, and led to the loss of 11.5 million DALYs [7]. In 2017, around 30 million people worldwide were affected, with the highest burden in Africa, Southeast Asia, and the Western Pacific [7] [8].

Although largely preventable, RHD remains a serious health challenge not only in low- and middle-income countries but also among marginalized populations in high-income settings where the disease had once been nearly eradicated [1] [6] [7] [9]. The Pacific region reports the world's highest incidence rates [10]; for instance, in New Caledonia, the prevalence was 8.1% in 2020 [11].

As the most significant acquired cardiac disease in children and young adults, RHD is responsible for an estimated 223,000 to 492,000 deaths annually in low- and middle-income countries [7]. In sub-Saharan Africa, it represents a major public health challenge [12]. A multicenter retrospective study conducted between 2004 and 2008 across seven countries reported high mortality rates associated with rheumatic valvular disease, coupled with very limited access to surgical treatment [13]. In Burkina Faso, Kinda *et al.* (2013) found that RHD accounted for 20.8% of all pediatric heart disease and 75.6% of acquired pediatric cases, with a hospital prevalence of 0.24% [14].

In South Africa, the incidence of RHD among children under 14 years in Soweto was 23.5 per 100,000 in 2010 [15]. In Senegal, Ba Ngouala *et al.* (2012) observed RHD in 25.6% of a predominantly young and female patient population [16]. This figure may even underestimate the true prevalence, as systematic echocardiographic screening is not routinely performed—a practice shown by Marijon *et al.* (2008) to reveal substantially higher prevalence rates [17].

More recently in Cameroon, RHD was found in 13.1% of 1020 schoolchildren screened by cardiac echography [18].

2. Prevention Strategies

Several preventive and therapeutic strategies have been developed to reduce the prevalence of rheumatic heart disease, repair valve lesions, improve quality of life, and decrease mortality.

Primary prevention relies on prompt antibiotic treatment of suspected streptococcal pharyngitis and tonsillitis, improvement of living conditions, and raising awareness among both patients and healthcare professionals [1]-[10].

Secondary prevention consists of the regular administration of benzylpenicillin to prevent relapses, and systematic school-based echocardiographic screening programs [1]-[10] [17].

Tertiary prevention aims to limit the complications of established cardiac involvement. This requires coordinated multidisciplinary management by general cardiologists, interventional cardiologists, and cardiac surgeons.

Severe rheumatic valvular disease may require surgical intervention. Indications for surgery are determined by the severity of symptoms, clear evidence of significant valve damage, as well as cavity size and left ventricular function. Surgical repair (valvuloplasty) or replacement (prosthesis) of damaged valves is critical to preserving left ventricular function and preventing severe pulmonary hypertension [6]. The valves most commonly affected are the aortic and mitral valves, while tricuspid surgery is less frequent and pulmonary valve procedures remain anecdotal.

Across sub-Saharan Africa, the number of cardiac surgery centers and the resources available for effective management of RHD remain critically insufficient to meet patient needs [19].

The Abidjan Declaration of May 10, 2019, drafted by a panel of cardiovascular surgeons, highlighted the alarming fact that RHD is the leading cause of mortality among children under 10 years in sub-Saharan Africa (12.5% - 20% of deaths), while only a minority of affected children have access to cardiac surgery [20]. The declaration called on governments, NGOs, and private actors to invest in education, research, and the development of cardiac surgery across the region [20].

3. History of Cardiac Surgery in Cameroon

Cardiac surgery in Cameroon began in 1985 with humanitarian missions conducted by French teams at the University Teaching Hospital of Yaoundé and later at the Yaoundé General Hospital [21]. These activities came to a halt in 1990, resuming briefly in 2008 with a Belgian-led pilot mission that did not evolve into a sustained program [22].

In the public sector, a new initiative started in 2012 at the Douala General Hospital (1st Category, 300 beds) in collaboration with CHU Saint-Pierre in Brussels. This partnership has enabled the organization of two humanitarian missions per year

[23]. Due to the lack of a permanent extracorporeal circulation activity, an average of only 10 valve replacements are performed each year. Nevertheless, vascular and thoracic surgery and coronary angiography are routinely performed at this centre.

In 2019, an evaluation of the long-term outcomes of these humanitarian missions in public hospitals confirmed that rheumatic valvular disease remained the leading surgical indication. The study also found that the long-term results of these interventions were acceptable [24].

In the private sector, a milestone was reached in 2009 with the inauguration of the Shisong Cardiac Center in the Northwest region. The center was staffed with a multidisciplinary team—including cardiologists, interventional cardiologists, cardiac surgeons, perfusionists, intensive care and operating room nurses, and administrative staff—trained in Italy. During the first six years, more than 300 patients with rheumatic valvular disease were operated on, with outcomes consistent with international standards [25]-[27].

Following a period of interruption due to security crises, surgical activities were transferred to Yaoundé, initially at the Clinique du Jourdain and, more recently, at the Yaoundé General Hospital (1st category level with 300 beds), where they continue to show promising results [28]. In 2024, approximately 50 valve replacements were performed at this centre by an entirely Cameroonian team, with the aim of doubling this number this year.

Despite these achievements, the two flagship programs have yet to achieve full autonomy and routine daily activity.

