# A ROBOTIC-ASSISTED APPROACH MAY REDUCE RISK OF VENOUS THROMBOEMBOLISM AFTER MIIMALLY INVASIVE BARIATRIC SURGERY

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## INTRODUCTION

- Severe obesity is a risk factor for venous thromboembolism (VTE)
- While minimally invasive techniques reduce the risk of VTE compared to open surgery, few studies have described the risk for VTE after robotic bariatric surgery compared to laparoscopic bariatric surgery

## OBJECTIVE

- The primary endpoints were to compare rates of deep venous thrombosis (DVT), pulmonary embolism (PE) and determine the VTE risk with robotic-assisted surgery in relation to conventional laparoscopy.

## METHODS

- MBSAQIP (2015-2018) data was retrospectively reviewed
- Adults (≥18 years of age) who had primary laparoscopic sleeve gastrectomy (LSG) or Roux-en-Y gastric bypass (LRYGB) were included
- Patients were excluded if they had:
  - Any prior obesity surgery; revision or conversion procedure
  - Open or converted to open surgery
  - Were lost to follow-up within 30 days after index procedure
  - Records with missing data
- Patients meeting criteria were stratified into two main groups:
  - All laparoscopic bariatric surgery groups (LSG and LRYGB)
  - All robotic bariatric surgery groups (RSG and RRYGB)
- Perioperative factors and 30-day postoperative outcomes were assessed
- DVT was defined by reported cases with either postoperative VT requiring therapy or anticoagulation initiated for presumed/confirmed VT
- As a sub-analysis, we compared 30-day postoperative outcomes between LSG vs. RSG and LRYGB vs. RRYGB

## RESULTS

**Table 1:** Demographic and Operative Factors

| Factors | Laparoscopic (N=462,880) | Robotic (N=41,462) |
|---|---|---|
| Age, median [Q1-Q3], y | 44 [35.4-53] | 44.3 [35.9-53.3] |
| BMI, median [Q1-Q3], kg/m2 | 44.1 [40.2-49.5] | 44.2 [40.2-49.6] |
| Black or African American, n (%) | 83377 (18) | 8561 (20.6) |
| Female Sex, n (%) | 367836 (79.5) | 33322 (80.4) |
| Hispanic, n (%) | 59815 (12.9) | 4750 (11.5) |
| History of MI, cardiac surgery or other, n (%) | 14384 (3.1) | 1298 (3.1) |
| COPD | 7657 (1.7) | 745 (1.8) |
| Renal insufficiency or dialysis, n (%) | 3643 (0.8) | 281 (0.7) |
| Diabetes mellitus, n (%) | 120952 (26.1) | 11340 (27.4) |
| Hyperlipidemia, n (%) | 109787 (23.7) | 10063 (24.3) |
| Hypertension, n (%) | 223196 (48.2) | 20461 (49.3) |
| Obstructive sleep apnea, n (%) | 179974 (38.9) | 16305 (39.3) |
| PE, n (%) | 5568 (1.2) | 475 (1.1) |
| DVT, n (%) | 7661 (1.7) | 624 (1.5) |
| Smoking, n (%) | 39720 (8.6) | 3530 (8.5) |
| Therapeutic anticoagulation | 12412 (2.7) | 1146 (2.8) |
| Operative length, median [Q1-Q3], min. | 72 [52-103] | 103 [75-139] |
| Sleeve gastrectomy, n (%) | 335473 (72.5) | 29836 (72) |
| Gastric bypass, n (%) | 127407 (27.5) | 11626 (28) |



Superficial SSI
Blood transfusion

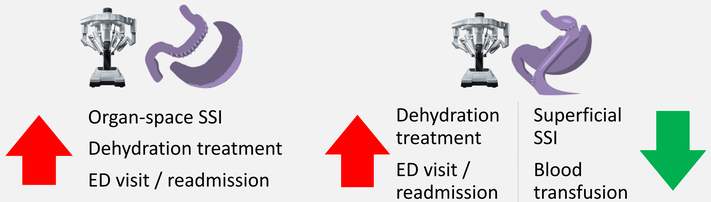
Operative length
Organ-space SSI
Dehydration treatment
ED visit / readmission
Reoperation / intervention

**Figure 1:** Unadjusted analysis. Significant (P<0.05) 30-day post-operative complications associated with robotic vs. laparoscopic bariatric surgery.

**Table 2:** Multiple Logistic Regression Analysis

| Variable | Adjusted Odds Ratio (95% CI) DVT as the outcome | PE as the outcome |
|---|---|---|
| Age | 1.07 (1.00, 1.01) | 1.01 (1.00, 1.01) |
| BMI | 1.02 (1.01, 1.02) | 1.02 (1.01, 1.02) |
| Male sex | 1.16 (1.04, 1.30) | 1.11 (1.01, 1.22) |
| Totally dependent* | 2.37 (1.44, 3.90) | 1.97 (1.27, 3.04) |
| Therapeutic anticoagulation | 2.06 (1.69, 2.50) | 2.26 (1.93, 2.65) |
| History of DVT | 3.20 (2.59, 3.94) | 3.28 (2.76, 3.89) |
| History of PE | 2.07 (1.64, 2.63) | 1.95 (1.60, 2.37) |
| Operation length (minutes) | 1.00 (1.00, 1.00) | 1.00 (1.00, 1.00) |
| Robotic-assisted approach** | 0.81 (0.68, 0.97) | 0.86 (0.75, 0.99) |

*References: *Independent functional status and ** laparoscopic bariatric surgery groups. Other included control variables were diabetes, ethnicity/race, functional status, hypertension, surgical approach, and therapeutic anticoagulation.*



Organ-space SSI
Dehydration treatment
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Dehydration treatment
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Superficial SSI
Blood transfusion

**Figure 2:** Unadjusted analysis. Significant (P<0.05) 30-day post-operative complications associated with RSG vs. LSG (left) and RRYGB vs. LRYGB.

## Conclusions

- Approximately 2% of patients develop VTE after minimally invasive bariatric surgery
- Robotic-assisted surgery showed a lower rate of DVT and PE compared to laparoscopic surgery.