

# Outcome of patients undergoing laparoscopic procedures at University teaching hospital of Butare

## Abstract

**Background:** MIS is beneficial LMICs, it reduces infections rates, decreases days of hospitalization, and quicker return to normal activity. However, it remains largely unavailable in most LMICs due prohibitive costs, lack of reliable gas supply, and insufficient trained personnel.

This study was a retrospective study aiming to evaluate outcomes of patients who underwent laparoscopic surgery at CHUB.

**Methods:** This was a retrospective descriptive study including patients operated using laparoscopic techniques in CHUB. A pre-established questionnaire was administered for socio-demographic characteristics, clinical and surgical informations were retrieved from hospital logs. Data analysis was done using SPSS version 25.0. Percentages and means have been used for descriptive statistics. A  $p$ -value of 5% or less was considered statistically significant.

**Results:** 197 patients have been recorded in the study. 197 laparoscopic procedures were performed during our study period; Majority of patients were female with 65.5 % with mean age of 43 years. The most frequent procedure was cholecystectomy (36.5%), followed by diagnostic laparoscopy (22.7%) and by hernioplasties (12.6%). The mean hospital stay was 3 days. Elective procedures represented 84%. In emergencies, appendectomy was predominant (14%). The majority of patients tolerated early feeding (81.2%) and mean time of feeding after surgery was 4h. The conversion rate to open procedure was 0.5%, no mortality reported

**Conclusion:** Laparoscopic surgery at CHUB is mainly basic laparoscopic procedures and associated with low morbidity.

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## Background

MIS is advancing globally, with both technological improvements and surgeon expertise becoming increasingly refined. Unlike traditional open surgery, which typically necessitates large incisions, MIS techniques enable surgeons to use a small incision—or sometimes none at all—to insert a camera.<sup>1-9</sup> This camera allows the surgeon to maneuver surgical instruments within the body, guided by a video display. While conventional surgical approaches often lead to longer recovery times, MIS offers numerous advantages for patients, including enhanced safety, reduced risk of infection, less blood loss, and shorter hospital stays.<sup>10-15</sup>

## Problem statement

Laparoscopic surgery has become an increasingly prevalent surgical technique worldwide, with over 13 million procedures performed annually. This minimally invasive approach offers numerous advantages, including reduced recovery times, lower postoperative complications, and overall decreased surgical risks.<sup>16</sup>

A multi-country survey conducted among surgeons COSECSA highlighted the state of laparoscopic surgery training. Key findings include: limited resource availability in health care facilities and curriculum gaps in many training facilities.<sup>17</sup>

IN Rwanda, Laparoscopic techniques were first introduced at CHUB in 2015, where initially only two surgeons were trained to perform these procedures. Since then, there has been a concerted effort to enhance the skills of local surgeons and increase the volume

of laparoscopic surgeries performed. By 2023, the number of laparoscopic cases has significantly increased, reflecting a growing acceptance and capability within the surgical community in Rwanda.<sup>18</sup>

At CHUB, Laparoscopic surgeries was introduced in September 2019, with two locally ongoing training local surgeon with visiting mentorship of experienced laparoscopic surgeon. Some procedures are being performed on regular basis like cholecystectomy, hernioplasty, diagnostic laparoscopy for infertility, appendectomy etc.

## Study justification

Even if MIS was being done in other hospital in Kigali, capital city of Rwanda, laparoscopic surgery was only introduced 3 years ago in CHUB. Indeed, CHUB was the first hospital to start MIS out of Kigali. Based on the above, little is known about outcomes of patients operated using minimally invasive techniques in CHUB. This study will help to evaluate safety, identify potential challenges and opportunities in order to improve surgical outcomes for patients undergoing laparoscopic surgery at CHUB.

## Research question

What is the morbidity and mortality related to laparoscopic surgery at CHUB?

## HYPOTHESIS

Laparoscopic surgery at CHUB is associated low morbidity, with comparable length of hospital stay comparable to other centers in the country.

