Stable Coronary Artery Disease as the Indication for Coronary Stenting is Associated with a Reduced Risk of Gastrointestinal Bleeding Compared to Acute Coronary Syndrome

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BACKGROUND

- Dual anti-platelet therapy (DAPT) increases the risk of a gastrointestinal bleed (GIB) after coronary stenting.

OBJECTIVE & HYPOTHESIS

- We aimed to determine whether acute coronary syndrome (ACS) compared to stable coronary artery disease (CAD) was associated with an increased risk of a GIB following coronary stenting at 180 days.
- We hypothesized that ACS would be associated with an increased odds of a GIB after coronary stenting.

METHODS

- Retrospective study across Mayo Clinic Florida between January 2015 and December 2021.
- Inclusion criteria: 1) successful coronary stenting, 2) initiation of DAPT, 3) age 18 years or older.
- Exclusion criteria: if any of the above not met or lost to follow up at 180 days.
- The primary outcome was the incidence of a GIB following coronary stenting at 180 days.
- Univariable analysis performed using Wilcoxon Rank Sum Test or Fisher Exact Test.
- Multivariable Logistic Regression Analysis with Bootstrap Resampling and Kaplan-Meier Estimates were performed.

CONCLUSIONS

- In this single-center retrospective cohort study, moderate alcohol use, acute coronary syndrome, hemoglobin < 10 g/dL at coronary stenting, and obesity were associated with a GIB after coronary stenting.
- Stable CAD as the indication for coronary stenting was associated with a 49% decreased odds of a GIB.
- Most patients (91.2%) are continued on their DAPT following their index GIB after coronary stenting.
- This study suggests coronary stenting for stable CAD before the manifestations of ACS could prevent the incidence of GIB.

Coronary stenting for ACS compared to stable CAD is associated with a 95% increased odds of a GI Bleed at 6 months.

Table 1: Baseline Characteristics of All Patients.

Median (IQR) or Fraction (%)	All Patients N=506	No GIB N=338	GIB N=168	p-value
Age at Coronary Stent Placement	72.2 (65.6-79.5)	71.8 (65.0-79.2)	73.2 (66.3-80.4)	0.223
Male gender	348 (68.8%)	237 (70.1%)	111 (66.1%)	0.361
White Race	491 (97.0%)	327 (96.7%)	164 (97.6%)	0.782
Hispanic Ethnicity	5 (1.0%)	4 (1.2%)	1 (0.6%)	1.000
Never Smoker	174 (34.4%)	125 (37.0%)	49 (29.2%)	0.091
Body Mass Index	29.2 (25.8-33.9)	29.9 (26.3-34.7)	28.6 (24.5-32.7)	**0.017**
Obesity	232 (45.9%)	168 (49.7%)	64 (38.1%)	**0.014**
Comorbidities – defined as per HAS-BLED				
Hypertension	447 (88.3%)	298 (88.2%)	149 (88.7%)	1.000
Chronic Kidney Disease	105 (20.8%)	62 (18.3%)	43 (25.6%)	0.063
Liver Disease	83 (16.4%)	59 (17.5%)	24 (14.3%)	0.444
History of stroke	99 (19.6%)	70 (20.7%)	29 (17.3%)	0.406
Prior Major Bleeding	208 (41.1%)	145 (42.9%)	63 (37.5%)	0.251
Labile INR	166 (32.8%)	108 (32.0%)	58 (34.5%)	0.615
Age > 65	384 (75.9%)	253 (74.9%)	131 (78.0%)	0.508
Medication predisposing to bleeding	506 (100%)	338 (100%)	168 (100%)	NA
Alcohol use	77 (15.2%)	41 (12.1%)	36 (21.4%)	**0.008**
HAS-BLED score	4 (3-5)	4 (3-5)	4 (3-5)	0.492
Coronary Catheterization Data				
Pre-catheterization Endoscopy Performed	79 (15.6%)	51 (15.1%)	28 (16.7%)	0.697
Indication for coronary catheterization				
• Acute Coronary Syndrome	264 (52.2%)	158 (46.7%)	106 (63.1%)	**<0.001**
○ NSTEMI	183 (36.2%)	108 (32.0%)	75 (44.6%)	**0.006**
○ STEMI	81 (16.0%)	50 (14.7%)	31 (18.5%)	0.305
• Stable CAD	242 (47.8%)	180 (53.3%)	62 (36.9%)	**<0.001**
Number of Stents Placed	1 (1-2)			
Hemoglobin prior to catheterization	12.6 (10.7-14.2)	12.9 (11.0-14.2)	12.1 (10.3-14.0)	**0.019**
• Hemoglobin < 10 g/dL	72 (14.2%)	37 (10.9%)	35 (20.8%)	**0.004**
Medications After Catheterization				
Proton pump inhibitor	228 (45.1%)	141 (41.7%)	87 (51.8%)	**0.037**
SSRI	60 (11.9%)	43 (12.7%)	17 (10.1%)	0.466
NSAIDs	5 (1.0%)	4 (1.2%)	1 (0.6%)	1.000
Anticoagulation	158 (31.2%)	100 (29.6%)	58 (34.5%)	0.264

Table 2: Multivariable Logistic Regression Models for Acute GIB After Coronary Stenting at 180 days.

