Perioperative Outcomes of Robotic versus Laparoscopic Bariatric Surgery in Australia

A propensity matched analysis

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XXVII IFSO World Congress IFSO MELBOURNE 2024 Melbourne 2024

Dr. Yit J Leang is supported by Australian Government Research Training Program (RTP) scholarship.

Professor Wendy Brown received grants from Johnson & Johnson, Medtronic, GORE, Applied Medical, Apollo Endosurgery, Novo Nordisc and personal fees from GORE, Novo Nordisc and Merck Sharpe and Dohme, outside of submitted work.

Other co-authors have no potential conflict of interest to declare.

Background

- Number of metabolic bariatric surgery performed robotically has more than doubled in the last 5 years globally (IFSO registry reports)
- Associated higher costs and inconclusive evidence on superiority to conventional laparoscopic platform
  - ❖ Barrier to widespread adoption[1,2]
- Systematic review and meta-analysis on robotic gastric bypass – HIGHER reoperation rate (4.4% vs 3.4%)[3]
- Paucity of data on outcomes in Australia
  - Only 2 single center series being published[4,5].
- Convened robotic expert working group

Aims

- Evaluate the caseloads and early outcomes of robotic bariatric surgery in Australia
- Benchmark the early outcomes of robotic bariatric surgery against laparoscopic cohort

1. El Chaar M, Petrick A, Clapp B, Stoltzfus J, Alvarado LA. Outcomes of Robotic-Assisted Bariatric Surgery Compared to Standard Laparoscopic Approach Using a Standardized Definition: First Look at the 2020 Metabolic and Bariatric Surgery Accreditation Quality Improvement Project (MBSAQIP) Data. OBES SURG. 2023 Jul 1;33(7):2025–39.
2. Bauerle WB, Mody P, Estep A, Stoltzfus J, El Chaar M. Current Trends in the Utilization of a Robotic Approach in the Field of Bariatric Surgery. OBES SURG. 2023 Feb 1;33(2):482–91.
3. Leang YJ, Mayavel N, Yang WT, Kong JC, Hensman C, Burton PR, Brown WA. Robotic versus laparoscopic gastric bypass in bariatric surgery: a systematic review and meta-analysis on perioperative outcomes. Surgery for Obesity and Related Diseases. 2023 Aug 16
4. Silverman CD, Ghusn MA. Early Australian experience in robotic sleeve gastrectomy: a single site series. ANZ Journal of Surgery. 2017;87(5):385–9.
5. Soon DSC, Moar X, Lee DJ, Moore P, Clough A. Australian experience with robot-assisted Roux-en-Y gastric bypass with comparison to a conventional laparoscopic series. Surg Endosc. 2022 Jun 1;36(6):4025–31.

Methods

- Retrospective analysis of Australia Bariatric Surgery Registry (**ANZBSR**)

BARIATRIC SURGERY REGISTRY

- ➢ Prospectively maintained national clinical quality and safety registry (Clinical trials ID – NCT03441451).
- ➢ Captures clinical data for patients undergoing bariatric surgery across public and private hospitals in Australia.

Study period

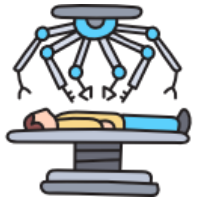
- 2014 to June 2023 (inclusive of 12-month follow up period).

Cohort selection

- Robotic: all patients who underwent robotic bariatric surgery in Australia within study period
- Laparoscopic: all similar procedures performed laparoscopically within study period