## Objectives

### IV.1. General objective

To evaluate outcomes of laparoscopic surgery at CHUB

### IV.2. SPECIFIC OBJECTIVES

1. To describe demographic profile of patients undergoing laparoscopic techniques at CHUB
2. To report on length of hospital stay, in hospital mortality and morbidity related to laparoscopic surgery in CHUB.
3. To identify the common laparoscopic procedures performed at CHUB

## Methodology

### a. Research design

This was a retrospective descriptive study. The patients treated using laparoscopic techniques during the period of the study were part of the research.

### b. Study settings

The study was done at CHUB, it is located in southern province, Huye District. CHUB is overseeing medical practice and supervising other hospital located in southern province and part of western province of Rwanda.

CHUB is among 5 teaching hospitals affiliated to University of Rwanda, with various specialty.

Surgical department has general surgery unity, Orthopedic, urology, maxilla-facial surgery, ENT, and ophthalmology units.

CHUB has bed capacity of 419 and surgical department counts 136 beds, has two operational laparoscopic towers

Laparoscopic surgeries are performed in general surgery units and urology in surgery department as well as in obstetrics and gynecology. General surgery unit has annually more 2000 major procedures, 2351 in 2020/2021 and 2115 procedures in 2021/2022.

### c. Study population

Our study population included adult patients (16 years and above) admitted at CHUB for surgical procedures using laparoscopic procedures in the units of general surgery, urology and obstetrics and gynecology.

### d. Study period

This study included patients operated from 1st January 2020 to 31st August 2022.

### e. Inclusion criteria

All Patients operated laparoscopic surgery at CHUB during study period.

### f. Exclusion criteria

Patients with incomplete file were excluded in the file.

### g. Data collection process

A standardized data collection questionnaire was used. Patients were identified from operating theater logs and their files retrieved

from hospital archives. A pre-established questionnaire was filled for socio-demographic characteristics, clinical and surgical information.

Data were collected using inpatient files and electronic patient's files. The principal investigator supervised all data collection.

### h. Data analysis

Data analysis was done using SPSS version 25.0. Percentages and means have been used for descriptive statistics. A  $p$ -value of 5% or less was considered statistically significant.

## Ethical consideration

This research was approved by CHUB and IRB-CMHS.

All data collected from participant files were held with utmost confidentiality.

## Study results

### Demographics

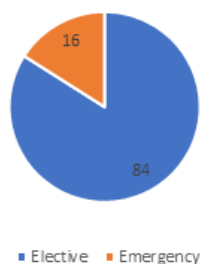
**Table 1** Demographic data

Demographics			
Age	Minimum Maximum Mean	16 87 43	
Gender	Female	129	65.5
	Male	68	34.5
	Total	197	100
Education	High School	20	10.2
	None	2	1
	Primary	151	76.6
	University	24	12.2
Occupation	<b>Total</b>	<b>197</b>	<b>100</b>
	Farmer	153	77.7
	Prisoner	2	1
	Private	7	3.6
	Public servant	20	10.2
	Student	15	7.6
	<b>Total</b>	<b>197</b>	<b>100</b>
Provenances	East	1	0.5
	Kigali city	8	4.1
	North	2	1
	South	175	88.8
	West	11	5.6
	<b>Total</b>	<b>197</b>	<b>100</b>

Table 1 shows that majority of study population was female with 65%. 76.6 % of our study population has primary education only, and majority is doing agriculture activity(farmer). Although majority is located in southern, this table is showing that CHUB is treating the patients from all corner of the country. Our study population age is ranging from 16 years old to 87 years old with the mean age of 43 years.

## Urgency of procedures

urgency of surgery



**Figure 1** Urgency of surgery.

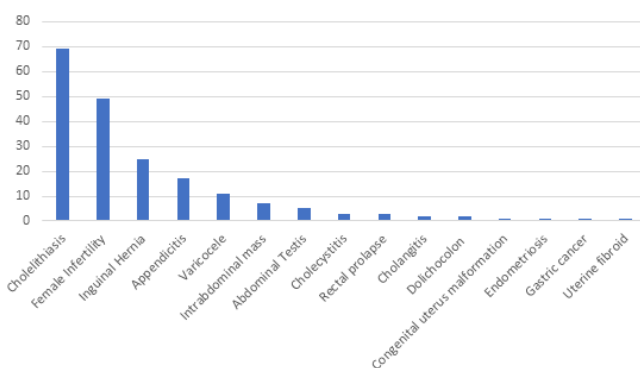
Above figure is showing that elective laparoscopic surgeries dominate with 84%, and emergency surgeries counted 14 %.

