Living guidance: Surgical patient safety in relation to COVID-19 infection and vaccination

1. Purpose

To provide frequently updated advice on safety concerns for surgery in patients with current or previous COVID-19 infection, or who have recently received or soon plan to receive a COVID-19 vaccination.

2. Scope

This document is intended to apply to fellows, trainees and SIMGs involved in perioperative care of surgical patients.

3. Background

The Australian and New Zealand College of Anaesthetists (ANZCA) has produced this *Living guidance* to provide current advice to our fellows, trainees and SIMGs on navigating surgical patient safety concerns in the rapidly changing environment of the COVID-19 pandemic.

This document updates previous ANZCA advice:

- ANZCA, RACS, RANZCOG, RANZCO and RACDS. Guidance on delays to elective surgery post recovery from SARS- COV 2 infection. 5 August 2020.
- ANZCA. Surgery following the Astra Zeneca Vaccine. 8 June 2021.

This document has been produced via a review of current best available clinical evidence and of relevant health sector, regulatory and government body guidance. As living guidance, the document will be reviewed and updated frequently. Before making use of this document, please ensure you are accessing the latest version, which is available from the college website (www.anzca.edu.au).

Public health orders in each state, territory or country supersede this guidance and should be followed ahead of this guidance.

We invite suggestions and contributions for future versions, via email to sq@anzca.edu.au.

4. Recommendations: surgical patients and COVID-19 infection

4.1 Timing of elective surgery after a confirmed COVID-19 infection

Decisions regarding surgical timing will require careful consideration of possible sequelae of COVID-19 infection, the urgency of the required surgery and the expected physiological effects of surgery and anaesthesia on the patient. After 7 weeks,[1] the perioperative risk is thought to return to baseline in those who had asymptomatic COVID-19 infection and/or those whose symptoms have resolved.

4.1.1 General recommendation

It is recommended that post PCR confirmation of COVID-19 infection, **non-urgent elective major surgery** should be delayed for a **minimum of eight weeks** and **non-urgent elective minor surgery** for **at least 4 weeks**[2,3,4] provided the patient has returned to baseline function and is symptom free. Those with ongoing symptoms may benefit from further delay if circumstances allow.

4.1.2 Vaccinated patients with break-through COVID-19 infection

For vaccinated patients with a break-through COVID-19 infection, the decision, in the absence of current specific evidence, varies according to the severity of the break-through infection. Patients with a fully resolved mild or asymptomatic infection may be treated like patients requiring deferral after acute respiratory illness. Patients with a more significant break-through infection should be treated the same as the unvaccinated patients post COVID-19 infection.

4.1.3 Repeat testing

It is apparent that repeat testing subsequent to initial recovery may yield false-positive results for at least 30 days (see below). Current advice in many health-care protocols is not to re-test asymptomatic patients during this period.

4.1.4 Children

Studies suggests that the surgical risks in children with COVID-19 are much lower than in adults, mirroring the lower morbidity of COVID-19 infection seen in children.[5] The current recommendation endorsed by Society for Paediatric Anaesthesia in New Zealand and Australia (SPANZA) is to defer elective non-urgent surgery on a similar timeframe as other acute respiratory illness.

4.1.5 Long COVID and other sequelae

Long COVID, cardiorespiratory and/or immunological sequelae post COVID-19 infection should be considered and optimised, especially in the presence of persisting symptoms including fatigue.

4.1.6 Time-sensitive surgery – risk-benefit analysis

For time-sensitive surgery (e.g. cancer surgery), the individual risk versus benefit of proceeding and delaying needs to be carefully assessed. Ideally a plan is formulated based on shared decision making between all involved in the patient's care, to ensure optimal timing.[6]

From the available evidence,[1] perioperative outcomes start to improve after two weeks predominantly in the asymptomatic group of patients, though the best outcomes are found >=49 days post PCR/RAT confirmation of COVID-19 infection for both asymptomatic and symptomatic patients with resolved symptoms. Patients with persistent symptoms at seven weeks have worse outcomes.[1]

4.1.7 Follow-up of patients whose surgery is delayed

It is of the utmost importance to ensure that patients whose surgery is delayed due to COVID-19 infection are not lost to follow-up, and unnecessary prolonged delays to diagnostic procedures or surgery are avoided, to prevent poorer short and long term outcomes.

