IL RUOLO DELLA PREABILITAZIONE E DELLA PERDITA DI PESO PREOPERATORIA: il punto di vista del chirurgo

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WHAT IS PREHABILITATION?

With the term surgical ***Prehabilitation*** we intend a series of interventions directed to patients awating surgery, which have the objective to improve the functional capacity, lower the SSI/SSO and recurrence.

The European Hernia Society Prehabilitation Project: a systematic review of patient prehabilitation prior to ventral hernia surgery

K. K. Jensen[1] · B. East[2] · B. Jisova[2] · M. López Cano[3] · G. Cavallaro[4] · L. N. Jørgensen[1] · V. Rodrigues[3] · C. Stabilini[5,6] · D. Wouters[7] · F. Berrevoet[7]

WHY USE PREHABILITATION IN ABDOMINAL WALL SURGERY?

- Reduce SSI/SSO rate
- Reduce long term hernia recurrence
- Reduce hospital stay
- Improve QoL

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Original Research Article

The association of hernia-specific and procedural risk factors with early complications in ventral hernia repair: ACHQC analysis

Mazen R. Al-Mansour [a,*], Delaney D. Ding [a], Celeste G. Yergin [a], Robert Tamer [b], Li-Ching Huang [c]

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[b] Center for Surgical Health Assessment, Research and Policy, The Ohio State University, Columbus, OH, USA
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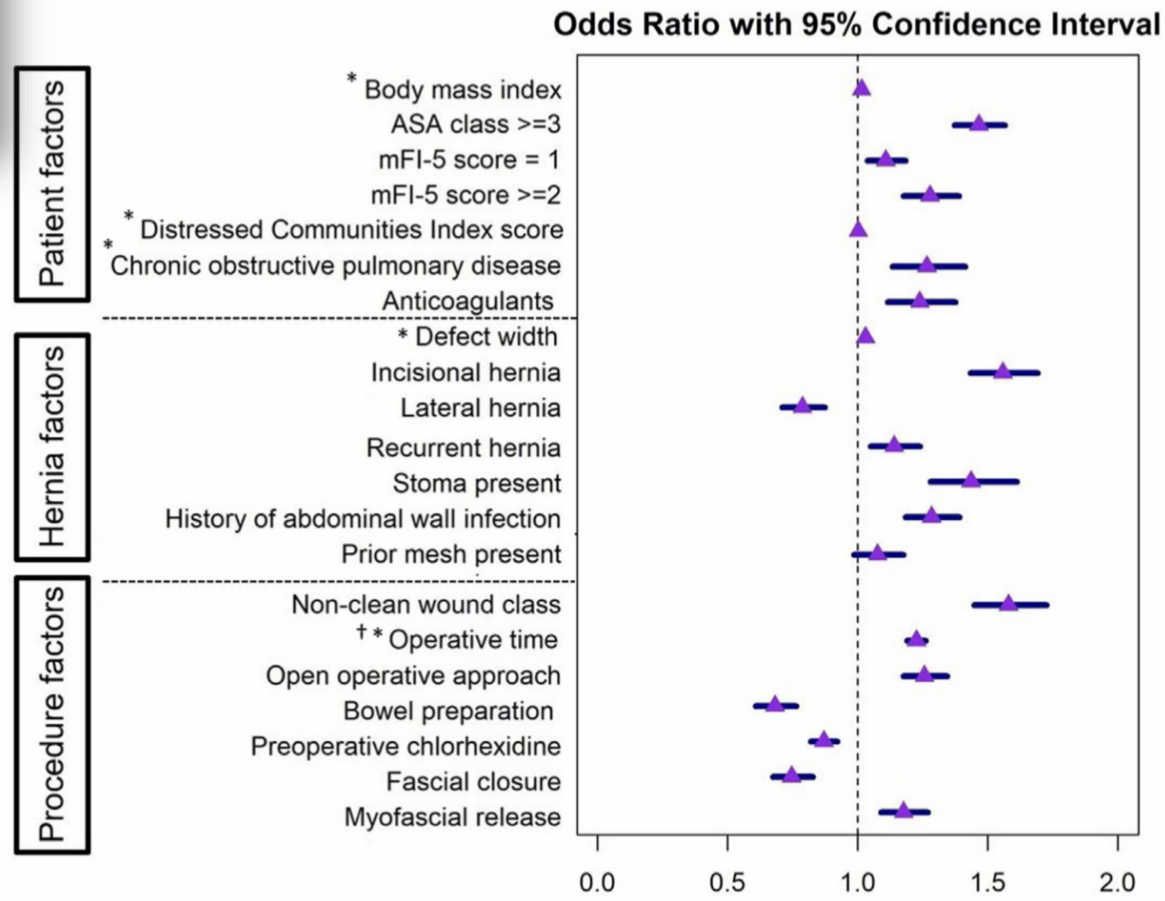


Fig. 2. Multivariable logistic regression of 30-day overall complication. * Odds ratio for each one-unit increase. † Operative time in ordinal fashion (minutes) 1: 0–59; 2: 60–119; 3: 120–179; 4:180–239; 5: 240+.

IS IT POSSIBLE TO ASSESS PREHABILITATION PROTOCOLS FOR ABDOMINAL WALL SURGERY ?

Enhanced Recovery Pathway for Complex Abdominal Wall Reconstruction

Sean B. Orenstein, MD
Robert G. Martindale, MD, PhD

Portland, Ore.

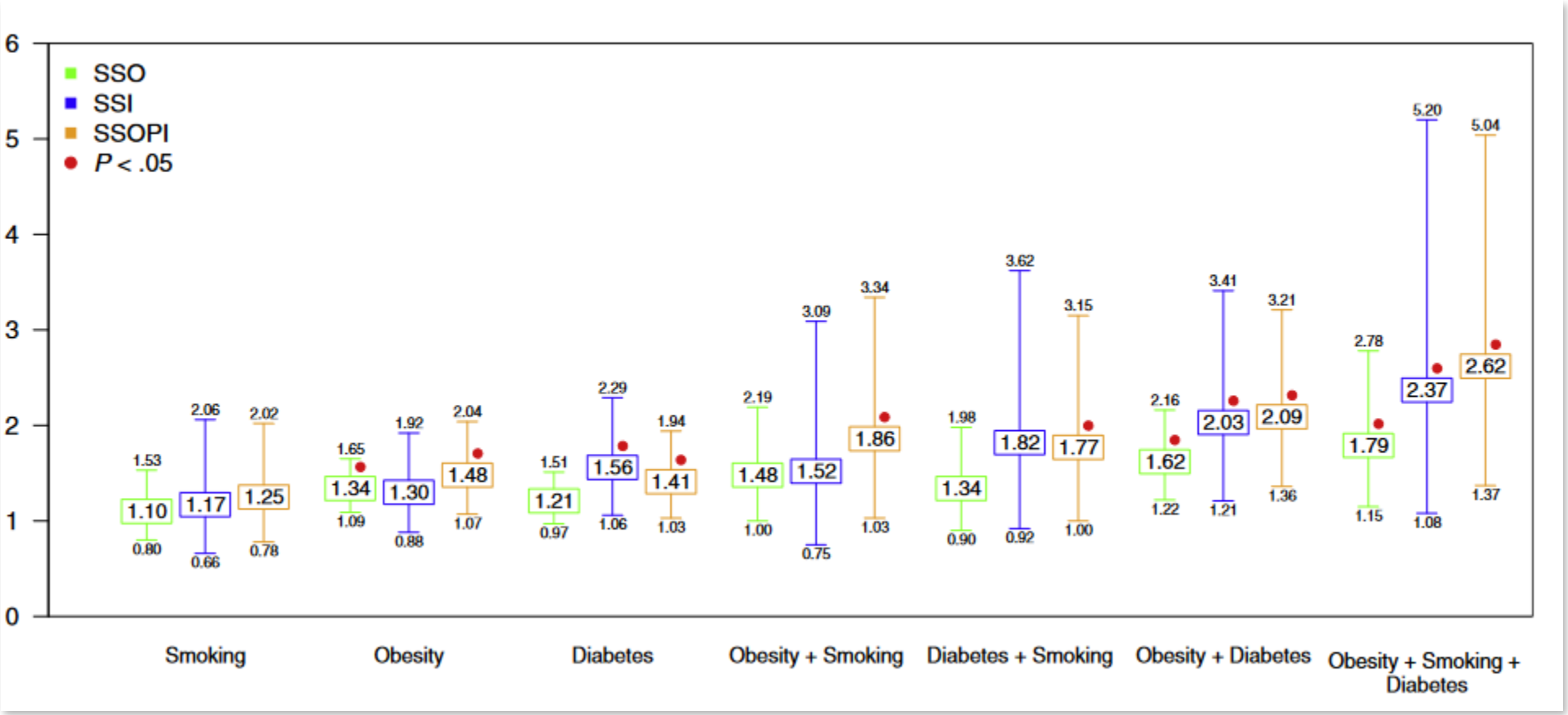
Table 1. Enhanced Recovery Pathway Interventions for Ventral Hernia Repair

