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Is There an Impact of COVID-19 on Admission of Patients to the Emergency Department for Vascular Surgery?

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Background: On March 2020, the World Health Organization declared the coronavirus disease 2019 outbreak a pandemic. During this period, surgical activity and admission to the Emergency Department (ED) decreased globally. The aim of this article is to understand how the admission of a patient to the ED for vascular surgery changed in our center in Portugal and if this situation prevented urgent surgical procedures.

Methods: Through a retrospective study, we compared the volume of patients admitted to the ED during the emergency state (ES) in Portugal with the same period in 2019. In addition, we analyzed the urgent surgical activity during the ES and in the correspondent period of the previous 10 years, regarding limb acute ischemia, acute aortic pathology, and vascular trauma. Two groups of patients were formed—patients operated during the ES and during the non-ES, for control. Statistical analysis was performed using IBM SPSS® Statistics, version 25.

Results: In the ES, 115 patients were observed at the ED and 179 in the 2019 corresponding period. During the ES, patients significantly recurred less to the ED directly from home ($P < 0.001$) and were less referred to the ED by primary care doctors ($P < 0.001$). Patients observed at the ED were significantly more urgent—required urgent surgery or were admitted to the department—than those in 2019 (40% vs. 24%). However, there were no differences when only considering urgent surgery (14% in ES vs. 10% in 2019). In the ES, 38% of patients observed at the ED were discharged with no follow-up related to vascular surgery against 60% in 2019, although this difference was not significant. Compared with the preceding 10 years, there are not significant differences in the number of patients who underwent urgent surgery in both ES and non-ES periods. In patients with acute limb ischemia, we did not find an increase in the time between onset of symptoms and ED admission, during the ES.

Conclusions: Fewer patients were admitted at the ED during the ES, and those admitted were significantly more urgent. We did not find a decrease in the number of urgent surgeries when compared with the preceding 10 years. Therefore, we cannot assume that coronavirus pandemic precluded urgent surgical procedures.

Conflicts of interest: None.

Funding: None.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Ann Vasc Surg 2020; 69: 100–104

<https://doi.org/10.1016/j.avsg.2020.08.002>

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Manuscript received: July 4, 2020; manuscript accepted: August 4, 2020; published online: 11 August 2020