Outcomes

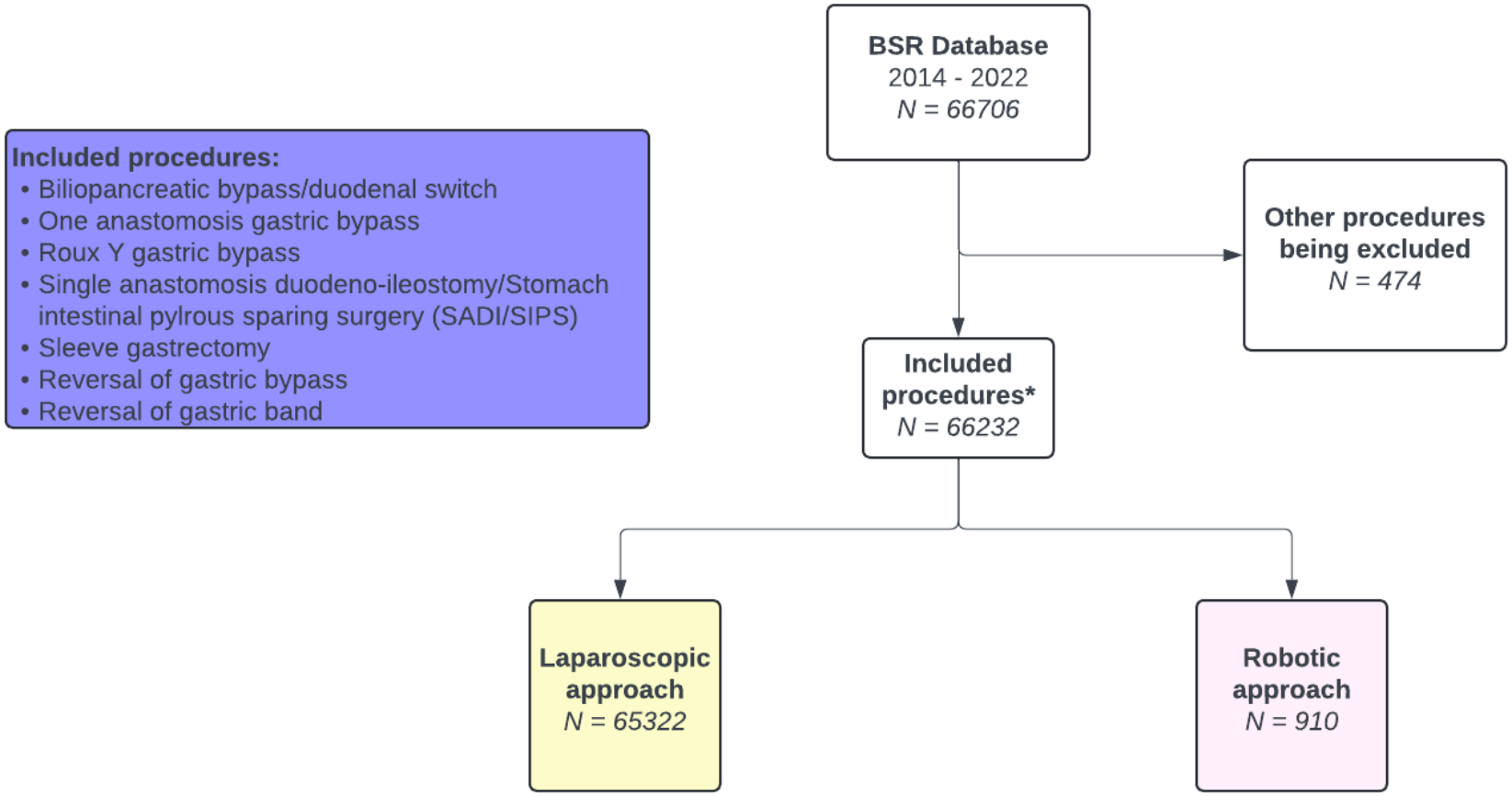
- Demographics
- Procedure type
- Primary vs Revision



