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Research Paper

Patient-reported outcome, perception and satisfaction after laparoscopic cholecystectomy in Kigali, Rwanda

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ABSTRACT

Background: Laparoscopic surgery is the gold standard for many abdominal surgeries. Laparoscopic programs in low- and middle-income countries (LMICs) and in sub-Saharan Africa face many constraints, although its use is safe, feasible, and clinically beneficial. The authors assessed patient-reported outcomes and the experience of patients operated on at the University Teaching Hospital of Kigali (CHUK).

Methods: This is a retrospective cross-sectional study combining medical data from medical files and information collected from telephone calls to 288 patients who underwent laparoscopic cholecystectomy at CHUK from January 2015 to December 2020.

Results: Among 446 laparoscopic surgeries performed at CHUK over 6 years, cholecystectomies accounted for 64.6 % of cases (288/446). Postoperative complications and mortality after laparoscopic cholecystectomy were low, respectively 1.7 % and 0.7 %, while the median length of stay was 3 days. About 74 % of surveyed patients had never heard of laparoscopic surgery prior to their procedure. Knowledge of laparoscopic surgery was associated with patient education level ($p < 0.001$). Half of patients had not been involved in the choice of the surgical technique. Overall satisfaction was over 95 % and >90 % of patients consider laparoscopic surgery as the best surgical approach in Rwanda, and for this reason they declared to be ready to promote this new technology despite its higher cost. However, patients reported some weaknesses and made recommendations for improving public awareness of laparoscopy and its benefits, patient-provider relationships, training of surgical workforce, laparoscopic equipment, and infrastructure.

Conclusion: Laparoscopic cholecystectomy can be performed with a low rate of postoperative complications in a resource-limited setting like Rwanda. Patient satisfaction was high, but efforts should be made to improve public awareness of laparoscopic surgery, improve surgical capacity, laparoscopic equipment, and infrastructure.

Introduction

Laparoscopic surgery has become the gold standard for many abdominal surgical procedures in the Western world [1–3]. Laparoscopic programs in Low- and Middle-Income Countries (LMICs) face many constraints, including a shortage of qualified staff, limited resources, equipment, and maintenance capacity, increased operating time and lack of safe procedural guidelines [4–8]. Recent studies have shown that laparoscopy is feasible in LMICs and could be safe and clinically beneficial [8–10]. However, it has been proven that complication rates might be underreported in the literature. In addition, the number of laparoscopic cases in most LMIC units has not reached a level where complications directly related to the laparoscopy are reported [11–13]. Major complications such as bile leaks and duodenal

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perforations following laparoscopic cholecystectomy have been reported in a large series of patients in Afghanistan [5].

Among patient-reported outcomes, patient satisfaction (PS) and quality of recovery are key measures of patient-centered care. PS can relate to the outcome of care treatment and/or to the perception of the process of care, and it has emerged as an important indicator of health care quality [14,15]. This applies to surgical care in general, but also to laparoscopic surgery whose benefits in terms of perioperative morbidity, postoperative pain, hospital stay, cosmesis and overall cost have been proven, with consequently a rapid postoperative recovery [16,17].

Approximately 80,000 surgical procedures are annually performed in Rwanda [15]. Rwanda, a country of 11.9 million people in Sub-Saharan Africa, has 4 main referral hospitals performing surgical operations including laparoscopic procedures. The University Teaching Hospital of Kigali (CHUK) is the main public, tertiary referral hospital of Rwanda. CHUK has 565 beds and 11 operating rooms, shared among all surgical units that annually perform approximately 4000 major surgical procedures. In 2014 a national assessment of laparoscopic practice in Rwanda showed that 209 laparoscopic procedures had been performed in Rwanda, and only 7 cholecystectomies in CHUK [18]. To fill this gap, CHUK started performing laparoscopic procedures in 2015 and laparoscopic cholecystectomy was among the most performed procedures.

In many LMICs, patient safety, patient satisfaction and the quality of laparoscopic surgery are not sufficiently documented. This study aimed to evaluate the clinical outcomes of laparoscopic cholecystectomy and to assess the satisfaction and experience of patients operated on at CHUK with laparoscopic techniques in order to further improve the process of care for patients undergoing laparoscopic surgery in Rwanda.

Material and methods

Method and setting

This was a cross-sectional observational study combining a retrospective review of data from medical records and data from phone call follow-ups of the patients who had undergone laparoscopic cholecystectomy in the Surgery Department of CHUK from January 2015 to December 2020. This study was approved by both the Institutional Review Board (IRB) of the University of Rwanda, and the Ethics Committee of CHUK with reference numbers No 412/CMHS IRB/2021 and EC/CHUK/075/2021, respectively.

