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EARLY RISK STRATIFICATION AND OPTIMIZATION OF PREHOSPITAL CARE IN PATIENTS WITH HYPERTENSIVE CRISES AND NEUROLOGICAL SYMPTOMS

Khamroev Orif Olimovich
Emergency Medical Care Physician
Sergeli District, Tashkent, Uzbekistan

Abstract
Hypertensive crises with neurological manifestations represent a life-threatening condition associated with a high risk of acute cerebrovascular complications. The aim of this study was to evaluate the effectiveness of early risk stratification and optimization of prehospital management strategies in patients presenting with severe arterial hypertension and neurological symptoms. A total of 125 patients were included in the study. The findings demonstrate that structured clinical assessment and standardized management protocols significantly improve diagnostic accuracy and clinical outcomes.

Keywords: Hypertensive crisis, neurological symptoms, prehospital care, emergency medicine, cerebral circulation.

Introduction

Arterial hypertension continues to represent a major global health burden and remains one of the leading modifiable risk factors for cardiovascular and cerebrovascular diseases [1,4]. According to epidemiological data, more than one billion people worldwide suffer from hypertension, and this number is expected to increase due to demographic changes, urbanization, and lifestyle-related factors such as obesity, sedentary behavior, and dietary habits [4,8].

Hypertensive crises, particularly those accompanied by neurological symptoms, are considered among the most dangerous acute complications of elevated blood pressure. These conditions are associated with a high risk of target organ damage, especially involving the brain, and may lead to severe consequences such as stroke, cognitive impairment, or death if not managed promptly and appropriately [3,7].

The pathophysiological basis of hypertensive neurological complications is closely related to the disruption of cerebral autoregulation. Under normal conditions, cerebral blood flow remains relatively stable despite fluctuations in systemic blood pressure. However, in hypertensive crises, excessive elevation of blood pressure exceeds the autoregulatory capacity of cerebral vessels, resulting in hyperperfusion, endothelial dysfunction, increased vascular permeability, and the development of cerebral edema [5,6].

Clinically, patients may present with a wide spectrum of neurological manifestations, including severe headache, dizziness, visual disturbances, confusion, and decreased level of consciousness. These symptoms often overlap with other acute neurological conditions, particularly ischemic and

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hemorrhagic stroke, which complicates differential diagnosis at the prehospital stage [3,6]. One of the major challenges in emergency medicine is the accurate and rapid identification of patients who require urgent intervention and hospitalization. In many cases, inadequate assessment or misinterpretation of clinical signs leads to inappropriate treatment strategies. For instance, excessively rapid reduction of blood pressure may compromise cerebral perfusion and exacerbate neurological deficits, while insufficient treatment may allow ongoing vascular damage [5,7].

Recent clinical guidelines emphasize the importance of individualized blood pressure management and careful monitoring of neurological status in patients with hypertensive emergencies [1,2]. At the same time, there is growing evidence that structured clinical algorithms and early risk stratification significantly improve the quality of prehospital care and reduce the incidence of adverse outcomes [2]. Despite these advances, implementation of standardized approaches remains inconsistent in real-world practice, particularly in emergency medical services. Factors such as variability in clinical training, limited diagnostic tools, and time constraints contribute to suboptimal management of hypertensive crises at the prehospital stage [6].

Therefore, improving early assessment strategies and optimizing prehospital management protocols are essential for enhancing patient outcomes. The present study aims to evaluate clinical features, risk factors, and management strategies in patients with hypertensive crises and neurological symptoms, with a focus on developing more effective prehospital care approaches [2,5].

Materials and Methods

This study was conducted to evaluate clinical and organizational aspects of prehospital care in patients with hypertensive crises accompanied by neurological symptoms. A total of 125 patients were included, all of whom received emergency medical care at the prehospital stage by ambulance teams in Tashkent. Inclusion criteria consisted of systolic blood pressure above 180 mmHg, presence of neurological symptoms, and clinical suspicion of hypertensive emergency without confirmed stroke diagnosis at the initial stage.

The study population included patients aged 35 to 78 years, with a mean age of 55.8±10.6 years. A significant proportion of patients had a history of long-standing hypertension and associated comorbidities such as diabetes mellitus and obesity, consistent with previously reported data. Clinical assessment at the prehospital stage included measurement of blood pressure, heart rate, respiratory rate, and neurological evaluation using standardized tools, including the Glasgow Coma Scale.

Patients were stratified into risk categories based on severity of symptoms, level of consciousness, and hemodynamic parameters. High-risk patients were defined as those with severe neurological impairment or extremely elevated blood pressure requiring urgent hospitalization. Statistical analysis was performed using standard descriptive and comparative methods. Results were expressed as mean ± standard deviation, and statistical significance was set at $p<0.05$.

Results and Discussions

Analysis of clinical data revealed that the most common presenting symptom was severe headache, observed in 88.0% of patients. Dizziness was reported in 72.0% of cases, while visual disturbances were noted in 41.6% of patients. Altered consciousness was present in 34.4%, indicating significant neurological involvement. The mean systolic blood pressure was 198.1±13.2 mmHg, and the mean

diastolic pressure was 110.5±8.9 mmHg, reflecting severe hypertensive states requiring immediate medical intervention. Risk stratification demonstrated that 57.6% of patients were classified as high-risk, requiring urgent hospitalization and intensive monitoring. In contrast, 42.4% were categorized as moderate-risk and managed with controlled blood pressure reduction and observation.

