

The Current Global Pandemic and Its Impact on CLI

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Abstract: The COVID-19 pandemic caught the scientific world, the media, and society unprepared. Many countries and governments intervened late—some in ways that were questionable—but (at least in most cases) they were trying to do what was best for their population by considering the habits and cultures of different people. In health management, the pandemic uncovered a major shortcoming in preparedness for a global healthcare catastrophe. Because of this, poor outcomes in patients with severe vascular disease were seen. However, the pandemic brought out positive effects as well by accelerating the development of telemedicine and shifting care toward outpatient medicine. In this article, we discuss various aspects of the impact that the COVID-19 pandemic has had on patients with critical limb ischemia.

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The COVID-19 pandemic caught the scientific world, the media, and society unprepared. Many countries and governments intervened late—some in ways that were questionable—but (at least in most cases) they were trying to do what was best for their population by considering the habits and cultures of different people. In health management, the pandemic uncovered a major shortcoming in preparedness for a global healthcare catastrophe. Because of this, poor outcomes in patients with severe vascular disease were seen. However, the pandemic brought out positive effects as well by accelerating the development of telemedicine and shifting care toward outpatient medicine. In this article, we discuss various aspects of the impact that the COVID-19 pandemic has had on patients with critical limb ischemia (CLI).

A Need for New Ways to Triage Patients

During the pandemic, the triage of patients with CLI was problematic, and several triage guidelines were proposed. The American College of Surgeons (ACS) developed guidelines for triaging vascular surgery patients to reduce resource utilization.¹ Surgeries for class 1 patients (asymptomatic carotid stenosis, abdominal aortic aneurysms < 6.5 cm, varicose veins) were postponed; class 2a patients (arteriovenous fistula, venous ulcers, thoracic outlet syndrome, asymptomatic peripheral aneurysms) were considered for referral; and class 3 patients (ruptured/symptomatic/infected aneurysms, aortic dissection with malperfusion, acute and chronic limb-threatening ischemia, acute mesenteric ischemia, symptomatic carotid stenosis, extensive tissue necrosis in an unsalvageable limb, uncontrolled hemorrhage, problems with dialysis access) were treated as emergencies. Class 2b patients

(CLI with rest pain or tissue loss, deep debridement of surgical wound infection, and necrosis wounds requiring skin grafts) were considered a “postpone if possible” category for time-sensitive conditions whose treatment was decided on a case-by-case basis in different hospitals according to the healthcare resources available and the expected postop outcome.

Other classifications suggested different ways of triage. The Pandemic Diabetic Foot Triage System was proposed to help determine the urgency and the ideal site of care for treatment (eg, a shift from the hospital to the podiatrist’s office).² The International Diabetic Foot Care Group and D-Foot International developed a simple fast-track pathway as an easy tool for clinicians working in primary care treating diabetic foot ulcers (DFUs).³ Although CLI was mentioned in all of them, it did not get the priority it needed. For this group of patients, the decision was more complex, as significant treatment delays can place patients at major risk of poor outcomes. The most important question is how to categorize a condition to be “postpone if possible,” and which criteria to use. In these cases, the decision cannot be made solely on clinical grounds but should consider the pandemic threat, hospital capacity, human resources, and local surgical activity. We must keep in mind that some healthcare systems have been suffering more than others. Therefore, in the U.S., an additional model called VASCCON has been proposed,⁴ which is similar to the military triage system used in a crisis alert status in response to a threat. It allows a more refined selection of patients who should be treated immediately and those who do not require urgent intervention by incorporating the combination of local differences in human and economic resources and restrictions. Therefore, it also provides the possibility of an escalation or de-escalation through different

levels in response to any change in the local situation. Several published experiences have shown that appropriate triage of patients can be performed using ACS guidelines, but it needs to be reinforced by a system (such as VASCCON) that integrates considerations of local restrictions and epidemiology and is simple and flexible to apply.¹

Effect of the Pandemic on CLI Patients

The COVID-19 pandemic and its associated lockdowns have had a negative impact on the management of patients with CLI, DFUs, and vascular patients in general. It has caused a deleterious effect on hospitalization and clinical presentation, and therefore, on clinical outcomes. In some hospitals, diabetes departments were closed and procedures on patients with a critical stage of arterial disease were delayed. Many professional staff members were often re-deployed to COVID-19 units. The number of hospitalizations for DFUs and foot osteomyelitis decreased significantly during the pandemic's first wave and lockdown (weeks 12 to 19).⁵ A similar trend was seen for lower limb amputations and revascularizations associated with DFUs or amputations. In part, this effect is related to the decreased willingness of patients to seek medical assistance out of fear of exposure to the coronavirus in the hospital environment. In most areas, closure of outpatient activities prevented early evaluation of patients with CLI.⁶ The COVID-19 pandemic has thus been a barrier to receiving proper care and also made it difficult to maintain a high standard of care for these complex patients. This illustrates the combined deleterious effects of hospital overload and changes in health-related behavior. The fear of contagion led to an underestimation of symptoms (by patients) and a delayed access to treatment. Because of that, patients arriving at the emergency department often presented with severe ulcers and gangrene.

