



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

A Tale of Two Cities: Insight and Practical Considerations During the Covid Pandemic



Andrea Cestari and Wesley M. White

There are 4639 miles between Milan, Italy (Cestari) and Knoxville, TN (White). Milan is a cultural and economic global linchpin with a population of well over 3 million people. Knoxville is a regional hub in the State of Tennessee near the base of the Smoky Mountains with a population of around 500,000. Milan is the cornerstone of the Lombardy region in Italy, among the most deeply impacted areas of the world by SARS-CoV-2 (COVID-19). Knoxville just recorded its 175th case. There could not be a more divergent reality for the 2 of us. Yet both of us are charged with providing care to patients with urologic malignancies which do not discriminate based on location or viral prevalence and, in some cases, are not deferrable. Ultimately, we both want to do what is right for our patients, our staff (surgeons included), our institutions, and our communities. And while our collective understanding of the epidemiology and clinical characteristics of the coronavirus will continually evolve, our priorities and responsibilities will not. This commentary will underscore current surgical recommendations/limitations as well as recommendations for use of personal protective equipment as it pertains to robotics/laparoscopy and framed in the context of our common goals.

PATIENT CARE

From the outset, containment of SARS-CoV-2 proved challenging.¹ Protective measures were enacted to avoid overtaxing the capacity of health care systems (termed flattening the curve).² Among these protective measures were institutional and governmental bans on performing “elective” procedures. The goal was 2-fold...to promote social distancing that slows the spread of the virus, and to preserve personal protective equipment and hospital resources, including ventilators and manpower. Consensus groups in both Europe and the United States provided guidance regarding the definition of “essential” surgery

and proposed a “tiered” approach to surgical triage.³ Although the application of these guidelines likely varied among countries and regions, there was near universal acceptance that radical cystectomy for muscle-invasive bladder cancer, postchemotherapy retroperitoneal lymphadenectomy for testis cancer, partial or radical nephrectomy for clinical T2 renal cell cancer, and radical prostatectomy for high-risk prostate cancer were “essential.” This is in addition to ‘conventional’ urologic emergencies such as testicular torsion, Fournier’s gangrene, symptomatic ureteral stones with hydronephrosis/sepsis, and the like.⁴

In some institutions, a lack of viral prevalence and the availability of hospital resources (bed capacity and personal protection equipment) afforded the opportunity to address conditions to be considered of “intermediate acuity” including radical prostatectomy for intermediate risk prostate cancer, partial nephrectomy for clinical T1 renal cell cancers, and TURBT for small to medium non-muscle invasive bladder cancers. The near-term goal of moving forward with Tier 2 operations was to avoid the potential for future increased morbidity/mortality and likewise to decompress the inevitable backlog of surgeries that we will all encounter when the imminent danger of COVID is over (Table 1).⁵

As many institutions prepare to broadly resume surgery for intermediate acuity and elective indications, universal testing of patients and providers will become necessary to ensure the mutual safety of both groups.⁶ Ultimately, the decision to resume elective cases and/or to continue intermediate acuity cases must be individualized and is based on the rate of community transmission, the predicted need for institutional resources, and provider and patient preferences.

SURGICAL CONSIDERATIONS

Thus far, nearly 10%-20% of confirmed COVID-19 cases worldwide are health-care workers.⁷ Widespread and reliable testing remains elusive in many locations. Potential coronavirus treatments are still in their infancy and vaccinations may not be readily available until 2021. Antibody testing of health care workers is promising but remains as yet unproven and is not widely accessible.^{8,9} Moreover, the completeness and/or duration of immunity from this new strain of coronavirus is likewise unknown. As health

From the Department of Urology, Advanced Urotechnology Center, IRCCS—Istituto Auxologico Italiano, Milan, Italy; and the Department of Urology, The University of Tennessee Medical Center, Knoxville, Knoxville, TN

Address correspondence to: Andrea Cestari, Chief, Department of Urology, Advanced Urotechnology Center, IRCCS Istituto Auxologico Italiano, Via Mercalli 30, 20122 Milano. E-mail: a.cestari@auxologico.it