Data collection

Data were retrospectively retrieved from operating room registers and medical record system. A total of 288 cases of laparoscopic cholecystectomy among 446 laparoscopic procedures were recorded during the study period. Data collected included age, gender, transfer note, date of surgery, medical diagnosis, procedure performed, intra-operative complications, drain placement, conversion to open surgery, duration of surgery, postoperative complications according to the Clavien-Dindo classification [19] and hospital length of stay (LOS).

Patient opinions

A random sample of patients underwent cholecystectomy were contacted prospectively by telephone and provided verbal consent to participate in this study; additionally, they completed a structured questionnaire that included end-to-end questions, a Likert scale rating and open-ended responses. The questionnaire covered awareness of laparoscopic surgery, patient experience during the surgical process including pain, scar aesthetics, time to return to normal activities, cost of surgery and overall satisfaction about the technique. Patients were asked to express their bad experience and provided recommendations to improve service delivery.

Data analysis

Data were recorded using Microsoft excel spreadsheets and exported to international business machines (IBM) Statistical Product and Service Solutions (SPSS) version 25 for analysis. Descriptive data were used to generate frequencies and percentages for categorical variables. The median and interquartile range (IQR) was used to describe the central tendency and dispersion of continuous data, respectively. The significance of the association between dependent and independent variables was measured using Chi-square for expected frequencies of >5. A p-value <0.05 was considered significant.

Results

Socio-demographic characteristics

A total of 288 laparoscopic cholecystectomies over 446 laparoscopic procedures were performed during the study period, with a gradual annual increase (Fig. 1). The majority (87.2 %) of patients were women and >58 % of patients were older than 40, with a median age for women of 44.5 years and 34.2 years for men. More than 50 % came from their homes without any medical transfer and 44.4 % of patients were transferred from district hospitals (Table 1).

Clinical features of laparoscopic cholecystectomy and post-operative complications

Laparoscopic cholecystectomy was performed successfully with only 4 cases (1.4 %) of conversion to open surgery. Five patients (1.7 %) developed post-operative complications with a grade >1 using Clavien-Dindo classification. Two patients suffered from biliary peritonitis secondary to bile duct injury, one suffered from iatrogenic bowel injury, one from surgical site infection and an additional one from deep vein thrombosis. Among the patients with postoperative complications 2 were re-operated on for further management. Two patients were admitted to the intensive care unit for cardiorespiratory support, and in total 2 patients died (0.7 %) due to hemorrhage and biliary sepsis from bile duct injury (Table 2). Fig. 3 shows the evolution of laparoscopic skill acquisition by junior consultants and the gradual annual increase in the volume of laparoscopic procedures, where currently almost half of laparoscopic cholecystectomies are performed by junior consultants after 6 years of surgical exposure.

Patient information and knowledge

In total 164 random patients were contacted by telephone and interviewed regarding their social status and education as well as their preoperative knowledge and experience of the laparoscopic procedure they had undergone. Concerning the level of education, 62 % of contacted patients had at least completed secondary school and the patient's knowledge of laparoscopic surgery was strongly associated with the level of education ($p < 0.001$) (Table 3). In total, 122 (74 %) patients confirmed that they had never heard of laparoscopic surgery before undergoing their operation, and of those who knew before, only 30 (24.6 %) obtained the information from the attending surgeon (Fig. 2). More than 64 % of the interviewed patients were informed about this technique and its advantages, for the first time, just before surgery and half of the patients were not involved in the choice of the laparoscopic technique (Table 4). However, following surgery, >90 % of the contacted patients stated that laparoscopic surgery is the best surgical approach for surgical care in Rwanda, and that they were willing to promote this technique despite its higher cost (Table 4).

