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Returning to quasi-normal activities after shutdown. Is regional anesthesia a better option during the COVID-19 crisis?

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Introduction

Since its appearance in China two years ago, the evolution of the COVID-19 pandemic has collapsed health systems around the world and until today millions of people have died, a figure that continues to increase every day, in particular during the outbreaks of the illness. Like all viruses, SARS-CoV-2 is genetically modified, and the new variants are continuous enigmas and challenges for researchers, and notably for health care workers (HCW) who labor in the first line of contact.[1,2] The *"chronicity of this pandemic"* has forced the development of multiple guidelines to prevent the transmission of the virus, the production of various vaccines, new medical equipment, and the trial of antiviral drugs and support medications in the management of COVID-19 patients.

The practice of medicine has been modified in all its aspects, especially the specialties that have a greater contact with the management of the airway.

Anesthesiology has rapidly adapted to the changes generated by this microscopic and deadly pathogen, creating drastic modifications in daily practice. Since the beginning of this pandemic the airway management has been modified with several maneuvers and equipment that provide protection to health personnel. On the other hand, the deleterious effects of general anesthesia on the immune system, together with the high possibility of contagion and the lack of personal protective equipment, forced us to use regional anesthesia during this global health emergency. Avoiding general anesthesia reduces the production of aerosols and exposure to respiratory secretions, reducing the risk of viral transmission.[3-5]

As the COVID-19 virus spread across the globe, governments established strict containment measures and multiple prevention and management regimes were created. The economy collapsed; humanity changed in such a way that the face of the planet became different. However, during the outbreaks and remissions of the pandemic, health systems needed to care not just for those affected by COVID-19, but for the billions of patients with common illnesses. This is how gradually the hospital and outpatient surgery programs were reestablished in accordance with the characteristics of the pandemic and the resources for health in the different regions of the planet.

Clinical circumstances during the pandemic

During the de-confinement stages, we have been gradually returning to our activities in an almost normal way. This has generated several clinical scenarios in health systems: COVID-19 patients, COVID-19 survivors, potential COVID-19 carriers, patients vaccinated against COVID-19, patients not vaccinated against COVID-19, and non-COVID-19 patients.

- COVID-19 patients. Two years after the current pandemic started, there is no definitive cure for the SARS-CoV-2 virus. Fortunately, the available vaccines have proven to be effective, although some variants are still a management challenge,[1,2] which together with the large group of unvaccinated people, the global crisis tends to an unusual chronicity that favors outbreaks, which force the continuation of the common measures in the management of patients with or without COVID-19. Emergency physicians, intensivists and anesthesiologists continue to be exposed to a high risk of contagion during the management of these patients.
- COVID-19 survivors. In this clinical setting there are two groups; those who have fully recovered and patients who developed long-standing systemic damage. This last group has special importance in anesthesiology due to the multiple systemic affections that negatively interferes with anesthesia; Lung, cardiovascular, hematological, kidney, endocrine, and in the central and peripheral nervous system damage have been found. Table 1 lists the majority of these manifestations and systemic lesions.[6-9] It is interesting to consider the psychological and psychiatric alterations that have been reported in this post-COVID-19 syndrome; Chronic fatigue, cognitive dysfunction, sleep disturbances, and memory impairment.[10] Laboratory tests that may persist altered in this syndrome and should be carefully evaluated before anesthesia include hemoglobin, erythrocyte sedimentation rate, white blood cell count, lymphocyte count, C-reactive protein, serum glutamic pyruvic transaminase, serum ferritin, prothrombin time, D-dimer, serum creatinine, as well as chest x-ray, CT; MRI and PET.[11,12]
- Potential COVID-19 carriers. Asymptomatic carriers can easily transmit the virus to other people. There are difficulties in detecting these asymptomatic people, which makes it difficult to prevent and control this pandemic.[13] This group of patients have a special risk for HCW since they are one more factor in the prolongation of the pandemic. Their peculiarity of being asymptomatic makes it necessary for all people scheduled to receive anesthesia to be meticulously scrutinized. The reverse transcription polymerase chain reaction (RT-PCR) is currently the most recommended test.