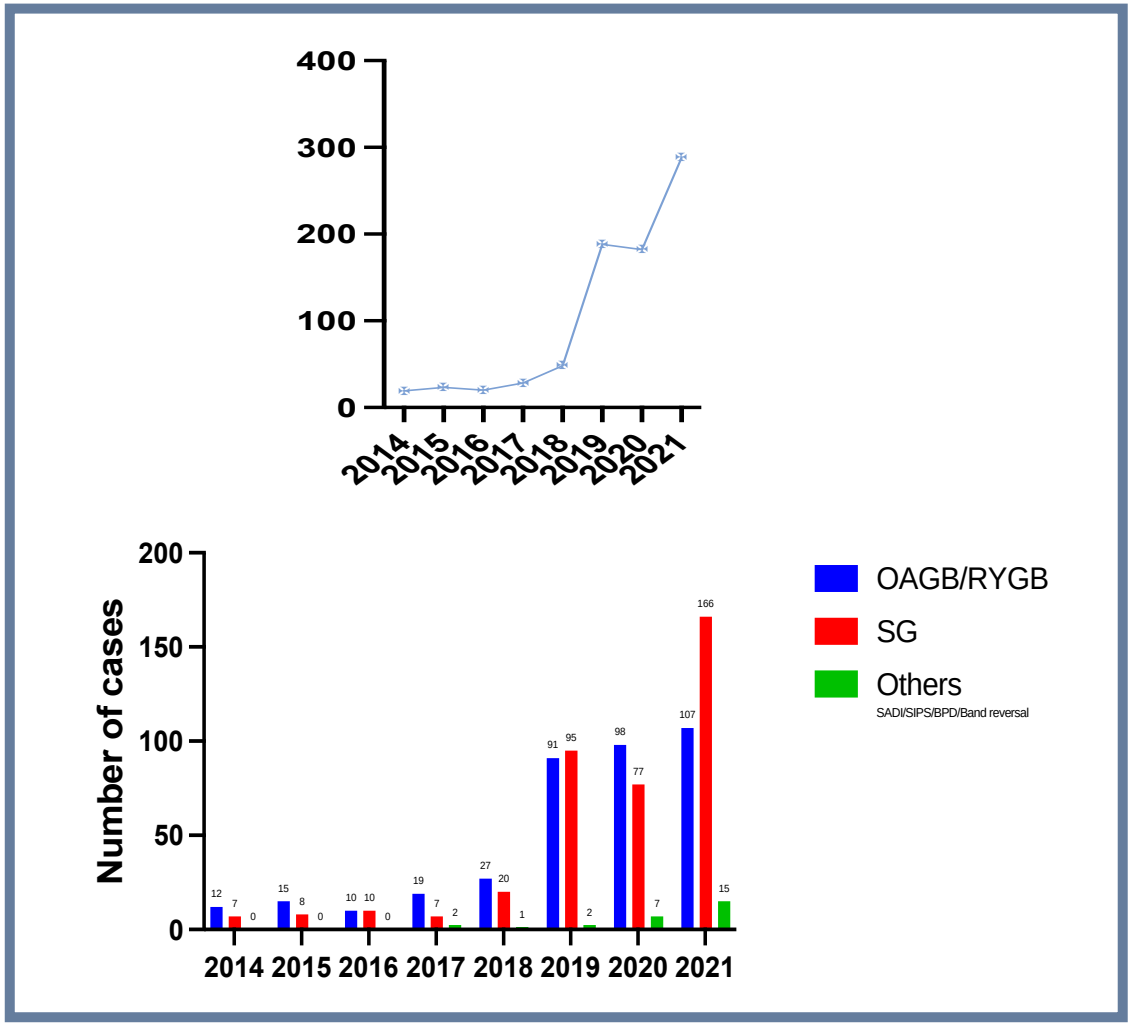
- Defined Adverse Events (DAE)
  - Return to theatre
  - Unplanned ICU admission
  - Readmission to Hospital within 90 days
- Surgical Complications

The Alfred Hospital Human Research Ethics Committee (Ref 400/22)

Flow Chart


BSR Database
2014 - 2022
N = 66706
Other procedures being excluded
N = 474
Included procedures*
N = 66232
Laparoscopic approach
N = 65322
Robotic approach
N = 910
Included procedures:
• Biliopancreatic bypass/duodenal switch
• One anastomosis gastric bypass
• Roux Y gastric bypass
• Single anastomosis duodeno-ileostomy/Stomach intestinal pylrous sparing surgery (SADI/SIPS)
• Sleeve gastrectomy
• Reversal of gastric bypass
• Reversal of gastric band

