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Review Article

Treatment of Children with Rheumatic Heart Disease in Sub-Saharan Africa by Overseas' Medical Missions: Challenges Left Behind

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Abstract

The surgical or percutaneous treatment of children with congenital or acquired heart diseases remains a challenge in most developing countries. Different charity and non-governmental organizations have provided sporadic care to children with congenital or acquired heart diseases through transfer of patients to sophisticated centers in Europe or North America. In recent decades, the model of cooperation has shifted towards sending short-term surgical and catheter missions with their equipment to treat patients in the local countries, or in some cases, establishing cardiovascular centers. This review aims to analyze the strengths of short-term cardiac surgery missions and the challenges that are associated with this strategy, particularly in the care of children with rheumatic heart disease.

Treatment of patients with rheumatic heart disease in sub-Saharan Africa by overseas medical missions is an effective model of care for patients with rheumatic heart disease. However, there are still important challenges. Timely and proper postoperative care, issues related to anticoagulant treatment, adherence to secondary prophylaxis and need for timely re-intervention when needed, are few of the many challenges that this model does not effectively address. The collaboration has to focus on strengthening the local capacity and training system if these patients are to get the care they need at the appropriate time and accessible location. While it might be difficult for a single foreign charity to send missions and cover all-year round to contribute to a meaningful training program, this may be feasible if voluntary missions in different western countries collaborate and set a time-table for sequential visits. The volunteers need to work with the local governments in sub-Saharan Africa so that they will have input into the medical education and health care system of the nations.

INTRODUCTION

The surgical or percutaneous treatment of children with congenital or acquired heart diseases remains a challenge in most developing countries [1-5]. Millions of preventable deaths result from lack of sustainable cardiac and other surgical care every year [6-8]. Poorer countries need to prioritize their resources towards more prevalent and easy to treat public health problems like infectious diseases, malnutrition and HIV care making cardiac services an unachievable priority [3,9,10]. Different charity and non-governmental organizations have provided sporadic care to children with congenital or acquired heart diseases through transfer of patients to sophisticated centers in Europe or North America [3,10,11]. However, this strategy is prohibitively expensive and benefits only few patients [3]. In recent decades, the model of cooperation has shifted towards sending short-term surgical and catheter missions with their equipment to treat patients, or in some cases, establishing cardiovascular centers [3,5,6,11-14]. This review aims to analyze the strengths of short-term cardiac surgery missions and the challenges that are associated with this strategy, particularly in the care of children with rheumatic heart disease.

Burden of rheumatic heart disease in sub-Saharan Africa

Though it has become exceedingly rare in the developed world [15], rheumatic heart disease continues to be an important public health problem in the developing countries [16,17]. Recent

echocardiography based surveys in some sub-Saharan African countries and other developing countries have shown that the actual prevalence of RHD is 3 – 10 times higher than previously believed, based on clinical examination alone [18-21]. The course of rheumatic heart disease in sub-Saharan Africa differs from that seen in the developed countries [22-28]. Multi-valvular involvement is also exceedingly common [22].

There are important factors suggested for the increased prevalence and malignant course of rheumatic heart disease in sub-Saharan African and other developing nations. Predisposing factors like illiteracy, poverty, over-crowding are common and prophylactic penicillin therapy is often inadequate [29]. Prompt and proper treatment of group A beta-hemolytic streptococcal pharyngitis which has been noted to reduced the risk of acute rheumatic fever [30], may not be accessible. Echocardiographic screening of children is not always feasible and programs that depend on clinical examination importantly underestimate the true prevalence [18-21], making early detection and secondary prophylaxis difficult. While it is known that continuous regular, secondary prophylaxis can prevent or significantly reduce the progression of rheumatic valve damage [31], patients may not adhere to secondary prophylaxis even when they are well-informed about the risk [16,32].

Though there are no population-based echocardiographic studies for the majority of the sub-Saharan Africa, the few studies that exist suggest that the region has one of the highest burdens in the world [18,21].

Treatment options performed for rheumatic valvular heart disease

Valve surgery has seen significant technical advances in the last several decades from closed commissurotomy to the different options of open valve repair and replacement [33-40]. There is no consensus as to which technique of treatment is the preferred option. Several authors have favored valve repair with preservation of the native valve [34,37,38,41-52], while others prefer valve replacement as the treatment of choice [53-55]. Combinations of repair and replacement have also been practiced at the same time in a setting of multiple valve surgery for multivalvular rheumatic heart disease [56]. Others still have recommended valve repair in the young as a way of delaying valve replacement to a favorable age [57].

Each of these surgical techniques has its own inherent pros and cons. Valve repair (and its variants) has the advantage of lower operative mortality, better preservation of left ventricular function, freedom from the hazards associated with anticoagulation, improved late survival and continued growth of the valve in young patients [41,42,51,58-64]. The downside of valve repair surgery is that it is associated with high re-operation rate, continued or reactivated active rheumatic carditis with progression of disease, valve dysfunction and long-term mortality and need for strict compliance to secondary prophylaxis [33,44,54,65-67]. The success of valve repair surgery is also dependent on the valve morphology and the extent of the valve disease as well as the specific technique used and the skill of the surgeon [68].