- Vaccinated and unvaccinated patients against COVID-19. Now we know that all vaccines promote immunity to SARS-CoV-2.[14,15] Morbidity and mortality have decreased in vaccinated people, while statistics show that during the last two outbreaks of the pandemic, unvaccinated people tend to become more complicated, and their death rate is higher. This last group represents a management and contagion challenge similar to the beginning of this pandemic. Unfortunately, anti-vaccine people represent an important group and continue to be a factor that favors the persistence of this disease and few countries have taken drastic measures against this group. It is important to remember that vaccinated people can get COVID-19 and be carriers or have mild to severe manifestations.
- Patients without COVID-19. Non-COVID-19 patients who require anesthesia could be treated as before this pandemic. However, in this era of COVID-19, the most prudent management is to handle each patient as if they were a potential transmitter of SARS-CoV-2 virus. As mentioned above, there is evidence that asymptomatic COVID-19 carriers easily transmit the virus to other people. It is this group of carriers that has forced us to manage all of our patients with widely recommended preventive recommendations: 1) Online pre-anesthetic consultation, 2) Questionnaire on COVID-19, 3) Only the patient would attend the face-to-face consultation, 4) Mandatory KN95 face mask in the waiting room, during consultation, in the patient's room, in the operating room as well as in the recovery area, 5) Negative RT-PCR three to five days before consultation, 6) All personnel protected with KN95 face mask, healthy distance, frequent hand washing and sanitation of work areas, and 7) Anesthesiologist with personal protective equipment.

Table 1 Most important manifestations / Lesions by systems in the post COVID-19 syndrome

System	Associated manifestations / Lesions
Respiratory	Restrictive abnormalities, reduced diffusion capacity, small airways obstruction, pulmonary fibrosis, reduced exercise capacity, pneumothorax, secondary infections, massive hemoptysis, pulmonary hypertension with or without evidence of thrombosis
Cardiovascular	Chest pain, dyspnea, palpitations, hypertension, myocarditis, pericarditis, postural orthostatic tachycardia syndrome
Hematological	Prothrombotic state (deep vein thrombosis, venous thromboembolism), lymphocytopenia, thrombocytopenia, hemorrhage
Neurology	Headache, vertigo/dizziness, anosmia, ageusia, hypogeusia, dysgeusia, insomnia, memory impairment, inability to concentrate, global CNS dysfunction, encephalitis, ischemic stroke, intracranial hemorrhage, encephalopathy, seizures, peripheral neuropathies, autoimmune demyelinating encephalomyelitis, dysautonomia.
Renal	Chronic renal failure, focal glomerulopathy, tubulo-reticular injury, proteinuria, hematuria.
Endocrine	Post-COVID-19 primary type 2 diabetes mellitus, thyroiditis

The return to quasi-normal activities after shutdown

- COVID-19 has been and will continue to be an unexpected and catastrophic nightmare for healthcare systems around the world.
- The immediate cessation of elective care ordered by the governments had severe negative effects.
- The resumption of elective surgery during the various outbreaks and remissions of the pandemic has required adjustments to pre-pandemic routines.

Elective surgery was greatly reduced during the onset of the pandemic and millions of patients were affected. Programs for cardiac surgery, organ transplantation, cancer and other common surgical pathologies were suspended or postponed.[16] Recovery has been slow, progressive without currently recovering to its pre-pandemic state. The current trend towards normalization during this health crisis has been favored by the development of multiple management guidelines that have two common characteristics; the safety of patients and HCW, as well as preventive measures to avoid / reduce the spread of the virus.[17-19] With the measures and precautions properly implemented it is now feasible and extremely safe without increased risk for patients to resume all surgical activities. The health personnel of the surgical and recovery areas have been adapting to the new care guidelines, recommendations that still have unresolved controversies.

Unfortunately, outbreaks with the new variants, including the new strain called Omicron, continue to perpetuate the risks of contagion for health personnel, especially for professionals who manipulate the airway, which favors the use of various anesthesia techniques.[1,2]

General versus regional anesthesia

- When the type of surgery allows, always use regional anesthesia during the COVID-19 pandemic.
- If the patient has COVID-19, it is not a formal contraindication to perform regional anesthesia.
- The most experienced anesthesiologist in your hospital should do the anesthesia procedures.
- The least number of HCW in the operating room is recommended.
- Whenever possible, informed consent should be obtained digitally.
- Avoiding the aerosols found in general anesthesia can further protect HCW and other patients.[20]