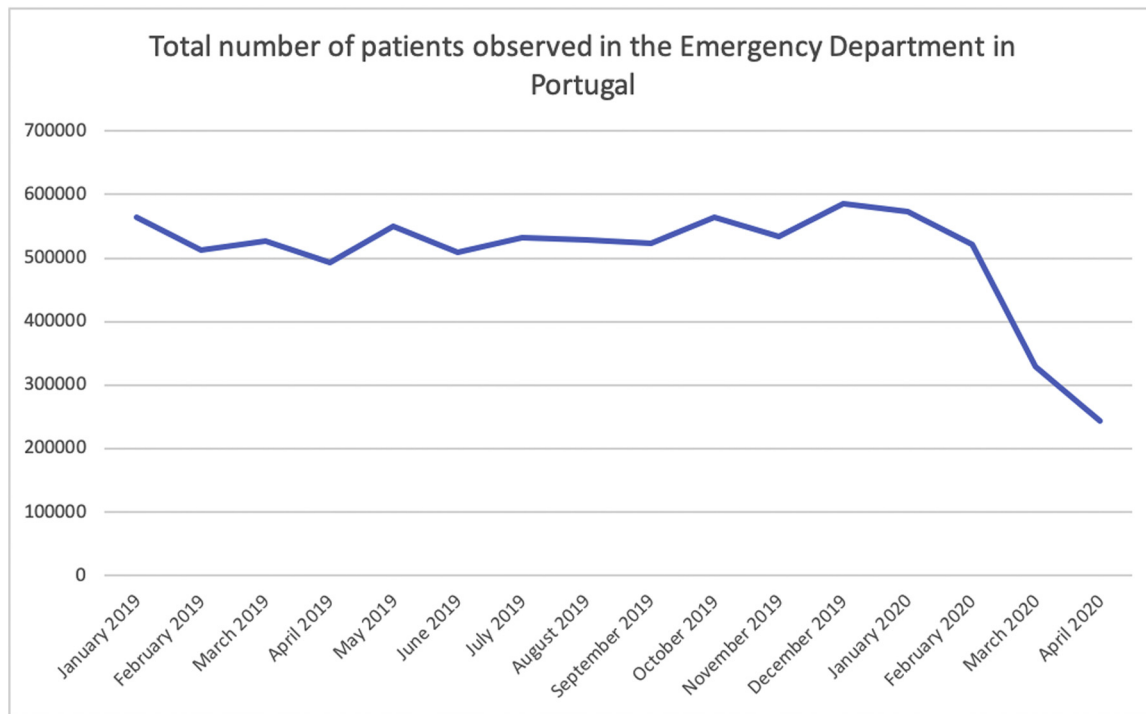


Fig. 1. Total number of patients observed in the emergency department in Portugal by months.

INTRODUCTION

Coronavirus disease is caused by a new coronavirus subtype, severe acute respiratory syndrome coronavirus 2, and started in Wuhan, China, in December 2019. On March 11, 2020, the World Health Organization declared the coronavirus disease 2019 (COVID-19) outbreak a pandemic. To the date, more than 7 million people all over the world have been infected, causing more than 400,000 deaths and affecting 216 countries.¹ The first cases in Portugal date to March 3, 2020. Portugal declared national emergency on March 19, 2020, and the emergency state (ES) lasted until the 2nd May. By the end of the ES, 25,190 cases had been confirmed and 1,023 deaths had occurred.²

Our vascular surgery department is at a central hospital and is a referral hospital for approximately 1.6 million people. During this period, surgical activities drastically reduced in all surgical departments, including ours. Elective surgery was not performed, and surgical procedures were limited to urgent or deferred urgent cases. To guide surgical practice, guidelines such as COVID-19 Guidelines for Triage of Vascular Surgery Patients were created to help sort out surgery priority in patients who are to undergo vascular surgery.³

Furthermore, there was a global decrease in the number of patients admitted to the emergency department (ED), including in Portugal (Fig. 1).⁴

The aim of this article is to understand if COVID-19 actually reduced admissions of patients to the ED for vascular surgery and how it affected care in patients for urgent vascular surgery.

METHODS

We performed an observational study and a retrospective analysis. On a first step, we compared the volume of patients admitted to the ED and observed for vascular surgery during the ES, with the same period in 2019. We also analyzed the numbers of urgent surgery regardless of the diagnosis in both periods. For this purpose, information about patient's ED clinical file was collected through the ED clinical software program (ALERT® Life Sciences Computing, SA).

On a second step, we analyzed the numbers of urgent surgical activity during the ES and the corresponding period in the preceding 10 years, only regarding patients with limb acute ischemia, acute aortic pathology, and vascular trauma. Patients excluded from the study underwent vascular access for hemodialysis complications, acute complications of a recent revascularization procedure, and

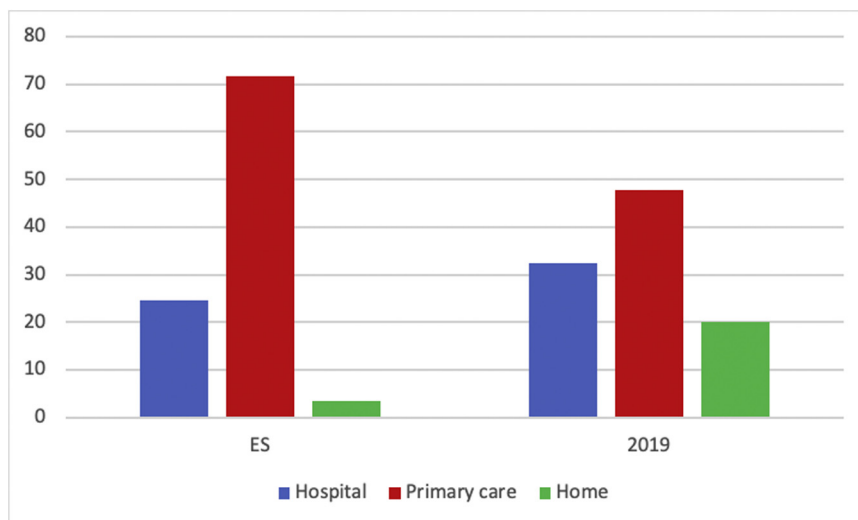


Fig. 2. Font of referral of patients during the emergency state and in the 2019 corresponding period (in percentage).