Number of Robotic Cases



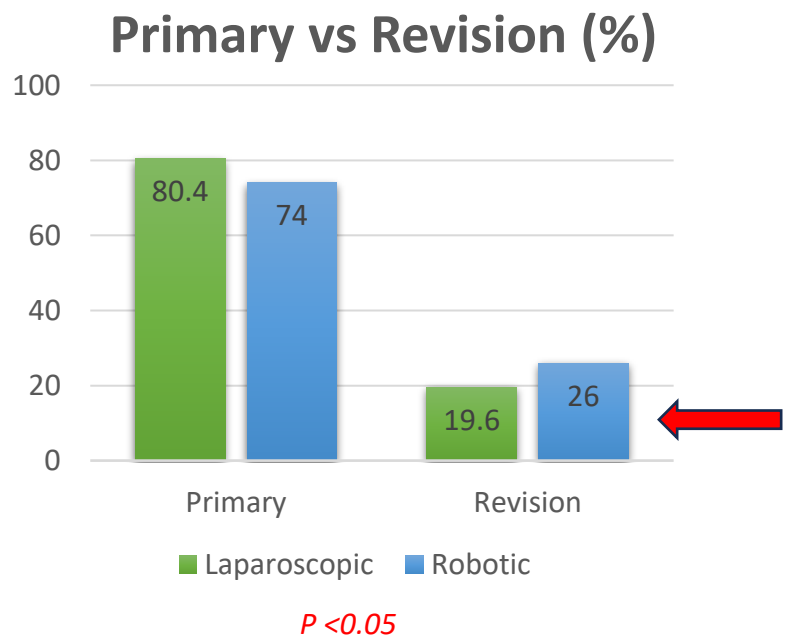
30 accredited robotic surgeons

Demographics – Pre matching Cohort

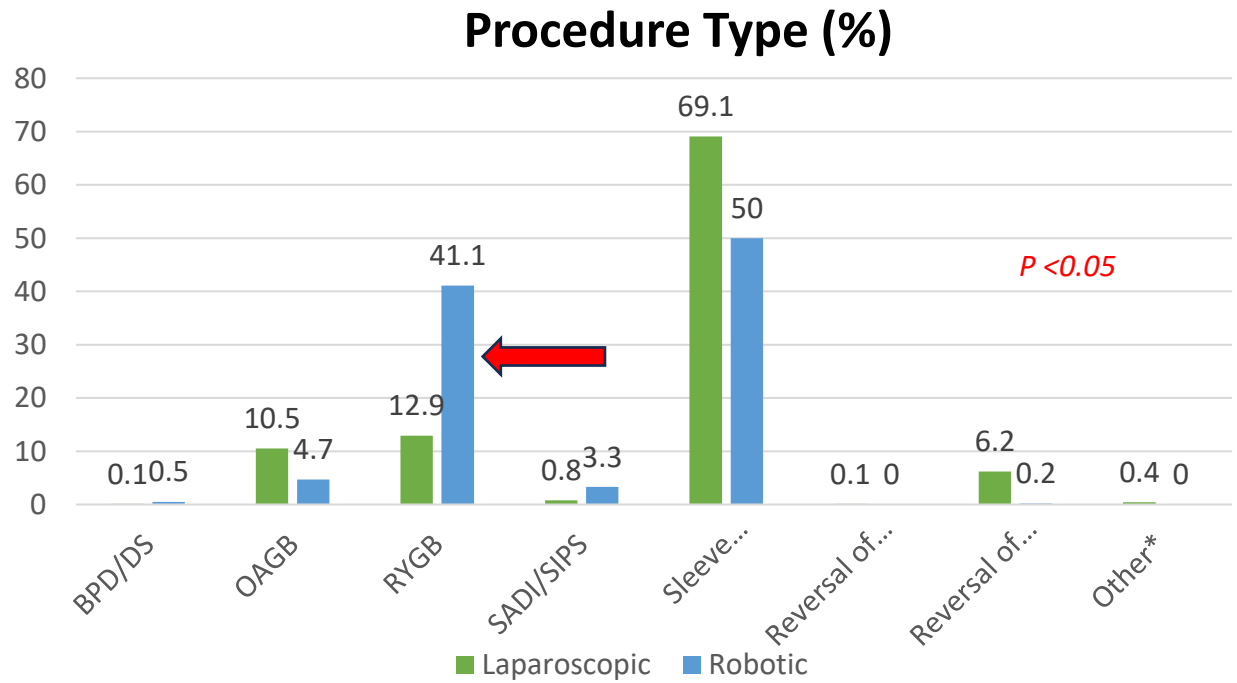
Lap: 43.3 years (34.4 – 51.9)
vs
Robot: 46.1 years (37.0-54.2)
P <0.05