Solid Data to Support Intervention	Awaiting Greater Confirmation of Data
Obesity and weight management • Sufficient weight loss necessary, however, no consensus on target BMI	Bowel preparation
Smoking cessation—30+ d preoperatively	Patient warming
Diabetes management and perioperative glucose control • Preoperative HgbA1c <7.0 • Postoperative blood sugar 120–160 mg/dL	Hyperoxygenation
Nutrition and metabolic control • Preoperative and postoperative supplements • Consider specific nutrients (arginine and omega-3 fatty acids)	Carbohydrate loading
Alcohol-containing skin preparation	Prehabilitation
Antibiotic prophylaxis • Choice of antibiotic—first generation cephalosporin for most • Vancomycin in high-risk groups • Duration—should stop when wound closed and all sutures placed • Duration—for redosing, consider $t^{1/2}$ of specific antibiotic; refer to ASHP and/or hospital guidelines	Antibiotic-impregnated sutures

ASHP, The American Society of Health-System Pharmacists.

Impact of modifiable comorbidities on 30-day wound morbidity after open incisional hernia repair

Hemasat Alkhatib, MD[a,*], Luciano Tastaldi, MD[a], David M. Krpata, MD[a], Clayton C. Petro, MD[a], Li-Ching Huang, PhD[b], Sharon Phillips, MSPH[b], Aldo Fafaj, MD[a], Steven Rosenblatt, MD, FACS[a], Michael J. Rosen, MD, FACS[a], Ajita S. Prabhu, MD, FACS[a]



The European Hernia Society Prehabilitation Project: a systematic review of patient prehabilitation prior to ventral hernia surgery

K. K. Jensen[1] · B. East[2] · B. Jisova[2] · M. López Cano[3] · G. Cavallaro[4] · L. N. Jørgensen[1] · V. Rodrigues[3] · C. Stabilini[5,6] · D. Wouters[7] · F. Berrevoet[7]

The strategies examined were optimization of:

- Diabetes
- Smoking cessation
- Obesity
- Nutrition
- Physical exercise
- COPD
- Renal disease

a separate literature search was conducted, allowing for seven different sub-reviews

OBESITY

Surg Open Sci. 2023 Jun 17:14:11-16. doi: 10.1016/j.sopen.2023.06.005. eCollection 2023 Aug.

Association of body mass index with morbidity following elective ventral hernia repair

Russyan Mark Mabeza [1], Nam Yong Cho [1], Amulya Vadlakonda [1], Sara Sakowitz [1], Shayan Ebrahimian [1], Ashkan Moazzez [2], Peyman Benharash [1]

Affiliations + expand

PMID: 37409072 PMCID: PMC10319335 DOI: 10.1016/j.sopen.2023.06.005

Table 2
Unadjusted postoperative outcomes following elective ventral hernia repair by BMI class.

Variable	Underweight	Normal weight	Overweight	Class I obese	Class II obese	Class III obese	Superobese	*P*-value
Serious complications								
Mortality, %	1.2	0.4	0.2	0.2	0.2	0.2	0.1	<0.001
Wound dehiscence, %	1.0	0.2	0.2	0.3	0.3	0.5	0.6	<0.001
Stroke, %	0	0.08	0.05	0.05	0.05	0.03	0	0.81
Cardiac arrest, %	0	0.1	0.1	0.1	0.1	0.1	0.2	0.53
Myocardial infarction, %	0.5	0.1	0.2	0.2	0.1	0.2	0.1	0.37
Bleeding, %	1.7	0.7	0.6	0.4	0.5	0.5	0.8	<0.001
Pulmonary embolism, %	0.5	0.2	0.2	0.3	0.3	0.4	0.5	0.01
Prolonged ventilation, %	0.5	0.2	0.2	0.2	0.3	0.3	0.8	<0.001
Acute renal failure, %	0	0.1	0.2	0.2	0.3	0.4	0.9	<0.001
Sepsis or septic shock, %	1.0	0.7	0.5	0.5	0.5	0.9	1.3	<0.001
Other complications								
Superficial SSI, %	1.2	1.0	1.1	1.4	1.7	2.5	4.0	<0.001
Deep SSI, %	0.5	0.3	0.3	0.4	0.5	0.8	0.9	<0.001
Organ space SSI, %	0.3	0.5	0.5	0.6	0.5	0.8	1.3	<0.001
Pneumonia, %	1.0	0.7	0.6	0.6	0.5	0.5	1.1	<0.001
Reintubation, %	0.7	0.4	0.3	0.3	0.3	0.4	0.6	<0.001
Urinary tract infection, %	0.5	0.8	0.6	0.5	0.7	0.7	1.1	0.004
Deep vein thrombosis, %	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.34
Operative time, minutes	60 (37–100)	66 (39–107)	73 (45–117)	77 (48–122)	80 (50–127)	81 (53–127)	85 (55–132)	<0.001
Postoperative LOS, days	0 (0–2)	0 (0–1)	0 (0–1)	0 (0–1)	0 (0–2)	1 (0–2)	1 (0–2)	<0.001
30-day readmission, %	5.4	4.5	4.1	3.9	4.1	5.0	6.0	<0.001

Continuous variables reported as median with interquartile range. LOS, length of stay; SSI, surgical site infection.

Conclusion: BMI ≥ 32 is associated with greater morbidity following open, but not laparoscopic VHR. The relevance of BMI may be more pronounced in open VHR and must be considered for stratifying risk, improving out comes, and optimizing care. Key message: Body mass index (BMI)continues to be a relevant factor in morbidity and resource use for elective open ventral hernia repair (VHR). A BMI of 32 serves as the threshold for significant increase in overall complications following open VHR, though this association is not observed in operations performed laparoscopically.

Surg Endosc. 2020 Aug;34(8):3584-3589. doi: 10.1007/s00464-019-07129-7. Epub 2019 Oct 1.

Updated outcomes of laparoscopic versus open umbilical hernia repair in patients with obesity based on a National Surgical Quality Improvement Program review

Kristen N Williams [1], Lala Hussain [2], Angela N Fellner [2], Katherine M Meister [3]

Table 2 Unadjusted patient outcomes

	OR (n=9695)	LR (n=2331)	p-value
Outcomes			
Superficial SSI	146 (1.5%)	21 (.9%)	.026
Deep SSI	26 (.3%)	2 (.1%)	.147
Organ space SSI	13 (.1%)	2 (.1%)	.750
Wound disruption	12 (.1%)	1 (.0%)	.484
Post op pneumonia	12 (.1%)	9 (.4%)	.012*
UTI	24 (.2%)	9 (.4%)	.269
OR time	44 min	70 min	.000
Return to OR	70 (.7%)	12 (.5%)	.327
Composite SSI	1.9%	1.1%	<0.01