peripheral artery disease (PAD) stages 4 to 6 of Rutherford's classification. For control, 2 groups of patients were formed—patients with surgery during the ES and patients with surgery during the non-ES, which corresponds to the period between 1st February and March 18, 2020.

Statistical analysis was performed using IBM SPSS® Statistics, version 25, and comprised descriptive and inferential statistics. We used nonparametric tests (chi-squared and Kruskal-Wallis tests). The significance threshold was set at 0.05.

RESULTS

On a first stage, we compared patients admitted to the ED during the ES with those in the 2019 corresponding period.

One hundred five patients were observed at the ED during the ES (mean age 68,8 years old) and 179 in 2019 (mean age, 69.7 years).

During the ES, patients were less transferred from another hospital for vascular surgery observation, although this was not significant (p 0.10). Conversely, patients did significantly recur less to the ED directly from home ($P < 0.001$) and were less referred to the ED by primary care doctors ($P < 0.001$) (Fig. 2).

Our hospital uses the Manchester Triage System for patients attending the ED. During the ES, no differences were found between patients concerning color assignment when comparing with those in 2019 (p 0.305).

The most frequent diagnosis observed at the ED was PAD in both periods (46% in the ES vs.

51.3%) followed by deep and superficial venous thrombosis (23.4% vs. 21.7%), acute limb ischemia (7.8% vs. 5%), suspected deep venous thrombosis (2.6% vs. 8.3%), acute aortic pathology (3,4% vs.1,6%), and others.

In the ES, patients observed at the ED were significantly more urgent—required urgent surgery or were admitted to the department—than those in 2019 (40% vs. 24%, p 0.004). This result was obtained at the expense of the number of admissions to the department in both periods. In the ES, 26% of patients were admitted to the department (90% with PAD diagnosis) and most underwent surgery on a semielective basis. On the contrary, in 2019, only 14% of the patients observed in the ED were admitted. Regarding urgent surgery, there were no significant differences between ES and 2019 periods (14% in ES vs. 10% in 2019, p 0.313).

Urgent surgical activity during the ES comprised 16 patients—8 embolic acute limb ischemia, 2 ruptured aortic aneurysms and 1 iliac aneurysm, 2 inferior limb revascularization procedures, 2 major amputations, and 1 dialysis access—related procedure. In the same period in 2019, 18 patients had undergone urgent surgery. Most of them were also acute limb ischemia and 6 were submitted to major amputation.

Finally, during the ES, 38% of patients observed at the ED were discharged with no follow-up related to vascular surgery against 60% in 2019, although this difference was not significant (p 0.562). Most patients had a diagnosis of deep and superficial venous thromboses in both periods.

On a second stage, we compared patients who had undergone urgent surgery during the ES with

