Institutional Review of Laparoscopic Surgery during Coronavirus Disease - 2019: Recommendations for Developing Countries

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Research Article

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Abstract

Context: The outbreak of the Coronavirus disease 2019 (Covid-19) has posed new challenges to surgical care throughout the world. Laparoscopic guidelines were revised to address the theoretical risks associated with transmission of viral droplets and many elective surgeries were suspended.

Aims: We aimed to describe strategies that lowered viral transmission risks such as alternative anaesthetic techniques and low-cost infection control and prevention practices for laparoscopic surgeries.

Settings and Design: Seventy two patients who presented to hospital as acute surgical emergencies between April and July 2020 and analyzed clinical data of 50 patients who underwent laparoscopic surgeries. This was a prospective observational study.

Methods and Material: Procedures were performed under spinal anaesthesia utilizing alternate electrosurgical units and simple smoke evacuation systems.

Statistical analysis used: Continuous variables were summarized as mean and standard deviation (SD) or median and range. Discrete variables were summarized as frequencies and percentages. Univariate testing was performed using *t* test or Mann-Whitney U test. ANOVA or Kruskal-Wallis test was used for categorical data.

Results: Of the 50 operated patients, the median age was 23 years with 54% females. The most frequently performed procedure was laparoscopic cholecystectomy, the overall median theatre time was 47 minutes, and 40% patients were managed as day cases with reduced hospital stay.

Conclusions: Use of spinal anaesthesia, a simple smoke evacuator and some additional measures during laparoscopic surgeries reduce theatre time and length of hospital stay. These strategies could address and minimize the risks associated with Covid-19 transmission in surgical settings in low-resource countries.

Key Messages

We propose the safety of alternative anaesthesia techniques such as SA, and low cost options of smoke evacuation that can significantly decrease the theoretical risks of viral transmission, reduce theatre time, and duration of hospital stay.

Introduction

The global transmission of Coronavirus disease 2019 (Covid-19) is fraught with widespread implications on traditional health care practices related to surgery.[1] Current practices such as laparoscopy, which has been instrumental in the practice of surgery for decades, were reconsidered and guidelines were restructured to ensure patient safety and best clinical outcomes. Elective surgeries were suspended by the

surgical and allied societies since the start of the pandemic and judicious triage protocols were adopted.[2-3] Laparoscopic procedures were avoided in all cases due to risk of viral transmission from aerosol-generating products (AGP) during procedures performed under general anesthesia (GA) during intubation and ventilation and smoke generation from insufflated gas.[4-6] Gradually surgical societies adopted newer guidelines which allowed laparoscopy provided protective measures were strictly implemented.[7] Some of these measures were limited due to the cost of devices and systems to support procedures.[8]

Laparoscopy has been the widely accepted gold standard for several organ procedures such as cholecystectomy and appendectomy.[9] Despite established advantages, consensus for laparoscopic surgical practice was modified to curb risks that increased viral transmission such as hazardous smoke generation during surgical procedures.[8] And indeed societies published new recommendations discouraging laparoscopy in favour of open surgeries during Covid-19 pandemic; however, guidelines evolved with time.[10-11] In regards to choice of anesthetic modalities, GA has been the mainstay of laparoscopic surgeries. In the past, various factors have discouraged the uptake of alternative anesthetic techniques such as the notion of inadequate abdominal muscle relaxation during spinal anesthesia (SA).[12] In contrast, emerging evidence supports merits of SA and good feasibility due to profound muscle relaxation, shorter recovery time and cites it comparable to GA in regards to laparoscopic procedures, complications and length of hospital stay.[13]

In relation to Bangladesh, the first confirmed case of Covid-19 was declared on 8th March 2020.[14] Subsequently, the general public avoided hospitals especially during the months of March and April which led to a significant decrease in elective surgeries. Herein we present measures adopted for laparoscopic surgical practice at a hospital in Bangladesh. We propose the safety of alternative anesthesia techniques such as SA, and low cost options of smoke evacuation that can significantly decrease the theoretical risks of viral transmission, reduce theatre time, and duration of hospital stay.

Subjects and Methods:

Between 1, April 2020 and 31, July 2020, 72 patients presented to a tertiary care hospital in Chittagong, Bangladesh with acute surgical conditions amenable to laparoscopic procedures. Among these, 50 patients underwent laparoscopy and the remainder improved on non-operative management. All patients had abdominal pain and many had associated fever and were provisionally considered as Covid-19 positive until proved otherwise. Except in a few cases where Covid-19 testing was not done and the decision to perform surgery was made despite non-testing, the majority of patients had the testing done. For this prospective observational study, we included medical records of all patients and ethical clearance was obtained on March 14, 2020 (no/admin/SPH/189/2020) from Ethical Committee of the Hospital. Informed consent was obtained from all patients and parents or legal guardians as appropriate.

