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Regional anaesthesia and COVID-19: first choice at last?

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In a crisis, be aware of the danger – but recognize the opportunity.

John F. Kennedy

Coronavirus disease 19 (COVID-19) has presented challenges to healthcare systems around the world and will continue to do so for months and perhaps years. The threats that the disease poses to both patients and healthcare workers have changed medical practice, but these changes can offer opportunity to those with subspecialty interests in areas such as regional anaesthesia. Indeed, the European and American Societies of Regional Anaesthesia have produced joint COVID-19 recommendations boldly stating that regional anaesthesia should be preferred over general anaesthesia whenever possible, and practice recommendations for regional anaesthesia during the pandemic have subsequently been published.^{1,2} The Royal College of Anaesthetists and Association of Anaesthetists also advise using local or regional anaesthesia where practicable and safe in order to preserve key drugs required during the critical care of COVID-19 patients.³ Other perceived advantages of regional anaesthesia during the COVID-19 pandemic may include: a reduction in aerosol-generating procedures (AGPs) and thereby both increased safety and a saving in the time, resource and financial costs of personal protective equipment (PPE), preservation of immune function when compared with general anaesthesia, improved postoperative analgesia minimising direct contact with care givers, and earlier discharge. However, some of these potential benefits favour healthcare workers and the institution rather than the patients themselves, and we must not forget that patients are at the centre of the shared decision-making process when selecting the safest and most effective anaesthetic technique for a surgical procedure. Although the 'COVID-19 considerations' listed above are not all patient-centred, changes made to clinical practice resulting from them may still directly affect the patient. As regional anaesthetists we support the use of regional anaesthesia as the 'first choice'

anaesthetic, but we also believe that the decision to choose regional anaesthesia must remain as patient-centred as possible, minimising risk not only to staff and institution, but also to the patient. This is important based upon our collective anecdotal experience whereby the volume of regional anaesthesia practice at all of the authors' institutions has increased considerably during the pandemic.

Is regional anaesthesia safer than AGPs?

Airway manipulation is associated with some of the highest rates of coronavirus transmission, and it is recognised that minimising AGPs is desirable.⁴ Logic suggests that regional anaesthesia reduces the risk of severe acute respiratory syndrome related coronavirus-2 (SARS-CoV-2) transmission from patient to staff, but there are unsurprisingly no RCTs confirming this to be the case. In a recent analysis of the deaths of 106 UK healthcare staff there were no deaths of anaesthetists or intensive care doctors, or other staff similarly working in areas where AGPs were occurring regularly.⁵ There are numerous limitations with this study, but one suggestion is that these high-risk groups are knowledgeable and rigorous in their use of PPE.

Is it possible that an awake patient anaesthetised with a regional technique, for whom staff are appropriately wearing droplet precaution PPE, poses a greater risk than a well-managed general anaesthetic in a patient who neither coughs on tracheal intubation or extubation nor requires suctioning when staff are wearing AGP PPE? Could some staff be more complacent during non-AGPs such as regional anaesthesia?

SARS-CoV-2 is primarily spread via respiratory droplets and fomite transmission.⁶ Droplet spread is limited by gravity to <2 m, whereas AGPs lead to more distant spread of the virus, which in turn also remains airborne for longer. Coughing and sneezing are considered to be droplet-generating, but

there is a suggestion that these, or even talking and breathing, may also generate aerosols, which is clearly important in an awake patient for whom droplet precautions alone would be used.⁷ Although the evidence that SARS-CoV-2 can actually spread in such an airborne fashion remains inconclusive, the results of a retrospective study from China examining a small cohort of anaesthetists providing neuraxial anaesthesia to patients with known COVID-19 were interesting.⁸ Subsequent COVID-19 infection was statistically more likely in those anaesthetists who had not worn self-contained breathing apparatus and a fully encapsulating protective suit. Clearly, a causal relationship cannot be established in such an analysis, nor can it be clear whether staff contracted the virus from colleagues rather than patients. PPE use in the UK is stratified into contact, droplet, and airborne precautions, and current UK guidance in such elective cases with a low risk of conversion to general anaesthesia remains to wear droplet precaution PPE only.^{9,10} Outwith the UK, other classifications of PPE have however been suggested, with one such example being: droplet and contact; airborne, droplet, and contact; high-risk aerosol-generating medical procedures.¹¹