Implementation of structured clinical assessment protocols led to improved diagnostic accuracy and more appropriate therapeutic decisions. Specifically, inappropriate rapid blood pressure reduction decreased significantly, and patient routing became more efficient ($p<0.05$). These findings confirm that standardized approaches to prehospital care can significantly enhance patient outcomes and reduce the risk of complications.

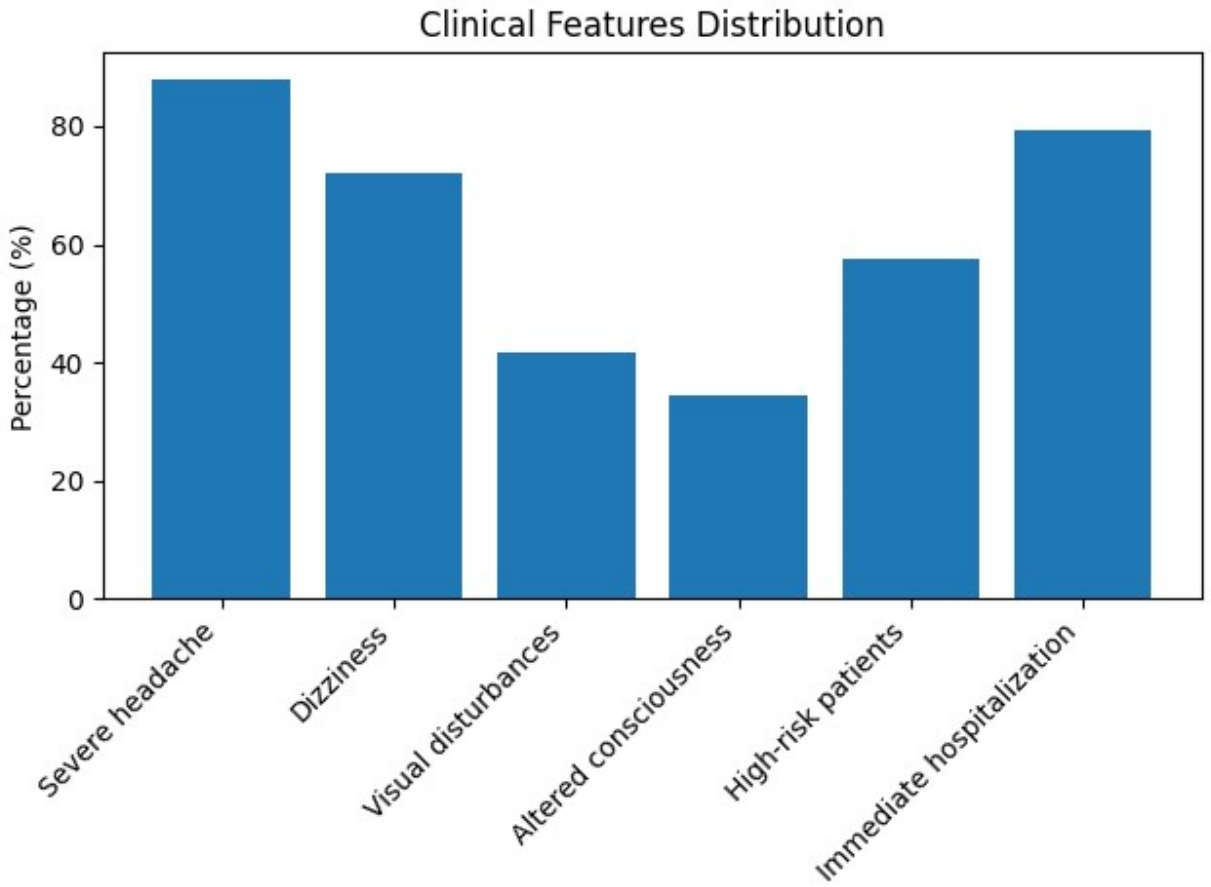

Fig 1. Clinical and risk characteristics of patients with hypertensive crises (n = 125).

The findings of this study confirm that hypertensive crises with neurological manifestations remain a significant clinical challenge in emergency medical practice. The high prevalence of neurological symptoms observed in the studied population is consistent with previous research, indicating that impaired cerebral autoregulation plays a central role in the pathogenesis of these conditions. The strong association between elevated blood pressure levels and the severity of neurological symptoms highlights the importance of timely and controlled antihypertensive therapy. Our results support the concept that both insufficient and excessively rapid blood pressure reduction may negatively affect cerebral perfusion, emphasizing the need for balanced and individualized management strategies.

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Furthermore, the implementation of structured clinical assessment and risk stratification significantly improved diagnostic accuracy and clinical decision-making. These findings are in line with modern clinical recommendations, which stress the importance of standardized protocols in emergency care settings.

The study also demonstrates that early identification of high-risk patients and appropriate routing to specialized medical facilities are crucial for preventing complications and improving outcomes. This underscores the need for continuous training of emergency medical personnel and the integration of evidence-based algorithms into routine practice.

Conclusion

The present study demonstrates that hypertensive crises with neurological manifestations require prompt recognition and effective management at the prehospital stage. Early risk stratification and implementation of structured clinical algorithms significantly improve diagnostic accuracy and optimize treatment strategies, leading to better patient outcomes ($p<0.05$).

The findings highlight the importance of standardized protocols, professional training of emergency medical personnel, and improved clinical decision-making processes in reducing complications associated with hypertensive emergencies. Further research is needed to develop and implement advanced prehospital care models aimed at enhancing the quality of emergency medical services.

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