Patient-reported experience and satisfaction

Patient satisfaction as measured using indicators including the

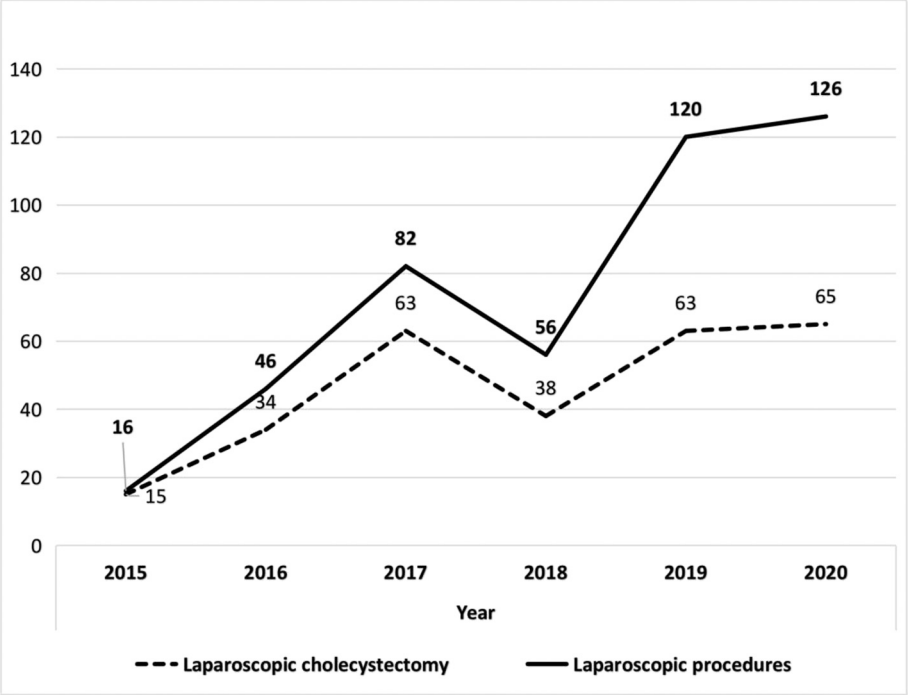

Fig. 1. Trend of laparoscopic cholecystectomies at CHUK since 2015.

Table 1
Socio-demographic characteristics of operated patients.

	n (288)	%
Age at operation		
<20 years	3	1.1
20–39 years	91	31.6
40–69 years	169	58.7
≥70 years	25	8.7
Sex (median age)		
Male (34.2 years)	37	12.8
Female (44.5 years)	251	87.2
Transferring hospital		
Home	150	52.1
Private clinic	2	0.7
District hospital	128	44.4
Referral hospital	8	2.7

assessment of LOS, time to return to normal activities, pain, scar size and aesthetics, and general care, is reported in Table 5. More than 95 % of interviewed patients said that they were satisfied with laparoscopic surgery.

Around 10 % of patients reported having a poor experience of the service provision and/or a substandard interaction with health care providers during admission (Table 6). All surveyed patients came up with recommendations for future laparoscopic surgery care and suggested that more improvements should be made in 5 aspects of care, including public awareness of the laparoscopic service, resource and training capacity, the patient-provider interaction, the cost of service and service delivery in general (Table 6).

Discussion

Laparoscopic surgery remains unavailable to the majority of the population living in LMICs. Additionally, the majority of countries in sub-Saharan Africa have not yet fully adopted this surgical practice due to several challenges that need to be addressed [1]. In certain countries where laparoscopic surgery is practiced, patient outcomes are under-reported. Patient experience and satisfaction with this new surgical approach have not yet been evaluated or reported, even though they are indicators used to improve the quality of care. This reality motivated us to conduct this study to evaluate the postoperative results of a retrospective series of 288 patients who had undergone laparoscopic cholecystectomy at CHUK. In this series, which we consider to be among the

Table 2
Characteristics of the laparoscopic cholecystectomy and postoperative complications.

Laparoscopic cholecystectomy	n (288)	%
Conversion to open surgery		
No	284	98.6
Yes	4	1.4
Reason for conversion	4	1.4
Bleeding	1	0.25
CBD injury	1	0.25
Bowel perforation	1	0.25
Instrument problem	1	0.25
No complications	283	98.3
Post-operative complications Clavien-Dindo classification	**5**	**1.7**
Grade I	2	40
Grade II	0	0.0
Grade III	1	20
Grade IV	0	0.0
Grade V	2	40
Types of post-op complications (n = 5)		
Biliary peritonitis	2	0.4
Bowel perforation	1	0.2
Surgical site infection	1	0.2
Thrombophlebitis	1	0.2
Indications for reoperation (n = 2)		
Biliary peritonitis	2	100
Reason for ICU admission (n = 2)		
Cardiorespiratory support	2	100
Mortality	**2**	**0.7**
Cause of hospital death (n = 2)		
Hemorrhage	1	50
Biliary sepsis	1	50
Hospital stay	Median: 3 days (Min 1, Max 13)	

Abbreviations: ICU: intensive care unit, CBD: Common bile duct.