Valve replacement surgery includes mechanical valve replacement, tissue valve replacement and the variants of the Ross procedure (Ross and Ross II procedures). Each of these techniques has its advantages and disadvantages. Mechanical valves offer a wonderful longevity and lesser need for re-operation [51]. However, the need for life-long anticoagulation and potential thrombo-embolic complications, incidence of postoperative ventricular dysfunction, and increased mortality make it a less attractive option [51,56]. On the other hand, tissue valves offer freedom from the need for life-long anticoagulation and thrombo-embolic complications. However, tissue valves are short-lived and the need for re-operation is substantially high.

Over the last few decades percutaneous transmitral balloon commissurotomy has become an attractive option for the treatment of rheumatic mitral stenosis [30,69-71]. This option is especially important when surgical risk is considered to be significant due to presence of severe pulmonary hypertension or pregnancy [71,72].

Strengths of Overseas' voluntary surgical and interventional cardiology missions

For a number of years, non-profit and non-governmental organizations used to transfer patients to centers in Western Europe and North America for specialized cardiac treatment [3,10,11]. Having realized that this option is extremely expensive and can benefit very few number of children [3], the attention now has shifted towards sending short term medical missions to treat children in their locality or establishing and equipping cardiovascular centers in sub-Saharan Africa and other developing nations [6,73,74]. Obviously, this is a major step forward in the effort to establish sustainable cardiac care in the developing world and represents a much better model of collaboration [3]. Patients are treated in their own home country, more patients can be treated with a limited resource [12] and the involvement of the local professionals should result in skill transfer using a parallel education programme.

A number of European and North American charities have been involved in sending renowned surgeons, anesthetists and interventionists for a few days to weeks to treat children and adolescents with rheumatic or congenital heart diseases in their own locality. In addition to treating patients, this strategy is likely to have resulted in motivation and increased awareness of cardiac care in the minds of the local professionals, at least in our own experience.

Challenges inherent in the care of patients with rheumatic heart disease treated by visiting overseas' medical missions

While there is no doubt that this model of collaboration has led to important achievements, many challenges remain. Firstly, patients with chronic rheumatic heart disease in the sub-Saharan Africa present late with poor physical condition, and usually, with multivalvular involvement [22]. Multivalvular surgery prolongs cardio-pulmonary bypass and aortic cross-clamp times [75,76] with subsequent increases in postoperative complications and mortality [77]. Some of these patients need continued vigilant medical care [and in rare circumstances, re-operation] long after the operating team has left. In the absence of trained

professionals in most parts of sub-Saharan Africa, the life of these patients remains at a significant risk. Besides, many patients live hundreds of kilometers away from the centers of care and in a setting of underdeveloped transportation infrastructures, these patients are less likely to appear for a frequent follow-up.

In patients who present with late disease where repair is not practical, valve replacement remains the only option [78]. In patients in whom mechanical valve replacement is opted continued warfarin anticoagulation is mandatory [79,80]. Treatment with warfarin constitutes a delicate balance between two serious complications – thrombo-embolism due to under-dosing and bleeding due to over-dosing [81-83]. Frequent laboratory determination of International Normalized Ratio (INR) and dose adjustment is required to decrease this complications [81,84]. In addition, warfarin dosage requires readjustments based on dietary changes, inter-current illnesses or other concomitant medications [84,85].

In the Ethiopian and probably other similar sub-Saharan contexts, the problem starts from the regular availability and access to the warfarin itself. INR determination is a challenge due to unavailability or unaffordability of laboratory facilities. The adherence of patients to treatment is dependent on access to health care, cultural beliefs, education about chronic disease and the role of medication, the nature of patient-physician interactions and social support structures. These factors are entirely different in resource-limited sub-Saharan Africa and may profoundly affect the rate of adherence [86]. Adherence counseling is important even in those who claim to be taking their warfarin [87,88] but this would certainly need dedicated trained staff.

In those patients in whom valve repair or tissue valve replacement is opted, strict adherence to monthly penicillin prophylaxis is required [65-67,89]. Ongoing or recurrence of rheumatic carditis is the most important factor that leads to valve dysfunction after repair. In the developing nations where illiteracy is prevalent and access to medical care is scarce, adherence to secondary prophylaxis is a problem even in those who well-informed about their risk [16,32].

CONCLUSION

Treatment of patients with rheumatic heart disease in sub-Saharan Africa by overseas medical missions is an effective model of care for countless number of patients suffering from this preventable but serious condition. However, there are still important challenges. Timely and proper postoperative care, issues related to anticoagulant treatment, adherence to secondary prophylaxis and need for timely re-intervention when needed, are few of the many challenges that this model does not effectively address. The collaboration has to focus on strengthening the local capacity and training system if these patients are to get the care they need at the appropriate time and accessible location. While it might be difficult for a single foreign charity to send missions and cover all-year round to contribute to a meaningful training program, it might be feasible if voluntary missions in different western countries collaborate and set a time-table for sequential visits. Overseas' non-profit and non-governmental organizations need to work with the local governments in sub-Saharan Africa to have input into the medical education and health care system rather than sticking to small local charities that are usually incapable of influencing the health care system of the countries. It is only through a combined strategy involving charitable, non-governmental organizations and the local and national governments of the host country that this significant problem can start to be addressed. Through a multidisciplinary approach tackling education of healthcare professionals, logistics, equipment and immediate life saving surgery then significant advances can be made into a long-term sustainable solution to this devastating disease.

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