Much COVID-19 guidance is based on pragmatism as well as science.¹⁰ For example two air changes in an operating theatre does not completely eliminate aerosols; rather, this merely reduces the viral load by some 86%. Five air exchanges increase this to nearly 100% but, in theory at least, guaranteed 100% elimination is impossible. Proximity to the patient, duration of exposure, and whether the patient actually has COVID-19 as well as the number of air changes are all important considerations in addition to the question of droplet, fomite, or aerosol spread. Limiting the period of close proximity between patient and healthcare worker would seem sensible during regional anaesthesia, as would placing a surgical mask on the patient and minimising manipulation of oxygen therapy devices. Interestingly, in contrast to UK guidance, some authors suggest considering the use of airborne precautions during head, neck, and upper limb blocks owing to proximity to the patient's airway.² Finally, limiting sedation to minimise the risk of coughing would also appear prudent.

Other potential advantages of regional anaesthesia

Beyond superior analgesia, the evidence for patient, surgical, institutional, and environmental benefits provided by regional anaesthesia is growing, with many of these benefits greatest when general anaesthesia can be avoided.^{12,13} Benefits such as reduced postoperative complications, bypassing or reducing time in recovery, and earlier hospital discharge are particularly valuable. Avoiding a general anaesthetic in patients with active COVID-19 undergoing urgent surgery is likely to be beneficial, but there is also a suggestion that mortality rates of patients with undiagnosed COVID-19 who subsequently undergo surgery is higher.¹⁴ With evidence accumulating that volatile anaesthesia may contribute to decreased perioperative immunity, this is a potentially significant benefit of regional anaesthesia, although such views can only be currently described as speculative.¹⁵ Finally, it may be less daunting for, and slightly easier to communicate with, patients when not wearing AGP PPE.

Institutional advantages of regional anaesthesia include avoiding the need for filtering facepiece (FFP) masks, saving both staff discomfort and supplies. Regional anaesthesia may

also be useful where negative pressure operating rooms do not exist. Theatre turnover may be improved in non-AGP surgical procedures by avoiding both the post-intubation and post-extubation wait for air changes, and more stringent and lengthy cleaning processes. However, any time saved must clearly be offset against the performance and onset time of regional anaesthesia, although this duration will vary depending both on practitioner expertise and block room availability, which has been shown to increase throughput.¹⁶

Potential issues of regional anaesthesia during the COVID-19 pandemic

Consent for regional anaesthesia

When consenting patients, anaesthetists must ensure that the patient is aware of the benefits, material risks, and any reasonable alternative treatments.¹⁷ In assuming that regional anaesthesia is the safest technique for healthcare providers, we must be careful not to present biased information, and patients must not be denied general anaesthesia. In these circumstances, there is a risk that the consent process becomes healthcare worker-rather than patient-centred. One might argue that this is valid on an individual and workforce preservation level, but there may be medicolegal consequences if a patient were to experience a material risk that could have been avoided by an alternative technique that was not offered. Further criticism could be levied if the patient had been assessed, reviewed, and consented within the theatre complex immediately before surgery, as has been suggested during the pandemic.¹⁸ While respecting the patient's right to autonomy, the anaesthetist has the right both to express a preference and to share the view that the healthcare workers in the operating theatre may be safer if the patient undergoes regional anaesthesia.

Patient selection

It is reasonable to consider administering regional anaesthesia to patients at higher risk of complications simply to avoid a general anaesthesia during the pandemic. In new Association of Anaesthetists guidance on hip fracture, clopidogrel is no longer considered a contraindication to spinal anaesthesia, whereas an acceptable international normalised ratio (INR) is now ≤ 1.5 .^{19,20} These adjustments have been made to facilitate timely surgery, but should they also be considered in a patient with suspected COVID-19? Despite the finding that COVID-19 is associated with hypercoagulability, there is a link between COVID-19 and thrombocytopenia.^{21,22} Although we are unaware of its detection or severity in asymptomatic COVID-positive patients, a full blood count should be reviewed before performing a neuraxial procedure in anyone with COVID-19, and consideration given to the additional risk of epidural techniques, not just during insertion but also during catheter removal.²³

Where a patient with neurological disease has COVID-19, the risk/benefit pendulum may swing slightly towards regional anaesthesia but, as always, decisions must be made on an individual patient basis taking into account guidance and precautions.²⁴ Initial reports suggested that as SARS-CoV-2 was not detectable within CSF, spinal anaesthesia presented a low risk to patients. However, in light of the publication of a report of the first case of meningitis secondary to SARS-CoV-2 and its isolation within the CSF, this view may need to be re-