## Diagnosis

**Table 2** Diagnosis of patients operated with laparoscopic at CHUB

Diagnosis	Frequency	Percentage
Cholelithiasis	69	35
Female Infertility	49	24.9
Inguinal Hernia	25	12.7
Appendicitis	17	8.6
Varicocele	11	5.6
Intrabdominal mass	7	3.6
Abdominal Testis	5	2.5
Cholecystitis	3	1.5
Rectal prolapse	3	1.5
Cholangitis	2	1
Dolichocolon	2	1
Congenital uterus malformation	1	0.5
Endometriosis	1	0.5
Gastric cancer	1	0.5
Uterine fibroid	1	0.5
Total	197	100

Diagnosis



**Figure 2** Diagnosis of patients operated with laparoscopic at CHUB.

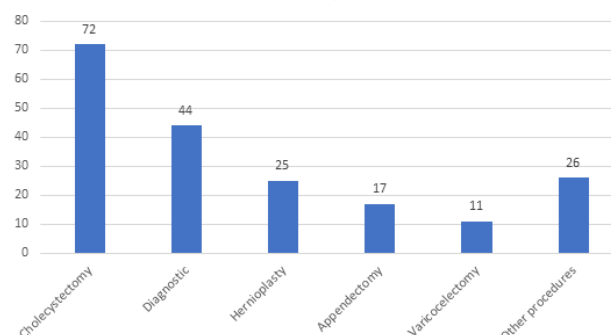
Above table is showing frequent pathologies that were operated using minimally invasive surgery during our study period. Cholelithiasis is predominant and occupied 35%, followed by female infertility both primary and secondary. Inguinal hernia and appendicitis also count 12.7% and 8.6% respectively.

## Laparoscopic procedures

**Table 3** Laparoscopic procedures done at CHUB

Types of procedures	Frequencies	Percentage
Cholecystectomy	72	37
Diagnostic	44	22
Hernioplasty	25	13
Appendectomy	17	9
Varicolectomy	11	6
Other procedures	26	13
Total	197	100

Laparoscopic procedures



**Figure 3** Laparoscopic procedures done at CHUB.

This table is showing frequently performed laparoscopic procedures at CHUB. Cholecystectomies predominate with 36.5% of cases, both cholelithiasis and cholecystitis were managed by cholecystectomies followed by hernioplasty and appendectomies count 12.7% and 9.1 % respectively.

## Hospital stay

### A Number of days

**Table 4** Hospital stay in days

Hospital stay in days				
	Frequency	Percent	Valid Percent	Cumulative Percent
1	6	3.0	3.0	3.0
2	79	40.1	40.1	43.1
3	62	31.5	31.5	74.6
4	25	12.7	12.7	87.3
5	17	8.6	8.6	95.9
6	5	2.5	2.5	98.5
7	3	1.5	1.5	100.0
Total	197	100.0	100.0	

### Statistics

#### Hospital stay in days

N	Valid	197
	Missing	0
Mean		3.00
Median		3.00

Above table is showing hospital stay, it ranges from one day to 7 days. 3 % of patients had passed 1 day in the hospital. And around 74% of patients were discharged on third day. Overall Mean hospital was 3 days.

