Establishing a Minimally Invasive Abdominal Wall Reconstruction Program

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Introduction:

- Ventral hernia repairs are one of the most common surgeries performed in the USA, tallying over 350,000 annually [1].
- Larger ventral hernias often require abdominal wall reconstruction (AWR), whereby a combination of component separation and prosthetic mesh reinforcement are used to regain abdominal wall integrity [2].
- Expanding capabilities of robotic surgery has allowed for minimally invasive approaches to posterior component separation, complex ventral hernia repair, and AWR [3].
- Adjuncts to component separation include progressive preoperative pneumoperitoneum, tissue expanders, and botox [4].
- In the United States today, AWRs are often performed at "hernia centers" as advertised by hospitals and surgical practices.
- However, 89% of dedicated hernia centers in the United States are in urban environments and are disproportionately associated with University Hospitals, limiting patient access [5].
- The purpose of this study is to illustrate how we've set up a minimally invasive AWR program at our hospital.

Methods:

- Twenty-Four patients who underwent abdominal wall reconstruction (AWR) between January 2017 - June 2022 by a single surgeon at our institution.
- Demographic and health related metrics (Smoking, diabetes, obesity status) taken at the time of initial visit and at the time of surgery were compared
- Chemical component separation (botulinum toxin) vs mechanical component separation
- Hernia defect characteristics were obtained
- The ellipsoid formula (V = 4/3πABC) was used to calculate volume of the hernia sac (VIH) and volume of the abdominal cavity (VAC)
- CeDAR (Carolinas Equation for Determining Associated Risks) risk scores were compared at the initial and pre-operative visits
- Results were compared using two-tailed T-Test ($p < 0.05$ signified significance)

Results:

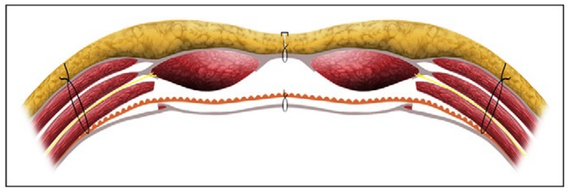


Figure 1: Posterior component separation and TAR with retrorectus musculocutaneous flap advancement and retrorectus mesh placement

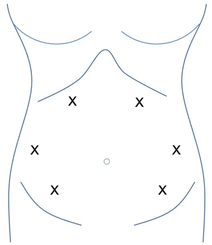


Figure 2: Injection sites for chemical component separation using botulinum toxin.

Table 1: Pre-operative counseling results

	First visit	Pre-op	% Change	Significance
Active smokers	5/24 (20.8%)	1/24 (4.2%)	-80.00%	
HbA1C	6.98	6.24	-10.57%	p < 0.05
Excess body weight (kgs)	29.8	28.5	-4.41%	p = 0.23*
BMI (kg/m^2)	32.163	31.750	-1.30%	p = 0.27*
CeDAR Scores:				
Risk of Complications	35.29%	31.50%	-10.74%	p < 0.05
In hospital charges	$7,221.46	$6,435.50	-10.88%	p < 0.05
Follow up charges	$17,193.58	$15,322.42	-10.88%	p < 0.05

*Updated data shows significant downtrends for these values (p < 0.05)

Table 2: Procedure Metrics (averages)

Average length of counseling	233 days
% Received Botox	46% (11/24)
% Stayed MIS	58% (14/24)
Hernia defect size	71.89 cm^2
VIH	483 cc
VAC	5766 cc
VIH/VAC	0.088
Recurrences	0

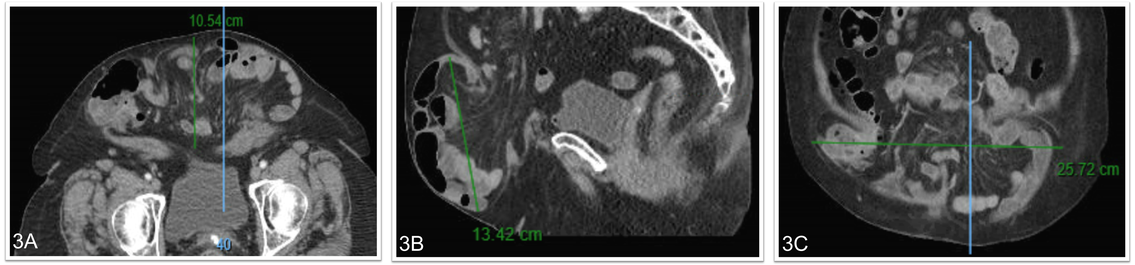


Figure 3: Example of hernia sac measurements in the transverse (A) sagittal (B) and coronal (C) planes

Discussion and Conclusions:

- Extensive counseling for modifiable risk factors such as weight loss, smoking cessation, and diabetes control was emphasized in our patient population, which significantly reduced the CeDAR risk scores in all categories.
- Chemical component separation with botox has become standard in our program and is most often used for patients with high VIH/VAC ratios.
- Despite botox use for patients with larger hernias, a higher percentage of those receiving botox can have surgery completed robotically while a higher percentage of those without botox may convert to open surgery.
- All patients underwent successful primary closure, even with loss of domain (VIH/VAC > 0.20).
- We suggest that surgeons can successfully treat complex ventral hernia repairs and perform AWR in a community hospital setting through the implementation of pre-operative medical counseling and optimization, adjunctive botulinum toxin treatment, and robotic posterior component separation +/- TAR.
- Further development and expansion of our patient registry will be important to understanding the full impact that these steps have on surgery outcomes including length of procedure, length of stay, complication rates, recurrence rates, etc.

References:

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