Lap: 11.8%
vs
Robot: 15.2%
P <0.05

Lap: 40.5 (36.5-45.6)
vs
Robot: 40.3 (36.2-45.8)



P <0.05



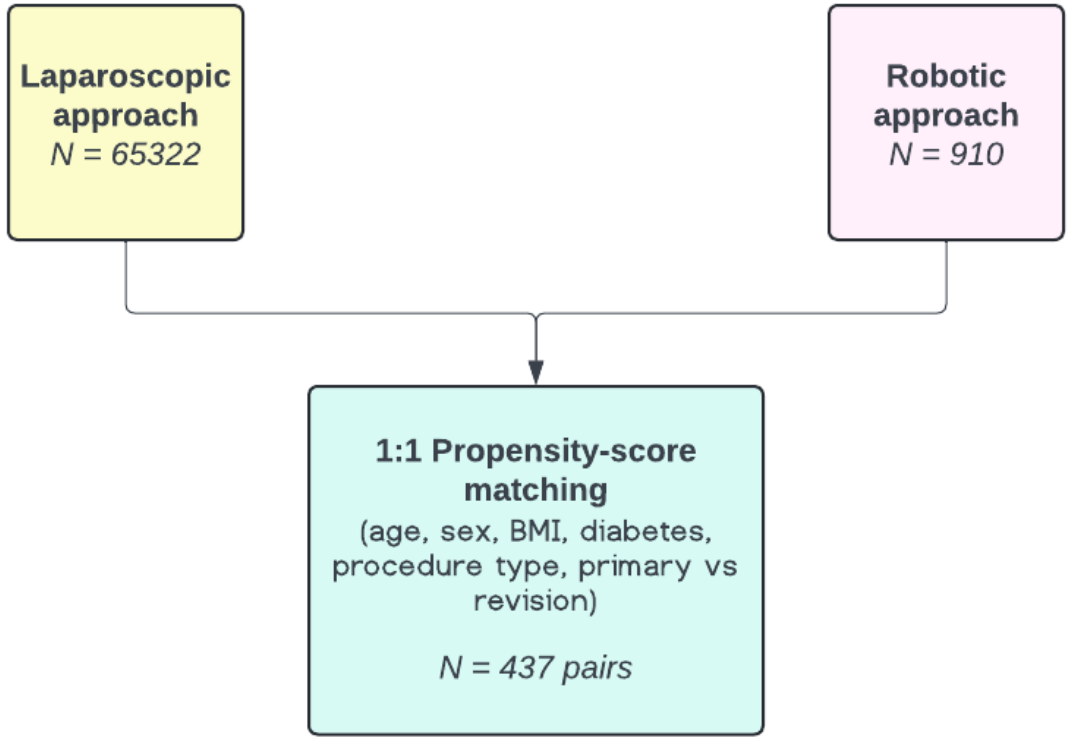
Clinical Outcomes – Pre-Matching Cohort

Outcomes	Laparoscopic (%) *n=65322*	Robotic (%) *n=910*	P value
Mortality	13 (0.02)	0 (0)	ns
Unplanned return to theatre	904 (1.38)	32 (3.52)	**<0.01**
Unplanned ICU admission	84 (0.13)	10 (1.08)	**<0.01**
Unplanned readmission to hospital	897 (1.37)	22 (2.42)	**0.01**
Post operative complications (total)	2531 (3.87)	64 (7.03)	**<0.01**
Deep SSI/Sepsis	57/65322 (0.09)	1 /910) (0.11)	ns
Anastomotic leak	139 /15939 (0.21)	4/452 (0.88)	**0.01**
Post operative bleeding	145/65322 (0.22)	1/910 (0.11)	ns
Anastomotic stricture	244/15939 (1.53)	11/452 (2.43)	ns
Organ injury/perforation	64/65322 (0.1)	2/910 (0.22)	ns
BMI at 1 year, median (IQR) (kg/m^2)	29.4 (26.2-33.4)	29.8 (26.5-33.9)	ns
Diabetes at 1 year	1100/20707 (5.31)	29/413 (7.02)	ns