In this time of COVID-19 we have two major scenarios in the practice of anesthesia: 1) Hospital medical centers that have all the resources for the adequate care of patients with COVID-19 and non-COVID-19 cases where they have been progressively recovering in all their pre-pandemic activities. These hospitals have personnel resources and supplies that vary according to each country and geographic region of the planet. The surgery programs have been gradually normalized according to their capacity and the level of

infections of this virus. 2) On the other hand, there are the outpatient and short-stay surgery units that suspended their activities for short periods of time, but quickly resumed their activities during the pandemic due to the high demand for surgical patients referred from hospitals that limited their usual operating capacity due to being collapsed by COVID-19 patients.[21-23]

General anesthesia forcibly leads to the generation of aerosols, increasing the risk of COVID-19 contamination in operating rooms and recovery areas, significantly exposing healthcare teams to COVID-19 infection during tracheal intubation, extubation, and in the immediate period of recovery from anesthesia. On the other hand, it is well known that general anesthesia decreases the immune response which could negatively interfere with the evolution of COVID-19 patients.[4,24,25]

Regional anesthesia

- Reduces the risks of postoperative complications
- Reduce / avoid aerosols during and after surgery
- Lower risk of contagion for HCW
- Does not interfere with respiratory function
- It is not contraindicated in COVID-19
- Use personal protective equipment[19-21]

Although current prevention techniques make general anesthesia safe in the management of patients with COVID-19, the risk of contagion for HCW is greater than when regional anesthesia is used for the sole fact of not manipulating the airway.[26-28] To date, there is not enough information on the use of regional anesthesia in asymptomatic carriers, not COVID-19, or vaccinated patients requiring anesthesia for surgery or any other medical procedures, however, it is prudent to favor its use in these types of patients as a safe way to avoid possible infections in health personnel.

It is important to plan the best approach to regional anesthesia; local infiltration, peripheral regional blocks or neuraxial anesthesia can be used safely during this crisis. It is prudent not to force the use of regional anesthesia in severe cases with pulmonary involvement, coagulation disorders, severe sepsis, and to carefully evaluate advantages *vs* disadvantages and possible complications.[21,27,28] Before starting regional anesthesia, it is prudent to have the most expert personnel, the appropriate equipment, local anesthetics and adjuvants drugs, available oxygen, complete perioperative monitoring, as well as ensuring post anesthetic care. Equally important, be prepared to convert to safe general anesthesia in the event of a failed block.

There is an indisputable trend towards an increase in regional anesthesia techniques up to 42.6 %, being the preferred neuraxial approach, although the use of ultrasound-guided peripheral blocks or with neurostimulation has increased.[28] Murata et al. made preventive recommendations when using ultrasound-guided regional anesthesia[29] since the gel, the transducer as well as the ultrasound machine used are vectors that can transmit pathogens, including SARS-CoV2. Devices that only have contact with intact patient skin are classified as non-critical and can be disinfected with 70–90% alcohol, aldehyde, phenolic and quaternary ammonium-based sanitizers, and be used in conjunction with a single-use sterile transducer cover during the procedure. Needle guidance aids that are affixed to the transducer must be sterilized if re-used, but sterile and disposable attachments may be better suited for use in a pandemic. Ultrasound-guided blocks that are performed by an expert reduce failure and avoid complications and the possibility of conversion to general anesthesia. It is convenient to use long-lasting local anesthetics added with adjuvant drugs.[21,30]

In obstetric cases, neuraxial analgesia/anesthesia has been shown to be safe in women affected with COVID-19 who do not have coagulation disorders.[31-34] To date, there is not enough information on the advantages of regional anesthesia in children, although the results in adults could be repeated in pediatric regional anesthesia.

Conclusion

Since its origin in China, the COVID-19 pandemic has collapsed the planet in all its aspects. Health services were affected and although their recovery has been gradual, there are still many challenges to overcome. Surgery programs around the world are slowly being regularized and multiple guidelines have been designed with two primary goals: the safety of patients and health personnel, as well as the definitive control of the pandemic. In addition to maintaining excellence, anesthesiological care during this health crisis has been reinforced with preventive measures for all personnel working in the areas of the operating room, post-anesthetic recovery and intensive care units. Regional anesthesia techniques have been shown to be a safe alternative.

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