Ten-year clinical experience of humanitarian cardiothoracic surgery in Rwanda: Building a platform for ultimate sustainability in a resource-limited setting

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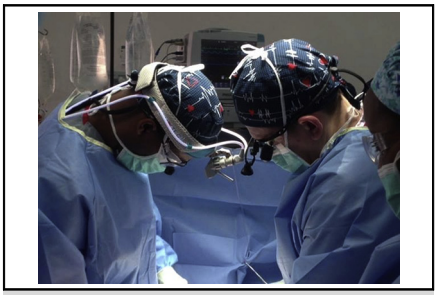
ABSTRACT

Objective: Despite its near complete eradication in resource-rich countries, rheumatic heart disease remains the most common acquired cardiovascular disease in sub-Saharan Africa. With a ratio of physicians/population of 1 per 10,500, including only 4 cardiologists for a population of 11.4 million, Rwanda represents a resource-limited setting lacking the local capacity to detect and treat early cases of strep throat and perform lifesaving operations for advanced rheumatic heart disease. Humanitarian surgical outreach in this region can improve the delivery of cardiovascular care by providing sustainability through mentorship, medical expertise, training, and knowledge transfer, and ultimately the creation of a cardiac center.

Methods: We describe the experience of consecutive annual visits to Rwanda since 2008 and report the outcomes of a collaborative approach to enable sustainable cardiac surgery in the region. The Ferrans and Powers Quality of Life Index tool's Cardiac Version (http://www.uic.edu/orgs/qli/) was administered to assess the postoperative quality of life.

Results: Ten visits have been completed, performing 149 open procedures, including 200 valve implantations, New York Heart Association class III or IV, with 4.7% 30-day mortality. All procedures were performed with the participation of local Rwandan personnel, expatriate physicians, nurses, residents, and support staff. Early complications included cerebrovascular accident (n = 4), hemorrhage requiring reoperation (n = 6), and death (n = 7). Quality of life was assessed to further understand challenges encountered after cardiac surgery in this resource-limited setting. Four major domains were considered: health and functioning, social and economic, psychologic/spiritual, and family. The mean total quality of life index was 20.79 ± 4.07 on a scale from 0 to 30, for which higher scores indicated higher quality of life. Women had significantly lower ''social



Ten-year clinical experience of cardiac surgery in Rwanda.

Central Message

This report represents the first account of a long-term humanitarian effort to develop sustainability in cardiac surgery in a resource-limited setting.

Perspective

This report represents the first account of a long-term humanitarian effort to develop sustainability in cardiothoracic surgery in Rwanda. Moving forward, preventive measures of acute rheumatic fever and RHD should be among health prevention program priorities. Team Heart has laid the foundation for a comprehensive program that could eventually eliminate RHD from the country.

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Abbreviations and Acronyms
QOL = quality of life
RHD = rheumatic heart disease

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and economic'' subscores (16.81 ± 4.17) than men (18.64 ± 4.10) ($P < .05$). Patients who reported receiving their follow-up care in rural health centers also had significantly lower ''social and economic'' subscores (15.67 ± 3.81) when compared with those receiving follow-up care in urban health facilities (18.28 ± 4.16) ($P < .005$). Value afforded to family and psychologic factors remained high among all groups. Major postsurgical challenges faced included barriers to follow-up and systemic anticoagulation.

Conclusions: This report represents the first account of a long-term humanitarian effort to develop sustainability in cardiac surgery in a resource-limited setting, Rwanda. With the use of volunteer teams to deliver care, transfer knowledge, and mentor local personnel, the results demonstrate superior outcomes and favorable indices of quality of life. The credibility gained over a decade of effort has created the opportunity for a partnership with Rwanda to establish a dedicated center of cardiac care to assist in mitigating the burden of cardiovascular disease throughout sub-Saharan Africa. (J Thorac Cardiovasc Surg 2018;■:1-10)

Disproportionately affecting low- and middle-income countries and chiefly regions of pervasive poverty, cardiovascular disease is responsible for more than one third of all deaths worldwide.[1] In excess of three quarters of these deaths occur in low- and middle-income countries. The consequential burden is directly related to the paucity of integrated primary health care programs designed to facilitate early detection and treatment of individuals with risk factors in these regions. The result is a surge in late detection or delayed diagnosis that leads to premature death during early adulthood, the most economically productive years of life.[1,2]

Of the constellation of cardiovascular diseases that saturate these areas, rheumatic heart disease (RHD) is responsible for a worldwide toll of more than 1 million untimely deaths per year.[2] As the most common acquired cardiovascular disease among children and adolescents in sub-Saharan Africa, RHD steadily confers severe disability in this region despite its near eradication in high-income countries.[3] The prevalence of RHD in sub-Saharan Africa among children aged 5 to 14 years is 5.7 per 1000, whereas in developed countries it is only 0.5 per 1000.[4]

Rwanda is a small, mountainous East African country with a population of approximately 12 million people. The capital city Kigali, located in the center of the country, contains the only hospital in Rwanda capable of hosting a visiting cardiac surgery team. This facility, King Faisal Hospital, was built with Saudi funding in the 1960s and was the site of killing of many doctors and nurses during the genocide. Now, with 1 physician per 10,500 individuals, including only 4 cardiologists in the public sector for a population of 11.4 million people, Rwanda represents a resource-limited setting that lacks the local capacity to detect, prevent, and treat early cases. As a result, RHD in this region often advances unchecked to critical stages, requiring surgical intervention. However, surgery has not been possible in vast majority of instances because of socioeconomic and health systems barriers.[5-7] Also, the cost of medical management of end-stage RHD requires enormous investment, leading to personal or family debt.[6,7] In this desperately resource-limited circumstance, the option of local partnership with humanitarian surgical outreach may represent a tenable solution to improving the delivery of cardiovascular care. This can occur through mentorship, medical expertise, training, knowledge transfers, and ultimately delivery of sustainable and safe cardiovascular surgery. However, access to this type of care has remained largely unavailable in resource-limited settings. With the exclusion of South Africa, the availability of cardiac surgery centers per million of inhabitants in sub-Saharan Africa is 1 program for every 33 million people. By comparison, in the United States, the ratio is 1 program for every 120,000 people, representing a striking global health disparity.[8] These data explain why millions of young patients worldwide with rheumatic or congenital heart disease are declined treatment or are unable to receive life-sustaining operations each year.[4]

QUALITY OF LIFE AFTER CARDIAC SURGERY IN RWANDA

To date, there exist accounts of successful and failed attempts to provide sophisticated cardiovascular care, including cardiac surgery, to underdeveloped regions like Rwanda.[9,10] However, no literature has yet investigated the postoperative quality of life (QOL) among patients with RHD in a resource-limited setting, a critical step in assessing the value of valve replacement or repair in such settings. QOL may be affected by such factors as the patient's gender, age, degree of social support, location of the primary health center for follow-up care, or type of valve