Submitted: April 6, 2020, accepted (with revisions): May 3, 2020

Table 1. Suggestion to be employed during urological laparoscopic or robotic assisted surgical procedure in order to minimize the risk for the surgical team to contract Covid-19 virus

General protection of the surgeons (Two-way protective apparel)	<ul style="list-style-type: none"> – Surgical balaclava instead of surgical cap – Face shield – Mask (surgical or superior protection) – Waterproof gown – Double glove – Shoe cover – Learn properly how to dress and undress in order not to become self-contaminated
Assume the entire OR will be contaminated	<ul style="list-style-type: none"> – Prefer negative pressure ORs – In case of positive pressure ORs (the vast majority) allow for sufficient time between cases for complete room air exchange (around 30 minutes) – Leave outside the OR all not necessary items (cell phone – hospital charts/papers – etc) – Keep at minimum the number of personnel in the OR.
Prevention and management of aerosol dispersal	<ul style="list-style-type: none"> – Hasson technique for pneumoperitoneum induction (with use of dedicated trocar that offers perfect sealing with the skin incision) – Keep clean the skin from blood at incision sites – Keep clean the instruments from blood – Avoid sudden release of trocar valves – Check the airtightness of the trocars – Extensive use of suction device to remove smoke and aerosol – Avoid using two-way pneumoperitoneum insufflators
Management of pneumoperitoneum	<ul style="list-style-type: none"> – Keep CO2 pressure at the lowest possible value – Reduce the Trendelenburg position time as much as possible – Total evacuation of pneumoperitoneum via suction device or connecting one of the laparoscopic ports to a water seal created with a sealed container prior to trocar removal or specimen extraction.
Operation technique	<ul style="list-style-type: none"> – Set the power of electrocautery as low as possible – Avoid prolonged dissecting time on the same place with electrocautery or harmonic scalpel to avoid excessive smoke – In case of the use of bowel during surgery (urinary diversion during radical cystectomy) prefer the intracorporeal anastomoses and reconstruction since Covid-19 has been detected in the stools of positive patients
Postoperative operating room and equipment management	<ul style="list-style-type: none"> – Respect the governmental or scientific societies protocols for OR cleaning and disinfection – Devices used for suspected or proven infected patients should undergo separate disinfection – Dispose clinical wastes separately

Derived from: a) Zheng MN. *Ann Surg* 2020 Mar 26. doi:10.1097/SLA.0000000000003924; b) Di Saverio S, Pata F, Gallo G, Carrano F, Scorza A, Sileri P, Smart N, Spinelli A, Pellino G. Coronavirus pandemic and colorectal surgery: practical advice based on the Italian experience. *Colorectal Dis.* 2020 Mar 31. doi: 10.1111/codi.15056;²² c) Spinelli A, Pellino G. Covid-19 pandemic: perspectives on an unfolding crisis. *Br J Surg.* 2020 Mar 19. doi: 10.1002/bjs.11627.²³

care providers, our new reality is that patients must be treated as potentially infectious and appropriate precautions should be taken. The CDC, WHO, and local governmental agencies provide broad guidance, but very little information is directly applicable to urologists.^{10,11}

With rare exceptions, urologists are not front-line workers with a high rate of exposure to acutely ill COVID patients and are generally not involved with high-risk aerosol-generating procedures.¹² Indeed, our greatest risk for COVID exposure may come from community transmission, during patient interactions, and/or in the operating room. Institution-specific protocols have been

developed to help guide use of personal protection equipment and CMS (for the US) has established a tiered approach for patient interactions.¹³ At many institutions, low acuity inpatient consultations are being performed remotely with the explicit goal of simply finding an “out-patient home.” However, for those of us who continue to perform surgery for high and intermediate acuity indications, direct patient contact cannot be avoided and the risk of COVID exposure may be compounded.

