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Changes in vascular surgery practice patterns 1 year into the COVID-19 pandemic



As of March 14, 2021, 1 year after the World Health Organization declared the novel coronavirus diseases 2019 (COVID-19) a global pandemic, more than 2.6 million people have died from the virus.¹ The impact of the pandemic on vascular surgery practices has been a subject of frequent speculation,² but data are sparse. Therefore, we sought to understand how vascular surgery practice patterns have changed during the pandemic to help anticipate and respond to resource-related needs as the pandemic persists.

At our multicenter tertiary healthcare system (Mass General Brigham) in Massachusetts, we used a centralized clinical data registry to examine vascular surgery practice patterns across nine affiliated hospitals. We compared vascular procedures performed following the state's Public Health Department's order to cancel all nonessential procedures (March 18 to May 17, 2020) and after resumption of services (May 18 to December 31, 2020) to the same time periods in 2019 as a reference.³

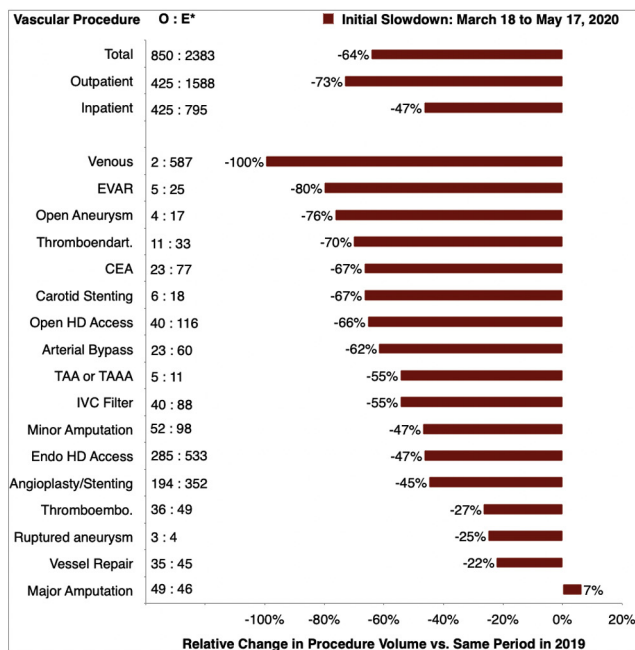
A total of 17,362 vascular procedures were performed during the study period. We observed a 64% (95% confidence interval [CI], 63%-66%) decrease in the total number of vascular procedures performed during the initial

COVID-19 slowdown (Fig. A). The greatest decrease were observed in venous procedures (-100%; 95% CI, -99% to -100%), followed by endovascular aneurysm repair (-80%; 95% CI, -59% to -93%), and open aneurysm repair (-76%; 95% CI, -50% to -93%). In contrast, nonelective procedures such as blood vessel repair (-22%; 95% CI, -10% to -34%) and ruptured aneurysm repair (-25%; 95% CI, 0% to -67%) had the smallest decrease. Notably, the only procedure that increased during this period was major amputation (7%; 95% CI, 0%-14%), potentially owing to delays in presentation and treatment for peripheral artery disease and diabetic foot complications.⁴⁻⁶

After resumption of surgical services, we observed a significant increase in vascular procedures; however, the total volume remained 14% (95% CI, 13%-15%) lower than in 2019 (Fig. B). Ruptured aneurysm cases increased by 2.4-fold, whereas carotid stenting increased by 74% (95% CI, 63%-85%) at the expense of carotid endarterectomy (22%; 95% CI, -17% to -27%). It is unclear whether these changes occurred owing to delays in elective surgery during the initial slowdown or changes in referral patterns as a consequence of the pandemic.

As the pandemic persists, continuing a live review of institutional case volumes is important to help inform adequate resource allocation during this public health

A During the First COVID-19 Wave



B After the First COVID-19 Wave

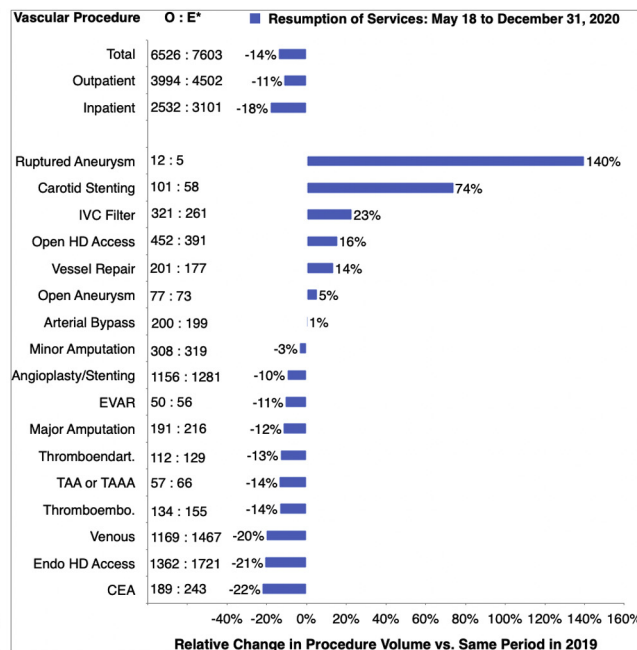


Fig. Trends in vascular procedures performed at Mass General Brigham during (A) and after the first COVID-19 wave (B) relative to the same periods in 2019. Caption: *O : E represents numbers of observed to expected procedures during the study period. Expected number of procedures were calculated based on cases during the same period in 2019. Procedures defined as "other vascular" are not presented (n = 1481). CEA, Carotid endarterectomy; Endo, endovascular; EVAR, endovascular aneurysm repair; HD, hemodialysis; IVC, inferior vena cava; Major amputations, Amputations proximal to the ankle; Minor amputation, Amputations at the ankle and foot; TAA, thoracic aortic aneurysm repair; TAAA, thoracoabdominal aortic aneurysm repair; Thromboendart., thromboendarterectomy; Thromboembo., thromboembolotomy.

emergency and drive further research to understand the effects of COVID-19.

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REFERENCES

1. COVID-19 map. Johns Hopkins Coronavirus Resource Center. Updated March 14, 2021. Available at: <https://coronavirus.jhu.edu/map.html>. Accessed March 14, 2021.
2. Leung S, Al-Omran M, Greco E, Qadura M, Wheatcroft M, Mamdani M, et al. Monitoring the evolving impact of COVID-19 on institutional surgical services: imperative for quality improvement platforms. *Br J Surg* 2021;108:e7-8.
3. Baker-Polito administration announces emergency actions to address COVID-19. Mass.gov. Available at: <https://www.mass.gov/news/baker-polito-administration-announces-emergency-actions-to-address-covid-19>. Accessed March 14, 2021.
4. Caruso P, Longo M, Signoriello S, Gicchino M, Maiorino MI, Bellastella G, et al. Diabetic foot problems during the COVID-19 pandemic in a tertiary care center: the emergency among the emergencies. *Diabetes Care* 2020;43:e123-4.
5. Schuivens PME, Buijs M, Boonman-de Winter L, Veen EJ, de Groot HGW, Buimer TG, et al. Impact of the COVID-19 lockdown strategy on vascular surgery practice: more major amputations than usual. *Ann Vasc Surg* 2020;69:74-9.
6. Lancaster EM, Wu B, Iannuzzi J, Oskowitz A, Gasper W, Vartanian S, et al. Impact of the coronavirus disease 2019 pandemic on an academic vascular practice and a multidisciplinary limb preservation program. *J Vasc Surg* 2020;72:1850-5.

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