SSI surgical site infection, *UTI* urinary tract infection, *OR* operating room

Table 4 Patient outcomes by BMI class with comparison between classes

Outcome	Overall	Obesity I 30–35 kg/m^2 n=6327	Obesity II 35–40 kg/m^2 n=3313	Obesity III > 40 kg/m^2 n=2386	p-value
Superficial SSI					
OUHR	146/9695 (1.5%)	50 (0.9%)[a]	38 (1.4%)[a]	58 (3.3%)[b]	<0.001*
LUHR	21/2331 (0.9%)	7 (0.7%)	7 (1.0%)	7 (1.2%)	0.555
Deep SSI					
OUHR	26/9695 (0.3%)	6 (0.1%)[a]	6 (0.2%)[a]	14 (0.8%)[b]	<0.001*
LUHR	2/2331 (0.1%)	0 (0.0%)	2 (0.3%)	0 (0.0%)	0.092
Organ space SSI					
OUHR	13/9695 (0.1%)	7 (0.1%)	3 (0.1%)	3 (0.2%)	0.890
LUHR	2/2331 (0.1%)	0 (0.0%)	0 (0.0%)	2 (0.3%)	0.056
Wound disruption					
OUHR	12/9695 (0.1%)	4 (0.1%)	5 (0.2%)	3 (0.2%)	0.330
LUHR	1/2331 (0.0%)	1 (0.1%)	0 (0.0%)	0 (0.0%)	0.538
Return to operating room					
OUHR	70/9695 (0.7%)	29 (0.5%)[a]	21 (0.8%)[a,b]	20 (1.1%)[b]	0.041*
LUHR	12/2331 (0.5%)	6 (0.6%)	2 (0.3%)	4 (0.7%)	0.602
Post-operative pneumonia					
OUHR	12/9695 (0.1%)	4 (0.1%)[a]	2 (0.1%)[a,b]	6 (0.3%)[b]	0.018*
LUHR	9/2331 (0.4%)	5 (0.5%)	3 (0.4%)	1 (0.2%)	0.594
Occurrence of urinary tract infection					
OUHR	24/9695 (0.2%)	12 (0.2%)	7 (0.3%)	5 (0.3%)	0.902
LUHR	9/2331 (0.4%)	6 (0.6%)	2 (0.3%)	1 (0.2%)	0.387
Operative time					
OUHR (min), median (IQR)	37 (26, 53) n=9695	34 (25, 49)	37 (27, 53)	44 (31, 63)	<0.001*
LUHR (min), median (IQR)	60 (42, 87) n=2331	57 (41, 81.5)	60 (41, 87)	67 (47, 97)	<0.001*
Composite SSI					
OUHR	185/9695 (1.9%)	63 (1.2%)[a]	47 (1.8%)[a]	75 (4.2%)[b]	<0.001*
LUHR	25/2331 (1.1%)	7 (0.7%)	9 (1.3%)	9 (1.5%)	0.230

LUHR laparoscopic umbilical hernia repair, *OUHR* open umbilical hernia repair, *SSI* surgical site infection, *IQR* interquartile range

*Different letters following percentages (i.e. a/b) indicate significant differences

CONCLUSION: Even though the patients in the LUHR group had a higher BMI, higher rates of diabetes, hypertension, current smoking status, and longer operative times, they had decreased post-operative wound complications compared to patients in the OUHR group. This study supports the superiority of LUHR compared to OUHR in patients with obesity in regards to decreased wound complications, especially in the non-elective setting.

Surg Endosc. 2022 Mar;36(3):2032-2041. doi: 10.1007/s00464-021-08489-9. Epub 2021 May 4.

Laparoscopic ventral hernia repair in patients with obesity: should we be scared of body mass index?

Marianna Maspero [1 2], Camillo Leonardo Bertoglio [3], Lorenzo Morini [3], Bruno Alampi [3], Michele Mazzola [3], Valerio Girardi [3], Andrea Zironda [3 4], Gisella Barone [3], Carmelo Magistro [3], Giovanni Ferrari [3]

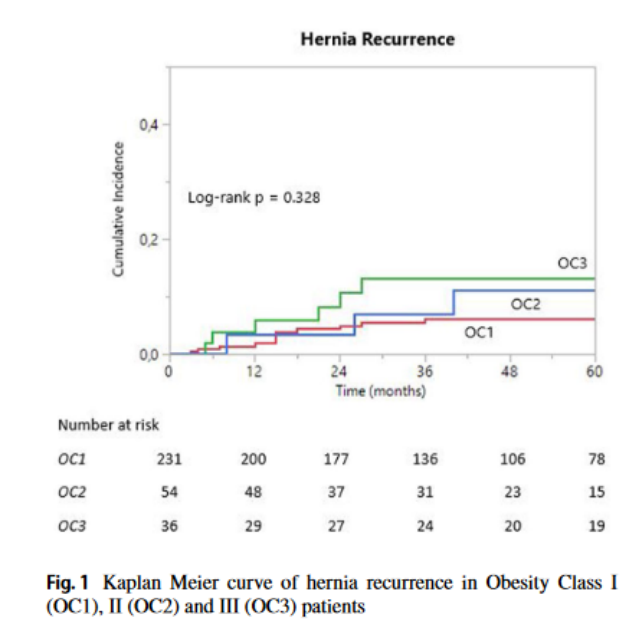


Fig. 1 Kaplan Meier curve of hernia recurrence in Obesity Class I (OC1), II (OC2) and III (OC3) patients

Table 4 Long-term variables

	OC1 ($n = 231$)	OC2 ($n = 54$)	OC3 ($n = 36$)	p value
Median follow up (months)	47 (27–81)	46 (24–73)	60 (26–108)	0.453
Seromas	55 (24%)	14 (26%)	8 (22%)	0.915
Type I–II	41/55	10/14	4/8	
Type III	5/55 (3 3a, 2 3d)	2/14 (2 3a)	1/8 (3a)	
Type IV	9/55 (5 4a, 1 4b, 3 4e)	2/14 (1 4b, 1 4c)	3/8 (all 4e)	0.464
Chronic pain	11 (5%)	5 (9%)	3 (9%)	0.383
Pseudorecurrence	6 (3%)	1 (2%)	1 (3%)	0.945
Port-site hernia	7 (3%)	0	2 (6%)	0.272
Reoperation with mesh removal	4 (2%) (1 due to bowel occlusion, 2 to infected seroma, 1 to persistent seroma)	3 (6%) (2 due to infected seroma, 1 to persistent seroma)	2 (6%) (both due to infected seroma)	0.176
Hernia recurrence	13 (6%)	6 (11%)	3 (8%)	0.328
Recurrence at 1-year po	2 (1%)	1 (2%)	1 (3%)	
Surgical repair	4 (2%) (2 laparoscopic, 2 open repair)	3 (6%) (2 laparoscopic, 1 open repair)	0	0.142

	OC1 ($n = 231$)	OC2 ($n = 55$)	OC3 ($n = 36$)	p value
Operative time (min)	137 (SD 76)	151 (SD 73)	144 (SD 68)	0.433
Defect closure	23 (10%)	8 (15%)	1 (3%)	0.186
Transfascial sutures	17 (7%)	7 (13%)	2 (6%)	0.355
Use of more than one mesh	5 (2%)	3 (5%)	0	0.221
Mean mesh area (cm^2)	402 (SD 204)	386 (SD 189)	396 (SD 166)	0.861
Mesh:defect area ratio	12 (SD 10)	13 (SD 13)	12 (SD 8)	0.723
Associated procedures	35 (15%)	12 (20%)	7 (19%)	0.538
VLC	13 (6%)	6 (10%)	2 (5%)	
TAPP	12 (5%)	2 (3%)	3 (8%)	
Fundoplication	1 (0%)	0	0 (0%)	
Urological surgery	1 (0%)	0	0 (0%)	
Sleeve gastrectomy	0	1 (2%)	2 (5%)	
Other	8 (3%)	1 (2%)	0 (0%)	
Intraoperative complications	9 (4%)	3 (5%)	1 (3%)	0.801
Conversion to open approach	2 (1%)	1 (2%)	0	0.664
Median length of stay (days)	4 (IQT 3–5)	4 (IQT 3–5)	5 (IQT 3–9)	0.0006 *p* 1–2 0.815 *p* 1–3 0.0002 *p* 2–3 0.001
At least one postoperative complication	17 (7%)	3 (5%)	6 (17%)	0.120
Surgical site infection	2 (1%)	1 (2%)	0	
Surgical site hematoma	2 (1%)	0	1 (3%)	
Paralytic ileus	4 (2%)	1 (2%)	0	
Bowel perforation	0	0	1 (3%)	
Hematochezia	1 (1%)	0	0	
Cardiovascular complications	2 (1%)	0	2 (6%)	
Respiratory complications	5 (2%)	1 (2%)	1 (3%)	
Urinary complications	1 (1%)	0	1 (3%)	
Ischemic stroke	1 (1%)	0	0	
Major complications (Clavien-Dindo > II)	6 (2%)	1 (2%)	2 (6%)	0.449
Clavien-Dindo grade				
I	6 (2%)	1 (2%)	0	0.061
II	6 (2%)	0	4 (11%)	
IIIa	3 (1%)	0	0	
IVa	2 (1%)	1 (2%)	1 (3%)	
IVb	0	0	1 (3%)	
V	0	1 (2%)	0	0.090

Conclusion: Class III obesity is associated with longer length of hospital stay after laparoscopic ventral hernia repair, but without differences in postoperative complications and long-term outcomes compared with class I and class II obesity

Comparative Study › Hernia. 2008 Jun;12(3):233-8. doi: 10.1007/s10029-007-0310-8. Epub 2007 Dec 4.

