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Convergence of COVID-19 and recurrent stroke: In-hospital mortality risks explored

Nagoba BS *et al.* Convergence of COVID-19 and recurrent stroke

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Abstract

This editorial comments on the article by Desai *et al*, which investigates the impact of coronavirus disease 2019 (COVID-19) on in-hospital mortality among patients with recurrent stroke using data from the 2020 National Inpatient Sample. The findings reveal significantly higher mortality rates in COVID-19-positive patients compared to non-COVID-19 patients, particularly among middle-aged individuals, males, and ethnic minorities. This editorial explores the underlying mechanisms contributing to these outcomes and discusses the clinical implications for targeted management strategies in high-risk groups. The results emphasize the need for comprehensive approaches to mitigate the heightened risks faced by recurrent stroke patients during the COVID-19 pandemic.

Key Words: Recurrent stroke; COVID-19; In-hospital mortality; Nationwide analysis; Stroke admissions; Infectious diseases; Chronic health conditions; Hypercoagulability

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Core Tip: This editorial highlighted the critical findings of heightened in-hospital mortality risk among recurrent stroke patients with coronavirus disease 2019 (COVID-19). Key findings include significantly higher mortality rates in COVID-19-positive patients, especially among middle-aged individuals, males, and ethnic minorities. The discussion explores the underlying mechanisms, such as inflammation and endothelial dysfunction, contributing to these outcomes. It also underscores the need for targeted management strategies for high-risk groups, emphasizing comprehensive approaches to mitigate risks for recurrent stroke patients during the COVID-19 pandemic. These insights aim to enhance clinical practices and improve patient outcomes in this vulnerable population.

INTRODUCTION

The intersection of infectious diseases and chronic health conditions has been starkly highlighted during the coronavirus disease 2019 (COVID-19) pandemic. The study by Desai *et al*[1] provides critical insights into how COVID-19 affects patients with recurrent stroke, a condition already associated with high morbidity and mortality. By analyzing nationwide data from 2020, this study offers a comprehensive overview of the additional risks posed by COVID-19 to this vulnerable population.

Recurrent stroke significantly increases the risk of severe complications and mortality, with nearly 25% of all strokes being recurrent[2]. The emergence of COVID-19 has exacerbated these risks, leading to heightened mortality rates among patients with comorbid conditions, including recurrent stroke[3,4]. Several studies have highlighted the prothrombotic nature of COVID-19, which contributes to increased stroke incidence and severity[5,6]. Desai *et al*[1] utilize data from the National Inpatient Sample to compare in-hospital mortality rates between COVID-19-positive and COVID-19-negative patients with recurrent stroke. The study reveals significantly higher mortality rates in COVID-19-positive patients, particularly among middle-aged individuals, males, and ethnic minorities, aligning with other research indicating disproportionate impacts on these groups[7,8].

This editorial explores the underlying mechanisms contributing to these outcomes, such as inflammation, endothelial dysfunction, and cytokine storms, which exacerbate the severity of recurrent strokes in COVID-19 patients[9,10]. Furthermore, the editorial discusses the clinical implications for targeted management strategies in high-risk groups, emphasizing comprehensive approaches to mitigate these heightened risks during the pandemic.

MECHANISMS OF RECURRENT STROKE ADMISSIONS WITH AND WITHOUT COVID-19 AND ASSOCIATED IN-HOSPITAL MORTALITY

The mechanisms underlying the increased mortality in recurrent stroke patients with COVID-19 are multifaceted, involving a complex interplay of viral pathogenesis and

