Bariatric Surgery with Zero Perioperative Mortality In a Teaching Institution. Detailed Analysis of Perioperative Outcomes of 3273 Consecutive Patients.

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Introduction

Laparoscopic bariatric surgery is well accepted for the treatment of morbid obesity. The purpose of this study was to evaluate perioperative outcomes and provide an update on improved safety of bariatric procedures performed in a teaching institution with minimal morbidity and mortality.

Materials & Methods

Perioperative data from a detailed, prospectively collected database was analyzed for each bariatric procedure as well as for all procedures collectively. All patients were evaluated in a multidisciplinary setting using the same clinical pathways. All patients met the National Institute of Health (NIH) criteria for bariatric surgery. All operations were performed by a single surgeon (PG) with the assistance of surgical residents. **In this study, we used perioperative mortality and reoperations as the ultimate outcomes studied, since both represent the most important and visible quality and safety measures.**

- **Study Design:** Retrospective analysis of prospectively collected data.
  - Population: 3,273 consecutive laparoscopic bariatric operations (2001-2024).
  - Setting: New York-Presbyterian Brooklyn Methodist Hospital.
  - Criteria: All patients met NIH criteria and underwent a standardized multidisciplinary preoperative evaluation

- **Outcome Measures: Perioperative mortality and reoperations.**
  Patient Demographics
  - Mean Age: 41.7 years (15-75)
  - Female: 85.8%
  - Mean BMI: 46.7 kg/m² (35-73)

Procedures Performed:
- **Laparoscopic Roux-en-Y Gastric Bypass (LRYGB):** 710
  - Stapled (circular staple / EEA) gastrojejunal (GJ) anastomosis: 434
  - Hand-sewn GJ anastomosis: 276
- **Laparoscopic Adjustable Gastric Band (LAGB):** 429
- **Laparoscopic Sleeve Gastrectomy (LSG):** 1,669
- **Revisions & Secondary Bariatric Surgeries:** 465

Preoperative Evaluation

- ✓ All patients met NIH criteria for Bariatric Surgery
- ✓ All were evaluated in the multidisciplinary setting
- ✓ Therapeutic options were given (Sleeve vs RYGB vs Lap-Band vs Medical / GLP1 more recently)
- ✓ Extensive informed consent was obtained
- ✓ Understanding of the surgery was documented in a form of a test
- ✓ Support group and education seminar attendance were strongly encouraged
- ✓ Prospective database - severity of symptoms, comorbidities and quality of life (QOL) documented
- ✓ Perioperative data were all recorded
- ✓ Intensive follow-up for life was encouraged

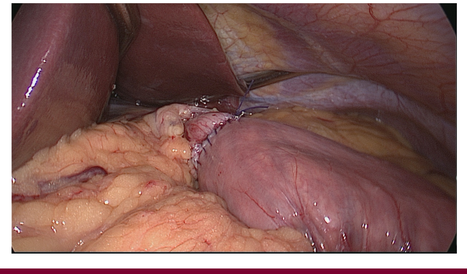


Figure 1

Recent 276 patients – hand sewn GJ anastomosis over 34 F gastric lavage tube, 3.0 Vicryl two layers, Intraoperative leak test with air insufflation and methylene blue instillation, no drain.

Leaks - 0

Results

Between August 2001 and July 2024, 3271 consecutive laparoscopic bariatric operations were performed, including 710 primary Roux-en-Y gastric bypasses (LRYGB), 429 primary adjustable gastric bands (LAGB), 1669 primary sleeve gastrectomies (LSG) and 463 secondary bariatric surgeries and revisions. All bariatric procedures were approached laparoscopically (2552 procedures were stapled and 719 were non stapled). **All reoperations and major perioperative complications were presented at the departmental educational (Morbidity and Mortality) and quality improvement conferences**. The mean patient age was 41.7 years (15 -75), females represented 85.8 % and mean BMI was 46.66 kg/m2 (35-73).

There were no perioperative mortalities, no conversions to open surgery in any elective procedure and no intraoperative blood transfusions. In addition, there were no accidental organ resection or retained foreign bodies. There we two major intraoperative complications (hypopharyngeal perforation-1, malignant hyperthermia-1). Mean hospital stay was 1.85 days (0-40 days). Sixteen patients (0.49%,11 in gastric bypass group and five in LSG group) required 30-day reoperations for postoperative complications (staple line gastrointestinal or peritoneal hemorrhage - 6, anastomotic leak- 4, strangulated port site hernia-1, unexplained abdominal pain-1, intestinal obstruction -2, retained hiatal hernia -1, and intraabdominal abscess -1). There were no 1-year mortalities in patients that required reoperation.

