Women's Health and Complications

MINI REVIEW

COVID-19 Pandemic: Which hysterectomy?

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Introduction:

Severe Acute Respiratory Syndrome Corona-virus-2 (SARS-CoV-2) has been confirmed as the cause of COVID-19, a contagious viral infection that attacks primarily the throat and the lungs causing pneumonia and, if untreated, may result in acute respiratory distress syndrome and multi-organ failure. The outbreak of this severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) which originated in Hubei, China was declared a global pandemic by the World Health Organization [1,2] and now poses a massive health and economic burden to several countries, impacting many lives and affecting our daily practice, our own safety and overall patient care.

The global pandemic of corona virus disease 2019 (COVID-19) continues to be felt as hospitals in almost all countries have made the decision to reduce all elective and non-urgent cases in order to allow staffing and resources to be deployed elsewhere, but, also in the case of a shortage, there is a possibility that operating theatres will be converted into intensive care units. However, when emergency and urgent gynaecological cases are taken to theatre, it is an absolute necessity to ensure that all the measures are taken to reduce the risk of viral transmission, irrespective of whether the patient is suspected, potential or proven to have COVID-19.

Selection of the Patients:

In this acute phase of COVID-19, all elective surgical procedures must be postponed. It is imperative to ensure that the postponement of the intervention doesn't affect the outcome or the quality of life. Conversely emergency and all urgent surgery, including surgery for fast growing malignancies, or where a delay in cancer surgery may lead to systematic morbidity should be offered. These cases need to be discussed with the anaesthetist, theatre staff and medical personnel that will be directly involved in patient care. Consideration must of course be given to the possibility of viral contamination to staff during surgery, be it via open, vaginal, laparoscopic or robotic surgery and that all the protective measures are strictly employed for theatre staff safety. Appropriate Personal Protective Equipment (PPE) and N95 masks should be provided and change after each procedure as per normal infection control policies [Table1].

Routine Patient Care	COVID-19 (confirmed or suspected cases)
Surgical masks	Fit-tested N-95 masks
Disposable gloves	long-sleeved gown
Aprons	Impermeable Eye protection and/or full-face shield
Eye protection	Disposable caps
	Disposable gloves (ideally double gloved)

Table 1: A summary of the minimum recommended Personal Protective Equipment (PPE) required for laparoscopic surgery, in confirmed or suspected COVID-19 patients.

Hysterectomy: Vaginal, Laparoscopic or Open Hysterectomy:

Hysterectomy for benign uterine conditions must be postponed, as alternative measures can be considered. Hysterectomy is likely to continue to be undertaken in this pandemic when dealing with fast growing malignancies, or where a delay in cancer surgery may lead to systematic morbidity in short term (such as in cases of endometrial malignancies, premalignant diseases of cervix, or cervical carcinoma in situ). There are various surgical approaches to hysterectomy for the conditions described above. The Total Abdominal Hysterectomy (TAH) is associated with less favourable medical outcomes and evidence supporting its use arises only when documented pathologic conditions preclude the vaginal route or when complications develop during vaginal hysterectomy (VH) and laparoscopic hysterectomy (LH), either total laparoscopic hysterectomy (TLH) or laparoscopy-assisted vaginal hysterectomy (LAVH). For this reason, it has been recommended that, where possible, minimally invasive hysterectomy (MIH) - vaginal, laparoscopic or robotic hysterectomy (RH) – should be undertaken. The benefits of MIH over TAH are well recognised [3-5] and supported by international societies such as the ACOG, AAGL, ESGE, ISGE and BSGE [6-10].

The decision which hysterectomy should be offered during COVID-19 pandemic (open or minimally invasive) must be based on the same internationally accepted standards as in pre-Covid-19 era. Attention during surgery must be given to

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viral transmission in surgically generated smoke and aerosols, whether or not general anaesthesia is needed and the duration of the operation.

Viral Transmission in Surgically Generated Smoke and Aerosols:

The main route of viral transmission of SARS-CoV-2 is through contact and respiratory droplets. Viral transmission during open abdominal and laparoscopic hysterectomy generated smoke and aerosols it is theorized, but not yet proven, for SARS-CoV-2. With other viruses (such as human papilloma virus- HPV, hepatitis B virus- HBV and human immunodeficiency virus- HIV) it has already been shown that viral particles can be released during the procedure, in particular during the release of CO2 gas [11-13]. Theoretically the risk of disease spread does exist, but was not documented for HPV or HIV [14]. Only 4 confirmed cases of HBV transmission have been documented in recent literature [15]. It must be noted however, that the presence of these pathogens, before the era of pandemic COVID-19, were and are not an absolute contraindication to vaginal, laparoscopic or open abdominal hysterectomy.

Infection Risk with SARS-Cov-2 During Hysterectomy:

Controversy exists whether LH or TAH should be performed in the event that an urgent hysterectomy is needed. Both procedures use electro surgery generating bio aerosols. Additional to this SARS-CoV-2 is primarily a respiratory virus and the team involved in general anaesthesia and who performed endotracheal intubation and extubation are at the highest risk of viral transmission [16-18]. In the event that a confirmed case of SARS-CoV-2 is found, every attempt should be made to optimize medical management and defer hysterectomy until the patient has recovered. If the patient is asymptomatic or screen-negative, hysterectomy can be undertaken. Every attempt should be made to avoid intubation and if possible regional (spinal) anaesthesia to be utilized. Both LH and TAH make use of general anaesthesia, whereas VH is the only hysterectomy that can be performed with the aid of regional (spinal) anaesthesia, avoiding viral contamination during intubation and extubation.