Spinal anesthesia was used during all laparoscopic procedures. Ergonomics were such that surgeon could operate with only one assistant so that less personnel was needed during laparoscopy. Smoke generation was minimized by use of Ligasure (COVIDIEN Valleylab LS10) instead of diathermy. Smoke leakage was minimized by use of indigenous smoke evacuator which evacuated insufflated gas via least dependant port through suction tubing into a jar containing detergent solution and from there to a bucket containing water mixed with detergent and bleach [Fig. 1]. All the patients wore a mask and a screen separated the head end of the patient from the surgical team.

Data collection: We obtained data on age, gender, clinical and surgical variables which included Covid-19 testing, diagnosis, treatment, theatre time and length of hospital stay.

Data analysis: Data was collected using Microsoft Excel and analyzed with Stata/IC 16.0 for Mac. Continuous variables were summarized as mean and standard deviation (SD) or median and range when appropriate. Discrete variables were summarized as frequencies and percentages. Univariate testing was performed using *t* test or Mann-Whitney U test based on distribution of data. One-way analysis of variance (ANOVA) or Kruskal-Wallis test was used for categorical data. All *P*-values were two-sided and values ≤ 0.05 were considered statistically significant.

Results

There were 72 patients in the overall cohort with a median age of 18.5 years (range, one to 48 years) and 54.17% were female. Some patients were admitted with a probable diagnosis of either appendicitis or calculous cholecystitis. Conservative management improved their condition and they were discharged. Of these, five returned with similar complaints during the study period and were operated, and their operation and hospital stay were counted considering both occasions of admissions. Descriptive statistics of the variables in the operative cohort are presented in Table 1.

The median age was 23 years (range, one to 48 years). Less than half had a negative Covid-19 test report before treatment (40%) and 38% of patients had a negative test after treatment (sample was taken before operation but reports came later). Only two patients (4%) had a positive report after treatment (sample was taken before operation). The majority of operative treatments during the period comprised of cholecystectomy (22%) followed by appendectomy (18%) and appendectomy with peritoneal cleansing (16%). The overall median theatre time was 47 minutes (range, 32 to 75 minutes) and in most cases procedures were performed as day case (40%). The average theatre time by different treatments is displayed in Figure 2. There was no association of sex ($P = 0.128$) with theatre time; however there was a strong positive correlation with age ($P = 0.006$), and associations with treatment ($P = 0.001$) and duration of stay ($P = 0.001$). During the four month period, we operated two Covid-19 positive cases. One of our OT staff had developed Covid-19 symptoms, nine days after we had operated a Covid-19 positive case, and was sent to isolation. He later tested positive but the source of infection was not clear as he had a positive family history for at least seven days before his symptom development.

Table 1. Descriptive statistics: Surgery data (operative cohort, n=50)

Variables	
Age in years, median (range)	23 (1 to 48)
Females, n (%)	27 (54)
Theatre time in minutes, median (range)	47 (32 to 75)
Covid-19 test n (%)	
Not done	9 (18)
Negative report before treatment	20 (40)
Negative report after treatment	19 (38)
Positive report before treatment	2 (4)
Stay, n (%)	
Day case	20 (40)
1 day	16 (32)
2 days	12 (24)
3 days	2 (4)
Procedure, n (%)	
Appendectomy	9 (18)
Appendectomy with peritoneal cleansing	8 (16)
Submucosal appendectomy	5 (10)
Cholecystectomy	11 (22)
Partial cholecystectomy	4 (8)
Reduction of intussusception	1 (2)
Ovarian cystectomy	1 (2)
Salpingo-oophorectomy	1 (2)
Salpingo-oophorectomy with contralateral oophoropexy	1 (2)
Salpingo-oophorectomy with removal of gestational sac	2 (4)
Patient returned and appendectomy	3 (6)
Patient returned and cholecystectomy	4 (8)

Discussion

The impact of Covid-19 on surgical practices has been immense globally. We presented our experience of 50 laparoscopic procedures from April to July 2020. In retrospect, we performed 176 laparoscopies during the same period in 2019 which translated to reduction of laparoscopic procedures during the pandemic by about 75%. The drop in elective surgeries globally as a consequence of Covid-19 necessitates gathering appropriate information and advocating more efficient global surgical care.[15]

As laparoscopic restrictions and other health care concerns grew amongst the surgical community, we devised simpler solutions for approaches to surgical management in the context of our hospital setting. Reflecting on our practices, we propose that laparoscopy under regional anesthesia is a safe surgical approach for patients during Covid-19 pandemic; by achieving adequate regional anesthesia/SA, we obviated the need for GA and its accompanying risks of aerosolization which have been linked with increased viral transmission.[16] The risks associated with SA were not substantiated; it was administered as an intrathecal injection over a few a minutes and patients left OT as soon as the operation was complete and there were additional benefits such as cost-effective containment of aerosolized products, markedly reduced theatre time and shorter hospital stay.