Figure 2

Intraoperative complications - 3273 consecutive laparoscopic bariatric patients

12 Patients had 12 (0.36%) intraoperative complications

5 Intraoperative complications occurred in the first 100 patients (all LRYGB stapled anastomosis - SA)

Intraoperative Complications/ Major complications - in Bold	LRYGB SA	LRYGB HSA	LAGB	LSG	Revision	Total
Number #	434	276	429	1669	465	3273
Mortality	0	0	0	0	0	0
Conversion to laparotomy	0	0	0	0	0	0
Liver laceration (minor)	2 (0.46 %)	0	1 (0.23%)	1 (0.06%)	0	4 (0.12%)
Stapling of nasogastric tube	1 (0.23 %)	0	0	0	0	1 (0.03%)
Stapling temperature probe	2 (0.46 %)	0	0	0	0	2 (0.06%)
Incomplete division of the stomach	1 (0.23 %)	0	0	0	0	1 (0.03%)
Linear stapler malfunction	2 (0.46 %)	0	0	0	0	2 (0.06%)
Malignant Hyperthermia	**0**	**0**	**1 (0.23%)**	**0**	**0**	**1 (0.03%)**
Accidental Splenectomy / other	0	0	0	0	0	0
Retained Foreign body	0	0	0	0	0	0
Inoperative blood transfusions	0	0	0	0	0	0
Hypopharyngeal perforation	**0**	**0**	**0**	**1 (0.06%)**	**0**	**1 (0.03%)**
Total	**8 (1.8 %)**	**0**	**2 (0.46 %)**	**2 (0.12 %)**	**0**	**12 (0.36%)**

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Figure 3

30-day perioperative complications – **Major**/by category
(requiring reoperation, intervention, organ failure, blood transfusion, disability or more than 7 days hospital stay)

44 Patients (1.34 %) developed major complication (**16 were re-operated – 0.49%)**

Major complications	LRYGB SA	LRYGB HSA	LAGB	LSG	Revisions	Total
Number #	434	276	429	1669	465	3273
Requiring reoperation (causes*)**	**9 (2.07 %)**	**1 (0.37%)**	**0**	**4 (0.24%)**	**2 (0.4%)**	**16 (0.47%)**
*GI Hemorrhage – staple line bleed	5 (1.15%)	0	0	1 (0.06%)	0	6 (0.18%)
*Leak from gastrojejunostomy GJ 2/ staple line SL 2	1 (0.23%) GJ	0	0	2 (0.12%) SL	1 (0.21%) GJ	4 (0.12%)
*Bowel obstruction	1 (0.23%)	1 (0.36%)	0	0	0	2 (0.06%)
*Port site hernia strangulation	1 (0.23%)	0	0	0	0	1 (0.03%)
*Intraabdominal abscess	0	0	0	1 (0.06%)	0	1 (0.03%)
*Unexplained severe abdominal pain	1 (0.23)	0	0	0	0	1 (0.03%)
*Retained hiatal hernia (previous LAGB)	0	0	0	0	1 (0.21%)	1 (0.03%)
Blood transfusion (causes)**	**12 (2.7%)**	**2 (0.7%)**	**0**	**4 (0.24%)**	**0**	**18 (0.55%)**
**GI bleed	12 (2.7%)	2 (0.73%)	0	2 (0.22%)	0	16 (0.49%)
**Intraperitoneal bleed	0	0	0	2 (0.22%)	0	2 (0.08%)
Additional intervention	**6 (1.3%)**	**1 (0.37%)**	**0**	**3 (0.18%)**	**0**	**10 (0.30%)**
Overall longer hospital stay (stay over 7 days / including 16 patients who had reoperations – 15 stayed for more than 7 days)	**11 (2.5%)**	**1 (0.36%)**	**0**	**4 (0.24%)**	**1 (0.21%)**	**17 (0.52%)**
Mortality / No 1- year mortality**	**0**	**0**	**0**	**0**	**0**	**0**

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Figure 4

30-day Perioperative complications Continuations - **Major / Specific categories**

Perioperative Major	LRYGB SA	LRYGB HSA	LAGB	LSG	Revisions - All	Total
Number #	434	276	429	1669	465	3273
MOF	1 (0.23%)	0	0	0	0	1 (0.04 %)
ARDS	1 (0.23%)	0	0	0	0	1 (0.04 %)
Anastomotic leak / or staple – early*	1 (0.23%)	0	0	2 (0.12%)	1 (0.21%)	4 (0.16 %)
Unexplained severe abdominal pain*	1 (0.23%)	0	0	0	0	1 (0.04%)
Intraabdominal abscess	3 (0.69%)	0	0	1 (0.06 %)	0	4 (0.17 %)
Anastomotic leak - late	1 (0.23%)	0	0	0	0	1 (.0.04 %)
GI hemorrhage -Total (including 5 re-operated*)	16 (3.7%)	0	0	0	0	16 (0.69 %)
Intra Peritoneal Bleeding/transfusions	0	0	0	4 (0.24 %)	0	4 (0.12 %)
Port site hernia (incarcerated*)	1 (0.23%)	0	0	0	0	1 (0.04 %)
Bowel obstruction	2 (0.46 %)	2 (0.73 %)	0	0	1 (0.21%)	4 (0.17 %)
DVT/Pulmonary embolus	0	0	2 (0.46 %)	1 (0.06 %)	0	3 (0.12 %)
Portal vein thrombosis	0	0	0	5 (0.3 %)	0	5 (0.15 %)
Myocardial Infarct (non Q wave)	1 (0.23 %)	0	0	2 (0.12 %)	0	3 (0.13 %)
CO2 retention – Respiratory Failure	1 (0.23 %)	0	1 (0.23 %)	0	0	2 (0.08 %)
Pulmonary edema / Respiratory failure	1 (0.23%)	0	0	0	0	1 (0.04 %)
Paramedhoracx (CVP line)	1 (0.23%)	0	0	0	0	1 (0.04 %)
Pneumonia	2 (0.46%)	0	0	0	0	2 (0.08%)
Other – Autoimmune hepatitis	0	1 (0.37 %)	0	0	0	1 (0.04 %)
Other – CVA	0	1 (0.37 %)	0	0	0	1 (0.04 %)
Other - Pancreatitis	0	0	0	1 (0.06%)	0	1 (0.04 %)
Other – Acute renal insufficiency/no dialysis	0	0	1 (0.23 %)	1 (0.06 %)	0	2 (0.08 %)
DKA (ketoacidosis)	0	0	0	1(0.06%)	0	1(0.045)
Total	33 (7.6 %)	4 (1.47 %)	4 (1.47 %)	18 (1.08 %)	2 (0.43%)	52 (1.58 %)