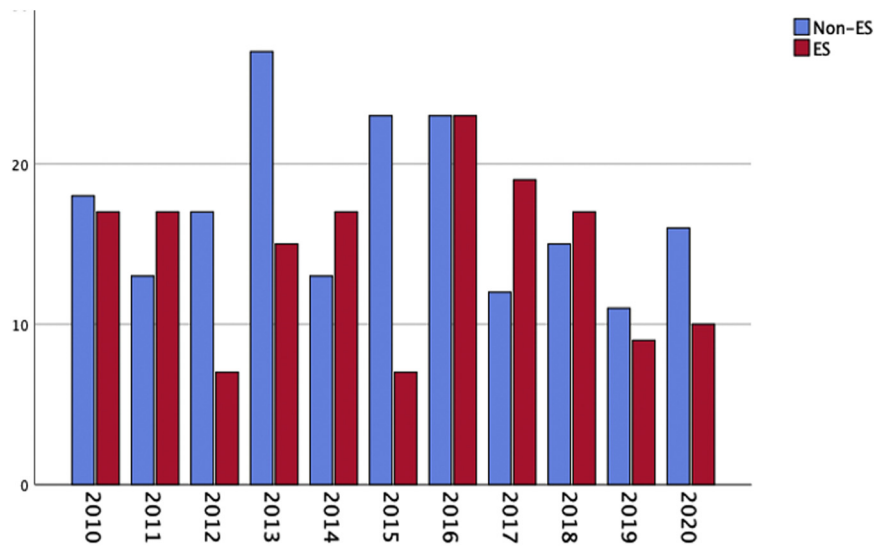


Fig. 3. Number of patients with urgent surgery during the emergency state and non-emergency state over the years.

Table I. Number of surgical procedures during the emergency state and the corresponding period over the years, regarding patients with limb acute ischemia, acute aortic pathology, and vascular trauma

Year	Acute inferior limb ischemia	Acute superior limb ischemia	Acute aortic pathology	Vascular trauma	Total
2010	8	6	-	3	17
2011	10	2	3	2	17
2012	9	2	2	1	7
2013	12	2	1	-	15
2014	12	3	2	-	17
2015	5	1	1	-	7
2016	11	8	4	-	23
2017	8	3	4	4	19
2018	11	3	3	-	17
2019	8	-	1	-	9
2020	7	1	2	-	10

those in the same period in the preceding 10 years. For control purposes, we also compared with patients who had undergone urgent surgery outside the ES period (non-ES).

After reviewing the previous 10 years, we observed that the number of patients who had undergone urgent surgery in both the ES and non-ES periods oscillates over the years, with no significant decrease in 2020 (p 0.054) (Fig. 3). This finding remained unchanged after subanalysis by diagnosis (p 0.077) (Table I).

Finally, we checked if patients with acute limb ischemia were arriving later to the ED when comparing with those in the preceding years. Over the years, a gradual decrease in the time between onset of symptoms and ED admission was noticed,

with no particular differences during the ES (p 0.284). During the ES, the mean time until the admission of patients with acute limb ischemia to the ED was 21.5 hr.

DISCUSSION

With the outbreak of COVID-19, vascular surgery departments had to be reorganized, with the surgical activity restricted to a semielective and urgent basis.^{5,6}

Besides being an observational study with a small sample, we could confirm that there was a decrease in the number of patients admitted to the ED⁴ during the ES. Indeed, fewer patients recurred to the ED by personal initiative, and primary health care

referred less patients to the ED. Furthermore, patients observed in the ED were considered more urgent. As such, we could expect that patients admitted in the ED were attributed to a more urgent color according to the Manchester Triage System, but this was not confirmed. Patients were considered more urgent at the expense of the increased number of admissions to the department. One explanation for this might be that patients observed in the ED were more ill, perhaps because of a postponed seek for medical care, that is, patients possibly awaited until later stages of the disease before attending to the ED. Other explanation might be that patients were not managed in an outpatient basis after stopping practically all outpatient care activities during the ES.

During the ES, there was a decrease in the number of patients' discharge from the ED with no furthermore referral within vascular surgery, and this suggests that during this period, patients observed in the ED needed more vascular surgery therapeutic support than those in the previous year.

When comparing to the urgent surgical activity of the preceding 10 years, there was no decrease in the number of surgeries during the ES. We cannot assume that COVID-19 precluded urgent surgery in patients for vascular surgery and that patients with potential limb- or life-threatening conditions were prevented from undergoing surgery. This could be

reinforced by the fact that the time of limb ischemia until ED admission did not raise.

CONCLUSION

Fewer patients were admitted at the ED during the ES, and those admitted were significantly more urgent. Furthermore, we did not find a decrease in the numbers of urgent surgery during the ES when comparing with those of the preceding 10 years.

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