Multivariable Logistic Regression Models With Bootstrap Resampling of 2,000 samples												
	Model 1: 6 variables, AIC: 617.7102, AUROCC (95% CI) 0.664 (0.614-0.714)			Model 2: 7 variables, AIC: 619.6446, AUROCC (95% CI) 0.666 (0.616-0.716)			Model 3: 8 variables, AIC: 620.6700, AUROCC (95% CI) 0.666 (0.615-0.716)			Model 4: 9 variables, AIC: 622.0386, AUROCC (95% CI) 0.667 (0.617-0.717)		
Variable	OR (95% CI)	P	Coefficient (95% CI)	OR (95% CI)	P	Coefficient (95% CI)	OR (95% CI)	P	Coefficient (95% CI)	OR (95% CI)	P	Coefficient (95% CI)
(Intercept)	0.32 (0.21-0.48)	<0.001	- 1.140 (-1.591- -0.751)	0.32 (0.21-0.48)	**<0.001**	- 1.140 (-1.1574- -0.766)	0.38 (0.23-0.63)	**<0.001**	- 0.989 (-1.537- -0.507)	0.32 (0.17-0.61)	**<0.001**	- 1.145 (-1.858- -0.527)
Obesity	0.62 (0.42-0.91)	0.0164	- 0.480 (-0.879- -0.0.94)	0.63 (0.42-0.93)	**0.0196**	- 0.478 (-0.896- -0.103)	0.63 (0.42-0.93)	**0.0207**	- 0.475 (-0.900- -0.089)	0.63 (0.42-0.93)	**0.0214**	- 0.472 (-0.907- -0.060)
Alcohol Use	1.97 (1.19-3.29)	0.0091	+ 0.680 (0.188-1.201)	1.98 (1.19-3.31)	**0.0087**	+ 0.679 (0.193-1.186)	2.07 (1.23-3.48)	**0.0061**	+ 0.719 (0.214-1.243)	2.08 (1.24-3.50)	**0.0057**	+ 0.724 (0.218-1.240)
Prescribed Proton Pump Inhibitor	1.60 (1.06-2.41)	0.0256	+ 0.468 (0.052-0.913)	1.59 (1.05-2.43)	**0.0294**	+ 0.478 (0.075-0.927)	1.57 (1.03-2.40)	**0.0343**	+ 0.467 (0.037-0.926)	1.57 (1.03-2.40)	**0.0348**	+ 0.466 (0.009-0.922)
Stenting for Acute Coronary Syndrome	1.95 (1.32-2.89)	<0.001	+ 0.668 (0.271-1.104)	1.93 (1.31-2.86)	**0.0010**	+ 0.667 (0.287-1.097)	1.91 (1.29-2.84)	**0.0012**	+ 0.658 (0.289-1.075)	1.92 (1.30-2.86)	**0.0011**	+ 0.665 (0.300-1.107)
Hemoglobin < 10 g/dL at Stenting	2.00 (1.17-3.41)	0.0110	+ 0.691 (0.137-1.280)	2.05 (1.18-3.56)	**0.0106**	+ 0.708 (0.159-1.305)	2.03 (1.17-3.53)	**0.0115**	+ 0.701 (0.103-1.352)	2.02 (1.16-3.51)	**0.0124**	+ 0.694 (0.092-1.291)
Major Bleed Prior to Catheterization	0.68 (0.45-1.03)	0.0684	- 0.385 (-0.830-0.035)	0.68 (0.44-1.03)	0.0706	- 0.375 (-0.813-0.034)	0.67 (0.44-1.02)	0.0617	- 0.388 (-0.824-0.022)	0.67 (0.44-1.02)	0.0634	- 0.385 (-0.837-0.019)
Pre-Catheterization Endoscopy Performed	NA	NA	NA	0.94 (0.52-1.66)	0.8344	- 0.0750 (-0.715-0.534)	0.95 (0.53-1.67)	0.8570	- 0.067 (-0.729-0.522)	0.97 (0.54-1.71)	0.9059	- 0.048 (-0.677-0.588)
Male Gender	NA	NA	NA	NA	NA	NA	0.80 (0.53-1.22)	0.2949	- 0.212 (-0.638-0.218)	0.81 (0.53-1.23)	0.3139	- 0.203 (-0.643-0.241)
Age > 65 years	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.20 (0.76-1.91)	0.4505	+ 0.186 (-0.254-0.700)

RESULTS

- A total of 168/506 patients (33.2%) had a GIB after coronary stenting at 180 days.
- Of the 168 patients who had a GIB, 166 (98.8%) were still on DAPT at the time of GIB. Of these 166 patients, **only 14 (8.4%)** had their P2Y12 inhibitor discontinued at discharge from the hospital.
- On univariable analysis, obesity, moderate alcohol use, acute coronary syndrome, proton pump inhibitor, and hemoglobin < 10 g/dL were significantly associated with a GIB at 180 days. **Table 1.**
- On multivariable logistic regression analysis, stenting for ACS was associated with a 95% increased odds of a GIB. Inversely, stable CAD was associated with a 49% decreased odds [OR 0.51, 95% CI: 0.35-0.76, p <0.001] of a GIB. Adjusting for male gender, age > 65 years, and whether a pre-catheterization endoscopy was performed within 6 months did not change the significance. **Table 2.**
- Following coronary stenting, 25% of patients had a GIB at 36 days, 41 days, or 159 days for NSTEMI, STEMI, or stable CAD, respectively, p = 0.0015. **Figure 1.**

Figure 1: Cumulative Incidence of GIB by Indication for Coronary Stenting at 180 days Following Coronary Stenting.