Effects of Teaching Hospital Status on Outcome of Aneurysm Treatment

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Introduction

There is increasing literature supporting the importance in triaging patients to teaching hospitals for complex surgical procedures. This study analyzes the effect of teaching hospital status on outcome of endovascular coiling and microsurgical clipping of ruptured and unruptured intracranial aneurysms using the Nationwide Inpatient Sample (NIS) database.

Methods

We analyzed patients with cerebral aneurysms using NIS 2001 to 2010. Patients with ruptured aneurysms were identified by ICD-9 codes for diagnoses of subarachnoid hemorrhage or intracerebral hemorrhage and at least one procedural code for aneurysm repair. Patients with unruptured cerebral aneurysms were identified by diagnosis code 437.3 and at least one procedural code. Multivariate linear models were used to analyze the association of in-hospital death, non-routine discharge, and length of stay with teaching hospital status, adjusting for patient age, sex, race, comorbidities, household income, time to aneurysm repair procedure, aneurysm procedure volume, hospital region and location.

Results

There were 34,843 hospitalizations for treatments of unruptured (14,763 in teaching and 1794 in non-teaching hospitals) and ruptured (15,628 in teaching and 2658 in non-teaching hospitals) aneurysms. In patients with ruptured aneurysms, the odds ratio of in-hospital death and non-routine discharges were 0.69 (95% CI 0.54-0.88) and 0.77 (95% CI 0.60-0.99) in teaching hospitals, respectively, independent of hospital aneurysm procedure volume. Moreover, the disparity in mortality rate in teaching versus non-teaching hospitals seemed even more pronounced for those treated with clipping (OR 0.62, 95% CI 0.46-0.84). These differences in outcome parameters were not observed in the unruptured population, in which mortality, non-routine discharges and length of stay were not different between those treated at teaching and non teaching hospitals.

Table 1. Adjusted odds ratios for outcome and difference in length of stay and time to procedures in patients who underwent treatment of A) ruptured and B) unruptured aneurysms in teaching versus non-teaching hospital.*

A)

	% of Patients	Odds Ratio	95% Confidence Interval	P value
Mortality	13.4			
Teaching	12.9	0.69	[0.54, 0.88]	0.003
Non-Teaching	17.5			
Non-Routine Discharges	61.0			
Teaching	59.9	0.77	[0.60, 0.99]	0.042
Non-Teaching	68.8			
	Mean Number of Days	Difference (Days)		
Length of Stay	20.4			
Teaching	20.4	0.22	[-1.48, 1.92]	0.801
Non-Teaching	20.1			

B)

	% of Patients	Odds Ratio	95% Confidence Interval	P value
Mortality	0.74			
Teaching	0.69	0.84	[0.38, 1.88]	0.677
Non-Teaching	1.18			
Non-Routine Discharges	14.9			
Teaching	14.6	1.00	[0.73, 1.36]	0.976
Non-Teaching	17.3			
	Mean Number of Days	Difference (Days)		
Length of Stay	4.70			
Teaching	4.65	0.47	[-0.26, 1.20]	0.208
Non-Teaching	5.05			

*Regression model includes covariates adjusted for patient age, sex, race, total number of comorbidities, median household income, hospital region, hospital location and average hospital volume of aneurysm procedure. Ruptured aneurysms (A) also includes time to aneurysm repair procedure as covariate.

Learning Objectives

1) Describe the effect of teaching hospital status on the outcome of patients with ruptured cerebral aneurysm

2) Discuss the use and limitations of the Nationwide Inpatient Sample database

Conclusions

Our results suggest that the teaching status of a hospital is an independent factor for favorable outcome in the treatment of ruptured aneurysms. The difference in in-hospital death is accentuated in patients who underwent microsurgical clipping.

Table 2. Adjusted odds ratios for outcome and difference in length of stay in patients with ruptured (3A) and unruptured (3B) aneurysms who had undergone endovascular coiling or microsurgical clipping based on hospital teaching status.

A)

Outcome Procedure	% of Patients		Odds Ratio	95% Confidence Interval	P Value
	Teaching	Non-Teaching			
Mortality					
Clipping	11.9	17.8	0.62	[0.46, 0.84]	0.002
Coiling	14.2	17.0	0.73	[0.51, 1.05]	0.085
Non-Routine Discharge					
Clipping	59.9	70.0	0.83	[0.61, 1.13]	0.239
Coiling	59.6	67.4	0.76	[0.57, 1.01]	0.060
	Mean Number of Days		Difference (Days)		
Length of Stay					
Clipping	21.0	20.5	1.22	[-0.86, 3.30]	0.249
Coiling	19.2	19.0	-0.32	[-2.58, 1.94]	0.782

B)

Outcome Procedure	% of Patients		Odds Ratio	95% Confidence Interval	P Value
	Teaching	Non-Teaching			
Mortality					
Clipping	0.91	1.36	0.95	[0.30, 3.05]	0.949
Coiling	0.45	1.01	0.86	[0.28, 2.62]	0.789
Non-Routine Discharge					
Clipping	23.5	29.1	0.87	[0.63, 1.20]	0.402
Coiling	8.21	10.6	0.96	[0.56, 1.64]	0.872
	Mean Number of Days		Difference (Days)		
Length of Stay					
Clipping	6.53	6.96	0.48	[-0.39, 1.36]	0.276
Coiling	2.92	3.11	0.05	[-0.83, 0.93]	0.904

References

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