Laparoscopic ventral hernia repair (LVHR) in morbidly obese patients

Z Tsereteli [1], B A Pryor, B T Heniford, A Park, G Voeller, B J Ramshaw

Affiliations + expand

PMID: 18064399 DOI: 10.1007/s10029-007-0310-8

Conclusions LVHR in the morbidly obese population is both safe and feasible, although there is a higher, but still acceptable recurrence rate. Despite the increased risk for recurrence, LVHR in morbidly obese patients minimizes the potential wound and mesh complications that frequently occur for open mesh repair in this group of patients

Table 2 Operative and postoperative complications

Complication	Group A (BMI > 40), *n* (%)	Group B, *n* (%)
Prolonged ileus	5 (3.7)	22 (2.9)
Prolonged seroma	8 (5.9)	21 (2.7)
Bbowel injury	1 (0.7)	14 (1.8)
Prolonged pain	1 (0.7)	16 (2.0)
Urinary problems	2 (1.5)	12 (1.6)
Wound infection	2 (1.5)	9 (1.2)
Mesh infection	2 (1.5)	6 (0.8)
Cardiac problems	1 (0.7)	6 (0.8)
Respiratory problems	4 (2.9)	8 (1.0)
Hematoma	2 (1.5)	5 (0.6)
Others	4 (2.9)	10 (1.3)

› Surg Laparosc Endosc Percutan Tech. 2015 Apr;25(2):151-7. doi: 10.1097/SLE.0000000000000100.

Amelioration of the effects of obesity on short-term postoperative complications of laparoscopic and open ventral hernia repair

Jort F Fekkes [1], Vic Velanovich

Conclusions: LVHR repair is related to a decreased risk for superficial SSI's and LOS in obese patients, without extending OT.

TABLE 2. Comparison of Postoperative Complications, Length of Stay, Operation Time, and Blood Loss for BMI < 30 and BMI > 30

	BMI < 30			BMI > 30		
Postoperative Complication	Open Technique	Laparoscopic Technique	OR (95% CI), *P*	Open Technique	Laparoscopic Technique	OR (95% CI), *P*
Superficial SSI, n (%)	49 (1.5)	3 (0.4)	0.25 (0.08-0.81), 0.01	113 (3.4)	7 (0.7)	0.20 (0.09-0.44), < 0.01
Deep SSI, n (%)	36 (1.1)	1 (0.1)	0.11 (0.02-0.83), 0.01	54 (1.6)	6 (0.6)	0.37 (0.16-0.86), 0.02
Organ/space SSI, n (%)	13 (0.4)	3 (0.4)	0.95 (0.27-3.4), 0.94	25 (0.8)	3 (0.3)	0.40 (0.12-1.33), 0.12
Wound disruption/ dehiscence, n (%)	5 (0.2)	1 (0.1)	0.826 (0.096-7.083), 0.86	25 (0.8)	2 (0.2)	0.27 (0.06-1.13), 0.05
Blood transfusions, n (%)	43 (1.3)	4 (0.5)	0.38 (0.14-1.07), 0.06	44 (1.3)	2 (0.2)	0.15 (0.37-0.62), < 0.01
Operation time, mean ± SD	83.2 ± 68.3	93.8 ± 51.7	< 0.01	98.4 ± 75.8	103 ± 59.9	0.08
Length of stay	2.5 ± 9.92	2.04 ± 13.39	0.28	2.72 ± 7.93	1.86 ± 4.70	< 0.01

› Surg Endosc. 2021 Oct;35(10):5796-5802. doi: 10.1007/s00464-020-08069-3. Epub 2020 Oct 13.

Impact of Body Mass Index (BMI) on perioperative outcomes following minimally invasive retromuscular abdominal wall reconstruction: a comparative analysis

Alex Addo [1], Richard Lu [1], Andrew Broda [1], Philip George [1], Nick Huerta [1], Adrian Park [1], H Reza Zahiri [1], Igor Belyansky [2]

Conclusion Initia S
approach to AWI
These patients d
recurrence rates
patients, while av e
wound complicat
follow-up is requi ife
outcomes in this

Table 4 Postoperative outcomes with at least 12-month follow-up

Values	BMI ≤ 35 (*n* = 93)		BMI > 35 (*n* = 54)		Total (*n* = 147)		p
N	93		54		147		
> 30-day complication	7	7.5%	4	7.4%	11	7.5%	.955
Wound complications							
Surgical site infection	3	3.2%	0	0.0%	3	2.0%	.181
Seroma	6	6.5%	4	7.4%	10	6.8%	.849
Hematoma	3	3.2%	1	1.9%	4	2.7%	.613
Non-wound complication							
Ileus	2	2.2%	1	1.9%	3	2.0%	.891
Bowel obstruction	2	2.2%	1	1.9%	3	2.0%	.891
VTE	1	1.1%	0	0.0%	1	0.7%	.444
Cardiac complication	0	0.0%	0	0.0%	0	0.0%	-
Respiratory complication	1	1.1%	0	0.0%	1	0.7%	.444
Recurrence	3	3.2%	1	1.9%	4	2.7%	.620
Mortality	0	0.0%	0	0.0%	0	0.0%	-
Follow-up (months)	18.8 ± 6.33		18.43 ± 7.73		18.67 ± 6.87		.769

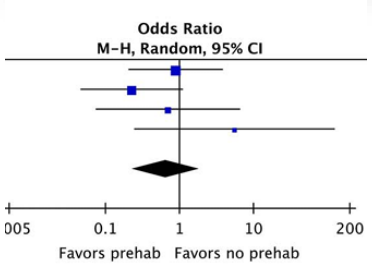
Table 3 Postoperative outcomes

Values	BMI				
	≤ 35 (*n* = 310)		> 35 (*n* = 151)		*p* value
30-day complication	31	10.0%	12	7.9%	.428
> 30-day complication	10	3.2%	8	5.3%	.369
Wound complications	20	6.5%	12	7.9%	.552
Surgical site infection	3	1.0%	0	0.0%	.163
Seroma	11	3.5%	10	6.6%	.189
Hematoma	6	1.9%	2	1.3%	.644
Non-wound complications	20	6.5%	8	5.3%	.626
Ileus	3	1.0%	3	2.0%	.561
Bowel obstruction	3	1.0%	1	0.7%	.745
VTE	3	1.0%	2	1.3%	.724
Cardiac complication	1	0.3%	0	0.0%	.487
Respiratory complication	5	1.6%	0	0.0%	.118
Recurrence	3	1.0%	1	0.7%	.740
Mortality	2	0.6%	0	0.0%	.323
Follow-up (months)	6.9 ± 6.9		7.0 ± 7.1		.905

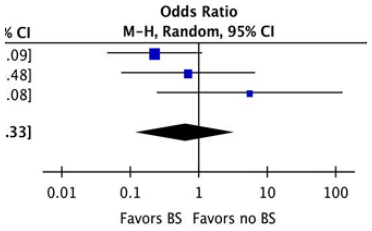
Meta-Analysis > Surg Laparosc Endosc Percutan Tech. 2023 Apr 1;33(2):211-218.
doi: 10.1097/SLE.0000000000001160.

Preoperative Optimization Before Ventral Hernia Repair: A Systematic Review and Meta-analysis

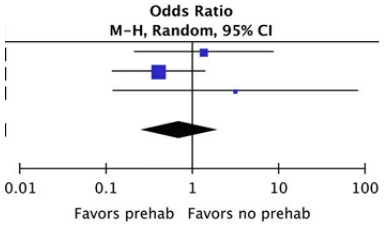
Patricia Marcolin [1], Sérgio Mazzola Poli de Figueiredo [2], Sérgio Walmir de Araújo [3],



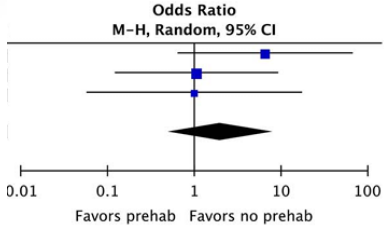
Hernia recurrence was not statiscally different between intervention and control group.



