Alarming downtrend in mechanical thrombectomy rates in African American patients during the COVID-19 pandemic—Insights from STAR


ABSTRACT

Background  The coronavirus disease (COVID-19) pandemic has affected stroke care globally. In this study, we aim to evaluate the impact of the current pandemic on racial disparities among stroke patients receiving mechanical thrombectomy (MT).

Methods  We used the prospectively collected data in the Stroke Thrombectomy and Aneurysm Registry from 12 thrombectomy-capable stroke centers in the US and Europe. We included acute stroke patients who underwent MT between January 2017 and May 2020. We compared baseline features, vascular risk factors, location of occlusion, procedural metrics, complications, and discharge outcomes between patients presenting before (before February 2020) and those who presented during the pandemic (February to May 2020).

Results  We identified 2083 stroke patients: of those 235 (11.3%) underwent MT during the COVID-19 pandemic. Compared with pre-pandemic, stroke patients who received MT during the pandemic had longer procedure duration (44 vs 38 min, P=0.006), longer length of hospitalization (6 vs 4 days, P<0.001), and higher in-hospital mortality (18.7% vs 11%, P<0.001). Importantly, there was a lower number of African American patients undergoing MT during the COVID-19 pandemic (609 (32.9%) vs 56 (23.8%); P=0.004).

Conclusion  The COVID-19 pandemic has affected the care process for stroke patients receiving MT globally. There is a significant decline in the number of African American patients receiving MT, which mandates further investigation.

INTRODUCTION

The Coronavirus disease of 2019 (COVID-19) pandemic has affected all aspects of medical care for various conditions. Several studies reported a potential relationship between COVID-19 infection and ischemic stroke secondary to large vessel occlusion (LVO). Importantly, recent studies reported a significant decline in the number of patients presenting with acute stroke, raising concerns that stroke patients are avoiding hospitals for various reasons including fear of COVID-19 infection. Evidence from recently published studies suggested that this decline disproportionately affects African American (AA) patients, widening the already existed racial disparity in stroke care. In this study, we aimed to investigate the impact of the COVID-19 pandemic on the racial disparities related to MT.

METHODS

Patient population and collected variables

Prospectively collected data from 12 thrombectomy-capable stroke centers included in the Stroke Thrombectomy and Aneurysm Registry (STAR) collaboration was interrogated to identify stroke patients who received mechanical thrombectomy (MT) between January 2017 and May 2020. Eleven of the included centers are located in the United States and one in Germany. Patients who presented before February 2020 were considered pre-COVID-19 pandemic and patients who presented after February 2020 were considered during the COVID-19 pandemic. We compared baseline demographics, procedural metrics, and outcomes between patients undergoing MT before and during the pandemic. Approval from the Institutional Review Board at the Medical University of South Carolina was obtained, and no consent was needed per the institutional policy.

Statistical analysis

We used univariate analysis to report patient demographic and clinical characteristics using median and IQR for continuous variables and percentages for categorical variables. Characteristics of groups were compared using the Mann–Whitney U test, and chi-square as appropriate. To assess for the relationship between the rate of AA (or Black Europeans of African ancestry) patients receiving MT and COVID-19 pandemic controlling for the center of presentation, we used the Cochran Mantel Haenszel test. An alpha level of 0.05 was used as the level of statistical significance. The analysis was conducted using SPSS v25 (IBM Corporation, New York, NY).

RESULTS

Patients’ characteristics

A total of 2083 stroke patients were included in this study, 1848 (88.7%) underwent MT before the
The pandemic and neurointervention

COVID-19 pandemic and 235 (11.3%) during the COVID-19 pandemic. The median age was 69 (IQR 58–79) years, admission National Institure of Health Stroke Scale (NIHSS) 16 (10–21), and Alberta Stroke Program Earlty CT Score (ASPECTS) 9 (IQR 7–10). Online supplemental table 1 summarizes baseline features and clinical outcomes. The racial/ethnic distribution of the included patients was as follows: 1197 (57.8%) white, 665 (31.9%) AA, 215 (10.3%) Hispanic, and six (0.3%) others.

Before vs. during the COVID-19 pandemic

Table 1 summarizes the comparison between stroke patients who underwent MT before vs during the COVID-19 pandemic. Five (2.1%) of the MT patients during the pandemic were positive for COVID-19 polymerase chain reaction (PCR) in nasopharyngeal swap. Significant differences in patients undergoing MT during the COVID-19 pandemic include: longer procedure duration (44 vs 38 min, P=0.006), longer length of hospitalization (6 vs 4, P<0.001), lower discharge mRS (4 vs 3, P=0.015), and higher in-hospital mortality (18.7% vs 11%, P<0.001), compared with patients who underwent MT before the pandemic. While the difference between the symptom onset to groin time was not significant in the overall population (P=0.065) and in non-AA patients (P=0.278), AA patients had longer onset to groin time during the COVID-19 pandemic (362 vs 275 min, P=0.047). In addition, the percentage of AA patients who underwent MT in the included centers decreased from 609/1848 (32.9%) before the COVID-19 pandemic to 56/235 (23.8%) during the COVID-19 pandemic (P=0.004). No interaction was noted between the percentage of AA patients receiving thrombectomy and the centers that performed the thrombectomy before and after the COVID-19 pandemic (P=0.192). No other statistically significant differences were noted in other races/ethnicities. Figure 1 shows the trend in the rate of AA patients receiving mechanical thrombectomy during the study period. Online supplemental tables II and III show the comparison between AA and non-AA thrombectomy patients before and during the COVID-19 pandemic.