LH as well as RH carries the theoretical risk of infection from endoscopically generated bioaerosols which may be increased due to the nature of laparoscopy. In laparoscopic surgery, the creation of a pneumoperitoneum using gas insufflation and the use of electrosurgical or ultrasonic devices may increase the risk of aerosol exposure to the whole operating team. The spread of viral particles is enhanced by high pressures, extensive coagulation, tissue manipulation and the duration of the procedure. The possibility of gas leaks when instruments are exchanged may potentially result in higher viral counts in the air. In a recent article, Mallick*et al.* [19] reviewed the evidence surrounding aerosolization, and highlighted the scarcity of evidence. In spite of the reassuring nature of these findings, caution should be maintained, especially when extrapolating to potentially more virulent pathogens such as SARS-CoV-2.

On the other hand, during open abdominal hysterectomy the use of energy based surgical instruments can be limited thus, theoretically, a number of products produced by energy based surgical instruments known as plume, aerosols, and smoke can be avoided. A study by Li *et al.* [20] concluded that the risk of aerosol spread may be lower at laparotomy, however this theoretical risk must be balanced with the advantages associated with laparoscopies, including: less postoperative pain, less analgesia needed, earlier discharge (thus reducing the risk of contracting nosocomial infections), and reduced rates of complications (which may result in readmissions into a high risk area for COVID 19). These advantages are robustly supported in the literature and provide much needed capacity in terms of bed space and critical staff for health care institutions during this time [21-28].The advantages offered by LH over the TAH, can also be obtained by VH. Additionally, since VH may be performed under regional (spinal) analgesia, the aerosol generating events of intubation and extubation are avoided. The benefits of VH over the other routes of hysterectomy are well known and documented long before the COVID-19 pandemic.

The 2009 ACOG guidelines on choosing the route of hysterectomy for benign disease state that, when feasible, VH is the safest and most cost-effective route by which to remove the uterus [29]. LH is an alternative to AH for those women in whom a VH is not indicated or possible [29]. The AAGL adopted the statement advising that surgeons without requisite training and skills required for the safe performance of VH or LH should enlist the aid of colleagues who do, or should refer patients requiring hysterectomy to such individuals for their surgical care [30].

In June 2017, the ACOG confirmed their 2009 statement defending VH as the route of choice wherever feasible. This statement was based upon data collected over the course of almost a decade, which indicated that VH was associated with better postoperative outcomes when compared with other approaches to hysterectomy [31].

When urgent hysterectomy is indicated on asymptomatic, suspected, or confirmed COVID-19 patients, there are concerns related to the transmission of the infection from the potential generation of SARS-CoV-2 contaminated aerosols, which arise from CO_2 leakage and the creation of smoke from the use of energy devices produced during open and laparoscopic surgery. Since gas insufflation and energy devices are not required during VH, these concerns are nullified. Additionally, VH has been found in several studies to be quicker than open or laparoscopic hysterectomy [3-5]. Reducing operation time and thereby reducing exposure, is imperative.

Laparoscopic hysterectomy, either TLH or LAVH, can be used if there is uncertain of succeeding VH or if there is a need of adnexectomy. During LH, all strategies to reduce leakage of smoke aerosols should be employed and is advisable to performed vaginal colpotomy after removing all the gas. LH when indicated should ideally be performed by confident and experienced surgeons, who are capable of

Table 2: Strategies to reduce production of bioaerosols and smoke aerosols during laparoscopy.

S.NO	Strategies to Reduce Production of Bioaerosols and Smoke Aerosols During Laparoscopy
1	Decrease the size of the incisions and the number of ports used
2	Consider using balloon fixated trocars to prevent port movements
3	Avoid exchanging unnecessary instruments to prevent gas leakage
4	Keep pneumoperitoneal pressure to 10-12mmHg to minimize gas leakage
5	Employ basic surgical principles: Careful handling and moving the tissues minimize bleeding
6	Use of energy at the lowest but effective settings and use of a traumatic instruments
7	Use of smoke and CO_2 filters during the procedure
8	Use of retrieval devices may minimize gas leaks
9	Deflate in supine position. Remove all ports only after the gas has been removed
10	At the end of the procedure, the sheath at port- sites≥10mm must be closed using a J needle

completing the procedures quickly and effectively. Strategies to reduce production of bioaerosols and smoke aerosols during laparoscopy are presented in Table 2.

Conclusion:

As COVID-19 patient numbers are now exponentially increasing, the need for urgent hysterectomy may occur more often. There is no need to place surgeons, anaesthetists and health workers in theatre at an elevated risk of infection with SARS-CoV-2 and the subsequent development of COVID-19 infection during the current pandemic. Therefore, VH should be our first choice for a large number of women who would have otherwise undergone LH or TAH were it not, during the current Covid-19 pandemic.

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