

Surgical Approach as a Driver of Decision-Making and Outcomes in Component Separation

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Introduction

Component separation technique (CST) is often reserved for large ventral hernia defects that require additional rectus muscle and fascial advancement. With the popularization of robotic surgery, there has been a rise in the number of minimally invasive component separations, specifically transversus abdominis release (TAR). This study examines whether surgical approach impacts surgical decision making for if and how CST is performed with associated surgical outcomes

Methods

We retrospectively reviewed a statewide registry to identify adult patients who underwent elective ventral hernia repair with component separation 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, CST). Outcomes included 30-day complications, ED utilization, readmission, and reoperation. Multivariable logistic regression models were used to assess the association of surgical approach on outcomes while controlling for other patient, hernia, and operative characteristics.

Results

1082 patients underwent ventral hernia repair with component separation, with the majority being performed open (67.2%). Patient characteristics were similar between the two groups with no clinically significant differences (Table 1).

Variable	Overall (%)	Open CS (%)	Robotic CS (%)	p
n	1082	727	355	
Age(mean (SD))	58.65 (13.12)	59.21 (13.11)	57.48 (13.06)	0.042
Sex (% Female)	555 (51.3)	380 (52.3)	175 (49.3)	0.393
BMI (mean kg/m ² (SD))	32.69 (7.15)	32.43 (7.14)	33.24 (7.16)	0.080
Diabetes (%)	236 (21.9%)	155 (21.4%)	82 (23.1%)	0.50
Smoker (%)	210 (19.4)	139 (19.1)	71 (20.0)	0.793
Hernia Defect Size (mean cm(SD))	8.65 (5.44)	9.09 (5.35)	7.89 (5.50)	0.002
Previous Hernia Repair (%)	401 (37.2)	302 (41.7)	99 (28.1)	<0.001

Table 1. Patient and Hernia Characteristics

Hernia and Operative Characteristics showed differences between the open and robotic repairs (Table 2). Mean hernia defect size was smaller in the robotic surgery group, and those undergoing robotic hernia surgery were less likely to be recurrent hernias. Posterior component separations were higher in the robotic group, as were higher rates of mesh placement. Majority of the mesh placed robotically was in the sublay plane. Operative time was also longer in the robotic surgery component separation cohort compared to open.

Variable	Overall (%)	Open CS (%)	Robotic CS (%)	p
Mesh Usage (%)	1034 (95.6)	679 (93.4)	355 (100.0)	<0.001
Mesh Location: Sublay	847 (81.9)	517 (76.1)	330 (93.0)	<0.001
Retrorectus	630 (74.4)	403 (77.9)	227 (68.8)	0.012
Preperitoneal	111 (13.1)	58 (11.2)	53 (16.1)	0.012
Intraperitoneal	106 (12.5)	56 (10.8)	50 (15.2)	0.012
Posterior Myofascial Release (%)	782 (76.5)	463 (68.3)	319 (92.7)	<0.001
Operative Time (mean min (SD))	184.61 (99.31)	171.91 (93.90)	210.88 (105.02)	<0.001

Table 2. Operative Characteristics

Variable	Overall (%)	Open TAR (%)	Robotic TAR (%)	p
n	782	463	319	
Length of Stay (mean days (SD))	3.2 (11.7)	4.0 (14.8)	1.9 (3.3)	0.018
Superficial Site Infection(%)	14 (1.8)	13 (2.8)	1 (0.3)	0.021
Readmission (%)	44 (5.6)	28 (6.0)	16 (5.0)	0.647
Presentation to ED (%)	60 (7.7)	37 (8.0)	23 (7.2)	0.790
Return to Operating Room (%)	27 (3.5)	22 (4.8)	5 (1.6)	0.028

Table 3: Post Operative Complications for Open vs Robotic TAR

On sub-analysis comparing open TAR vs robotic TAR, length of stay, superficial surgical site infection (SSI), and reoperation rates were all significantly lower in the robotic group (Table 3). On multivariable logistic regression, robotic surgery was a predictor of decrease length of stay (OR -1.3 [95% CI -1.8 to -0.8]).

Conclusions

Operative technique and surgical decision making is significantly different based on operative approach. Patients undergoing robotic CST were more likely to have a smaller hernia defect size and more likely to undergo TAR. There were also differences associated with mesh usage and mesh location based on whether open or robotic CST was performed. When just comparing open vs robotic TAR, robotic cases had decreased length of stay, lower rates of SSI, and reoperative rates.