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EDITORIAL

Maintaining Safe Elective Aneurysm Surgery in the COVID-19 Era

The respiratory syndrome COVID-19 has had a devastating effect on health, economy, and social life worldwide. The healthcare system of industrialised countries has been at times submerged by the pandemic, leading to some of the most challenging choices in health resource distribution experienced by this generation.

During local COVID-19 prevalence surges, access to operating theatres and intensive care facilities for all but the most urgent surgery has been severely restricted. The workforce and intensive care have been redeployed to deal with the flood of COVID-19 cases. Associated with this limited access to elective theatre, disease specific case prioritisation has been required. Society and healthcare providers tend to be very aware of the need to perform early surgery for cancer diagnoses, and the associated high morbidity and mortality of vascular patients is less well recognised. The high mortality of vascular patients infected with COVID-19 and particularly the risk of pulmonary complications was not widely understood at the start of the pandemic; moreover, there was a high geographical variability in the severity of the COVID-19 distribution, and a standardisation of the hospital strategies was not possible.^{1–4}

Data from the National Vascular Registry of the UK show that post-operative mortality was negatively influenced in the first pandemic wave by intervening infection with SARS-Cov-2, increasing from 2.9% to 6.1% for patients without respiratory complication and from 27.9% to 38.2% for those with respiratory complications.⁵

Although careful planning and organisation of dedicated vascular units has, in some instances, allowed activity to be maintained,¹ the problem of the treatment of asymptomatic abdominal aortic aneurysms (AAAs) required a number of considerations and studies. The treatment of asymptomatic intact AAAs obviously aims to prevent rupture and death and the thresholds to achieve the most advantageous benefit/risk ratio are well established in the literature.^{6,7}

The onset of the pandemic has forcedly changed this scenario, since a series of issues should be considered under these circumstances, as listed below.

1. The risk of AAA rupture should be balanced against the mortality risk in cases of COVID-19 infection, which is approximately 0.6% in patients < 60 years and 7% in those > 70 years.⁸ This adjunctive risk should be considered when admitting an asymptomatic AAA patient to a surgical ward,

where the risk of being infected by COVID-19 is definitely greater than in a protected environment outside the hospital. Generally speaking, patients with suspected COVID-19 (fever, cough, or radiological signs of pneumonia) should be isolated in dedicated rooms and undergo multiple nasopharyngeal swabs to reduce the risk of false negative results. Elective operations should be executed only in negative patients. All patients admitted to hospital should wear surgical masks at all times. Emergency patients should be considered positive for COVID-19 until proven differently, and directed to dedicated pathways, wards, and operating rooms. Any patient with COVID-19 infection, or suspicion of infection, should be treated by protected physicians wearing double surgical caps, FFP2 mask, facial shield, and complete body and leg coverage.¹

However, the risk of COVID-19 infection varies significantly among geographical areas, single hospitals and the status of the pandemic curve; therefore, quantitative considerations cannot be made in this sense. Strategies for COVID-19 prevention varied in different hospitals with effective results; however, no generalisation can be made in this sense.^{1,4,9}

Only generic recommendations can be suggested in order to wisely determine the most advantageous conduct in terms of patient benefit; however, the safety of in hospital personnel and conversely of admitted patients will not be an issue with the progression of the vaccination campaign, which will privilege this population.

2. Resources should be reserved for COVID-19 patients as much as possible. According to the Royal College of Surgeons,¹⁰ four priorities need to be preserved during the emergency phase:

Priority 1: Maintain emergency surgery capabilities.

Priority 2: Protect and preserve the surgical workforce.

Priority 3: Fulfil alternative surgical roles.

Priority 4: Fulfil alternative non-surgical roles.

For the individual surgeon this means to maintain at least subspecialty emergency surgical capacity. Outside the emergency setting, when faced with an intact, asymptomatic AAA, priority should therefore be given to a standard endovascular aneurysm repair (EVAR) procedure where the anatomy allows, as suggested by the European Society for Vascular Surgery guidelines in the ordinary setting⁷, in order to preserve limited Intensive Care Unit (ICU) resources for more urgent situations. This is in contrast to the general recommendation of NICE guidelines, where preference is given to open aneurysm repair, which often needs post-operative intensive care.¹¹ Since EVAR can be performed under local or locoregional anaesthesia, it can be continued during the pandemic; the decision about postponing AAA

treatment is therefore to be addressed almost exclusively to cases anatomically unsuitable for EVAR. Generally speaking, the American College of Surgeons recommends to not postpone ruptured or symptomatic aneurysm, to postpone if possible those > 6.5 cm, and definitely postpone those < 6.5 cm.¹² In the UK a higher threshold of 7.0 cm was chosen.¹³

Different protocols have been employed in vascular centres worldwide. At the University of Bologna, for example, AAAs were electively treated when > 6 cm or enlarging more than 1 cm/year. For that reason, the number of treated AAAs in the month of March 2020 halved compared with the previous year, eight vs. 16 in 2020 compared with 2019.¹ Similar indications were followed in another Italian centre.¹³ In other centres, AAAs continued to be treated when indicated, irrespective of their size.^{3,14,15}

A key question that should be kept in mind when in doubt about postponing AAA treatment is reported in the paper by Tan *et al.*: “If surgery is denied, will this patient be admitted with a life or limb threatening condition that will consume more resources if performed in an emergency setting?” The answer to this dilemma cannot be categorised or have an easy solution, but is a key question and may direct the vascular surgeon to a reasonable choice.²

If AAA repair can be reasonably postponed safely, greater resources can be dedicated to other COVID-19 patients, as seen above. However, the time of delayed treatment, the possible pandemic evolution, and the impact of the vaccine campaign are not yet defined; all of these issues are of utmost importance to define the shift of assets in favour of COVID-19 patients.