Table 1 Recommendations for regional anaesthesia for the patient with confirmed or suspected COVID-19.^{1,2,11,30} FFP3, filtering face piece 3; PPE, personal protective equipment; RA, regional anaesthesia.

| Phase of care | Issue | Potential solution |
|----------------------|-----------------------------------|--|
| Preoperative | Team brief/plan | <ul style="list-style-type: none"> • Discuss surgical plan, duration, aerosol generation, appropriate PPE and potential complications with surgical team. Ideally before seeing patient. |
| | Preoperative assessment | <ul style="list-style-type: none"> • Access electronic health record (EHR). • Virtual pre-assessment via telephone/video call. • If virtual pre-assessment/EHR not possible – consider assessment of patient in theatre (preserve PPE). |
| | Pre-existing neurological deficit | <ul style="list-style-type: none"> • Check bloods – particular attention to platelet count (thrombocytopenia) and clotting. • Examine for pre-existing neurological deficit and document if present |
| | Consent | <ul style="list-style-type: none"> • Discuss material risks and benefits of regional anaesthesia. • Provide alternative choices. • Frank discussion on reasons for general anaesthesia avoidance. • Document discussion. |
| | Equipment | <ul style="list-style-type: none"> • Don PPE meticulously outside the theatre. • Select and prepare appropriate monitoring, equipment. • Only take essential items into theatre. • Have a runner available for additional equipment and drugs. • Plastic cover/drape on reusable equipment such as ultrasound and nerve stimulator – consider role of hand held devices vs cart-based systems. • Plan sedation and airway rescue strategy. |
| | Transfer to operating theatre | <ul style="list-style-type: none"> • Patient should be transferred to theatre wearing a surgical facemask. Oxygen mask if required can be placed on top of surgical facemask. |
| | Intraoperative | Technique |
| Siting of block | | <ul style="list-style-type: none"> • Site block in theatre with essential staff present. • Ensure patient wearing surgical mask. • Oxygen mask over surgical facemask or nasal cannulae under surgical mask. • PPE – Droplet and Contact PPE will suffice for most instances unless concern of conversion to GA or very close contact to patient necessary in which case FFP3 mask may be considered. • Ensure Ultrasound probe within sheath before scanning. |
| Post-block insertion | | <ul style="list-style-type: none"> • Allow sufficient time for block to work. • Check block meticulously. • If in doubt, site supplementary block if appropriate. • Continuous monitoring and use of oxygen therapy and sedation if required – avoid high flow oxygen and deep sedation. • Have plan for surgical infiltration/rescue if required. • Maintain distance of 2 m from patient if possible. • Monitor for local anaesthetic systemic toxicity (LAST). |
| Recovery | | <ul style="list-style-type: none"> • Ideally recover within theatre and transfer patient to final destination wearing surgical face mask as before. • Ensure postoperative instructions are documented including monitoring for adverse effects. • Prescribe regular postoperative analgesia to commence before block regression and appropriate breakthrough analgesia. |
| Postoperative | Equipment decontamination | <ul style="list-style-type: none"> • Dispose of and decontaminate equipment carefully including ultrasound using appropriate materials (quaternary ammonium chloride disinfectant wipes). • Doff PPE carefully. |
| | Documentation Follow-up | <ul style="list-style-type: none"> • Clearly document procedure and outcome – electronically ideally. • Remote follow up via telephone or electronic health record. • Provide contact details. • Consider creating an RA database. |

evaluated.²⁵ Small case series have suggested that spinal anaesthesia is safe in COVID-19 patients, with no additional haemodynamic or infective consequences.⁸

Personal protective equipment

Some hospitals have suggested (A. Pawa, personal communication, 2020) that the 'full aseptic technique' be abandoned in a bid to preserve surgical gowns and that only sterile gloves and a mask be donned instead. Although not endorsed by the authors, it is recognised that this practice is well established elsewhere even outwith the coronavirus pandemic given the main risk of infection after neuraxial anaesthesia is from respiratory tract pathogens.²⁶ Regional anaesthesia can also cause conflict over unnecessary PPE utilisation, where some staff still wish to wear FFP3 masks during regional anaesthesia cases because of anxiety about virus transmission.²⁷

Regional anaesthesia experience and training

Key to the delivery of reliable and efficient surgical regional anaesthesia is a capable workforce. Regional Anaesthesia—UK believes that anaesthetists should be able to deliver a small number of high-value or 'plan-A blocks' that would be suitable for the majority of cases encountered during the pandemic.²⁸ One fear is the increased utilisation of regional techniques in which individuals are not well versed may generate more procedure-specific complications such as pneumothorax or generic complications such as bleeding and nerve damage. One solution is for the most experienced practitioner available to perform the blocks to maximise success, reduce complications, and minimise contact time with the patient, similar to the guidance on airway management in COVID-19 patients.²⁹ A mobile regional anaesthesia team similar to the COVID intubation team may be one method of delivering such care. Conversely, this could be an excellent opportunity to deliver regional anaesthesia training, not just to trainees missing out on other core modules but also to other colleagues wishing to refresh their practice or upskill.

