

Introduction

With increasing adoption of minimally invasive hernia surgery and popularization of newer hernia surgery techniques, there has been a shift in surgical technique and practice patterns. This study examines impact of robotic surgery on evolution of surgical technique and if these changes impact patient outcomes.

Methods

We retrospectively reviewed a statewide registry to identify adult patients who underwent elective minimally invasive (laparoscopic or robotic) ventral hernia repair between 2020-2024. The variables examined included patient characteristics (age, sex, race, body mass index, comorbidities), hernia characteristics (size, location, prior repair), and operative characteristics (approach, wound classification, mesh use, mesh location, mesh fixation, component separation). Outcomes included 30-day complications, ED utilization, readmission, and reoperation.

Results

9891 patients that underwent elective laparoscopic (23.7%) or robotic (76.3%) ventral hernia repair during the study period. Patient characteristics and hernia characteristics were similar between the two groups with no clinically significant differences (Table 1).

Variable	Overall (%)	Lap MIS (%)	Robotic MIS (%)	p
n	9836	2329 (23.7%)	7507 (76.3%)	
Age(mean (SD))	54.89 (13.90)	54.74 (13.82)	54.94 (13.93)	0.545
Sex (% Female)	4395 (44.7)	1053 (45.2)	3342 (44.5)	0.572
BMI (mean kg/m ² (SD))	33.32 (7.21)	33.04 (7.19)	33.41 (7.21)	0.033
Diabetes (%)	1603 (16.3%)	350 (15.0%)	1253 (16.7%)	0.16
Smoker (%)	1823 (18.5)	438 (18.8)	1385 (18.4)	0.721
Hernia Defect Size (mean cm(SD))	3.68 (3.04)	3.30 (2.85)	3.79 (3.08)	<0.001
Previous Hernia Repair (%)	1593 (16.3)	378 (16.5)	1215 (16.3)	0.854

Table 1. Patient and Hernia Characteristics

There were significant operative differences with robotic hernia surgery patients undergoing more mesh placement than laparoscopic patients. Robotic surgery patients also had extraperitoneal or retrorectus mesh placement and myofascial release. Operative time was also longer in the robotic surgery cohort compared to laparoscopy. (Table 2)

Variable	Overall (%)	Lap MIS (%)	Robotic MIS (%)	p
Mesh Usage (%)	9462 (96.6)	2148 (92.9)	7314 (97.7)	<0.001
Mesh Location: Sublay	7173 (75.8)	1332 (62.0)	5841 (79.9)	<0.001
Retrorectus	595 (8.3)	43 (3.2)	552 (9.5)	<0.001
Preperitoneal	2173 (30.3)	341 (25.6)	1832 (31.4)	<0.001
Intraperitoneal	4386 (61.1)	936 (70.3)	3450 (59.1)	<0.001
Myofascial Release (%)	370 (4.0)	15 (0.7)	355 (4.9)	<0.001
Operative Time (mean min (SD))	93.85 (60.80)	66.12 (46.63)	102.46 (62.10)	<0.001

Table 2. Operative Characteristics

Length of stay, rates of surgical site occurrence including surgical site infection, and reoperation rates were not different between the two groups. The laparoscopic group had slightly higher, but not clinical significant rates of 30-day emergency room visits (7.5% vs 6.2%, P=0.04) primarily driven by pain in both groups.

Conclusions

In this cohort of patients undergoing minimally invasive elective repair of ventral hernias, robotic ventral hernia repairs were more likely to have undergo an extraperitoneal repair indicating a shift in minimally invasive technique to transabdominal preperitoneal approach or retrorectus approach. It is unclear if this evolution in technique translates directly to patient outcomes. **In this population-level study, for small hernia defect sizes (< 4cm), short-term outcomes indicate that the results are similar.** Additional research on longer term outcomes and assessment of these techniques in larger hernia defects will be needed to assess if change in technique directly translates to change in outcomes.