Postponing AAA operations implies ethical considerations. Who should decide? The physician in charge alone? Multi-disciplinary meetings with a systematic review of all cases previously planned should be favoured in order to not only consider the diameter but the patient overall, with all the necessary transparency. Each individual patient should be postponed with a grade of emergency that is considered for replanning the procedure. The pandemic we thought or hoped to be temporary evolved in successive waves: some windows with recovered facilities must be used to treat patients of the highest emergency grade. The other ethical point is to never forget patients and to keep connected to them in order to explain what is best for them and to counteract the legitimate fear of leaving their home for the hospital.

Another aspect to be considered is the risk of thrombotic complications, which seem to be increased by COVID-19 infection. Although rare, catastrophic complications such as aortic graft thrombosis have been reported during the pandemic phase and should be taken in account.¹⁶

3. Psychological aspects. One factor to be considered is that during the COVID-19 pandemic pre-operative consultation between doctors and often with patients could not occur face to face but instead through web meetings or by telephone.¹⁷ This may alter in some way the relationship between patient and physician, leading to a more difficult

comprehension of the type and implication of the treatment. Another issue to be considered is the psychological effect of patients who were surveyed for an aneurysm < 5.5 cm in diameter. If the threshold is reached during the pandemic phase, the patient suddenly becomes aware that the benefit of treatment is now shifted beyond 6.5 cm or even 7 cm. This may lead to a fall in the trust towards the physician and medical science, particularly if the patient belongs to a screening programme, and care should be taken to explain in detail the reason for the shift in therapeutic strategy. Therefore, the possibility of adding new variables in vascular registries should be continuously considered.¹⁸

The concern about COVID-19 infection in the general population leads also to the patient possibly abandoning the surveillance programme: participants in the UK National Abdominal Aortic Aneurysm Screening Programme were willing to attend the programme in only 59% of cases vs. a 90% attendance rate in the previous years. This was mainly due to concern of being infected by COVID-19, since as many as 42.5% of them were more concerned about catching COVID-19 than having a ruptured aneurysm.¹⁹

In this context it is reasonable to anticipate an increase in the rate of ruptured aneurysms. If this has not been observed yet it is probably due to the relatively short duration of the pandemic. Future studies will analyse the shift in the incidence of ruptured AAA during and after the pandemic.

4. What is the effect on surgical training of residents? One of the most neglected effects of the emergency pandemic phase is the effect on surgical training. Since this phase lasts several months, a significant reduction in theoretical and practical surgical training programmes has occurred: as seen, elective procedures may diminish in most centres; overall, different types of emergencies can occur, with significant change in the usual planning and follow up procedures. All of this will lead to future effects on the professionalism of trainees, which must be analysed.²⁰

As seen, several aspects should be considered in the treatment of asymptomatic AAAs during the COVID-19 pandemic. If a fast track AAA diagnosis and treatment process can be followed, patients can continue to be treated, obviously with all the necessary precautions to avoid COVID contaminations of both patients and health professionals.¹ AAA requiring difficult procedures and expected prolonged ICU admission should be delayed in favour of interventions feasible under local anaesthesia, with simple post-operative controls and a short hospital stay.²¹

In conclusion, many considerations can be drawn after one year on the effect of the COVID-19 pandemic on safe vascular surgery treatment in non-urgent situation such as asymptomatic AAA. The principles listed of the latter can be extended to all non-urgent vascular procedures, as depicted in the [Table 1](#). In general, similar to the original UK Vascular Society and GIRFT (Getting It Right First Time) COVID-19 advice,^{22,23} units must interpret the general advice given and also take into account their local situation. Shared

Table 1. Key factors to consider for safe elective aneurysm surgery in the COVID-19 era

1. The patient risk and the clinical need for intervention
2. The unit's available capability and resources for vascular and endovascular surgery: theatre, intensive treatment unit
3. The unit's local and surrounding catchment population's prevalence of COVID-19
4. Mitigation against the risk of hospital acquired COVID-19: e.g., robustness of clean pathways
5. Workforce availability issues.
6. Training: absolute need to continue to train.
7. Research: importance of research to better understand risk and benefit.
8. Clinical governance: continued multidisciplinary team meetings and data collection.
9. Innovative working practices: the need to find innovative solutions.

decision making with patients, multidisciplinary team meetings, and documentation should recognise that “time intervals may vary from usual practice and may possibly result in greater risk of an adverse outcome due to progression or worsening of the condition, but we have to work within the resources available locally and nationally during the crisis”, as stated in the National Health Service England guidance on surgical prioritisation during COVID-19.²⁴

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