Ultimately, what is most important is that the safest, most effective block for the procedure and patient is performed. Good communication with the surgical team preoperatively is imperative. A thorough knowledge of the dermatomes, myotomes, and osteotomes or visceral structures involved is essential to guide the choice of block, and rescue block if necessary. Meticulous testing before surgery should reduce the need for conversion to general anaesthesia, thereby avoiding issues with upscaling PPE during surgery. Table 1 summarises these and other considerations when performing regional anaesthesia during the COVID-19 pandemic.³⁰

Conclusion

As regional anaesthesia enthusiasts, we support and encourage the increased use of regional anaesthesia during the pandemic. Despite the additional benefits to healthcare workers and the hospital, the patient must always remain at the centre of the process. These are unprecedented times, and the scales that balance risk and benefit in the perennial regional vs general anaesthesia debate have tipped slightly more towards regional anaesthesia. Well-established regional anaesthesia standards and guidance must still be carefully followed however, and best practice strived for even more so than normal in order to first do no harm.

Authors' contributions

All authors conceptualised, wrote, and edited the manuscript.

Declarations of interest

AJRM is on the Associate Editorial Board of the *British Journal of Anaesthesia*, an Editor of *BJA Education*, President-elect of Regional Anaesthesia UK and has received an honorarium from Heron Therapeutics. WHG has no conflicts of interest. AP is President of Regional Anaesthesia UK, has received honoraria from GE and consults for B Braun Medical UK.

References

- Uppal V, Sondekoppam RV, Lobo CA, Kolli S, Kalagara HKP. Practice recommendations on neuraxial anaesthesia and peripheral nerve blocks during the Covid-19 pandemic. <https://www.asra.com/page/2905/practice-recommendations-on-neuraxial-anaesthesia-and-peripheral-nerve-blocks-dur>. [Accessed 10 May 2020]
- Uppal V, Sondekoppam RV, Landau R, El-Boghdadly K, Narouze S, Kalagara HKP. Neuraxial anaesthesia and peripheral nerve blocks during the COVID-19 pandemic: a literature review and practice recommendations. *Anaesthesia*, Advance access published on April 28, 2020, ;doi: 10.1111/anae.15105
- Royal College of Anaesthetists and Association of Anaesthetists. *Guidance on potential changes to anaesthetic drug usage and administration during pandemic emergency pressures*. <https://static1.squarespace.com/static/5e6613a1dc75b87df82b78e1/t/5e8612d4892cf236f2e859bf/1585844949202/Guidance-on-potential-changes.pdf>. [Accessed 10 May 2020]
- Peng PWH, Ho P, Hota SS. Outbreak of a new coronavirus: what anaesthetists should know. *Br J Anaesth* 2020; 5: 497–501
- Cook T, Kursumovic E, Lennane S. Exclusive: deaths of NHS staff from Covid-19 analysed. *HSJ* 22nd April 2020, <https://www.hsj.co.uk/exclusive-deaths-of-nhs-staff-from-covid-19-analysed/7027471.article>. [Accessed 10 May 2020]
- Public Health England. *Transmission characteristics and principles of infection prevention and control*. <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/transmission-characteristics-and-principles-of-infection-prevention-and-control>. [Accessed 10 May 2020]
- Lewis D. Is the coronavirus airborne? Experts can't agree. *Nature* 2020; 580: 175
- Zhong Q, Liu YY, Luo Q, et al. Spinal anaesthesia in patients with coronavirus disease 2019 and possible transmission rates in anaesthetists: retrospective, single centre, observational cohort study. *Br J Anaesth*, Advance access March 28, 2020, doi.org/10.1016/j.bja.2020.03.007
- Cook T, Harrop-Griffiths W. *Personal protective equipment (PPE) for COVID-19 positive or possible patients*. https://static1.squarespace.com/static/5e6613a1dc75b87df82b78e1/t/5e91ee25a89a10132534a96e/1586621990439/PPE-guidance2020_11.04.20.pdf. [Accessed 10 May 2020]
- Bampoe S, Odor PM, Lucas DN. Novel coronavirus SARS-CoV-2 and COVID-19. Practice recommendations for obstetric anaesthesia: what we have learned thus far. *Int J Obs Anesth*, Advance access April 23, 2020, doi.org/10.1016/j.ijoa.2020.04.006