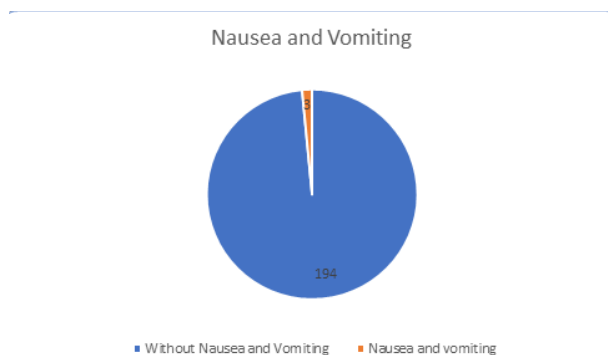
## B. Hospital stay by procedures

**Table 5** Hospital stays in days

Procedures	Numbers of Days (Mean)
Cholecystectomies	3
Hernioplasty	2
Diagnostic	2
Appendectomies	2
Varicocelectomy	2
Other Procedures	4
Overall Hospital stay	3

This table is showing number of days spent in hospital for laparoscopic patients. Mean hospital stay for cholecystectomies was 3 days, hernioplasty, diagnostic laparoscopic, appendectomies, varicocelectomy were two days; other procedures including advanced laparoscopic procedures had mean hospital stay of 4 days.

### Postoperative nausea and vomiting



**Figure 4** Nausea and vomiting.

Laparoscopic surgeries are done under general anesthesia, this incidence of nausea and vomiting was attributed to anesthesia and delayed resuming of feeding to 1.5% of patient.

### Postoperative feeding

**Table 6** feeding after laparoscopic surgery

		Frequency	Percent
Tolerated feeding	Yes	160	81.2
	No	37	18.8
	Total	197	100
Feeding time in hours	Hours	Frequency	percent
	0-4	64.0	32.49%
	5-8	97.0	49.24%
	more than 8	36.0	18.27%

Above is showing tolerance and feeding times after laparoscopic surgery. With 81.2% of patients tolerated feeding after surgery. More than 80% of patients started feeding in 8 hours following surgery.

### Complications intraoperative

Complications				
		Frequency	Percentage	Cumulative
	None	193	98.0	98.0
	bile duct injury	2	1.0	1.0
	allergy to medication	1	0.5	0.5
	Bleeding 900cc of blood	1	0.5	0.5
	Total	197	100.0	100.0

This table is showing some complications accounted during our laparoscopic surgery, bile duct injuries accounted two cases. Bile injuries were detected during procedures and were managed laparoscopic with t-tube insertion, and intraoperative bleeding accounted 1 cases, was controlled before proceeding with laparoscopic procedure. Allergy to medication accounted 1 cases and was managed successfully and laparoscopic procedure continued as planned.

### Conversion to open

conversion to open					
		Frequency	Percentage	cumulative	
Valid	No	196	99.5	99.5	
	Yes	1	0.5	0.5	
	Total	197	100.0	100.0	

Conversion rate to open was very low (0.5%); this conversion was due to large uterine mass, it was not expected and due to material availability, laparoscopic was converted to open for resection of tumor (myomectomy).

## Discussion

197 laparoscopic procedures were conducted in study period 2020 to 2022. This number is still too low as laparoscopic surgery I program is being initiated at CHUB. In our study, the gender distributions show a total of 129 females and 68 males highlighting a higher female participation. When we compare these numbers to the findings by Chandio a. et al in their study factors influencing successful completion of laparoscopic cholecystectomy, we observe a similar trend where the female-to-male ratio in laparoscopic cholecystectomy was also skewed towards females (245 females and 90 males).<sup>19</sup> Same findings by Karamanakis S also in their study Laparoscopy in the Emergency Setting found also that female was predominant with 54 %.<sup>20</sup>

Concerning hospital stays, cholecystectomies have over mean hospital stay of 3 days; hernioplasties, diagnostic laparoscopic, appendectomies had hospital of 2 days; other advanced procedures had mean hospital stay of 4 days. Several studies have examined hospital stay duration after laparoscopic surgery across different surgical procedures and patient populations. Brown et al. (2018) in their research on laparoscopic hysterectomy patients, they reported a longer average hospital stay of 4.2 days.<sup>21</sup> Hospital stay after laparoscopic, in the study made by B Bjornsson, et al. conducted a study on hospital stay following laparoscopic surgeries and had found the average of hospital stay 3.9 days and according to the study,<sup>21</sup> same finding was also by Bruno Leonardo Bancke Laverde et al in their study on laparoscopic surgeries.<sup>22</sup>