4.1.8 Proceeding with acute or time-critical surgery

Acute or time-critical surgery should proceed as required with multidisciplinary support from the infectious diseases, intensive care, cardiology, respiratory and renal units as appropriate. It is essential that acute or time-critical surgery is not delayed waiting for test results in a patient suspected of having COVID-19, and an assumption should be made that they are COVID-positive with appropriate precautions in place. RAT or rapid PCR tests (e.g. cobas Liat) can aid prompt risk assessment and avoid unnecessary use of staff and PPE resources.

4.2 PCR re-testing after a COVID-19 infection, prior to elective surgery

At present, the CDC[7,8] does not recommend re-testing for COVID-19 within 90 days of symptom onset or a positive PCR or RAT, since **persistent or recurrent positive PCR or RAT tests are common after recovery**. This is presumably due to shedding of viral fragments. The duration of shedding was found to be a median of 19 days (interquartile range 12-28).[9]

However, if a patient presents within 90 days and has recurrence of symptoms, re-testing in consultation with an infectious disease expert should be considered. Once the 90-day recovery period has ended, it is reasonable for the patient to undergo a preoperative PCR test, ideally within 72 hours prior to their procedure, where there is a public health directive to do so.

4.2.1 Determining when patients are no longer infectious

In the absence of re-testing, a time-and symptom-based strategy is needed to determine when patients with COVID-19 are no longer infectious.

a. Patients with mild/asymptomatic COVID-19 infection or with a break-through COVID-19 infection

   Patients with mild/asymptomatic COVID-19 infection and fully vaccinated patients with a break-through infection are no longer considered infectious at least 10 days from onset of symptoms and/or first PCR positive test and at least 24 hours since resolution of fever without the use of antipyretic medications and improvement in respiratory symptoms. This time frame is currently reduced to 7 days with the omicron variant.

b. Severely ill hospitalised patients

   A small number of severely ill hospitalised patients, especially if immunocompromised, can have culturable virus out to 20 days. Taking an abundantly cautious approach, one can assume that they are no longer infectious after 20 days from onset of symptoms and/or first PCR positive test and at least 24 hours since resolution of fever without the use of antipyretic medications and improvement in respiratory symptoms.

4.3 Assessment and optimisation after COVID-19 infection, prior to elective surgery

4.3.1 Formal clinical review

Patients should have a formal clinical review prior to surgery, especially if they have not returned to their pre-COVID baseline function. This must address the state of the cardiorespiratory system, as well as other potentially affected systems, e.g. renal, hepatic, haematological, immunological, musculoskeletal, neurological (memory,

sleep) and psychological (fatigue, post-traumatic stress disorder). This is especially important in those who have any persisting symptoms (including fatigue or dyspnoea) and those who were hospitalised for COVID-19 care. Where available, the perioperative care team is ideally placed to coordinate the assessment and optimisation of these patients.[6]

4.3.2 Potential investigations

Depending on severity of infection, assessment of functional status and return to baseline, investigations may include:

- N-terminal-pro hormone B-type natriuretic peptide and B-type natriuretic peptide (NTproBNP/BNP)
- ferritin
- possibly transthoracic echocardiogram (TTE) if indicated.

There is likely no value in repeating chest x-ray (CXR) or computed tomography (CT) of the chest unless more than 3 months has passed after the initial infection, and there is suspicion of Long COVID and/or there are abnormal signs on clinical examination.