11. Lockhart SL, Duggan LV, Wax RS, et al. Personal protective equipment (PPE) for both anaesthesiologists and other airway managers: principles and practice during the COVID-19 pandemic. *Can J Anesth* Advance access April 23, 2020, doi.org/10.1007/s12630-020-01673-w
12. Hutton M, Brull R, Macfarlane AJR. Regional anaesthesia and outcomes. *BJA Educ* 2018; 18: 52–6
13. Shelton CL, McBain SC, Mortimer F, White SM. A new role for anaesthetists in environmentally-sustainable health-care. *Anaesthesia* 2019; 74: 1091–4
14. Lei S, Jiang F, Su W, et al. Clinical characteristics and outcomes of patients undergoing surgeries during the incubation period of COVID-19 infection. *EClinicalMedicine*, Advance access April 5, 2020, doi: 10.1016/j.eclinm.2020.100331
15. Wall T, Sherwin A, Ma D, Buggy DJ. Influence of perioperative anaesthetic and analgesic interventions on oncological outcomes: a narrative review. *Br J Anaesth* 2019; 123: 135–50
16. Chazapis M, Kaur N, Kamming D. Improving the perioperative care of patients by instituting a 'block room' for regional anaesthesia. *BMJ Qual Improv Rep* 2014. <https://doi.org/10.1136/bmjquality.u204061.w1769>
17. Judgement. *Montgomery v Lanarkshire Health Board (Scotland)* 11 March 2015. <https://www.supremecourt.uk/cases/docs/uksc-2013-0136-judgment.pdf>. [Accessed 23 April 2020]
18. Wong J., Goh QY, Tan Z, et al. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. *Can J Anesth*, Advance access March 11, 2020, doi.org/10.1007/s12630-020-01620-9
19. Horlocker TT, Vandermeulen E, Kopp SL, Gogarten W, Leffert LR, Benzon HT. Regional anaesthesia in the patient receiving antithrombotic or thrombolytic therapy: American Society of Regional Anesthesia and Pain Medicine evidence-based guidelines (Fourth Edition). *Reg Anesth Pain Med* 2018; 43: 263–309
20. Griffiths R, Babu S, Dixon P, et al. *Management of hip fractures*. London: Association of Anaesthetists, London; 2020. in press
21. Connors JM, Levy JH. Thromboinflammation and the hypercoagulability of COVID-19. *J Thromb Haemost*, Advance Access April 17 2020, :10.1111/jth.14849
22. Lippi G, Plebani M, Henry BM. Thrombocytopenia is associated with severe coronavirus disease 2019 (COVID-19) infections: a meta-analysis. *Clin Chim Acta*, Advance March 13 2020, doi: 10.1016/j.cca.2020.03.022
23. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Resp Med* 2020; 8: 475–81
24. Kopp SL, Jacob AK, Hebl JR. Regional anaesthesia in patients with preexisting neurologic disease. *Reg Anesth Pain Med* 2015; 40: 467–78
25. Moriguchi T, Harii N, Goto J, et al. A first case of meningitis/encephalitis associated with SARS-Coronavirus-2. *Int J Infect Dis* 2020; 94: 55–8
26. Practice Advisory for the Prevention. Diagnosis and management of infectious complications associated with neuraxial techniques. *Anesthesiology* 2017; 126: 585–601
27. Harrop-Griffiths W. You can't be too careful ...or can you?. <https://rcoa.ac.uk/blog/you-cant-be-too-careful-or-can-you?>
28. Turbitt LR, Mariano ER, El-Boghdadly K. Future directions in regional anaesthesia: not just for the cognoscenti. *Anaesthesia* 2020; 75: 293–7
29. Cook TM, El-Boghdadly K, McGuire B, McNarry AF, Patel A, Higgs A. Consensus guidelines for managing the airway in patients with COVID-19. *Anaesthesia* 2020; 6: 785–99
30. Lie SA, Wong SW, Wong LT, Wong TGL, Chong SY. Practical considerations for performing regional anaesthesia: lessons learned from the COVID-19 pandemic. *Can J Anesth*, Advance access March 24, 2020, doi.org/10.1007/s12630-020-01637-0

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Supporting more than one patient with a single mechanical ventilator: useful last resort or unjustifiable risk?

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