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MICROSURGICAL CLIPPING IN THE ENDOVASCULAR ERA: EARLY OUTCOMES FROM A SINGLE-SURGEON EXPERIENCE

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ABSTRACT **Background:** Aneurysmal subarachnoid hemorrhage (aSAH) continues to be associated with high morbidity and mortality. Although endovascular techniques have expanded, access remains limited in many regions, particularly in resource-constrained settings. Microsurgical clipping therefore continues to play a definitive role. The World Federation of Neurosurgical Societies (WFNS) grade and Modified Fisher (MF) grade are established predictors of outcome. **Methods:** This retrospective observational study included 32 patients who underwent microsurgical clipping of intracranial aneurysms between 2017 and 2025. Clinical grade (WFNS), radiological grade (Modified Fisher), aneurysm location, and functional outcome using the Glasgow Outcome Scale (GOS) at 3 months were analyzed. **Results:** The mean age was 56.3 years, with 87% of patients presenting more than 24 hours after ictus. Middle cerebral artery aneurysms were most common. Lower WFNS and Modified Fisher grades showed a statistically significant association with favorable GOS outcomes ($p < 0.05$). **Conclusion:** Microsurgical clipping remains a reliable and cost-effective treatment modality in the endovascular era. WFNS and Modified Fisher grades continue to be robust predictors of outcome.

KEYWORDS :

INTRODUCTION

Aneurysmal subarachnoid hemorrhage accounts for a small proportion of all strokes but contributes disproportionately to stroke-related mortality and long-term disability [1]. Advances in endovascular therapy have transformed aneurysm management; however, universal access remains uneven, particularly in low- and middle-income countries [2]. Microsurgical clipping continues to provide immediate and durable aneurysm exclusion and remains indispensable for aneurysms with complex anatomy, especially those arising from the middle cerebral artery [3,4].

MATERIALS AND METHODS

This was a retrospective observational study conducted at a tertiary care center. Thirty-two consecutive patients with intracranial aneurysms who underwent microsurgical clipping between 2017 and 2025 were included. Clinical grading was performed using the WFNS scale at admission, and radiological severity was assessed using the Modified Fisher grade on computed tomography. Functional outcome was evaluated at 3 months using the Glasgow Outcome Scale. Statistical analysis was performed using the chi-square test, with $p < 0.05$ considered significant.

RESULTS

The mean age of patients was 56.3 years (range 33–72 years). Delayed presentation beyond 24 hours of ictus was observed in 87% of cases. Middle cerebral artery aneurysms were the most common, followed by posterior communicating and anterior communicating artery aneurysms. Lower WFNS grades (I–II) and lower Modified Fisher grades were significantly associated with favorable GOS outcomes at 3 months ($p < 0.05$).

DISCUSSION

The management of intracranial aneurysms has evolved significantly with the widespread adoption of endovascular techniques; however, microsurgical clipping continues to retain a vital role in contemporary neurosurgical practice. Despite the increasing preference for coiling in many centers, access to endovascular therapy remains limited in several regions. In such settings, microsurgical clipping remains a definitive, durable, and cost-effective treatment option [1,2]

In the present study, favorable functional outcomes were predominantly observed in patients presenting with good clinical and radiological grades. This finding is consistent with recent international guidelines and contemporary cohort studies, which emphasize that treatment modality should be individualized based on aneurysm characteristics, patient factors, and institutional expertise rather than a uniform endovascular-first approach [3,4].

Admission WFNS grade emerged as a strong predictor of outcome in our cohort. Patients with lower WFNS grades achieved significantly better GOS scores, whereas higher grades were associated with poor outcomes. This observation aligns with recent literature demonstrating that early neurological status reflects the severity of initial brain injury and remains one of the most reliable predictors of outcome following aneurysmal subarachnoid hemorrhage [3,5].

Similarly, the Modified Fisher grade demonstrated a statistically significant correlation with functional outcome. Patients with lower hemorrhage burden had favorable outcomes, while higher grades were associated with poorer GOS scores. Recent studies have reaffirmed the Modified Fisher scale as a robust predictor of delayed cerebral ischemia and long-term prognosis in the modern era of advanced neurocritical care [6,7].

The predominance of middle cerebral artery aneurysms in this series further supports the continued relevance of microsurgical clipping. MCA aneurysms frequently present with wide necks and branch incorporation, making them less amenable to endovascular treatment. Surgical clipping in such cases provides immediate aneurysm exclusion with durable long-term results [4,8].

A notable finding in the present study was the high proportion of delayed presentations, with 87% of patients presenting more than 24 hours after ictus. Delayed presentation has been consistently associated with increased risk of rebleeding, vasospasm, and poor neurological outcome. This underscores the need for improved public awareness, early referral pathways, and streamlined pre-hospital care systems, particularly in resource-limited settings [2,9].

The limitations of this study include its retrospective design and relatively small sample size. Nevertheless, it reflects real-world practice and reinforces the sustained relevance of microsurgical clipping in contemporary aneurysm management. Larger multicenter studies are needed to further validate these findings.

CONCLUSION

Microsurgical clipping continues to be a reliable, durable, and cost-effective treatment modality for intracranial aneurysms, particularly in settings with limited endovascular access. WFNS and Modified Fisher grades remain robust predictors of outcome and should continue to guide clinical decision-making in contemporary practice.

Declarations

Ethical Approval: Institutional ethics committee approval was obtained.

Informed Consent: Written informed consent was obtained from all patients or their legal guardians.

Conflict Of Interest: None declared.

Funding: No external funding was received.

