Annual Meeting of the AANS/CNS Cerebrovascular Section
Held in conjunction with the
4th SNIS International Endovascular Stroke Conference (IESC)
February 10-11, 2014
Hard Rock Hotel
San Diego, CA

National Trends in Utilization & Outcomes of Angioplasty and Stenting for Intracranial Stenosis

Taylor Anne Wilson; Omar Tanweer MD; Howard A. Riina MD, FACS
Department of Neurosurgery, New York University School of Medicine

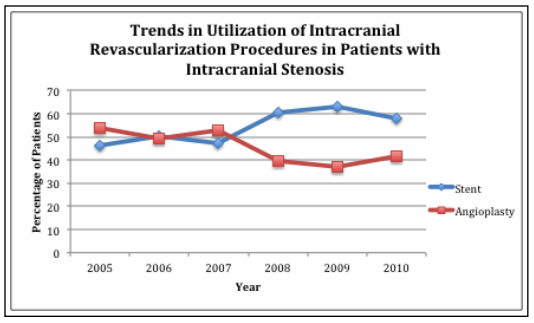
NYU Langone MEDICAL CENTER

Introduction

Angioplasty and intracranial stenting (ICS) are both endovascular revascularization procedures that have emerged as treatment options for intracranial atherosclerotic disease (ICAD). Some have suggested that angioplasty alone is an alternative to angioplasty with ICS. The role of these procedures for treatment of ICAD, however, remains unclear. This study examines recent trends in utilization and outcomes of angioplasty alone and ICS in the United States using a population-based cohort.

Methods

The National Inpatient Sample (NIS) database was queried for patients with ICAD who underwent angioplasty or ICS from 2005-2010. Patient demographics, characteristics, perioperative complications and discharge data were collected.



Results

During 2005-2010, the NIS captured 1,115 patients (angioplasty: n = 495, ICS: n = 620) with ICAD underwent endovascular revascularization. Over time, the total number of endovascular revascularization procedures increased. There was an increase in the percentage of symptomatic patients (p = 0.015) as well as in the number of comorbidities of patients treated (p < 0.001). Combined post-procedure stroke and death rates were 16% and 28.9% for angioplasty and ICS, respectively (p<0.001). Comparing by procedure, a larger percentage of angioplasty patients presented symptomatically compared to those who underwent ICS (p<0.001).

Trends in Revascularization for Intracranial Stenosis from 2005-2010

	Earlier Years (2005-2006)	Middle Years (2007-2008)	Later Years (2009-2010)	p-value
Total # of Pts	294	374	447	
Age (mean +/- SD)	61.8 +/- 14.8 yrs	61.5 +/- 14.9 yrs	62.3 +/- 14.6 yrs	0.832
Gender				0.301
Male	46.9%	52.1%	51.2%	
Female	53.1%	47.9%	48.8%	
Race				0.008
White	69.9%	68.0%	65.0%	
Black	19.9%	13.4%	15.7%	
Hispanic	6.2%	10.0%	9.4%	
Asian	3.1%	5.5%	5.0%	
Other	0.9%	3.1%	5.0%	
CMs (mean +/- SD)	2.2 +/- 1.4 CMs	2.4 +/- 1.6 CMs	2.7 +/- 1.6 CMs	<0.001
No CMs	10.9%	9.6%	5.1%	<0.001
1-3 CMs	71.4%	68.7%	65.3%	
≥4 CMs	17.7%	21.7%	29.5%	
Presentation				0.015
Asymptomatic	36.4%	33.4%	26.8%	
Symptomatic	63.6%	66.6%	73.2%	
Admission				0.443
Non-Elective	74.5%	72.2%	76.5%	
Elective	25.5%	27.8%	23.5%	
Hosp. Teach. Status				0.001
Non-Teaching	23.3%	10.2%	11.3%	
Teaching	76.7%	89.8%	88.7%	
Procedure				0.004
Stent	49.0%	55.6%	60.0%	
Angioplasty	51.0%	44.4%	40.0%	
Complications				
Stroke	6.5%	12.8%	7.8%	0.796
Death	12.9%	12.0%	12.8%	0.981
Discharge				0.118
Home	59.3%	53.2%	52.6%	
Transfer	40.8%	46.8%	47.4%	
Payer				0.511
Public	51.0%	52.9%	55.0%	
Private	38.4%	36.6%	33.8%	
Other	10.5%	10.4%	11.2%	
LOS				0.120
Median	6 days	8 days	7 days	
IQR	2-13 days	3-15 days	4-15 days	

Comparison of Intracranial Stenting and Angioplasty for Revascularization in Patients with Intracranial Stenosis

	Stent Patients	Angioplasty Patients	p-value
Total # of Pts	620	495	
Age (mean +/- SD)	62.3 +/- 14.3 yrs	61.4 +/- 15.0 yrs	0.217
Gender			0.022
Male	53.5%	46.5%	
Female	46.5%	53.5%	
Race			0.639
White	67.1%	67.7%	
Black	17.4%	14.2%	
Hispanic	8.5%	9.1%	
Asian	4.1	5.4%	
Other	3.0%	3.8%	
CMs (mean +/- SD)	2.4 +/- 1.6 CMs	2.5 +/- 1.6 CMs	0.179
No CMs	8.4%	7.9%	0.738
1-3 CMs	68.7%	67.3%	
≥4 CMs	22.9%	24.8%	
Presentation			<0.001
Asymptomatic	38.2%	23.2%	
Symptomatic	61.8%	76.8%	
Admission			<0.001
Non-Elective	66.3%	83.6%	
Elective	32.7%	16.4%	
Hosp. Teach. Status			0.495
Non-Teaching	13.0%	14.7%	
Teaching	87.0%	85.3%	
Complications			
Stroke	7.9%	10.7%	0.131
Death	8.1%	18.2%	<0.001
Discharge			<0.001
Home	64.8%	40.2%	
Transfer	35.2%	59.8%	
Payer			0.425
Public	54.7%	51.5%	
Private	35.5%	36.6%	
Other	9.8%	11.9%	
LOS			<0.001
Median	6 days	9 days	
IQR	2-10 days	4-17 days	
Total Charges			<0.001
Median	$125,425	$169,134	
IQR	$52,078-144,927	$64,388-211,163	

Multivariate Analysis for Predictors of Outcomes

	Odds Ratio (OR)	p-value
Post-Procedure Stroke		
Symptomatic Pres.	5.2	<0.001
Death		
Age	-	
Symptomatic Pres.	10.6	<0.001
Angioplasty	1.9	0.001

Multivariate Analysis for Predictors of Hospital Utilization

	p-value
Length of Stay	
Age	<0.001
Comorbidities	<0.001
Symptomatic Pres.	<0.001
Angioplasty	0.006
Post-Procedure Stroke	<0.001
Total Charges	
Age	<0.001
Comorbidities	<0.001
Symptomatic Pres.	<0.001
Angioplasty	0.011
Post-Procedure Stroke	<0.001

Conclusions

Although both angioplasty and ICS experienced an increase in utilization over time, the increase in utilization of ICS surpassed that of angioplasty. Angioplasty appears to be associated with higher rates of peri-procedural complications; however, that may represent patient selection bias. Further studies are needed to identify patients who would benefit from revascularization and to clarify the roles of angioplasty and ICS.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe and discuss in small groups the national trends in utilization and outcomes of endovascular revascularization procedures for ICAD, and 2) Identify treatment options, both endovascular and alternative, for ICAD.

References

1. HCUP Nationwide Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). 2004-2010. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/nisoverview.jsp