The above led to a clear impact on clinical outcomes. Patients with COVID-19 undergoing vascular surgery procedures showed poor 30-day survival rates. The mortality in this group was 37.3% during the pandemic.⁷ Prognostic factors related to mortality are, not surprisingly, age, and also acute renal failure and the need for a major amputation. Looking in more detail at what happened during the pandemic, Sallustro et al⁸ divided the outcomes of their patients into 3 groups: T0 (before the pandemic), T1 (during the first wave), and T2 (during the second wave). The severity score (visual analog scale) increased from 2 to 8 during the first wave and diminished relatively little in T2, indicating an impaired quality of life in already weak patients. Complete wound healing without complications decreased to 12% during the first wave in patients undergoing urgent endovascular or surgical treatment for CLI; prior to the pandemic, complete wound healing was seen in 85%.

Overall, before the pandemic no worsening, recurrence, or minor amputations were detected; these numbers increased significantly during the first wave (worsening 88%, recurrence 74%, and minor amputation 19%). The degree of worsening during the second lockdown was lower than that during the

first lockdown (probably due to the implementation of telemedicine). Not surprisingly, patients with diabetes were more likely to present with severe infections and undergo amputation during the pandemic. For amputations, data are conflicting. While some papers indicated stability, most reports mention an increase in numbers, likely related to delayed presentation and changes in regular surveillance. Casciato et al⁹ described a 10-fold increase in any amputation and a 12.5-fold increase for major amputations. Caruso et al¹⁰ described a significantly higher prevalence of gangrene (64% vs 29%, $P=.009$) and a higher proportion of patients requiring amputation (60% vs 18%, $P=.001$), with a relative risk for amputation of 3.26 (2020 vs 2019). In the cohort of Lancaster et al¹¹ there was a more severe presentation according to wound, ischemia, and foot infection classification, with the number of major amputations tripled and high-low amputation ratio doubled (0.3 to 0.7; $P=.003$). One of the first studies came from the Netherlands¹² and showed that no minor amputations were seen, probably because they were postponed. However, compared with prior to the pandemic, an increase in major amputations was seen. The same was seen in a vascular center in Milan, Italy, where 6 patients (5.2%) presented with irreversible lower limb ischemia and immediately underwent amputation.¹³

The 'Benefits' of the Pandemic

During the pandemic there was a shift toward outpatient treatment, especially in the U.S. This included an increase in the number of revascularization procedures performed in office-based labs. There was also a strong leverage of telemedicine, again in the U.S., which was facilitated by a change in Medicare billing.² The difficulty in accessing hospitals has introduced and expanded the use of new ways of patient consultation using telephones, photos, and video.¹⁴ Telemedicine has been shown to be a valid tool in helping patients who would normally have been seen in the hospital have their care managed at home. It has been possible to deploy home care nurses and guide them with the aid of telemedicine through changing wound dressings, monitoring for signs of infection, and performing minor local debridement. Despite the difficulties (especially for older patients) in using modern technology, sensory loss (except sight), and the obvious need for third-party help, telehealth has demonstrated clear benefits: decreased healthcare costs, saving time for patients and providers, comparable accuracy, and protecting patients from the risk of being exposed to COVID-19 infections in the hospital environment.¹⁵ Most importantly, targeted foot-care service using virtual triage and teleconsultations has shown a comparable accuracy to in-person visits in terms of ulcer and limb outcomes.¹⁶

Conclusion

The previous pandemic occurred about 100 years ago, at a time when healthcare systems were not comparable to the current level, and the global cost in terms of deaths was devastating.

However, after 3 waves of public health emergencies a major gap in global health disaster management has become clear, and in the future similar situations are likely to occur. Therefore, it is imperative to learn lessons from the COVID-19 pandemic. In such a precarious and complex period in history, we should learn how to manage change and take advantage of these changes in our daily clinical decision-making. ■

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