pre-existing cerebrovascular conditions. A study by Desai *et al*[1] highlights several key mechanisms that contribute to this heightened risk. Firstly, COVID-19 is known to induce a hypercoagulable state, which significantly elevates the risk of thrombotic events, including stroke[11]. The virus's ability to cause widespread endothelial injury leads to the activation of the coagulation cascade, resulting in an increased incidence of ischemic strokes. This is particularly detrimental in patients with a history of recurrent stroke, where the vascular system is already compromised[5]. Additionally, systemic inflammation plays a critical role. COVID-19 triggers a robust inflammatory response, often referred to as a cytokine storm, which can exacerbate pre-existing cerebrovascular conditions[12]. Inflammatory cytokines such as interleukin-6, interleukin-1 β , and tumor necrosis factor alpha are elevated in COVID-19 patients, contributing to endothelial dysfunction and further increasing the risk of stroke[13]. The study also points to the role of direct viral invasion of the central nervous system (CNS). Severe acute respiratory syndrome coronavirus 2 can enter the CNS *via* the olfactory nerve or hematogenous spread, causing direct neuronal damage and further increasing the risk of neurological complications, including stroke[10]. This mechanism is particularly concerning for patients with a history of recurrent stroke, as their CNS may be more susceptible to viral invasion and subsequent damage. Moreover, the demographic disparities observed in the study by Desai *et al*[1] align with other research indicating that males, middle-aged individuals, and ethnic minorities are disproportionately affected by both COVID-19 and stroke[7]. These populations often have higher prevalence rates of comorbidities such as hypertension and diabetes, which are known risk factors for both stroke and severe COVID-19[8]. Lastly, delayed medical intervention due to overwhelmed healthcare systems during the pandemic has also been a significant factor. Many stroke patients with COVID-19 experienced delays in receiving timely medical care, which is crucial for reducing stroke-related morbidity and mortality[14]. This delay exacerbates the outcomes for recurrent stroke patients, leading to higher in-hospital mortality rates. By understanding these mechanisms, clinicians can develop targeted management strategies to better support recurrent

stroke patients during the ongoing COVID-19 pandemic, thereby improving patient outcomes.

CLINICAL IMPLICATIONS

The study's findings have several significant clinical implications for managing recurrent stroke patients during and beyond the COVID-19 pandemic.

Enhanced risk stratification

Clinicians must integrate COVID-19 status into the risk assessment of patients with recurrent stroke. Given the higher mortality risk associated with COVID-19, especially in middle-aged individuals, males, and ethnic minorities, healthcare providers should prioritize rigorous monitoring and management of these high-risk groups.

Targeted interventions

There is a critical need for tailored interventions for recurrent stroke patients who test positive for COVID-19. This includes adjusting treatment plans to address COVID-19-specific complications, such as hypercoagulability and systemic inflammation, which significantly impact stroke outcomes.

Multidisciplinary approach

A collaborative, multidisciplinary approach involving neurologists, infectious disease specialists, and primary care providers is essential for managing patients with concurrent stroke and COVID-19. This team-based strategy can ensure comprehensive care that addresses both the neurological and infectious aspects of the disease.

Improved preventive measures

Emphasizing preventive strategies, such as vaccination against COVID-19 and adherence to stroke prevention protocols, is crucial. Given the higher risk of severe

outcomes associated with COVID-19, ensuring that stroke patients are vaccinated and manage their chronic conditions effectively can help reduce mortality and morbidity.

Access to healthcare

Addressing disparities in healthcare access is vital. The study highlights that ethnic minorities and those from lower socioeconomic backgrounds are at higher risk of poor outcomes. Efforts should be made to ensure equitable access to care, including telemedicine options for patients who may face barriers to in-person visits.

Healthcare system adaptations

The increased burden on healthcare systems due to the pandemic necessitates adaptations to manage the dual challenge of recurrent stroke and COVID-19. This includes optimizing hospital resources, streamlining patient pathways, and ensuring adequate support for both acute and long-term care. By addressing these clinical implications, healthcare providers can better manage recurrent stroke patients during the ongoing pandemic, ultimately improving patient outcomes and reducing the overall impact of COVID-19 on this vulnerable population.

CONCLUSION

The study provides critical insights into the exacerbated in-hospital mortality risk for recurrent stroke patients with COVID-19. The findings underscore the severe impact of the pandemic on this vulnerable population, highlighting significant disparities based on age, gender, and ethnicity. COVID-19's role in heightening stroke-related mortality is intricately linked to its induction of hypercoagulability, systemic inflammation, and direct neural damage. These factors, compounded by delayed medical care and prevalent comorbidities, exacerbate outcomes for these patients.

The heightened mortality risk among middle-aged individuals, males, and ethnic minorities necessitates targeted management strategies to mitigate these risks. Implementing comprehensive care protocols that address both COVID-19 and

cerebrovascular conditions is crucial. This includes enhancing preventive measures, optimizing treatment approaches, and ensuring equitable access to healthcare. As the pandemic continues, it is imperative for healthcare systems to adapt and refine strategies to improve outcomes for recurrent stroke patients, thereby reducing the adverse impact of COVID-19 on this high-risk group.

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Footnotes

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