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RESEARCH LETTER

The Impact of the First 11 Months of the COVID-19 Pandemic on Vascular Patients' Care and Hospitalisation Rate in the Vascular Surgery Divisions of Southern Italy

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Following the Italian government decree in March 2020, three month strict lockdown measures were implemented countrywide to avoid social contact. Hospital related routines were disrupted to prioritise the management of COVID-19 cases; in particular, outpatient and elective operations were postponed. Similar prevention and public health interventions were implemented from the second half of September 2020 up to the beginning of December 2020 in response to the second wave of the pandemic. Furthermore, except for situations of proven urgency, access to General Medicine in Southern Italy was negatively impacted during the lockdowns, affecting the diagnosis, management, and surveillance of vascular patients.

This study was conducted to assess the eventual impact of suspension of elective vascular surgery on the incidence rates of complications caused by common vascular conditions compared with the pre-pandemic period. A multicentre retrospective cross sectional study was carried out: 27 of 29 vascular surgery divisions, public or accredited with the National Health System, located in the Southern Italy were enrolled. Even though healthcare policies are issued at a regional level in Italy, the above mentioned regions implemented similar COVID-19 restrictions.

The focus was on 13 vascular surgical activities, among which diagnosis, treatment and follow up of abdominal aortic aneurysm (AAA), internal carotid artery (ICA) stenosis, Rutherford category 3 peripheral arterial disease (R3PAD, severe claudication), chronic limb threatening ischaemia (CLTI), deep venous thrombosis (DVT), and venous ulcers were investigated, analysing the number of

patients in the first 11 months of the COVID-19 pandemic, and in the prior 11 months (Table 1). Informed consent for this retrospective multicentre study was waived.

Clinical characteristics were described with absolute and relative (percentage) frequencies. Qualitative variables were compared using the chi squared test. Percentage differences for the collected variables (delta) between pre-COVID-19 and COVID-19 periods were computed. A two tailed p value $< .050$ was considered statistically significant. All statistical analyses were carried out using the STATA software version 17 (StataCorp LLC, TX, USA). Table 1 summarises the main results of the study.

During the pandemic period from March 2020 to January 2021, 36/1 713 (2.1%) patients who presented with CLTI, 33/501 (6.6%) patients who required major amputation, and 9/207 (4.4%) patients with stroke or transient ischaemic attacks tested positive for COVID-19.

The numbers of endovascular abdominal aneurysm repair or open repair for asymptomatic AAA, treatment for venous ulcers, and severe ICA stenosis $> 80\%$ according to the European Carotid Surgery Trial on the operation waiting list complicated by total obstruction (detected at duplex scan before revascularisation, or because they became symptomatic) did not change throughout the study period.

This multicentre study, covering more than one fifth of the Italian geographical area and population over a long time period, showed decreased rates of revascularisation for R3PAD and asymptomatic ICA stenosis, as well as increased rates of revascularisation (or major amputation) for CLTI and symptomatic ICA stenosis.

Interestingly, in January 2021 (when the immediate pandemic restrictions were lifted) a major decrease in R3PAD and asymptomatic ICA stenosis persisted compared with pre-pandemic levels (92 [11.4%] and 87 [10.8%] vs. 175 [16.8%] and 164 [15.7%], $p = .001$ and $.002$, respectively). This analysis suggests that the delays may have further consequences in the coming months. This may be due to a shortage of staff, burnout, but also COVID

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Table 1. Vascular surgical activities before and during the first and second wave of the COVID-19 pandemic in Italy

Activities	Apr – Dec 2019, no COVID-19 (n = 9 161)	Apr – Dec 2020, COVID-19 (n = 7 092)	p	Delta – %
EVAR or open repair for asymptomatic AAA	891 (9.7)	691 (9.7)	1.0	–22.4
Post-EVAR surveillance	1 484 (16.2)	1 014 (14.3)	<.001	–31.7
Open repair/EVAR for primary ruptured or symptomatic AAA	175 (1.9)	171 (2.4)	.030	–2.3
EVAR for ruptured or symptomatic AAA, or endoleak with expansion	106 (1.2)	80 (1.1)	.55	–24.5
Treatment for Rutherford category 3 PAD*	1 401 (15.3)	959 (13.5)	<.001	–31.5
Treatment for thrombotic acute lower limb ischaemia	455 (5.0)	370 (5.2)	.57	–18.7
Treatment for venous ulcers	588 (6.4)	461 (6.5)	.80	–21.6
Diagnosis of deep vein thrombosis	753 (8.2)	695 (9.8)	<.001	–7.7
Revascularisations for asymptomatic severe ICA stenosis†	1 558 (17.0)	934 (13.2)	<.001	–40.0
Revascularisations for CLTI	1 245 (13.6)	1 204 (17.0)	<.001	–3.3
Major amputation for CLTI	358 (3.9)	355 (5.0)	<.001	–0.8
Symptomatic carotid stenosis operated between 2 and 14 days	140 (1.5)	153 (2.2)	<.001	9.3

Data are presented as n (%). EVAR = endovascular aneurysm repair; AAA = abdominal aortic aneurysm; PAD = peripheral arterial disease; ICA = internal carotid artery; CLTI = chronic limb threatening ischaemia.

* In socially active patients who can walk less than 50 m on a flat surface, are not responsive to supervised exercise and best medical therapy and are asking for a definitive treatment to improve their walking distance.

† > 80% according to European Carotid Surgery Trial criteria, without ipsilateral cerebral ischaemia in the last six months.

infections. Project 1 (Impact of COVID-19 on scheduled vascular operations) of the international Vascular Surgery COVID-19 Collaborative (VASCC) registry aims to answer this particular question. VASCC is a combined international effort to obtain prospective data on the impact of widespread vascular surgical care delays due to an international crisis or pandemic.^{1,2}

Changes during the COVID-19 pandemic could have affected patient prognosis. Several researchers, clinicians, and policymakers have been trying to understand the real impact of the pandemic on clinical activities.^{3,4}

Several study limitations can be highlighted. The exact numbers are not known, since patients may not have visited any medical service during these periods. Some vascular diseases were not considered: complex aortic procedures are often referred to specialist centres, and numbers would probably have been too low to be considered; arteriovenous fistulas are also performed by nephrologists; likewise, varicose vein surgery was excluded based on its postponement caused by their low priority. Only the first 11 months of the COVID-19 pandemic were evaluated against the corresponding 2019 months; as such, interannual variability cannot be excluded. The stratification of the findings based on SARS-CoV-2 positivity was not always performed: the infection could have increased the incidence of some vascular diseases (e.g., DVT). Asymptomatic severe ICA stenosis that progressed to occlusion (and thus was managed non-surgically) could have been missed, since it can cause cerebral ischaemia, which can be managed in different medical wards (e.g., stroke unit, intensive care unit, neurology, internal medicine) and thus under reported.

The vascular community is called upon to raise awareness of the dangers arising from restrictions in the management of elective vascular patients during the pandemic crisis.

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