Secondary Analysis

1:1 Propensity Score Matching

- Sex
- Procedure type
- Primary vs revision
- Pre-op BMI
- Co-morbidities



Clinical Outcomes – Matched Cohort

	Laparoscopic (%) *n=437*	Robotic (%) *n=437*	P value
Mortality	0	0	n/a
Unplanned return to theatre	11 (2.5)	12 (2.7)	ns
Unplanned ICU admission	0 (0.13)	5 (1.1)	ns
Unplanned readmission to hospital	6 (1.4)	8 (1.8)	ns
Post operative complications (total)	17 (3.9)	22 (5)	ns
Deep SSI/Sepsis	1 (0.22)	1 (0.22)	ns
Anastomotic leak	1 (0.52)	4 (2.1)	ns
Post operative bleeding	1 (0.22)	0	ns
Anastomotic stricture	3 (1.56)	2 (1.05)	ns
Organ injury/perforation	0	0	n/a
BMI at 1 year, median (IQR) (kg/m^2)	29 (25.9-32.4)	29.85 (26.3-34.1)	ns
Diabetes at 1 year	11(2.5)	11 (2.5)	ns

Clinical Outcomes – Comparison to international outcomes

	Laparoscopic (%) *n=437*	Robotic (%) *n=437*	P value
Mortality	0	0	n/a
Unplanned return to theatre	11 (2.5)	12 (2.7)	ns
Unplanned ICU admission	0 (0.13)	5 (1.1)	ns
Unplanned readmission to hospital	6 (1.4)	8 (1.8)	ns
Post operative complications (total)	17 (3.9)	22 (5)	ns
Deep SSI/Sepsis	1 (0.22)	1 (0.22)	ns
Anastomotic leak	1 (0.52)	4 (2.1)	ns
Post operative bleeding	1 (0.22)	0	ns
Anastomotic stricture	3 (1.56)	2 (1.05)	ns
Organ injury/perforation	0	0	n/a

Vosburg et. al. 2022

MBSAQIP database – 2015 to 2019

791,423 patients (74,010 robotic patients)

- Robotic patients had higher readmission (OR 1.21) and reoperation rate (OR 1.22)
- Robotic sleeve gastrectomy – higher infectious complications (OR 1.26 – 1.76)

El Chaar et. al. 2023

MBSAQIP database – 2020

168,568 patients (propensity match analysis)

- Sleeve Gastrectomy (17,215 pairs)
  - Higher Adverse events rate 2.2% vs. 1.7%
- RYGB – (6566 pairs)
  - Higher readmission rate 5.7% vs 4.3%

Wesley Vosburg R, Haque O, Roth E. Robotic vs. laparoscopic metabolic and bariatric surgery, outcomes over 5 years in nearly 800,000 patients. Obesity surgery. 2022 Jul;32(7):2341-8.

El Chaar M, Petrick A, Clapp B, Stoltzfus J, Alvarado LA. Outcomes of robotic-assisted bariatric surgery compared to standard laparoscopic approach using a standardized definition: first look at the 2020 Metabolic and Bariatric Surgery Accreditation Quality Improvement Project (MBSAQIP) data. Obesity Surgery. 2023 Jul;33(7):2025-39.

Conclusion

- Robotic platform – promising technology but requires more data to prove superiority.
- Conform to international trends
  - Increasing number of robotic bariatric cases in Australia.
  - Higher ratio of gastric bypass and revisional cases being performed on robotic platform.
- Australian robotic outcomes are comparable international data.
- Judicious and safe implementation of robotic technology in MBS without increase in complications.
- Highlights the importance of a robust clinical quality and safety registry especially in the period of new surgical technology introduction.