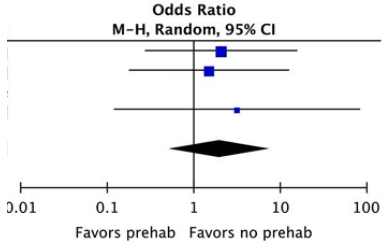
Subgroup analysis of recurrence in patients who underwent bariatric surgery was not statistically different between intervention and control group.



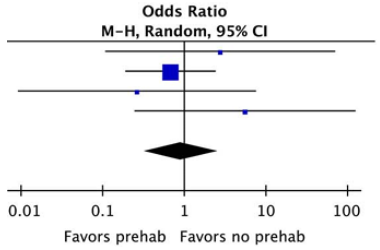
Occurrence of seroma was not statistically different between intervention and control group.



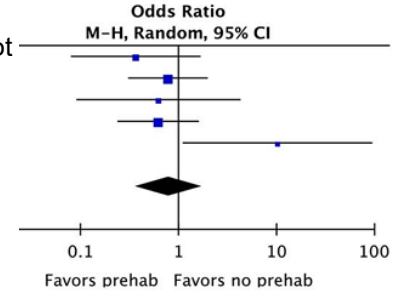
Occurrence of hematoma was not statistically different between intervention and control group.



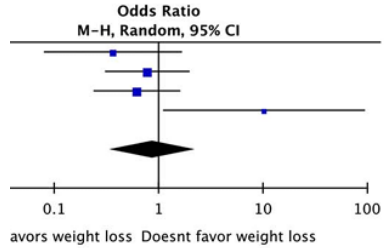
Occurrence of surgical site infection was not statistically different between intervention and control group.



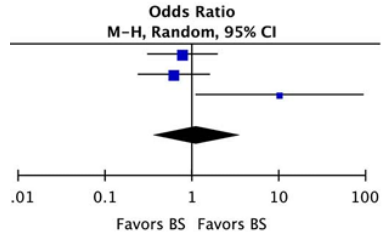
Rate of reoperation was not statistically different between intervention and control group.



Overall complications was not statistical different between intervention and contr group.



Subgroup analysis of overall complicatio in patients who lost weight and patients who did not lose weight was not statistically different between intervention and contr group. Figure



Subgroup analysis of overall complicatio in patients who underwent bariatric surgery was not statistically different between interventio and control group.

CONCLUSION We found similar hernia recurrence, seroma, hematoma, and SSI rates in patients undergoing ventral hernia repair who underwent preoperative optimization. Further controlled prospective studies are needed to assess the optimal candidates and prehabilitation strategy for obese patients seeking ventral hernia repair.

Modifying Risks in Ventral Hernia Patients With Prehabilitation

A Randomized Controlled Trial

Mike K. Liang, MD,† Karla Bernardi, MD,*† Julie L. Holihan, MD, MS,*† Deepa V. Cherla, MD,*†*
Richard Escamilla, BS, Debbie F. Lew, BS, MPH,* David H. Berger, MD,‡*
Tien C. Ko, MD, and Lillian S. Kao, MD, MS*†*

TABLE 3. Comparison of Changes in the Prehabilitation and Standard Counseling Groups

Characteristic (Mean ± SD)	Prehabilitation (n = 54)*	Standard Counseling (n = 58)†	P
Decrease in waist size, cm	4.6 (± 16.7)	1.6 (± 8.9)	0.239
Decrease in hip size, cm	2.1 (± 6.5)	2.3 (± 8.4)	0.188
Increase in sit-stand test	2.2 (± 3.7)	2.7 (± 3.2)	0.421
Total weight loss, lbs	6.0 (± 9.4)	4.3 (± 8.3)	0.308

This table shows the mean and SD of the difference between the baseline measurements and the patient's last preoperative or follow-up visit.

*Excludes 3 patients who dropped out of prehabilitation and 2 patients who underwent emergent repair before any preoperative follow-up visit.

†Excludes 1 patient who dropped out of standard counseling.

TABLE 6. Surgical Outcomes in Patients Who Met Their Preoperative Weight Loss Goals and Those Who Did Not (and Underwent Elective Ventral Hernia Repair)

	Met Weight Loss Goal (≥7% TBW)	Weight Loss but Did Not Meet Goal (<7% TBW)	P
Prehabilitation	12/45 (27.3%)	32/45 (72.7%)	—
Standard counseling	6/44 (17.6%)	28/44 (82.4%)	—
Wound complications	1/18 (5.6%)	8/60 (13.3%)	0.365

Preoperative weight loss goal = 7% TBW or more.

CONCLUSIONS

A prehabilitation program for obese patients is feasible to implement at a safety-net hospital.

Those patients undergoing prehabilitation have a higher likelihood of being hernia-free and complication-free at 30 days postoperatively.

However, prehabilitation tended to draw more patients away from the study and it may be associated with an increased risk for emergent VHR.

Although further trials and long-term outcomes are needed, prehabilitation may benefit surgical patients who are obese and with poor fitness.

Meta-Analysis > Surg Laparosc Endosc Percutan Tech. 2023 Dec 1;33(6):663-672.
doi: 10.1097/SLE.0000000000001235.

Body Mass Index Effect on Minimally Invasive Ventral Hernia Repair: A Systematic Review and Meta-analysis

Sergio Mazzola Poli de Figueiredo [1], Rui-Min Diana Mao [1], Giovanna Dela Tejera [1], Luciano Tastaldi [1], Alejandro Villasante-Tezanos [2], Richard Lu [1]

Results:
Eleven studies and 3199 patients were included in the meta-analysis. BMI >40 kg/m 2 cutoff analysis included 5 studies and 1533 patients;
No differences in hernia recurrence [odds ratios (OR): 1.64; 95% CI: 0.57-4.68; P = 0.36; I2 = 47%), seroma, hematoma, and surgical site infection (SSI) rates were noted. BMI >35 kg/m 2 cutoff analysis included 5 studies and 1403 patients; no differences in hernia recurrence (OR: 1.24; 95% CI: 0.71-2.16; P = 0.58; I2 = 0%), seroma, hematoma, and SSI rates were noted. BMI >30 kg/m 2 cutoff analysis included 4 studies and 385 patients; no differences in hernia recurrence (OR: 2.07; 95% CI: 0.5-8.54; P = 0.32; I2 = 0%), seroma, hematoma, and SSI rates were noted.

Conclusion: Patients with high BMI undergoing MIS VHR have similar hernia recurrence, seroma, hematoma, and SSI rates compared with patients with lower BMI. Further prospective studies with long-term follow-up and patient-reported outcomes are required to establish optimal management in obese patients undergoing VHR.

Hernia. 2019 Oct;23(5):899-907. doi: 10.1007/s10029-019-01944-6. Epub 2019 Apr 20.

Impact of body mass index on minimally invasive ventral hernia repair: an ACS–NSQIP analysis

L Owei [1], R A Swendiman [2], S Torres-Landa [3], D T Dempsey [4], K R Dumon [4]