Table 3
Information about laparoscopic surgery and level of education.

	Yes	No	p value*
	n (%)	n (%)	
Level of education (N = 164)			
None	2 (7.4)	25 (92.6)	<0.001
Primary	6 (16.7)	30 (83.3)	
Secondary	13 (17.3)	62 (82.7)	
University	16 (44.4)	20 (55.6)	

* Chi-square test.

most significant reported in laparoscopic surgery in the East and Central Africa region, more than half of operated patients were randomly called and their perceptions and satisfaction following their experience about this new surgical approach were assessed.

The results from this Rwanda experience have shown that laparoscopic cholecystectomy, the most performed laparoscopic procedure (64.6 %) can be performed with a minimal rate of postoperative complications (1.7 %) with low mortality rate (0.7 %) and an average LOS in hospital of 3 days. In our study only 4 (1.4 %) cases required conversion to open surgery due to bleeding, CBD injury, bowel perforation and non-surgical technical issues and 2 (0.7 %) cases needed reoperation for postoperative complications. In addition, considering the interviewed patient, the majority of them (>95 %) reported satisfaction with the procedure despite insufficient resources in equipment and qualified personnel, and despite the fact that 74 % of them declared that they had never heard of laparoscopic surgery before undergoing their operation.

Many series have shown that laparoscopic cholecystectomy has gained wider acceptance, accounting for roughly 90 % of all cholecystectomies in the United States despite an overall serious complication rate of 5 % that remains higher than that seen in open cholecystectomy, despite increasing experience with the procedure [20–23]. A reduced hospital stay averaging three days similar to our result has been reported [24]. In this series the most serious complications were biliary peritonitis due to common bile duct and bowel injuries. Serious complications that occur with laparoscopic cholecystectomy, including bile duct injury, bile leaks, bleeding, and bowel injury have been reported previously [9,25–27], and this is due in part from patient selection, surgical experience, and the technical constraints that are inherent to the minimally invasive approach [23]. The mortality was low in our series compared to other LMICs where the perioperative mortality is reported to be 5–10 %; encouragingly, our result is similar to the mortality rate of 0.4–0.8 % reported in Western countries [13].

During the survey, 164 patients among the 288 were randomly interviewed, the patients were asked about their knowledge and experience concerning the laparoscopic surgery they had undergone. About 74 % of the interviewed patients reported that they had never heard of laparoscopic surgery before their surgery, and this knowledge of the surgical technique was associated with the level of education of the patient ($p < 0.001$). It was found that than half of the patients interviewed were not involved in the choice of laparoscopic technique. There is no indication in the reported data about patient awareness and knowledge of the laparoscopic technique, as well as the choice of involvement or not in laparoscopic techniques before surgery in LMICs.

Laparoscopic surgery is generally considered less invasive than open abdominal surgery, both from the viewpoint of aesthetics and postoperative recovery. The indicators used in order to assess the level of

Table 4
Information provision about performed surgical technique.

Information provision n = 164	Yes		No		Neutral	
	n	%	n	%	n	%
Information about my surgery, benefits and consequences	105	64.0	55	33.5	4	2.4
Involved in the choice of the laparoscopic surgery technique	80	48.8	81	49.4	3	1.8
Laparoscopic surgery is the best option for surgical care in Rwanda	149	90.9	3	1.8	12	7.3
Cost of this treatment is high considering my income	62	37.8	90	54.9	12	7.3
If I had to be operated again, I would choose the same technique	157	95.7	3	1.8	4	2.4
Willing to promote this new technique	156	95.1	3	1.8	5	3.1