Gustavo L Carvalho et al. found average hospital stay of 4 days following laparoscopic cholecystectomy<sup>23</sup> comparatively to our study where average mean of hospital stay following cholecystectomy was 3 days. However, Carsten N Gutt et al. had found average oh hospital stay of 4 days following acute cholecystitis.<sup>24</sup> Yoshikazu Morimoto, et al. in their study of Predicting prolonged hospital stay after laparoscopic cholecystectomy results indicate 4.85 days of hospitalization while in our study The finding of a mean stay of 3 days is encouraging and suggests that there may have been improvements in surgical and post-operative care practices that contribute to quicker recovery times.<sup>25</sup> E. A. Vega1, et al. in their study, results shows that the median duration of hospitalization was 4 days for laparoscopic procedures, six days in open procedures while in our study The finding of a mean hospital stays of 3 days.<sup>26</sup>

Laparoscopic hernioplasty had overall hospital stay of 2 days in our study.

According to Xiang Zhu, et al. their study on hernioplasty; they find the mean hospital stay of one day; in our study (2 days) is slightly longer than the mean hospital stays for TEP repair (1.84 days) but significantly shorter than the mean hospital stays for open extra peritoneal operations (4.28 days).<sup>27</sup> According to P.-E. Moreau et al. in their study, it indicated that Hospital stays averaged 2.5 days. Hospital stay durations between the literature review (2.5 days) and our study (2 days) indicates a modest reduction in the mean hospital stay in our study.<sup>28</sup> Concerning the conversion to classic laparotomy following laparoscopic procedure, our study reported 0.5% of conversion rate, this is relatively low compared to the study done by Ryo Yamamoto et al. where they found conversion rate of 4.5 % in their study<sup>28</sup> and the one done by Gustavo L Carvalho, et al. found 3% for conversion to open cholecystectomies.<sup>23</sup> Our study recorded complication of 0.5 % which is relatively low compared to 2% found by Gustavo L Carvalho, et al. in their study on laparoscopic cholecystectomy.<sup>23</sup>

## Conclusion and recommendation

Laparoscopic surgery at CHUB is being done and mainly basic laparoscopic procedures. It is associated with low morbidity and hospital day is comparable to other centers. No mortality reported.

Further studies are needed to explore patients' satisfaction and understand health economics and cost implications

## Recommendation

To researchers and hospital staff".

To introduce ERAS protocol at CHUB to reduce hospital stay on hernioplasty and cholecystectomies.

To evaluate outcome for each pathology separately.