4.3.3 Risk of Deep Vein Thrombosis or Pulmonary Embolism (DVT/PE)

There is an increased risk of DVT/PE after COVID-19 infection. It is encouraged to discuss these patients with Haematology to ensure the implementation of the most appropriate pharmacological perioperative thromboprophylaxis plan balancing bleeding and thrombosis risk. In addition to pharmacological thromboprophylaxis, it is important to consider perioperative mechanical preventative measures such as calf compressors and stockings.

4.3.4 Further guidance

For helpful further guidance on specific assessment and optimisation, please refer to the Royal Australasian College of Surgeons' guidance, *Delaying surgery for patients recovering from COVID-19*.[2]

5. Recommendations: surgical patients and COVID-19 vaccines

5.1 Timing of elective surgery in relation to COVID-19 vaccination

5.1.1 Preoperative COVID-19 vaccination

Full vaccination prior to surgery should be encouraged if time permits. Partial vaccination may still be of benefit if time is constrained. Recommendations on the timing for COVID-19 vaccination **before** surgery are variable due to the unknown vaccine immunogenicity and are further dependent on what the goal is.

If the goal is to avoid confusion between symptoms of vaccine-related side effects and symptoms of surgical complications: general advice is to have a minimum of 1 week between vaccination and surgery. This is in line with government advice in Australia[10] and New Zealand.[4]

If the goal is to ensure optimal immunological response and better (at least likely adequate) protection from COVID-19 infection: a minimum of 2 weeks is recommended. Optimal immunological response prior to surgery is especially

important before transplant surgery, where the decision should be in consultation with a specialist immunologist and the transplant team as the timing may need to be significantly longer (up to 4-6 weeks before surgery).[11,*]

5.1.2 Postoperative COVID-19 vaccination.

It is recommended to wait **two weeks following major surgery** for COVID-19 vaccination, since post vaccination symptoms may confuse the clinical picture in the immediate postoperative period. However, following minor or intermediate surgery, it is reasonable to consider earlier vaccination for post-operative surgical patients (even in-hospital) who have not been COVID-19 vaccinated to make the most of that opportunity, especially if patients are at risk of being lost to follow up for vaccination later on.

5.2 Myocarditis and/or pericarditis post-mRNA COVID-19 vaccination.

Myocarditis is defined as 'inflammation of the heart muscle, which can reduce the heart's ability to pump and can cause rapid or abnormal heart rhythms'. Pericarditis is defined as 'inflammation of the pericardium'. Both conditions can be caused by a wide variety of infectious agents, toxins, and autoimmune conditions.

Myocarditis and pericarditis are rare adverse events post COVID-19 messenger ribonucleic acid (mRNA) vaccination (Pfizer-BioNTech/Comirnaty and Moderna/Spikevax) with an onset usually within 7 days of vaccination.

5.2.1 Incidence

Post mRNA COVID-19 vaccine myocarditis is more common after the second dose and especially in males, with the highest incidence among adolescents, young adults and infants.[12]

Most data to date regarding myocarditis post COVID-19 mRNA vaccine has been captured through VAERS data (Vaccine Adverse Event Reporting System, the US national vaccine safety passive monitoring system), which inevitably overestimates its incidence. VAERS is designed as a research data generating tool; it is not a diagnostic tool and is unable to ascertain causation.

Myocarditis reporting rates were 40.6 cases per million second doses of mRNA COVID-19 vaccines administered to males aged 12-29 years (versus 2.4 per million second doses administered to males age >= 30). The highest reporting rates were among males aged 12-17: 62.8 per million second doses, and those aged 18-24: 50.5 per million second doses. This in contrast to reporting rates among females: 4.2 per million in age group 12-29 and 1 per million second doses in those aged >=30.[13,14]

5.2.2 Symptoms

Symptoms of post mRNA COVID-19 vaccine myocarditis or pericarditis include chest pain, dyspnoea or palpitations. There may be an elevated troponin level and/or abnormal findings on electrocardiogram (ECG), echocardiography or cardiac magnetic resonance imaging (MRI). The most accurate diagnosis is via pathology

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[*] We note that our advice here differs from that of RACS, *Influence of COVID-19 vaccines on surgical practice*, October 2021, by making different recommendations based on different goals of the time delay between vaccination and surgery.

and/or MRI criteria. Not every patient with a raised troponin post COVID-19 mRNA vaccination has myocarditis, as troponin may be released just from other causes such as intense exercise.[15]

5.2.3 Recovery and follow-up

It is worth noting that most cases recover with supportive management and simple non-steroidal anti-inflammatory drugs (NSAID) therapy, and that longer-term follow-up of these cases is ongoing.

