Morbidity and Mortality Associated With Preoperative Therapeutic Anticoagulation and Revisional Bariatric Surgery

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Background

- Revisional bariatric surgery is becoming more prevalent over time, and the complexity of the patients undergoing these procedures is expanding
- The outcomes of patients who are on therapeutic anticoagulation prior to revisional bariatric surgery has not yet been investigated
- The objective of this study is to compare the impact of preoperative therapeutic anticoagulation on complications and outcomes of revisional bariatric procedures

Methods

- Between 2015 to 2019 a total of 147,430 patients in the MBSAQIP database underwent a revisional bariatric surgery
  - 5,103 patients were on therapeutic anticoagulation pre-operatively
- Retrospective multivariate analysis was performed to examine:
  - post-operative pulmonary embolus
  - post-operative venous thromboembolism
  - intra/post-operative transfusion
  - unplanned intensive care unit (ICU) admission
- Outcomes investigated:
  - length of stay greater than 2 days
  - death within 30 days
  - reoperation within 30 days
  - intervention within 30 days
  - readmission within 30 days of revisional bariatric surgery
- Analyses of complications and outcomes were adjusted for influencing demographics*

*Multivariate analysis: adjusted for sex, age, race, preop BMI, CRF, steroid, diabetes, smoking, COPD, OSA, ASA class

Variable	Pre-operative Therapeutic Anticoagulation N=5,103		No Pre-operative Therapeutic Anticoagulation N=142,327	
Sex	Female	3,861 (75.66%)	Female	113,697 (79.88%)
	Male	1,242 (24.33%)	Male	20,077 (14.10%)
	Unknown	0 (0%)	Unknown	8,553 (6.00%)
Age (Mean +/- SD)	55.27 +/- 11.90		49.16 +/- 11.31	
	Unknown n=15		Unknown n=125	
Race	White	4,342 (85.08%)	White	105,150 (73.87%)
	Black	726 (14.22%)	Black	24,379 (17.12%)
	Other	35 (0.68%)	Other	1,281 (0.90%)
	Unknown	279 (5.46)	Unknown	11,517 (8.09%)
Pre-operative BMI in kg/m^2 (Mean +/- SD)	42.40 +/- 10.30		41.48 +/- 9.05	
	Unknown n=114		Unknown n=3,044	
ASA Class	I	3 (0.05%)	I	779 (0.54%)
	II	455 (8.91%)	II	42,906 (30.14%)
	III	4,023 (78.83%)	III	93,931 (65.99%)
	IV	560 (10.97%)	IV	3,656 (2.56%)
	V	7 (0.13%)	V	37 (0.02%)
	Unknown	55 (1.07%)	Unknown	1,018 (0.71%)
Chronic Renal Failure (CRF)	Yes	131 (2.56%)	Yes	721 (0.50%)
	No	4,972 (94.78%)	No	141,606 (99.49%)
Chronic Steroid Use	Yes	266 (5.21%)	Yes	2,849 (2.00%)
	No	4,837 (94.78%)	No	139,478 (97.99%)
Diabetes	No	3,436 (67.33%)	No	115,996 (81.49%)
	Non-insulin	919 (18.00%)	Non-insulin	18,069 (12.69%)
	Insulin	748 (14.65%)	Insulin	8,262 (5.80%)
Smoker	Yes	407 (7.97%)	Yes	11,259 (7.91%)
	No	4,696 (92.02%)	No	131,068 (92.08%)
Chronic Obstructive Pulmonary Disease (COPD)	Yes	315 (6.17%)	Yes	2,077 (1.45%)
	No	4,788 (93.82%)	No	140,250 (98.54%)
Obstructive Sleep Apnea (OSA)	Yes	2,367 (46.38%)	Yes	39,209 (27.54%)
	No	2,736 (53.61%)	No	103,118 (72.45%)

Table 2 - Multivariate analysis of 30-day complications by preoperative anticoagulation

	Pre-Op AC n= 5,103	No Pre-Op AC n=142,327	OR (95%CI)	P-value
Post-operative Pulmonary Embolus	12 (0.23%)	245 (0.17%)	1.02 (0.54-1.94)	0.94
Post-operative Venous Thromboembolism Requiring Anticoagulation	30 (0.58%)	333 (0.23%)	2.13 (1.40-3.21)	0.0004
Transfusion Intra/post-operative (up to 72 hours)	181 (3.54%)	1,646 (1.15%)	2.66 (2.24-3.15)	<0.0001
Greater than 2 units of blood transfused	53 (29.44%)	462 (28.20%)	2.27 (1.66-3.10)	<0.0001
Unplanned ICU Admission	218 (4.27%)	1,740 (1.22%)	2.51 (2.14-2.93)	<0.0001

Table 3 - Multivariate analysis of 30-day outcomes by preoperative anticoagulation

	Pre-Op AC n= 5,103	No Pre-op AC n=142,327	OR (95%CI)	P-value
Length of Stay Greater than 2 days	1,566 (30.70%)	23,171 (16.28%)	1.95 (1.83-2.09)	<0.0001
Intraoperative/post-op Death within 30 days	49 (0.96%)	229 (0.16%)	3.03 (2.14-4.27)	<0.0001
Reoperation within 30 days of OR	254 (4.97%)	3,615 (2.53%)	1.85 (1.61-2.13)	<0.0001
Readmission within 30 days of OR	580 (11.36%)	7,858 (5.52%)	2.01 (1.83-2.21)	<0.0001
Intervention within 30 days of OR	298 (5.83%)	3,427 (2.40%)	2.27 (2.00-2.59)	<0.0001

Results

Demographics (see Table 1):

- Mean body mass index (BMI) of pre-op AC group was 42.40 (+/-SD 10.30) vs. 41.48 (+/-SD 9.05) for the non pre-op AC group
- Mean age of 55.27 years (+/- SD 11.90 years) in pre-op AC group vs. 49.16 years (+/- SD 11.31 years) in non pre-op AC group

Complications: (see Table 2):

- Patients on pre-operative therapeutic AC were found to be at higher risk for:
  - post-operative VTE
  - intra/post-operative transfusion
  - greater than 2 units of packed red blood cells (pRBC) transfused
  - unplanned ICU admission
- There was no difference in odds of post operative PE

Outcomes (see Table 3):

- Patients on pre-operative therapeutic AC were found to be at higher risk for:
  - length of stay greater than 2 days
  - intra/post-operative death
  - reoperation within 30 days
  - intervention within 30 days
  - readmission within 30 days

Conclusions

- Patients who are receiving preoperative therapeutic anticoagulation have worse morbidity and mortality when undergoing revisional bariatric surgery
- This data provides reason for bariatric surgeons to be aware of the preoperative anticoagulation status of their patients when considering them for a revisional bariatric procedure