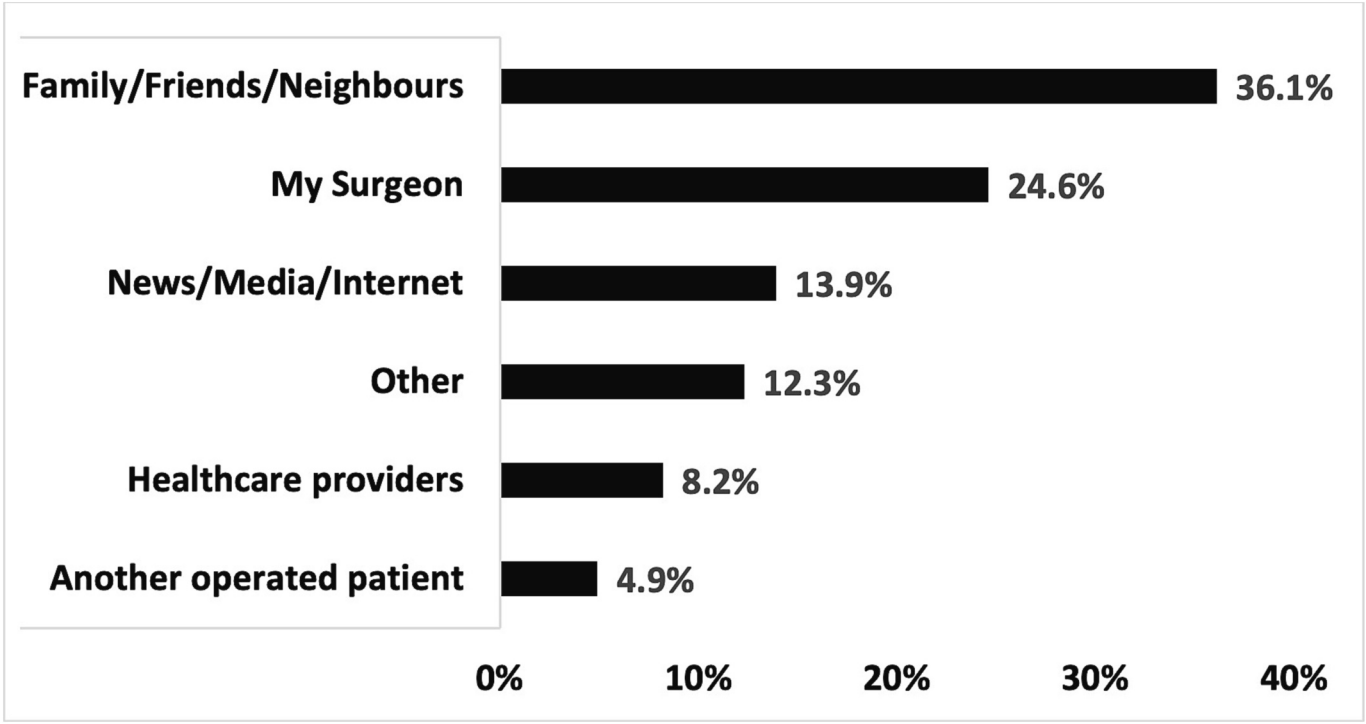

Fig. 2. Source of information about laparoscopic surgery.

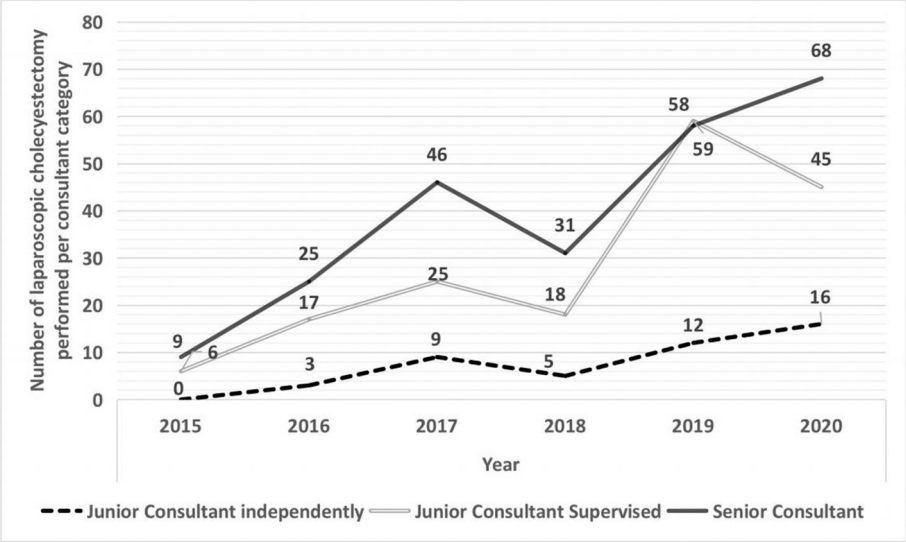

Fig. 3. Laparoscopic cholecystectomy performance and learning curve of junior consultants at CHUK.

Table 5
Patients' satisfaction.