In patients with a history of vaccine associated myocarditis/pericarditis, it is important to ascertain whether there are any long-term sequelae. It is advised to manage these patients perioperatively in close collaboration with a specialist cardiologist. They may require additional preoperative investigations such as transthoracic echocardiogram (TTE) or cardiopulmonary exercise testing (CPET), and a higher level of monitoring perioperatively.

5.3 Vaccine Induced Thrombosis and Thrombocytopenia (VITT) post-COVID-19 vaccination[16]

Vaccine Induced Thrombosis and Thrombocytopenia (VITT) is a severe prothrombotic syndrome associated with thrombocytopenia, which has been described in a small number of patients exposed to the COVID-19 AstraZeneca/Covishield or Vaxzevria and Janssen (Johnson & Johnson) vaccines. Even though the exact pathophysiology of the syndrome is unknown, the presence of pathological antibodies against PF4/polyanion complexes has been identified in the majority of cases. It is worth noting that these antibodies are only detectable by specific enzyme-linked immunosorbent assay (ELISA) methods in specialised laboratories.

5.3.1 Monitoring for onset, and initial confirmation

VITT can occur anytime between 4 and 42 days post COVID-19 vaccination and it is important to remain vigilant about this rare complication in the perioperative period. Maintain a high index of suspicion in anyone 4-42 days post vaccination with new thrombosis (particularly unusual sites such as cerebral venous sinuses and splanchnic veins, but also DVT/PE or arterial thrombosis, thrombocytopenia (< 150 x 109/L) and high d-dimer (typically > 5 x ULN). Please follow THANZ guidelines[16] for when to suspect VITT, how to initially proceed to confirm n followed by consultation with a specialist haematologist as to their anticoagulation management.

5.3.2 Perioperative thromboprophylaxis or anticoagulation in patients with history of VITT

Perioperative thromboprophylaxis or anticoagulation in patients with a confirmed past history of VITT should be non-heparin-based (e.g. fondaparinux, danaparoid, bivalirudin, argatroban) unless functional testing has specifically excluded heparin enhanced platelet activation. There remains uncertainty whether ELISA negativity can guide safe resumption of heparin-based anticoagulation. Some will be fully recovered from VITT, others may still be on a direct oral anticoagulant (DOAC) and require temporary cessation preoperatively. This is a very complex clinical situation and requires consultation with a specialist haematologist.

5.3.3 Thrombotic Thrombocytopenia Syndrome (TTS)

Thrombotic Thrombocytopenia Syndrome (TTS) is an alternative designation applied by regulatory bodies such as the Therapeutic Goods Administration (TGA) to

individuals who have experienced a combination of thrombosis and thrombocytopenia, without necessarily fulfilling above serological and laboratory criteria for VITT. Although the temporal relationship to COVID vaccination suggests a shared aetiology, without evidence of PF4/polyanion antibodies and platelet activation with in vivo studies, treatment considerations can only be speculative and should be made in consultation with a specialist haematologist.

6. Definitions and abbreviations

- Break-through COVID-19 infection

  A COVID-19 infection occurring in a fully vaccinated patient.

- COVID-19

  This document uses 'COVID-19' as a shorthand for both the SARS CoV-2 virus and its clinical syndrome.

- Long COVID

  This document uses 'Long COVID' to mean post COVID-19 condition as described by the World Health Organization:

  > Post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time.[17]

- PCR

  Polymerase chain reaction test for COVID-19.

- RAT

  Rapid antigen test for COVID-19.

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Version control

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