## References

- Alkatout I, Schollmeyer T, Hawaldar NA, et al. The development of laparoscopy—a historical overview. *Front Surg*. 2021;8:799442.
- Nikolov NK, Reimer HT, Sun A, et al. Open versus laparoscopic appendectomy: a literature review. *J Mind Med Sci*. 2024;11(1):4-9.
- Bittner R. Laparoscopic surgery—15 years after clinical introduction. *World J Surg*. 2006;30(7):1190-1203.
- Pizzol D, Bertoldo A, Turati M, et al. Laparoscopy in low-income countries: 10-year experience and systematic literature review. *Int J Environ Res Public Health*. 2021;18(11):5796.
- Parkar RB, Khetan M, Mallick M, et al. Laparoscopic surgery in low-income and limited-resource settings: does it safely add value? A review of 2,901 laparoscopic gynecologic procedures. *J South Asian Feder Obstet Gynaecol*. 2016;8(1):1-6.
- Alfa-Wali M, Osaghae S. Practice, training and safety of laparoscopic surgery in low- and middle-income countries. *World J Gastrointest Surg*. 2017;9(1):13-18.
- Parkar RB, Khetan M, Mallick M, et al. Laparoscopic surgery in low-income and limited-resource settings: does it safely add value? A review of 2,901 laparoscopic gynecologic procedures. *J South Asian Feder Obstet Gynaecol*. 2016;8(1):1-6.
- Alfa-Wali M, Osaghae S. Practice, training and safety of laparoscopic surgery in low- and middle-income countries. *World J Gastrointest Surg*. 2017;9(1):13-18.
- Zadey S, Datar S, Kashikar SD, et al. KeyLoop retractor for global gasless laparoscopy: evaluation of safety and feasibility in a porcine model. *Surg Endosc*. 2023;37(8):5943-5955.
- Parkar RB, Khetan M, Mallick M, et al. Laparoscopic surgery in low-income and limited-resource settings: does it safely add value? A review of 2,901 laparoscopic gynecologic procedures. *J South Asian Feder Obstet Gynaecol*. 2016;8(1):1-6.
- Madhok B, Nanayakkara K, Mahawar K. Safety considerations in laparoscopic surgery: a narrative review. *World J Gastrointest Endosc*. 2022;14(1):1-16.
- Strasberg SM. A perspective on the critical view of safety in laparoscopic cholecystectomy. *Ann Laparosc Endosc Surg*. 2017;2:91.
- Zambouri A. Preoperative evaluation and preparation for anesthesia and surgery. *Hippokratia*. 2007;11(1):13-21.
- Li J, Sun L, Wang Z, et al. Long-term results of laparoscopic surgery and open surgery for colorectal cancer in Huaihe River Basin of China. *Food Sci Technol (Brazil)*. 2022;42.
- Jiang WZ, Li Y, Zhao Z, et al. Short-term outcomes of laparoscopy-assisted vs open surgery for patients with low rectal cancer: the LASRE randomized clinical trial. *JAMA Oncol*. 2022;8(11):1607-1615.
- Buia A, Stockhausen F, Hanisch E. Laparoscopic surgery: a qualified systematic review. *World J Methodol*. 2015;5(4):238-248.
- Nyundo M, Umugwaneza N, Bekele A, et al. Exploring laparoscopic surgery training opportunities in the College of Surgeons of East, Central, and Southern Africa region. *J Surg Educ*. 2023;80(10):1454-1461.
- Robertson F, Boyer A, Mutabazi D, et al. Laparoscopy in Rwanda: a national assessment of utilization, demands, and perceived challenges. *World J Surg*. 2019;43(2):339-345.
- Chandio A, Timmons S, Majeed A, et al. Factors influencing the successful completion of laparoscopic cholecystectomy. *J Soc Laparoendosc Surg*. 2009;13(4):581-586.
- Karamanakos SN, Sdralis E, Panagiotopoulos S, et al. Laparoscopy in the emergency setting: a retrospective review of 540 patients with acute abdominal pain. 2010.
- Björnsson B, Larsson AL, Hjalmarsson C, et al. Comparison of the duration of hospital stay after laparoscopic or open distal pancreatectomy: randomized controlled trial. *Br J Surg*. 2020;107(10):1281-1288.
- Bancke Laverde BL, Arboleda CA, Castaneda DC, et al. Risk factors for conversion from laparoscopic to open appendectomy. *J Clin Med*. 2023;12(13).
- Carvalho GL, Cavazzola LT, Silva FW, et al. Which cholecystectomy do medical students prefer? *J Soc Laparoendosc Surg*. 2019;23(1).
- Awolaran O, Gana T, Samuel N, et al. Readmissions after laparoscopic cholecystectomy in a UK district general hospital. *Surg Endosc*. 2017;31(9):3534-3538.
- Morimoto Y, Matsushita K, Yamashita N, et al. Predicting prolonged hospital stay after laparoscopic cholecystectomy. *Asian J Endosc Surg*. 2015;8(3):289-295.
- Vega EA, Beal EW, Cloyd JM, et al. Comparison of oncological outcomes after open and laparoscopic re-resection of incidental gallbladder cancer. *Br J Surg*. 2020;107(3):289-300.
- Zhu X, Pan Y, Jiang C, et al. Totally extraperitoneal laparoscopic hernioplasty versus open extraperitoneal approach for inguinal hernia repair: a meta-analysis of outcomes of our current knowledge. *Surg Endosc*. 2014;28(4):1234-1242.
- Moreau PE, Helmy N, Vons C. Laparoscopic treatment of incisional hernia: state of the art in 2012. *J Visc Surg*. 2012;149(5):e40-e48.