

ORIGINAL RESEARCH

Typical Cases of Cerebral Artery Issues in Tertiary Care Hospitals in West Bengal

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ABSTRACT

Introduction: This study evaluates the effectiveness of diagnostic and treatment methods for cerebral artery disorders in tertiary care hospitals in West Bengal. **Methodology:** A retrospective analysis was conducted on 287 patients diagnosed with cerebral conditions such as ischemic strokes, aneurysms, and arteriovenous malformations from February 2023 to February 2024. Advanced imaging techniques and various treatment modalities were analyzed. **Results:** The treatment success rates were 75% for ischemic strokes, 68% for aneurysms, and 82% for arteriovenous malformations, with a 15% overall complication rate. MRI was the most commonly used diagnostic tool. **Conclusion:** High success rates and low complication rates demonstrate the effectiveness of current practices in West Bengal's tertiary care hospitals. **Recommendations:** Further enhancement of diagnostic and treatment protocols is advised to improve patient outcomes.

Keywords: Cerebral Artery Disorders, Diagnostic Methods, Treatment Outcomes, MRI, West Bengal

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INTRODUCTION

Cerebral vascular disorders represent a significant healthcare challenge in West Bengal, as they do globally [1]. Tertiary care hospitals in this region encounter a diverse array of cases involving cerebral arteries, ranging from acute ischemic strokes to chronic cerebrovascular anomalies [2]. These conditions are medical emergencies and complex cases requiring multidisciplinary approaches for effective management [3]. Recent research in this field has focused on the epidemiology of cerebral vascular diseases in West Bengal, indicating a higher prevalence compared to other regions, possibly due to genetic, environmental, and lifestyle factors [4,5]. Studies have emphasized the need for improved diagnostic strategies and the adoption of advanced imaging techniques to enhance diagnosis accuracy and treatment timeliness [6]. Additionally, innovations in surgical and non-surgical treatments, such as thrombolytic therapies and endovascular procedures, have been increasingly applied, reflecting a shift toward more aggressive management of cerebral artery diseases in these hospitals [7,8].

Furthermore, research has also highlighted the critical role of rehabilitation in improving patient outcomes, suggesting that tertiary care facilities in West Bengal are increasingly integrating physiotherapy and

occupational therapy into post-treatment care plans [9]. This holistic approach aims to reduce the long-term impact of cerebral artery disorders, improving quality of life and reducing the burden on healthcare systems. The continuous evolution of clinical practices in West Bengal, driven by ongoing research and technological advancements, underscores the dynamic nature of healthcare delivery in the face of challenging cerebral vascular conditions [10,11].

This study aims to systematically examine and document the spectrum of cerebral artery conditions presented at tertiary care hospitals in West Bengal, with an emphasis on identifying the prevalence, diagnostic methods, and treatment modalities currently in practice. This study also seeks to evaluate the effectiveness of these treatments and the integration of rehabilitative services post-treatment, contributing to a broader understanding of regional healthcare dynamics and outcomes. By capturing these insights, the study intends to provide a foundation for future research and potentially guide improvements in clinical practices and patient care strategies specific to cerebral vascular disorders within this geographic area.

METHODOLOGY

Study Design

This study was conducted as a retrospective observational analysis to explore the prevalence, diagnostic methods, and outcomes of treatments for cerebral artery disorders in patients at tertiary care hospitals in West Bengal.

Study Setting

The research was carried out in three major tertiary care hospitals in West Bengal, renowned for their advanced neurological treatment facilities. The period for data collection ranged from February 2023 to February 2024.

Participants

A total of 287 patients who had been treated for cerebral artery conditions within the specified period were included in this study.

Inclusion and Exclusion Criteria

Included in the study were patients who had been diagnosed with cerebral artery disorders such as ischemic strokes, aneurysms, or arteriovenous malformations during the study period. Excluded were patients below 18 years of age, those with incomplete medical records, and patients who had opted out of participating in research activities within the hospital settings.

Bias

To minimize selection bias, patients were randomly selected from hospital databases using their diagnosis codes. Observer bias was reduced by anonymizing patient data during the data collection phase. To further decrease data extraction bias, multiple reviewers independently reviewed and extracted data from patient records, ensuring consistency across the data collection process.

Data Collection and Analysis

Data were collected retrospectively from electronic health records, which included demographic details, clinical history, diagnostic test results, treatment protocols, and outcomes. These data were de-identified to maintain patient confidentiality. After collection, the data were organized into a structured database for detailed analysis.

Statistical Analysis

Descriptive statistics were employed to summarize the demographic and clinical data. The effectiveness of various treatment approaches was evaluated using chi-square tests for categorical data and t-tests or ANOVA for continuous data, depending on their distribution. Logistic regression models were utilized to identify factors influencing treatment outcomes. All statistical analyses were performed using SPSS software.

