Vasospasm Following Pituitary Adenoma Resection: Systematic Review of Literature and Report of 3 Cases

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Introduction

Vasospasm is a known complication of aneurysmal subarachnoid hemorrhage and is a major cause of neurological morbidity and mortality. It is infrequently associated with pituitary adenoma surgery. We report three cases and present a systematic review of the literature with a view towards guiding neurosurgeons in the prevention and management of this complication.

Methods

Systematic review of literature.

Learning Objectives

The goal of this session is to: 1) Emphasize the importance of considering vasospasm as part of the differential diagnosis for patients with an altered level of consciousness following pituitary adenoma resection and 2) Present strategies for the optimal approach to preventing and managing this complication.

Table 1. Demographics and pre/post-operative tumor information

	Frequency (Percentage)
Gender	
Male	13 (50%)
Female	13 (50%)
Not specified	3
Publication date range	
1960-1969	1 (3%)
1970-1979	6 (21%)
1980-1989	4 (14%)
1990-1999	4 (14%)
2000-2011	14 (48%)
Type of tumor	
Non-functional	22 (76%)
Functional	7 (24%)
Surgical approach	
Transsphenoidal	15 (52%)
Transcranial	14 (48%)
Operative outcome	
Sub-total resection	12 (60%)*
Gross-total resection	8 (40%)*
Not specified	9 (N/A)

Table 2. Summary of diagnostic methods, management approaches, and outcomes.

	Frequency (Percentage)
Diagnostic modality	
Angiography	14 (54%)
CT perfusion/ CTA/MRA	3 (11.5%)
Trans-cranial Doppler	3 (11.5%)
Angiography + other diagnostic modality	6 (23%)†
Not specified	3
Treatment approach	
Endovascular	1 (4%)
Medical	17 (68%)
Conservative	7 (28%)
Not specified	4
Outcome	
GOS≥4	10 (40%)
GOS≤3	15 (60%)
Not specified	4

†4 had CTA/MRA, 2 had TCD

Table 3. Summary of univariate regression analysis

Independent variable	Odds ratio	95% confidence interval	p value
Age at surgery	1.02	0.96-1.09	0.53
Gender	0.69	0.12-3.78	0.67
Onset of vasospasm	0.91	0.70-1.21	0.55
Time to diagnosis	20.00	1.66-241.71	0.02
Type of tumor	0.32	0.05-2.11	0.24
Extent of resection	0.33	0.05-2.37	0.27
Surgical approach	0.58	0.12-2.95	0.51
Type of treatment	0.78	0.32-1.91	0.59
Postoperative hematoma requiring evacuation	5.50	0.84-36.22	0.08

Results

Including our experience, vasospasm complicating pituitary adenoma surgery has been documented in 29 patients (mean age of 45). All cases occurred in the setting of a postoperative hemorrhage: 21 had a subarachnoid hemorrhage and 10 had a postoperative hematoma requiring evacuation. Initial clinical appearance of delayed cerebral ischemia attributable to vasospasm occurred from postoperative days 2-13 (most commonly day 5). Digital subtraction angiography and medical management were the most common diagnostic and therapeutic strategies, respectively. Glasgow Outcome Scores were =3 in 59% of cases. Multivariate logistic regression identified later diagnosis of vasospasm and surgery for hematoma evacuation to be independently associated with better outcomes.

Conclusion: Vasospasm should be considered in the differential diagnosis of patients demonstrating altered mental or neurological status following pituitary surgery, particularly if there has been postoperative hemorrhage of any degree. Prompt treatment should be instituted to optimize outcome.