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## The impact of COVID-19 on an Irish vascular unit's service



The COVID-19 pandemic has encouraged vascular departments throughout the world to share their management strategies during this difficult time. The *Journal of Vascular Surgery* has published numerous accounts<sup>1,2</sup> of how specific countries have adapted their practices to ensure the best care to our patients during this difficult time. We would like to put forward an Irish response to the pandemic.

**Surgery.** Elective surgeries have been postponed, thereby limiting patient exposure and burden on anesthetics. In addition, we know that those unknowingly incubating COVID-19 at the time of intubation for surgery have a higher mortality and morbidity.<sup>2</sup>

In Ireland, we have taken a pragmatic approach to guidelines on who should be operated on<sup>3</sup>; the decision to intervene is consultant-led and based on threat to limb or life. An endovascular first approach is adopted, limiting the need for general anesthesia and critical care.

**Imaging.** We have designated a COVID computed tomography scanner. The secondment of a local, previously private hospital has allowed for outsourcing of imaging to a non-COVID facility, for urgent outpatient scans. Our vascular laboratory has followed a similar process.

**Outpatient reviews.** We have endeavored to continue to consult our outpatients via virtual clinic. From March 13 to April 27, we conducted 802 virtual reviews. Those at risk are offered an in-person clinic review. On average 4 patients attend per clinic, compared with an average of 60 before COVID. All team members have completed a course on telemedicine from Harvard Medicine.<sup>4</sup>

**Education and training.** Undergraduate tutorials are offered by videoconferencing. Patients were supplied with tablet devices and educated on videoconferencing so they could participate in medical education.

Postgraduate education, both local and national, is delivered using videoconferencing.

**Restructuring of the hospital.** The hospital was segregated into a COVID and non-COVID area to limit cross-contamination. Emergency construction work in wards has increased the number of isolation bays.

**Multidisciplinary care.** An encrypted digital platform (Siilo) allows for multidisciplinary meeting discussion, ensuring that we are still offering the best care.

Normal elective work will be slow to return for fear of a second surge, but with adaptations to our vascular service, we can limit future COVID-19 spread whilst maintaining a reasonable standard of care for our most vulnerable patients.

Mary J. Connolly, MB, BCh  
Zeeshan Ahmed, MB, BS  
Sayed Aly, MD, PhD  
Daragh Moneley, MB, BCh  
Elrasheid Kheirleiseid, MB, BS  
Peter Naughton, MB, BCh  
Seamus McHugh, MB, BCh

Beaumont Hospital  
Beaumont, Dublin, Ireland

Royal College of Surgeons in Ireland  
St Stephen's Green  
Dublin, Ireland

On behalf of the RIV "Red de Investigación Vascular de la SEACV"

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## Vasculitis and aortitis: COVID-19 challenging complications



Some pathophysiologic observations about thrombosis in small/medium sized arteries in coronavirus disease-19 (COVID-19) are of interest in study from Bellosta et al.<sup>1</sup> This complication can be correlated with two main processes. The first is an acute endotheliitis, where endothelial cells, inhabited by virions, become infiltrated by neutrophils and mononuclear elements, leading to an accelerated apoptosis and a lymphocytic endotheliitis, and to an inflammatory/prothrombotic milieu.<sup>2</sup> This correlates with a cell-mediated immune response. Second, in the same arteries in later stages of the disease, there is peri/panarteritis, consisting of an extended infiltration by the same inflammatory elements, followed by an

accelerated karyolysis, accumulation of apoptotic bodies, caspase proteic granules, and fibrinoid substances, indicating a leukocytoclastic vasculitis. Interestingly, this inflammatory reaction is followed by deposition of polyclonal antigen-antibody immune complexes IgG, prevalent, IgA and IgM, of C3 complement fraction proteins, suggesting a type III hypersensitive acute vasculitis, equally predisposing to thrombosis.<sup>3</sup> This finding indicates a host's dysregulated humoral response.

We have observed that an equivalent pathology can involve large-sized arteries as well, typically the aorta, with parietal thromboses often incidentally discovered and not always amenable to the sole blood hypercoagulability. In the absence of adequate histopathologic data, some aspects can be explained translating elements from the mechanisms presented in this letter, namely, the lymphocytic endotheliitis. In fact, we interpret an aortic parietal thrombosis in the course of COVID-19 as an infectious aortitis occurring during its viremic phase, when the aortic endothelium, largely provided of angiotensin-converting enzyme-2 receptors, is directly attacked by virions, leading to an endotheliitis that could later be complicated by a hypersensitive vasculitis.<sup>4</sup> This process can be favored by a preexisting pathology, typically atherosclerotic plaques, mainly if ulcerated, or, more generally, by a basal condition of endothelial dysfunction.<sup>5</sup> However, we do not exclude the importance of coexisting facilitating hemodynamic conditions, such as a turbulent flow and a reduced parietal elasticity, which are common in the aorta of elderly patients or after endovascular procedures. To our knowledge, this active inflammatory and non-necrotic/degenerative pathology did not cause intramural hematomas or dissections. However, we suggest further research about possible complications, such as extended thrombosis or secondary aneurysm.

Antonio Manenti, MD  
Alberto Farinetti, MD  
Gianrocco Manco, MD

Department of Surgery  
University of Modena  
Modena, Italy

Annavittoria Mattioli, MD, PhD

Department of Cardiology  
University of Modena  
Modena, Italy

On behalf of the RIV "Red de Investigación Vascular de la SEACV"

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## Efficacy of vascular virtual medical student education during the coronavirus disease 2019 pandemic



On March 17, 2020, Emory University School of Medicine temporarily suspended student–patient contact to minimize the risk of exposure to coronavirus disease 2019, representing an unprecedented disruption to medical education. In response, virtual electives were expeditiously created to supplement existing curricula and keep students on track for their scheduled graduation dates. The Emory University School of Medicine Department of Surgery faculty and students created the ViSEG (virtual surgical education group) to design virtual electives in eight surgical specialties for third-year medical students. All students, including those not previously enrolled in a surgical clerkship, were encouraged to enroll. Seven students chose the virtual vascular surgery elective.

The week-long vascular surgery curriculum, goals, and objectives were based on the American College of Surgeons prerequisite competencies and U.S. Medical Licensing Examination (USMLE) content outline<sup>1,2</sup> (Table). The topics included aortic, carotid, and peripheral arterial disease, vascular trauma, venous disease, and dialysis access. The daily schedule included ~4 hours of lectures, assigned reading of landmark vascular surgery publications, and video instruction of physical examinations or relevant surgical procedures. A virtual skills laboratory proctored by a faculty mentor offered basic suturing instruction using materials distributed in advance. The use of webcams afforded opportunities for real-time feedback, a feature that greatly enhanced the experience. These sessions included no more than four students per session.

The students completed a nonvalidated, objective 25-question pre- and postcourse assessment. All the students showed improved performance after the elective, with an overall significantly improved mean score (from  $11.6 \pm 3.5$  to  $16.6 \pm 3.4$ ;  $P < .03$ ). In addition, students indicated an overall positive response to the course and increased interest in pursuing vascular or other surgical specialty as a career.