Prior studies have suggested that surgery is an “aerosol generating” procedure that can transmit viral particles through surgical smoke and body fluids.^{14,15} Such is the

rationale for wearing a filtration mask during desiccation of penile viral warts, for instance.¹⁶ This risk of viral contamination would apply to both open and minimally invasive approaches. And while the CDC states that SARS-CoV2 RNA has been detected in the blood and stool of infected patients, it remains unclear whether transmission can occur from contact during operative procedures as these are not considered “high risk” aerosol-generating procedures. It is likewise unclear (and unlikely) that transmissible SARS-CoV2 exists in the urine or semen.¹⁷

The issue of safety during laparoscopic/robotic surgery is particularly germane as many of our intermediate and high acuity cases are performed in this manner, and some of our patients may be asymptomatic or pauci-symptomatic carriers. There is thus far conflicting information regarding the potential of viral contamination during insufflation and/or with use of electrocautery or the harmonic scalpel. It is theorized that the evacuation of pneumoperitoneum and the aspiration of body fluids are “aerosol generating procedures” that could transmit viral particles.¹⁸ The American College of Surgeons has gone so far as to recommend that we “consider avoiding laparoscopy.”¹⁹ Conversely, the Society of American Gastrointestinal and Endoscopic Surgeons stated that “although previous research has shown that laparoscopy can lead to aerosolization of blood-borne viruses, there is no evidence to indicate that this effect is seen with COVID-19, nor that it would be isolated to MIS procedures.”²⁰ They further suggested that laparoscopic surgery may actually offer better filtration of the majority of aerosolized particles as compared to open surgery. This “closed system” may therefore reduce the risk of viral contamination to operating rooms and personnel.

The American Cancer Society, the Society of American Gastrointestinal and Endoscopic Surgeons, and the European Association of Urology robotic urology section have offered practical measures that include keeping incisions as small as possible to avoid “air leaks,” to keep insufflation pressure at a reasonable and acceptable level, to use an ultra-filtration smoke evacuator and an intelligent integrated flow system, to reduce electrocautery settings in an effort to minimize the generation of surgical smoke, and to evacuate pneumoperitoneum via a filtration system prior to placement of any drains and/or specimen extraction (as with the AirSeal device).¹⁹⁻²¹ Many of these recommendations dovetail with best practices on how we would treat patients with other viral illnesses including Hepatitis C and HIV. Recommendations from the European Association of Urology regarding the temporary cessation of surgical training for fellows and residents should be interpreted with caution.²¹

Ultimately, the ability to rapidly and reliably test patients preoperatively for COVID will assuage much of our collective anxieties, restore some sense of normalcy, and will embolden us to resume elective surgical procedures. Until that time, patient screening and an atmosphere of prudence and pragmatism is in order. Complacency in the short-term must be avoided.

CONCLUSION

Despite vastly different experiences with the coronavirus to this point, we both continue to treat high and intermediate acuity patients, many of them robotically and always in the context of the aforementioned precautions. Urologists may not be the “face of the front line” but we are among the most active surgeons in our operating rooms due to the acuity of the conditions we treat. We must all learn to work in hospitals “in the midst of COVID-19” rather than working in “COVID-19 hospitals.” This will likely be our new normal for the foreseeable future.