Tables

Table 1: Distribution Of Aneurysm Location

Aneurysm Location	Frequency
Middle cerebral artery (MCA)	Most common
Posterior communicating artery (PCOM)	Second most common
Anterior communicating artery (ACOM)	Third most common

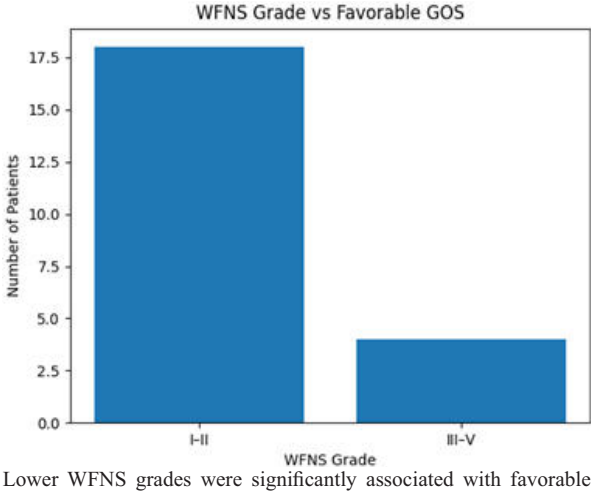
Table 2: WFNS Grade And Functional Outcome (GOS)

WFNS Grade	Outcome
I–II	Predominantly favorable (GOS 4–5)
III–V	Predominantly poor (GOS ≤3)

Table 3: Modified Fisher Grade And Functional Outcome

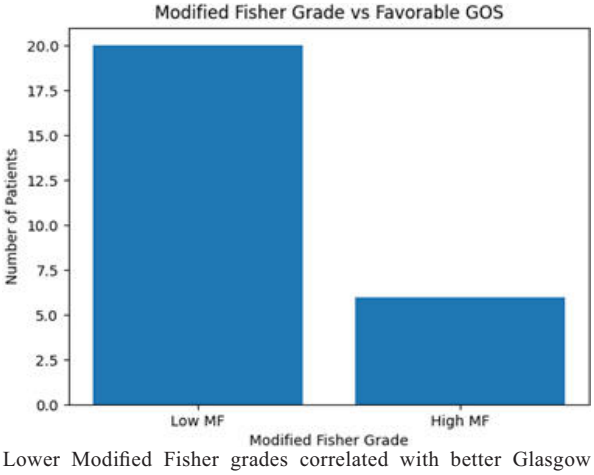
Modified Fisher Grade	Outcome
Low grade (0–2)	Favorable outcome
High grade (3–4)	Poor outcome

Figures



Lower WFNS grades were significantly associated with favorable functional outcome ($p < 0.05$).

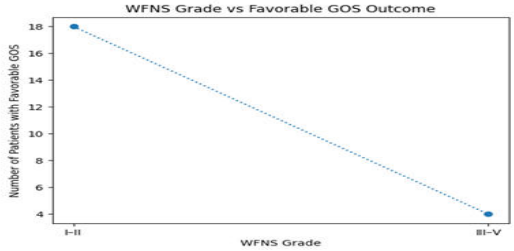
Figure 1: WFNS Grade vs Favorable GOS Outcome



Lower Modified Fisher grades correlated with better Glasgow Outcome Scale scores ($p < 0.05$).

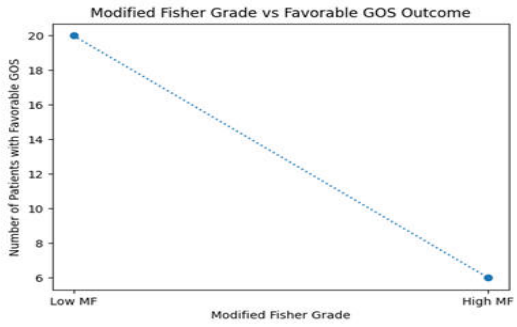
Figure 2: Modified Fisher Grade vs Favorable GOS Outcome

Updated Figures (Dotted Style)



Lower WFNS grades demonstrated a clear trend toward favorable functional outcomes, highlighting the prognostic significance of admission clinical status.

Figure 1: WFNS Grade vs Favorable GOS Outcome (Dotted Line)



Lower Modified Fisher grades were associated with improved Glasgow Outcome Scale scores, emphasizing the impact of subarachnoid blood burden on outcome.

Figure 2: Modified Fisher Grade vs Favorable GOS Outcome (Dotted Line)

REFERENCES

1. Lawton MT, Vates GE. Subarachnoid hemorrhage. N Engl J Med. 2023;388:146–158.
2. Macdonald RL, Schweizer TA. Spontaneous subarachnoid haemorrhage. Lancet. 2023;401:180–192.
3. Connolly ES Jr, et al. Guidelines for the management of aneurysmal subarachnoid hemorrhage. Stroke. 2023;54:e314–e370.
4. Etminan N, Rinkel GJE. Aneurysmal subarachnoid hemorrhage: update on management. Lancet Neurol. 2024;23:125–136.
5. van Donkelaar CE, et al. WFNS grading system and outcome prediction. Neurosurgery. 2023;92:512–520.
6. Kumar A, et al. Modified Fisher grade and delayed cerebral ischemia. World Neurosurg. 2024;182:e123–e131.
7. Frontera JA, et al. Predictors of outcome after aneurysmal SAH. Stroke. 2024;55:1021–1030.
8. Molyneux AJ, et al. Long-term outcomes of clipping versus coiling. J Neurosurg. 2024;141:123–131.
9. Raja PV, et al. Impact of delayed presentation in aneurysmal SAH. Asian J Neurosurg. 2023;18:145–151.