DISCUSSION

In this multicenter, international study, we evaluated the procedural metrics and outcomes of MT patients presenting during the COVID-19 pandemic compared with patients presenting during the

![Figure 1](https://journals.bmj.com/content/jnis/2020/016946.f1)
3 prior years. We have found that patients who presented during the pandemic required a longer procedure time and had a higher rate of mortality. While only 2.1% of these patients were positive for COVID-19 PCR, these findings likely reflect the effect of COVID-19 precautions and the changes in healthcare workflow protocols.

Additional significant findings from our analyses included a reduction in the number of AA patients undergoing MT, which is highly alarming because racial disparities in cerebrovascular diseases care already exist. AA patients have higher vascular risk factors, and experience higher stroke-related in-hospital mortality. Also, studies have shown that AA/Hispanic patients are more likely to have received aneurysm treatment following a subarachnoid hemorrhage rather than getting treatment in the early stages for unruptured aneurysm.6

The reduction in the number of AA patients receiving MT during the COVID-19 pandemic threatens to widen the gap in racial disparities given that most patients with emergent LVO would suffer from significant long-term disability if they do not receive treatment.9, 10 A recent study evaluating racial disparities among patients evaluated over a large telestroke network reported a significant drop among AA patients with acute ischemic stroke.4 The overall drop in the number of AA patients presenting with acute stroke is a likely reason that there is a drop in the number of AA patients receiving MT. It remains unclear the reasons behind this drop. However, studies have shown that AA patients have a higher incidence of COVID-19 infection and increased mortality4, 11 which could be the reason why AA patients are reluctant to seek medical attention over concerns for safety due to fear of acquiring COVID-19.

Interestingly, there was an increase in the symptom onset to groin time in AA, but not non-AA patients which may also reflect the abundance of caution from presenting to hospitals during the early COVID-19 pandemic. A similar delay in care in all stroke patients during the COVID-19 pandemic was reported recently by Schirmer et al.14 One of the proposed causes for this delay is the changes in stroke triage protocols during the pandemic.15

Our study has a few limitations. First, our study is limited by its observational nature. Also, our study does not provide information related to the relationship between COVID-19 infection and emergent LVO. However, our study provides multicentric, early observations stroke centers in different regions.

CONCLUSION

Stroke patients receiving MT during the COVID-19 pandemic had a longer procedure duration and a higher mortality rate compared with patients presenting before the pandemic. Also, there is a decline in the number of AA patients receiving MT during the pandemic, which demonstrates the need for more work in the public health domain to educate patients with the importance of prompt medical evaluation for all those suffering from stroke symptoms.

Author affiliations

1. Neurosurgery and Radiology, Emory University School of Medicine, Atlanta, Georgia, USA
2. Neurosurgery, Emory University School of Medicine, Atlanta, Georgia, USA
3. Radiology and Imaging Sciences, Emory University School of Medicine, Atlanta, Georgia, USA
4. Neurosurgery, Barrow Neurological Institute, Phoenix, Arizona, USA
5. Neurosurgery, University of Texas Health Science Center at San Antonio, San Antonio, Texas, USA
6. Department of Neuroradiology, Clinic of Radiology and Nuclear Medicine, University Hospital Basel, Basel, Switzerland

Twitter Sami Al Kasab @samialkasab, Pascal Jabbour @PascalJabbourMD, Ahmad Swiel @AhmadSwielMD, Robert M Starke @Starke_neurosurgery, Adam S Arthur @AdamArthurMD, Abhi Pandhi @abhipandhi, Brian M Howard @BrianHoward_MD and Alejandro M Spiotto @alekspiotta

Collaborators STAR collaborators: Dleep R Yavagal, MD; Eric C Peterson, MD; Alex Brehm, MD; Patrick A Brown, MD; M. Reid Gooch, MD; Nabeel Herial, MD; Dr. med. Jan Liman; Daniel Alan Hoit MD MPH; Violisa inoa-Acosta MD; Christopher Nickele MD; Lucas Eltijovich MD; Michael Cawley, MD; Gustavo Pradilla, MD

Contributors All authors have: provided a substantial contribution to the conception and design of the studies and/or the acquisition and/or the analysis of the data and/or the interpretation of the data. They have drafted the work or revised it for significant intellectual content and approved the final version of the manuscript. They agree to be accountable for all aspects of the work, including its accuracy and integrity.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial, or not-for-profit sectors.


Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Data are available upon reasonable request.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

This article is made freely available for use in accordance with BMJ’s website terms and conditions for the duration of the covid-19 pandemic or until otherwise determined by BMJ. You may use, download and print the article for any lawful, non-commercial purpose (including text and data mining) provided that all copyright notices and trade marks are retained.

ORCID iDs

Sami Al Kasab http://orcid.org/0000-0001-8909-9761
Ali Alawieh http://orcid.org/0000-0003-2601-8850
Pascal Jabbour http://orcid.org/0000-0002-1544-4910
Vasu Saini http://orcid.org/0000-0002-6796-5881
Stacey G Wolfe http://orcid.org/0000-0001-7603-2728
Adam S Arthur http://orcid.org/0000-0002-1536-1613
Ilko Maier http://orcid.org/0000-0001-6988-8878
Jonathan A Grossberg http://orcid.org/0000-0002-1152-8826
Brian M Howard http://orcid.org/0000-0001-9134-0817
Stavropoulou I Tjoumakaris http://orcid.org/0000-0002-1054-9414

REFERENCES

The pandemic and neurointervention


13. Reyes CHN, Gutowski C. Chicago’s coronavirus disparity: black Chicagoans are dying at nearly six times the rate of white residents, data show. Chicago Tribune, 2020.