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Figure 5

30-day Perioperative complications - Minor

82 Patients (2.5%) had 87 minor complications (none was re-operated)

Perioperative Minor #	LRYGB SA	LRYGB HSA	LAGB	LSG	Revisions	Total
Cases Number #	434	276	429	1669	465	3273
Wound infection	17 (3.9 %)	1 (0.37 %)	0	0	0	18 (0.78 %)
Port/Wound hematoma	0	0	1 (0.23 %)	5 (0.3%)	0	6 (0.18 %)
Port revision	0	0	1 (0.23 %)	0	0	1 (0.03 %)
Pulmonary atelectasis	8 (1.84 %)	0	0	1 (0.11%)	0	9 (0.27 %)
Dehydration	1 (0.46 %)	1 (0.37 %)	0	15 (1.00 %)	1 (0.35 %)	18 (0.55 %)
Ileus	4 (0.92 %)	0	0	0	0	4 (0.17 %)
Urinary tract infection	5 (1.15 %)	3 (1.10 %)	1 (0.23 %)	2 (0.11 %)	1 (0.35 %)	12 (0.37 %)
C. Diff Colitis	1 (0.23 %)	3 (1.10 %)	0	0	0	4 (0.12 %)
Hypoxemia	1 (0.23 %))	1 (0.37 %)	0	1 (0.11 %)	0	3 (0.09 %)
CHF*	1 (0.23 %)	1 (0.37 %)	0	0	0	2 (0.06 %)
Atrial Fibrillation	0	1 (0.37 %)	0	0	0	1 (0.03 %)
Abscess (unrelated/CT Drain)	0	1 (0.37 %)	0	0	0	1 (0.03 %)
Syncope	0	0	0	3 (0.54%)	0	3 (0.09%)
SOB	0	0	0	2 (0.11%)	0	2 (0.06%)
Chest Pain	0	0	0	2 (0.11%)	0	2 (0.0.6%)
Seizure	0	0	0	1 (0.06%)	0	1 (0.03%)

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Figure 2-5
The data collected for this study was analyzed using IBM SPSS v29, Python v3.14 and R v 4.4.2 to calculate complication rates, assess variability, and evaluate ratios between various surgical procedures.

Results

All (3273 bariatric) procedures were approached laparoscopically
- 2552 procedures were stapled and 721 were non stapled.

Perioperative Safety - Key Points
- ✓ **No perioperative mortalities**
- ✓ No conversions to open surgery in any elective procedure
- ✓ No intraoperative blood transfusions
- ✓ No accidental organ resection
- ✓ No retained foreign bodies
- ✓ No litigation or settlements
- ✓ There was one transfer to another institution

- ✓ **Sixteen patients (16 / 3273 or 0.49%,11 in gastric bypass group and five in LSG group) required 30-day reoperations for postoperative complications:**
- ✓ Staple line gastrointestinal or peritoneal hemorrhage - 6
- ✓ Anastomotic leak- 4
- ✓ Strangulated port site hernia-1
- ✓ Unexplained abdominal pain-1
- ✓ Intestinal obstruction - 2
- ✓ Retained hiatal hernia -1
- ✓ Intraabdominal abscess -1

All Complications – Laparoscopic Metabolic and Bariatric Surgery

Summary of Consecutive 3273 patients

- •Intraoperative 0.36%
- •Perioperative (30 day)
  - •Minor 2.5%
  - •Major 1.58 % (0.49% were reoperated)

Conclusions

With well-controlled and structured pre-, intra-, and post-operative care, laparoscopic bariatric surgery can be performed with minimal reoperations and near zero mortality in a teaching institution. Such favorable outcomes further optimize the benefits of bariatric surgery and may encourage more potential patients and referring primary physicians to pursue and recommend bariatric surgery as a preferred therapeutic management of morbidly obese patients.

References

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