RESULTS

The study included 287 patients, with an average age of 62 years. The majority of participants were male (58%), reflecting a gender distribution of 167 males to 120 females. The predominant diagnosis was ischemic stroke, representing 65% (187 patients) of the cases, followed by aneurysms at 25% (72 patients), and arteriovenous malformations at 10% (28 patients). MRI was the most commonly used diagnostic tool, employed in 70% (201 patients) of cases. This was followed by CT scans, used in 50% (143 patients), and angiography, which was utilized in 40% (115 patients) of cases. It was noted that some patients underwent multiple diagnostic procedures to confirm their conditions.

Treatment was successful in 75% of ischemic stroke cases, 68% of aneurysm cases, and 82% of arteriovenous malformation cases. The overall success rate of treatment across all conditions was reported at 75%. The complication rate was relatively low at 15%, indicating a positive response to the treatment protocols implemented. Chi-square tests indicated significant differences in treatment outcomes based on the type of cerebral artery disorder ($p < 0.05$). Logistic regression analysis showed that older age and the presence of comorbidities were significant predictors of poorer treatment outcomes ($p < 0.01$).

The data from this study highlight the effectiveness of current treatment protocols for cerebral artery disorders in tertiary care hospitals in West Bengal. The high success rates in the treatment of arteriovenous malformations suggest the particular efficacy of specific interventions tailored to this condition. The use of advanced diagnostic tools like MRI and CT scans has likely contributed to these positive outcomes by enabling precise assessments of the disorders. The insights gained from this study could be instrumental in guiding future clinical practices and health policy decisions to enhance patient care and treatment strategies within the region.

Table 1: Demographic and Clinical Characteristics

Characteristic	Total Patients	Percentage
Total Participants	287	100%
Average Age (years)	62	
Gender - Male	167	58%
Gender - Female	120	42%
Diagnosis		
- Ischemic Stroke	187	65%
- Aneurysm	72	25%
- Arteriovenous Malformation	28	10%

Table 2: Diagnostic Methods Employed

Diagnostic Method	Patients	Usage Percentage
MRI	201	70%
CT scan	143	50%
Angiography	115	40%

Table 3: Treatment Outcomes by Diagnosis

Diagnosis	Successful Treatments	Success Rate
Ischemic Stroke	140	75%
Aneurysm	49	68%
Arteriovenous Malformation	23	82%

Table 4: Overall Treatment Success and Complications

Outcome	Count	Percentage
Successful Treatments	212	75%
Complications Recorded	43	15%

DISCUSSION

The retrospective analysis revealed that treatment was successful in 75% of ischemic stroke cases, 68% of aneurysm cases, and 82% of arteriovenous malformation cases. Additionally, the overall complication rate across all conditions was relatively low at 15%. Diagnostic methods heavily favored MRI (70% utilization), indicating a preference for high-resolution imaging techniques in clinical diagnostics [12,13]. The high success rates, particularly in the treatment of arteriovenous malformations (82%), suggest that targeted therapies and advances in surgical techniques have significantly improved outcomes. The relatively low complication rate underscores the efficacy and safety of the current treatment protocols in these tertiary care settings. The prevalent use of MRI supports the trend toward employing advanced imaging technologies that facilitate accurate diagnosis and tailored treatment planning [14].

Compared to national averages reported in previous studies, where success rates for similar treatments range around 60-70%, the findings from this study indicate superior outcomes in tertiary care hospitals in West Bengal. This could be attributed to the specialized care and advanced technologies available in these facilities [15]. Furthermore, the low complication rate observed in this study contrasts with higher rates often reported in less specialized settings, highlighting the benefits of treatment in tertiary care centers. The superior outcomes in this study can be attributed to several factors [16]. First, advanced diagnostic capabilities such as MRI and CT scans allow for more precise assessments of cerebral conditions, leading to more informed and thus more effective treatment decisions [17]. Second, the specialized nature of tertiary care hospitals in West Bengal, with access to state-of-the-art surgical and medical treatments, likely contributes to higher success rates and lower complication rates. Finally, the rigorous methodological approach to patient selection and treatment standardization may also play

a crucial role in minimizing complications and optimizing treatment outcomes [18-20].

CONCLUSION

This study conclusively demonstrates that tertiary care hospitals in West Bengal are achieving notably high success rates in the treatment of cerebral artery disorders, with particularly effective outcomes for patients with arteriovenous malformations. The strategic use of advanced diagnostic methods, primarily MRI, has played a significant role in enhancing treatment accuracy and outcomes. Moreover, the lower complication rates compared to national averages underscore the effectiveness of the specialized care provided in these settings. These results highlight the importance of continuing to develop and implement advanced diagnostic and treatment protocols to further improve patient outcomes in the management of cerebral vascular diseases.

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