

Functional Outcome in Aneurysmal Subarachnoid Hemorrhage: Feasibility Study Using Neuropsychology Testing

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Introduction

Patients with aneurysmal subarachnoid hemorrhage (aSAH) suffer from cognitive changes with considerable impact on functional outcomes. Traditional outcome measures include radiological and clinical results with less attention paid to neuropsychological testing. This is a prospective pilot study for evaluation of functional outcome using serial testing of cognition, behavior, and level of independence.

Methods

Thirty consecutive patients with aSAH were enrolled. Inclusion criteria were Hunt Hess Score (HH) <3, age 18-80 years, and ability to return for follow-up. Patients were evaluated at admission and at 1, 3, 6, and 12-months by trained personnel. Cognitive assessment included the Montreal Cognitive Assessment (MOCA). Behavior assessment included the Neuropsychiatric Inventory—Questionnaire (NPI-Q). The Functional Activities Questionnaire (FAQ) assessed the pre-morbid level of independence. A multiple-measures ANOVA was used for statistical analysis.

Results

Nineteen patients had follow-up at 12 months, 21 at 6 months, and 23 at 3 months. For MOCA total score, there is a significant difference between “month 1” and “month 6,” and “month 1” and “year 1.” (p=0.0042). For FAQ, there is a significant difference between “month 1” and “month 3,” “month 1” and “month 6,” and “month 1” and “year 1.” (p=0.0527). The greater part of improvement in MOCA is from memory and is greatest from month 1 to month 6. FAQ and NPI-Q demonstrate improvement from baseline which is consistent with MOCA. Overall, most functional gains occur within the first 6 months.

Functional Outcome in aSAH patients: MOCA/NPI/FAQ Scores and ANOVA analysis

	Month 1	Month 3	Month 6	Year 1	
	n	n	n	n	
Total Subjects	30	23	21	19	ANOVA Analysis
	M (SD)	M (SD)	M (SD)	M (SD)	
MOCA- Total Score	23.7 (3.90)	24.3 (2.90)	25.6 (3.87)	25.5 (3.84)	p = .042
MOCA- Visuo Total	4.0 (0.82)	4.0 (0.85)	4.2 (0.81)	4.1 (0.85)	p = .259
MOCA- Naming Total	2.9 (0.36)	2.9 (0.29)	2.8 (0.51)	2.8 (0.37)	p = .480
MOCA- Attention Total	5.1 (1.36)	5.0 (1.22)	5.0 (1.36)	5.1 (1.52)	p = .803
MOCA- Language Total	1.7 (0.90)	1.7 (0.78)	2.2 (0.89)	2.1 (1.03)	p = .071
MOCA- Abstract Total	1.2 (0.79)	1.3 (0.71)	1.4 (0.81)	1.4 (0.69)	p = .039
MOCA- Delayed Recall Total	2.7 (1.83)	3.1 (1.74)	3.6 (1.36)	3.6 (1.50)	p = .025
MOCA- Orientation Total	5.8 (0.59)	5.8 (0.42)	6.0 (0.22)	5.9 (0.23)	p = .261
FAQ Total Score	6.4 (7.49)	2.1 (3.58)	3.5 (5.39)	2.6 (4.49)	p = .053
NPI Total	5.5 (4.71)	2.5 (3.69)	3.2 (5.39)	2.6 (4.49)	p = .216

Conclusions

Prospective analysis of functional outcomes in aSAH is feasible using trained personnel with serial neuropsychology evaluations. Memory, cognitive function, behavior, and functional activities improve at a specific and different pace and analysis of these variables can help in predicting functional recovery over time. The future intention is to expand this analysis to patients with other cerebrovascular pathology. Larger prospective studies are needed to explore the effects of treatment modalities on functional recovery and prognosis.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the trend for functional outcome in patients with aneurysmal subarachnoid hemorrhage. 2) Discuss, in small groups, prediction of functional outcome in patients with subarachnoid hemorrhage. 3) Identify any future studies that would benefit from the evaluation of functional outcome and treatment modalities. "