Table 2 Univariate associations between complications and BMI categories

Category	All	Body mass index, kg/m^2							*p* value
		<18.5	18.5–24.99	25–29.99	30–34.99	35–39.99	40–50	≥50	
Number	55,180	187	5531	13,878	15,428	10,068	7796	2292	
Complications, % (*N*)									
Any complications (at least 1)	4.0 (2180)	6.4 (12)	3.8 (209)	3.0 (421)	3.8 (582)	4.0 (405)	5.1 (394)	6.9 (157)	<0.0001
Complications by category, % (*N*)									
Surgical complications	1.7 (923)	3.2 (6)	1.3 (70)	1.1 (151)	1.6 (240)	1.8 (182)	2.4 (189)	3.7 (85)	<0.0001
Postoperative superficial SSI	0.7 (360)	1.1 (2)	0.4 (22)	0.4 (54)	0.6 (88)	0.8 (78)	1.1 (85)	1.4 (31)	<0.0001
Organ space SSI	0.4 (210)	1.1 (2)	0.4 (24)	0.3 (39)	0.4 (64)	0.4 (38)	0.4 (31)	0.5 (12)	0.227
Deep incisional SSI	0.2 (103)	0.5 (1)	0.1 (7)	0.2 (22)	0.2 (28)	0.1 (14)	0.3 (22)	0.4 (9)	0.040
Wound disruption/infection	0.5 (286)	0.5 (1)	0.4 (23)	0.3 (43)	0.5 (69)	0.6 (56)	0.8 (59)	1.5 (35)	<0.0001
Medical complications									
Pneumonia	2.7 (1505)	4.8 (9)	2.9 (160)	2.3 (313)	2.6 (406)	2.7 (274)	3.1 (243)	4.4 (100)	<0.0001
Pulmonary embolism	0.5 (284)	0.5 (28)	0.6 (79)	0.4 (65)	0.5 (49)	0.6 (45)	0.6 (13)	2.7 (5)	0.002
Acute renal failure	0.2 (106)	0 (0)	0.1 (4)	0.1 (17)	0.2 (31)	0.2 (20)	0.3 (24)	0.4 (10)	0.002
Myocardial infarction	0.1 (50)	0 (0)	0.1 (6)	0.03 (4)	0.1 (17)	0.1 (9)	0.1 (9)	0.2 (5)	0.074
Stroke	0.2 (94)	1 (0.5)	0.2 (11)	0.2 (25)	0.2 (32)	0.1 (12)	0.2 (12)	0.04 (1)	0.331
Urinary tract infection	0.04 (22)	0 (0)	0.02 (1)	0.02 (3)	0.1 (12)	0.03 (3)	0.04 (3)	0 (0)	0.195
Respiratory complications	0.8 (418)	0.5 (1)	1.0 (57)	0.6 (84)	0.7 (74)	0.8 (65)	1.3 (30)	0.5 (1)	0.002
	0.9 (508)	3.2 (6)	0.9 (51)	0.9 (123)	0.8 (128)	0.9 (93)	1.1 (82)	1.1 (25)	0.024

Table 5 Univariate associations between BMI categories and risk of any complication stratified by reducible (first row of values) or incarcerated/strangulated (second row)

Category	All	Body mass index, kg/m^2							*p* value
		<18.5	18.5–24.99	25–29.99	30–34.99	35–39.99	40–50	≥50	
Number	55,180	187	5531	13,878	15,428	10,068	7796	2292	
Any complications (at least one) [% (*N*)]	3.6 (1355)	5.3 (8)	3.4 (143)	3.0 (302)	3.8 (402)	3.6 (235)	4.1 (187)	6.6 (78)	<0.0001
	4.6 (825)	11.1 (4)	4.8 (66)	3.2 (119)	3.7 (180)	4.7 (170)	6.3 (207)	7.1 (79)	<0.0001
Complications by category [% (*N*)]									
Surgical complications	1.5 (552)	2.7 (4)	1.1 (44)	1.0 (103)	1.5 (160)	1.7 (113)	2.0 (89)	3.3 (39)	<0.0001
	2.1 (371)	5.6 (2)	1.9 (26)	1.3 (48)	1.7 (80)	1.9 (69)	3.1 (100)	4.2 (46)	<0.0001
Postoperative superficial SSI	0.6 (210)	0.7 (1)	0.3 (14)	0.4 (38)	0.6 (61)	0.7 (44)	0.9 (40)	1.0 (12)	<0.0001
	0.8 (150)	2.8 (1)	0.6 (8)	0.4 (16)	0.6 (27)	1.0 (34)	1.4 (45)	1.7 (19)	<0.0001
Organ space SSI	0.3 (124)	1.3 (2)	0.4 (16)	0.2 (22)	0.4 (40)	0.4 (25)	0.4 (16)	0.3 (3)	0.111
	0.5 (86)	0 (0)	0.6 (8)	0.5 (17)	0.5 (24)	0.4 (13)	0.5 (15)	0.8 (9)	0.646
Deep incisional SSI	0.2 (70)	0.7 (1)	0.1 (2)	0.2 (17)	0.2 (21)	0.2 (11)	0.3 (13)	0.4 (5)	0.054
	0.2 (33)	0 (0)	0.4 (5)	0.1 (5)	0.1 (7)	0.1 (3)	0.3 (9)	0.4 (4)	0.183
Wound disruption/infection	0.5 (167)	0 (0)	0.4 (15)	0.3 (31)	0.4 (45)	0.5 (34)	0.5 (23)	1.6 (19)	<0.0001
	0.7 (119)	2.8 (1)	0.6 (8)	0.3 (12)	0.5 (24)	0.6 (22)	1.1 (36)	1.4 (16)	<0.0001
Medical complications	2.6 (955)	4.6 (7)	2.7 (112)	2.2 (226)	2.7 (286)	2.4 (155)	2.7 (120)	4.1 (49)	0.002
	3.1 (550)	5.6 (2)	3.5 (48)	2.3 (87)	2.5 (120)	3.3 (119)	3.8 (123)	4.6 (51)	<0.0001
Postoperative pneumonia	0.5 (179)	2.7 (4)	0.5 (21)	0.6 (57)	0.4 (45)	0.4 (28)	0.4 (19)	0.4 (5)	0.007
	0.6 (105)	2.8 (1)	0.5 (7)	0.6 (22)	0.4 (20)	0.6 (21)	0.8 (26)	0.7 (8)	0.207
Pulmonary embolism	0.2 (70)	0 (0)	0.1 (3)	0.1 (12)	0.2 (24)	0.2 (12)	0.2 (11)	0.7 (8)	0.001
	0.2 (36)	0 (0)	0.1 (1)	0.1 (5)	0.1 (7)	0.2 (8)	0.4 (13)	0.2 (2)	0.158
Acute renal failure	0.1 (28)	0 (0)	0.1 (5)	0.02 (2)	0.1 (11)	0.1 (5)	0.1 (3)	0.2 (2)	0.241
	0.1 (22)	0 (0)	0.1 (1)	0.05 (2)	0.1 (6)	0.1 (4)	0.2 (6)	0.3 (3)	0.566
Myocardial infarction	0.2 (61)	0 (0)	0.2 (9)	0.2 (19)	0.2 (25)	0.1 (6)	0.04 (2)	0 (0)	0.050
	0.2 (33)	2.8 (1)	0.2 (2)	0.2 (6)	0.1 (7)	0.2 (6)	0.3 (10)	0.1 (1)	0.009
Stroke	0.05 (17)	0 (0)	0.02 (1)	0.02 (2)	0.1 (9)	0.05 (3)	0.04 (2)	0 (0)	0.410
	0.03 (5)	0 (0)	0 (0)	0.03 (1)	0.1 (3)	0 (0)	0.03 (1)	0 (0)	0.713
Urinary tract infection	0.8 (280)	0 (0)	1.1 (44)	0.6 (65)	0.7 (77)	0.7 (44)	0.8 (37)	1.1 (13)	0.100
	0.8 (138)	2.8 (1)	1.0 (13)	0.5 (19)	0.6 (30)	0.8 (30)	0.9 (28)	1.5 (17)	0.011
Respiratory complication	0.8 (309)	3.3 (5)	0.8 (35)	0.8 (84)	0.8 (86)	0.8 (53)	0.8 (36)	0.8 (10)	0.077
	1.1 (199)	2.8 (1)	1.2 (16)	1.0 (39)	0.9 (42)	1.1 (40)	1.4 (46)	1.4 (15)	0.319

Conclusion

A threshold of BMI ≥ 50 kg/m 2 was determined to be an independent risk factor for surgical and medical complications after minimally invasive VHR. Surgeons may consider this approach for patients with elevated BMIs to reduce their risk of post-operative complications if clinically appropriate

OBESITY

THE ROLE OF OBESITY IN THE PATHOGENESIS OF VENTRAL HERNIAS

Several studies identify BMI as a key factor for the development of primary ventral hernias and incisional hernias

DIVERSE RISK FACTORS:

- Increase of intrabdominal pressure
- Increase on abdominal circumference
- Increased risk of SSI

Published in final edited form as:
J Am Coll Surg. 2015 April ; 220(4): 405–413. doi:10.1016/j.jamcollsurg.2014.12.027.