Patients' satisfaction N = 164	Satisfied		Unsatisfied		Neutral	
	n	%	n	%	n	%
Length of hospital stay	159	96.9	1	0.6 %	4	2.4
Time of recovery to normal activities	157	95.7	4	2.4 %	3	1.8
Post-operative pain	155	94.5	6	3.6 %	3	1.8
Scar size and aesthetics	157	95.7	2	1.2 %	5	3.0
Service/care delivery at the hospital	160	97.6	0	0.0 %	4	2.4

Table 6
Patient-reported bad experience during hospital stay and recommendations.

	n (164)	%
Patient-reported bad experience		
Bad patient - caregiver relationship	3	1.8
Delay in service provision	13	7.9
Everything went well	148	90.2
Recommendation from patients		
Public awareness of the laparoscopic technique	6	3.6
Capacity – resources, equipment and laparoscopic instruments	4	2.4
Capacity – training of laparoscopic surgeons	16	9.7
Improve professional - patient relationships	3	1.8
Improve service provision	29	17.7
Maintain good service	58	35.4
Decrease service cost	4	2.4
No comment	44	26.8

satisfaction included length of hospital stay, time of recovery to normal activities, pain improvement, scar size and aesthetics, and general care. It was found that the general satisfaction of the patients in this study was >95 %. More than 90 % of interviewed patients declared that laparoscopic surgery was the best approach for surgical care in Rwanda and that they were willing to promote this technique. These results are similar to a previous study that reported that early laparoscopic cholecystectomy resulted in a significant reduction in LOS and an acceptable rate of operative complications and conversion rates and the overall patient's satisfaction between 75 and 93 % [28]. Several studies have shown that lack of resources, skills training and the hierarchical nature of the local surgical culture are barriers that have affected the practice of laparoscopic surgery in different developing countries [29,30]. A study reported in 2018 identified the lack of trainers as the most unaffordable barrier to laparoscopic practice in Rwanda [18]. The patients in this series reported some weaknesses in the laparoscopic service delivery including the training of laparoscopic surgeons, laparoscopic resources, infrastructure, the patient-caregiver relationship and public awareness of the laparoscopic technique. However, overall experience and opinions of patients regarding laparoscopic surgery techniques is insufficiently documented, this needs a prospective evaluation throughout Rwanda where the results could be used to improve the quality of surgical care as well as the quality of life for patients after laparoscopic surgery.

The present study is a retrospective cross-sectional observational study, and therefore may weaken the generalizability of the results. The authors included all laparoscopic cholecystectomies performed at CHUK surgical department during the study period; thus, the risk of selection bias is low. Due to the retrospective design of the study some patient data were missing. However, this study has its strengths as it includes a considerable series of laparoscopic cholecystectomy in East and Central Africa that explored patient outcomes, experience and satisfaction in Rwanda, a country with limited resources but where approximately 90 % of the population is covered by the community-based health insurance.

Conclusion

Laparoscopic cholecystectomy can be performed with a low rate of post-operative complications in resource-limited country, and in addition to that patients have reported being satisfied with this new technology. However, an effort should be made to improve public awareness of laparoscopic surgery, improve the interactions between patient and healthcare provider, increase capacity in the training of the surgical workforce, upgrade laparoscopic equipment and develop the infrastructure. Therefore, a shift towards laparoscopic surgery and other new surgical techniques must be encouraged in our settings in order to meet the surgical needs.

CRediT authorship contribution statement

Martin Nyundo is the principal investigator in this study and has been involved in all steps of the research from the conceptualization, methodology, validation, investigation, writing original draft, writing review and editing; King Kayondo contributed to designing, methodology, validation, writing review and editing; Miguel Gasakure was involved in data collecting, data analysis, writing review and Editing;

Jean Christian Urimubabo was involved in data collection, writing review and editing; Antoine Nifasha was involved in data collection, writing review and editing; Augustin Limgba contributed to data collecting, writing review and editing; Jean Jacques Houben was involved in conceptualization, methodology, writing review, editing, validation, and Supervision; Julien Gashegu contributed to writing review and editing, validation, and supervision; Olivier Detry was involved in conceptualization, methodology, writing review, editing, validation, and Supervision.

Ethics approval

This study was approved by both the Institutional Review Board (IRB) of the University of Rwanda, and the Ethics Committee of CHUK with reference numbers No 412/CMHS IRB/2021 and EC/CHUK/075/2021, respectively.

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Declaration of competing interest

Dr. Martin Nyundo, Dr. King Kayondo, Dr. Miguel Gasakure, Dr. Jean Christian Urimubabo, Prof. Jean Jacques Houben, Dr. Augustin Limgba, Dr. Antoine Nifasha, Prof. Julien Gashegu and Prof. Olivier Detry declare that they have no conflicts of interest or financial ties to disclose.

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