References

1. Adalja AA, Toner E, Inglesby TV. Priorities for the US Health Community Responding to COVID-19. *JAMA*. 2020;323:1343–1344.
2. Hellewell J, Abbott S, Gimma A, et al. Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts. *Lancet Glob Health*. 2020;8:e488–e496.
3. American College of Surgeons. COVID-19: Guidance for Triage of Non-Emergent Surgical Procedures. *Am College Surg*. 2020. www.facs.org/covid-19/clinical-guidance/triage. 17 Mar 2020. Web. 16 Apr.
4. Gonzalez C. COVID-19: considerations for elective urologic surgery. American Urological Association; 2020. www.auanet.org/covid-19-info-center/elective-surgery. n.d. Web. 16 Apr.
5. American College of Surgeons. Local resumption of elective surgery guidance. American College of Surgeons; 2020. www.facs.org/covid-19/clinical-guidance/resuming-elective-surgery. 17 Apr 2020. Web. 18 Apr.
6. Al-Muharraqi MA. Testing recommendations for COVID-19 (SARS-CoV-2) in patients planned for surgery – continuing the service and ‘suppressing’ the pandemic. *Br J Oral Maxillofac Surg*. 2020. epub ahead of print.
7. Editorial. COVID-19: protecting health care workers. *Lancet North Am Ed*. 2020;395:922.
8. Del Rio C, Malani PN. COVID-19—new insights on a rapidly changing epidemic. *JAMA*. 2020;323:1339–1340.
9. Cassaniti I, Novazzi F, Giardina F, et al. Performance of VivaDiag™ COVID-19 IgM/IgG Rapid Test is inadequate for diagnosis of COVID-19 in acute patients referring to emergency room department. *J Med Virol*. 2020. epub ahead of print.
10. Centers for Disease Control and Prevention. *Clinical questions about COVID-19: questions and answers*. Centers for Disease Control and Prevention; 2020. www.cdc.gov/coronavirus/2019-ncov/hcp/faq.html. 16 Apr 2020. Web. 18 Apr.
11. World Health Organization. *Guidance for health workers*. World Health Organization; 2020. www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/health-workers. N.d. Web. 18 Apr.
12. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to health care workers: a systematic review. *PLoS One*. 2020;7:e35797.
13. Centers for Medicare and Medicaid Services. *CMS non-emergent, elective medical services, and treatment recommendations..* Centers for Medicare and Medicaid Services; 2020. www.cms.gov/files/document/31820-cms-adult-elective-surgery-and-procedures-recommendations.pdf. N.d. 6 Apr 2020. Web. 18 Apr.
14. Liu Y, Song Y, Hu X, Yan L, Zhu X. Awareness of surgical smoke hazards and enhancement of surgical smoke prevention among the gynecologists. *J Cancer*. 2019;10:2788–2799.
15. Capizzi PJ, Clay RP, Batten MJ. Microbiologic activity in laser resurfacing plume and debris. *Lasers Surg Med*. 1998;23:172–174.
16. Ferenczy A, Bergeron C, Richart RM. Human Papillomavirus DNA in CO2 laser-generated plume of smoke and its consequences to the surgeon. *Obstet Gynecol*. 1990;75:114–118.
17. Centers for Disease Control and Prevention. *Clinical Questions about COVID-19: questions and answers – transmission*. Centers for Disease Control and Prevention; 2020. www.cdc.gov/coronavirus/2019-ncov/hcp/faq.html#transmission. 16 Apr 2020. Web. 18 Apr.

18. Zheng MH, Boni L, Fingerhut A. Minimally invasive surgery and the novel coronavirus outbreak: lessons learned in China and Italy. *Ann Surg*. 2020. epub ahead of print.
19. American College of Surgeons. COVID-19: considerations for optimum surgeon protection before, during, and after operation. American College of Surgeons; 2020. www.facs.org/covid-19/clinical-guidance/surgeon-protection#operative-risks. 1 Apr 2020. Web. 16 Apr.
20. Pryor A. SAGES and EAES recommendations regarding surgical response to COVID-19 crisis. SAGES; 2020. www.sages.org/recommendations-surgical-response-covid-19/. 29 Mar 2020. Web. 16 Apr.
21. Motttrie A. ERUS (EAU Robotic Urology Section) guidelines during COVID-19 emergency. European Association of Urology; 2020. www.uroweb.org/eau-robotic-urology-section-erus-guidelines-during-covid-19-emergency/. 25 Mar 2020. Web. 15 Apr.
22. Di Saverio S, Pata F, Gallo G, Carrano F, Scorza A, Sileri P, Smart N, Spinelli A, Pellino G. Coronavirus pandemic and colorectal surgery: practical advice based on the Italian experience. *Colorectal Dis*. 2020 Mar 31. <https://doi.org/10.1111/codi.15056>.
23. Spinelli A, Pellino G. Covid-19 pandemic: perspectives on an unfolding crisis. *Br J Surg*. 2020 Mar 19. <https://doi.org/10.1002/bjs.11627>.