Development and Validation of a Risk Stratification Score for Ventral Incisional Hernia after Abdominal Surgery: Hernia Expectation Rates iN Intra-Abdominal Surgery (The HERNIA Project)

Christopher J Goodenough, MD[1], Tien C Ko, MD, FACS[1], Lillian S Kao, MD, MS, FACS[1], Mylan T Nguyen, MPH[1], Julie L Holihan, MD[1], Zeinab Alawadi, MD[1], Duyen H Nguyen, MPH[1], Juan Ramon Gonzalez, MD[1], Nestor T Arita, MD[2], J Scott Roth, MD, FACS[3], and Mike K Liang, MD, FACS[1]

Walming *et al. BMC Surgery* (2017) 17:19
DOI 10.1186/s12893-017-0207-0

BMC Surgery

RESEARCH ARTICLE Open Access

Retrospective review of risk factors for surgical wound dehiscence and incisional hernia

Sofie Walming[1*], Eva Angenete[1], Mattias Block[2], David Bock[1], Bodil Gessler[1] and Eva Haglind[1]

OBESITY

The European Hernia Society Prehabilitation Project: a systematic review of patient prehabilitation prior to ventral hernia surgery

K. K. Jensen[1] · B. East[2] · B. Jisova[2] · M. López Cano[3] · G. Cavallaro[4] · L. N. Jørgensen[1] · V. Rodrigues[3] · C. Stabilini[5,6] · D. Wouters[7] · F. Berrevoet[7]

Non operative weight-loss intervention

Ketogenic diet

Diet high in fat and proteins and low in carbohydrates

Very low calories diet

Diet that involves eating fewer than 800 kilocalories per day

Low calories diet

Diet that restricts the intake to 1000 to 1200 calories per day

Studies have been shown to be effective at short-term weight loss, with dieters typically losing 10% to 20% of their initial body weight.

Use of Very Low-Calorie Diet in Preoperative Weight Loss: Efficacy and Safety

Tuula Pekkarinen, Pertti Mustajoki

A Multidisciplinary Approach to Medical Weight Loss Prior to Complex Abdominal Wall Reconstruction: Is it Feasible?

Michael J. Rosen[1,3] · Kasim Aydogdu[2] · Kevin Grafmiller[2] · Clayton C. Petro[2] · Gregg H. Faiman[2] · Ajita Prabhu[2]

Surgeon's requirement for obesity reduction: its influence on weight loss

Ross F Goldberg[1], Michael Parker, John A Stauffer, Salman Moti, Jacob Sylvia, Gretchen E Ames, Horacio J Asbun, Scott A Lynch, C Daniel Smith, Steven P Bowers

Outcomes Experienced by Patients Presenting with Ventral Hernia and Morbid Obesity in a Surgical Clinic

Margaret A Plymale, Daniel L Davenport, John S Roth

Preoperative Planning and Patient Optimization

Clayton C. Petro, MD, Ajita S. Prabhu, MD*

Ventral hernias in morbidly obese patients: a suggested algorithm for operative repair

George M Eid[1], Krzysztof J Wikiel, Fateh Entabi, Mark Saleem

OBESITY

Operative weight-loss intervention

BARIATRIC SURGERY

STAGED APPROACH

"The evidence seems to increase in favor of a staged approach in patients with morbid obesity and abdominal hernia"

> Hernia. 2021 Apr;25(2):383-387. doi: 10.1007/s10029-020-02253-z. Epub 2020 Jun 24.

Staged complex abdominal wall hernia repair in morbidly obese patients

A D Schroeder [1], T Mukherjee [2], N Tashjian [1], M Siu [1], R Fitzgibbons Jr [1], K Nandipati [3]

Review > J Laparoendosc Adv Surg Tech A. 2020 Aug;30(8):896-899. doi: 10.1089/lap.2020.0265. Epub 2020 May 21.

Obesity and Ventral Hernia Repair: Is There Success in Staging?

Eric Veilleux [1], Rami Lutfi [1]

PROs:

- ↓ Postoperative morbidity
- ↓ Wound complications and recurrence rates after preoperative weight loss
- ↓ Difficulty of repair in patients with large chronic hernias or loss of domain: succesful repair
- ↑ Control of comorbidities such as diabetes

The European Hernia Society Prehabilitation Project: a systematic review of patient prehabilitation prior to ventral hernia surgery

K. K. Jensen[1] · B. East[2] · B. Jisova[2] · M. López Cano[3] · G. Cavallaro[4] · L. N. Jørgensen[1] · V. Rodrigues[3] · C. Stabilini[5,6] · D. Wouters[7] · F. Berrevoet[7]

INTRAGASTRIC BALLOON THERAPY

lack of randomized studies that support its implementation and the cost associated with this therapy

INTRAGASTRIC BALLOON (BIB SYSTEM) IN THE TREATMENT OF OBESITY AND PREPARATION OF PATIENTS FOR SURGERY – OWN EXPERIENCE AND LITERATURE REVIEW

STANISŁAW DĄBROWIECKI, WOJCIECH SZCZĘSNY, CEZARY POPŁAWSKI, DARIUSZ SOSNOWSKI

LAPAROSCOPIC SLEEVE GASTRECTOMY

is recommended as procedure of choice since there is no manipulation of the intestine and it is a procedure with lower postoperative risk, lower risk of complication related to abdominal wall hernia and rapid loss of weight

Complex hernias with loss of domain in morbidly obese patients: role of laparoscopic sleeve gastrectomy in a multi-step approach

Yves Borbély, M.D., F.A.C.S.*, Jens Zerkowski, M.D., Julia Altmeier, M.D., Anna Eschenburg, Dino Kröll, M.D., Philipp Nett, M.D.

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Received October 30, 2016; revised January 1, 2017; accepted January 20, 2017

Laparoscopic sleeve gastrectomy in patients with complex abdominal wall hernias

David J. Morrell[1] · Eric M. Pauli[1] · Jerome R. Lyn-Sue[1] · Randy S. Haluck[1] · Ann M. Rogers[1]

Intragastric Balloons for Preoperative Weight Reduction

B. De Waele, MD[1]; H. Reynaert, MD[2]; D. Urbain, PhD[2]; G. Willems, PhD[1]

ELSEVIER

Surgery for Obesity and Related Diseases 14 (2018) 1221–1232

SURGERY FOR OBESITY AND RELATED DISEASES

American Society for Metabolic and Bariatric Surgery and American Hernia Society consensus guideline on bariatric surgery and hernia surgery

Emanuele Lo Menzo, M.D.[a], Marcelo Hinojosa, M.D.[b], Alfredo Carbonell, M.D.[c], David Krpata, M.D.[d], Jonathan Carter, M.D.[e], Ann M. Rogers, M.D.[f,g]

«Bariatric surgery appears to provide far more significant and rapid weight loss than other modalities and would be a good option for selected patients with severe obesity and large AWH.»

The dark side of prehab

Hernia. 2022 Oct;26(5):1259-1265. doi: 10.1007/s10029-022-02625-7. Epub 2022 Jun 8.

Can a free weight management program "move the needle" for obese patients preparing for hernia surgery?: outcomes of a novel pilot program

S M Maskal [1], A M Boyd-Tressler [2], L J Heinberg [3], K C Montelione [2], C C Petro [2], D M Krpata [2], M J Rosen [2], A S Prabhu [2]

Table 3 Number of patients enrolled in various programs through the Weight Management Navigator

Program	*n*	%
None	111	58%
Online coaching	60	31%
Dietician	11	6%
Lifestyle/integrative-	5	3%
Functional med	0	0%
Bariatric	1	0.5%
Medical/non-surgical	2	1%
Endocrinology	3	2%
Personal training	0	0%
Enrolled in more than one program	2	–

Table 4 Weight loss characteristics and outcomes of patients who proceeded to surgery, presented by participant vs non-participant

	Participant (36)	Non-participant (57)	
Mean initial BMI (kg/m^2)	45.6	44.5	$p=0.4$
Mean follow-up BMI (kg/m^2)	42.3	43.8	$p=0.6$
Average weight loss in kg (range)	6 (−4.1–26. kg)	1.8 kg (−35.9–23.3)	$p=0.01$
Proceed to hernia repair	9	8	
Time to surgery in months (range)	4.5 (1.3–8.3)	5.2 (0.8–13.1)	$p=0.3$
Emergencies prior to surgery	2	4	
SBO	2	3	
Emergent surgery	0	3	
No postoperative complications	4	2	
Postoperative skin and soft tissue infection	3	2	
Postoperative major complication	2	4	

Conclusion: Achieving weight loss can be a significant obstacle to elective ventral hernia repair for obese patients. Overall engagement in our institutional weight loss program was low. Referral to a Weight Management Navigator did increase the success rate for weight loss in our study population for those who participated. Obesity remains a difficult barrier to overcome for both patients and surgeons

Am Surg. 2017 Oct 1;83(10):1112-1116.