There have been concerns of smoke leakage during operations in relation to use of electrosurgical units.[17] We have been using Ligasure (COVIDIEN Valleylab LS10), a safe and effective vessel sealing system, which created less smoke as compared to conventional diathermy.[18] Evacuation of the insufflated gas was done via a simple underwater submersion system that minimized smoke leakage and aerosolization. In addition, health facilities globally have set protocols to restrict number of operation room personnel and our improvised technique of laparoscopy utilized at least one less person than conventional techniques by using a single assistant in all laparoscopies.[4,19-20]

Our mean operative time for an appendectomy was 42 minutes. In contrast, a study on 55 laparoscopic appendectomy procedures using standard anesthetic techniques reported a mean operative time of 69 minutes.[21] However, operative time parameters depend on several factors such as patient's characteristics and surgeon's skills; surgeons can utilize these estimates to optimize surgical management by adapting improvised techniques which can save resources, finances and time by reducing length of hospital stay.[22]

Although we lacked a negative-pressure OT due to cost constraints, we followed all other standard protocols pre, intra and postoperatively as per guidelines for infection prevention. We had limited testing facilities for Covid-19 in the country and oftentimes testing results were delayed. For practical reasons, we could not order testing for all patients and using clinical judgment and acumen, we proceeded to operate patients who were considered to be low risk. Nevertheless, we adopted every possible measure to reduce the risk of infection and dealt with all patients as if they were Covid-19 positive from first presentation to emergency department until discharge from hospital. On another note, conservative non-operative treatments for cases such as appendicitis could have greater interest in future as hospitals adapt and produce standard operating guidelines during epidemics and pandemics.

Conclusion

Use of spinal anaesthesia, a simple smoke evacuator and some additional measures during laparoscopic surgeries reduce theatre time and length of hospital stay. This seems to be safe and feasible as a means for cost-effective infection prevention and control practices during the pandemic. These strategies could be effectively adopted to address the risks associated with Covid-19 transmission during surgical practices in resource-limited settings.

Declarations

Acknowledgements: None

Author contributions

All four authors have designed the study, performed the experiments, analyzed the data and wrote the manuscript.

Conflict of interest statement

The authors have declared that no competing interests exist.

Ethics statement

The study was approved by the Ethics Committee of South Point Hospital (No. Admn/SPH/189/2020).

Funding statement

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Data availability statement

The datasets generated during and/or analyzed during the current study are available at https://doi.org/10.6084/m9.figshare.13172933.v1

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Figures

Figure 1

Evacuation of insufflated gas via a simple underwater submersion system.

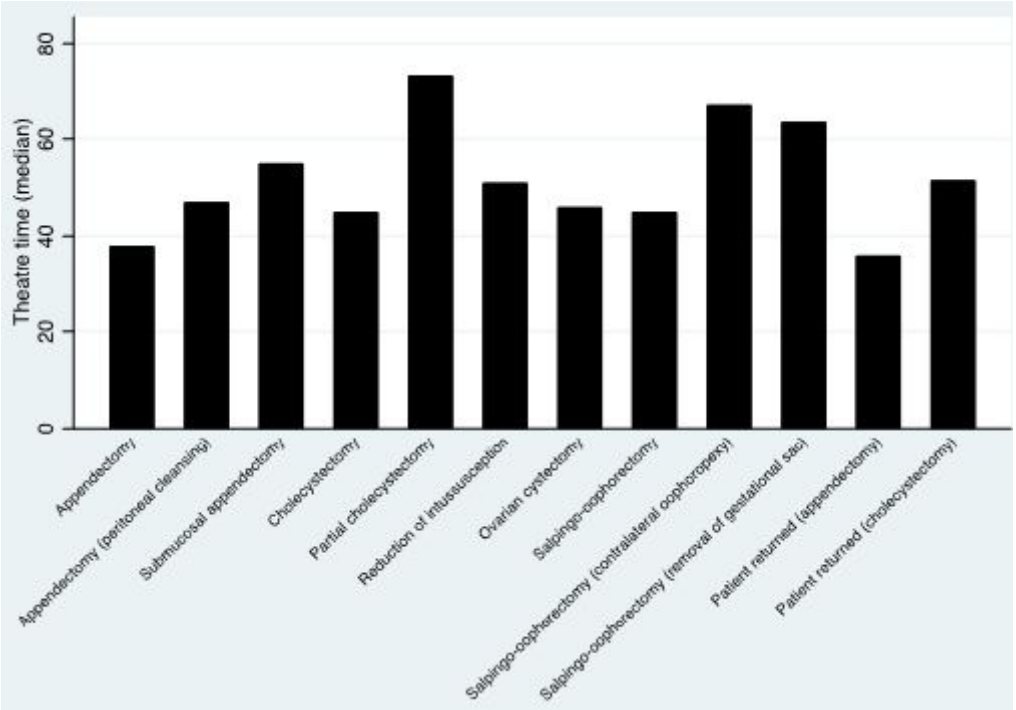

Figure 2

Median theatre time (minutes) per procedure (n=50).

Supplementary Files

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