4. Challenges and Perspectives for Sustainability

Despite promising clinical outcomes, the two main cardiac surgery programs in Cameroon have not yet reached full autonomy or regular daily activity. Several challenges must be addressed to ensure their long-term sustainability:

4.1. Building Stable and Complete Teams

Establishing a fully functional, stable team requires a diversified training model. The Shisong program, which relied on sending complete teams to Europe for training, revealed both financial and practical limitations. Some candidates trained abroad only assumed observer or secondary roles upon return [25]. The alternative model—local training of Cameroonian specialists during visiting missions by foreign experts—also fell short due to the limited frequency of missions and the small number of patients operated on per mission [25].

A national specialization program in cardiovascular surgery has since been launched, which should help address the shortage of surgical human resources in the short term. This initiative complements the return of about a dozen surgeons already trained in West Africa and Europe. Going forward, this critical mass of human resources must be allocated intelligently and supported by continuous training programs led by recognized local senior specialists.

The West African Health Organization has published the training course pro-

gram [29]. It takes place over 10 semesters, for a total of 300 credits. Applicants must earn a minimum of 40 credits to move on to the next year. The courses are theoretical and practical, with mandatory hospital internships. External training placements are encouraged, and the program ends with a thesis defense [29].

Additionally, the establishment of university-level training programs for other medical (anesthesiologists, intensivists) and paramedical (operating room nurses, perfusionists, intensive care nurses) professionals in cardiovascular surgery is essential. To deliver these programs effectively, the Cameroonian government should mobilize the expertise of the diaspora—many of whom are specialists in this field—through transparent and attractive contracts, possibly incentivizing permanent return [30] [31]. Achieving this objective will also require sound human resource management and adherence to contractual commitments, as poor governance has been a major driver of brain drain [32] [33].

4.2. Establishing Autonomous Cardiac Centers

University hospitals should develop cardiac surgery centers with financial and managerial autonomy. With cardiac surgery and interventional cardiology activities consolidating at the Douala and Yaoundé General Hospitals, granting a degree of financial independence to these programs would be an important step. In Yaoundé, a public-private partnership (PPP) could be developed to combine the technical expertise of the Shisong team with state resources.

The World Health Organization defines partnerships as "a means of bringing together a set of actors to achieve a common objective—improving population health—based on mutually agreed roles and principles." Agreement is thus central: all stakeholders commit to a shared goal and align on the means, principles, and roles [34] [35]. For such a PPP to succeed in Cameroon, the Shisong team should be guaranteed managerial autonomy, particularly in human resources and equipment maintenance, while the state would contribute to training, research, staffing, financial support, and oversight of allocated funds.

4.3. Financing Cardiac Care

Given that very few patients in sub-Saharan Africa can afford cardiac surgery, a state-funded health financing policy is indispensable. Both the Abidjan Declaration and several NGOs have advocated for the introduction of universal health coverage (UHC) to support these predominantly poor patients [20] [23]-[25].

In 2019, the Shisong team reported performing about 80 procedures per year, despite a capacity of 400, mainly due to the absence of UHC [25]. On average, healthcare expenditure in sub-Saharan Africa is less than six dollars per capita, whereas 30 - 40 dollars per capita are required to ensure basic medical care [25]. Costs are even higher for patients with rheumatic heart disease who need lifelong treatment and follow-up.

Currently in Cameroon, the average cost of a single valve replacement is US$5000. The government's efforts to implement a universal health insurance system have

ended in failure. To cover treatment costs, the vast majority of patients rely on family support or negotiate payment deferrals with hospitals.

By waiting for the Universal health insurance, governments must not only provide direct financial support but also establish PPPs with pharmaceutical companies involved in cardiovascular drugs and consumables [34] [35]. Differential pricing systems, advance purchase commitments, and similar mechanisms can help fund research programs while ensuring affordable prices for patients in low-income countries. State intervention should also be complemented by alternative funding sources such as philanthropy, fundraising, and donations.

4.4. Promoting South-South Collaboration, Research and Innovation

South-South cooperation among cardiac centers could allow experienced institutions in the region to support newer programs in areas such as training, research, procurement, and financing [20]. Since 2016, this model—championed by the French NGO "La Chaîne de l'Espoir"—has enabled several patients to be operated on by African teams it helped train. Some West African cardiac centers have, in turn, trained their teams in Maputo and Dakar, two of the NGO's training hubs. The same initiative funded continuing education for members of the Yaoundé team.

Despite their advantages, less invasive therapies such as transcatheter valve interventions are rarely performed in sub-Saharan Africa [36]. In order to become widespread, some challenges related to the rheumatic environment, such as extensive valve calcification and the frequent association with regurgitation, will need to be addressed [36]. In addition, the outcomes will need to be sustainable in order to limit reinterventions in this highly limited-resource setting.

At the Abidjan meeting, participants also called for the creation of a regional scientific society to strengthen training and research. This project, still pending, could draw inspiration from the successful establishment of the Pan-African Society of Cardiology (PASCAR). Research must be promoted to develop locally adapted solutions for patient care.

4.5. Limitations

This narrative review should be read and interpreted taking into account the inherent biases associated with this exercise (selection bias, publication bias, reporting bias, etc.).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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