Evaluation of Preoperative Weight Loss for Elective Hernia Repair in the Veteran Population

Beatrice J Sun [1], David Valdez, Dao Duong, Ryan Gupta, Brian R Smith

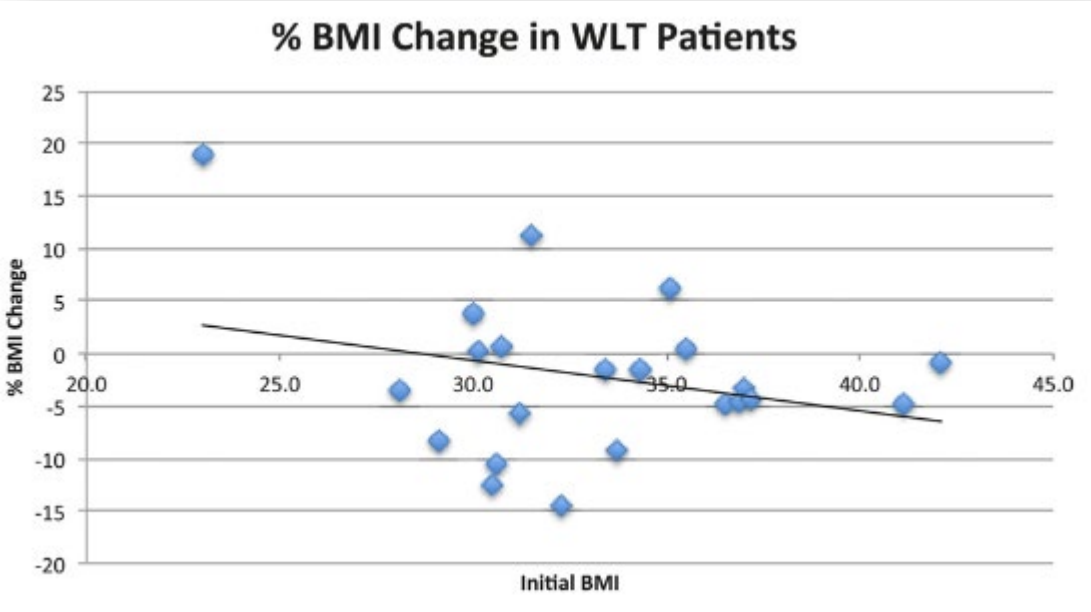

TABLE 3. *TRIAL Subgroup Outcomes*

	All TRIAL (n = 22)	Poor (n = 10)	Moderate (n = 9)	Good (n = 3)
Age	61.2 ± 8.2	60.2 ± 10.2	60.7 ± 5.3	66.0 ± 8.9
Male	22 (100.0%)	10 (100.0%)	9 (100.0%)	3 (100.0%)
Initial BMI	33.2 ± 4.4	32.6 ± 4.9	34.5 ± 4.3	31.1 ± 1.0
Preoperative BMI	32.4 ± 4.4	33.6 ± 4.1	32.7 ± 4.4	27.2 ± 0.5
% BMI change	−2.2 ± 7.6	3.8 ± 6.7	−5.3 ± 2.0	−12.6 ± 2.0
Type of hernia:				
Ventral	19 (86.4%)	8 (80.0%)	8 (88.9%)	3 (100.0%)
Inguinal	5 (22.7%)	2 (20.0%)	3 (33.3%)	0 (0%)
Both	2 (9.1%)	0 (0%)	2 (22.2%)	0 (0%)
Mesh placement	14 (63.6%)	6 (60.0%)	6 (66.7%)	2 (66.7%)
Open surgery	12 (54.5%)	6 (60.0%)	5 (55.6%)	1 (33.3%)
Delay to surgery (days)	226.14 ± 145.9	198.4 ± 154.3	257.9 ± 161.1	223.3 ± 64.7
Length of stay (days)	1.0 ± 2.4	1.2 ± 2.6	0.22 ± 0.67	2.7 ± 4.6

TRIAL subgroup patient demographics and outcomes. There were no emergent surgeries and no hernia recurrence in TRIAL patients.

Conclusion: Weight loss trials in elective hernia patients appear to be safe, although they result in significant delay to surgery and confer no difference in postoperative outcomes. Thus, efficacy of preoperative weight loss trials may be limited.

Hernia
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HOW-I-DO-IT

Preoperative optimization in hernia surgery: are we really helping or are we just stalling?

A. Fafaj[1] · S. M. P. de Figueiredo[1] · M. J. Rosen[1] · C. C. Petro[1]

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Conclusion

Most of the hernias that the reconstructive surgeons evaluate qualify for elective repair, so we have the option to maximally optimize every modifiable risk factor to improve surgical outcomes. While there is no question that modifying these risk factors can improve the patient's overall health, the hernia-specific data simply does not justify prolonged waiting times or even denying surgery when patients fail to achieve full optimization. With patients continuing to suffer while in the "waiting period", one wonders whether we are truly helping or perhaps disserving them by continuously kicking the can down the road.

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World Journal of Surgery

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ORIGINAL SCIENTIFIC REPORT

Risk Factors for Incarceration in Patients with Primary Abdominal Wall and Incisional Hernias: A Prospective Study in 4472 Patients

Dimitri Sneiders[1,6] · Yagmur Yurtkap[1] · Leonard F. Kroese[2] · Gert-Jan Kleinrensink[3] · Johan F. Lange[1,4] · Jean-François Gillion[5] · The Hernia-Club Members

Table 2 Incisional hernia: patient baseline and hernia characteristics

Variable Patient baseline characteristics	Not incarcerated *N* (%)	Incarcerated *N* (%)	Odds ratio OR (95% CI)	*p* value
Total # patients	2041	79		
Age (years)*	62.7 ± 14.1	67.9 ± 13.7	1.03 (1.01–1.05)**	**0.0013**
BMI (kg/m^2)*	29.3 ± 6.1	32.1 ± 7.9	1.06 (1.03–1.09)**	**0.0002**
Sex = female	1050 (51.4)	59 (74.7)	2.78 (1.66–4.66)	**<0.0001**
Current smoking	365 (18.8)	10 (13.5)	0.73 (0.39–1.37)	0.33
Diabetes mellitus	240 (12)	24 (31.6)	3.40 (2.07–5.57)	**<0.0001**
Corticosteroid use	73 (3.6)	2 (2.6)	0.71 (0.17–2.98)	0.64
Radiotherapy	36 (1.8)	1 (1.3)	0.74 (0.10–5.16)	0.75
Chemotherapy	126 (6.3)	3 (3.9)	0.64 (0.20–2.01)	0.44
History of AAA	15 (0.7)	1 (1.3)	1.81 (0.23–14.35)	0.58
Anticoagulant use	341 (17)	16 (21.1)	1.30 (0.74–2.29)	0.37
History of abdominal wall hernia	844 (41.6)	35 (44.9)	1.15 (0.73–1.82)	0.54
History of inguinal hernia	215 (10.6)	5 (6.4)	0.56 (0.22–1.40)	0.21
ASA classification				
I–II	1418 (69.7)	33 (43.4)	1 (reference)	
III–IV	617 (30.3)	43 (56.6)	3.04 (1.89–4.89)	**<0.0001**
Primary surgery				
Gastro-intestinal	972 (48.2)	27 (35.5)	0.79 (0.45–1.40)	0.42
Gynaecologic	344 (17.1)	25 (32.9)	2.12 (1.18–3.79)	**0.0118**
Other	700 (34.7)	24 (31.6)	1 (reference)	
Ascites	14 (0.7)	0 (0)	–	0.85
Chronic cough	196 (9.7)	8 (10.4)	1.12 (0.54–2.30)	0.76
Constipation	131 (6.5)	11 (14.3)	2.33 (1.2–4.51)	**0.0122**
Heavy lifting	139 (6.9)	8 (10.4)	1.57 (0.74–3.33)	0.07
Hernia characteristics				
Type of hernia				
Recurrent hernia	410 (20.4)	21 (28.0)	1.63 (0.95–2.77)	0.07
Previous surgery with mesh	689 (34.2)	20 (26.7)	0.74 (0.44–1.25)	0.26
Defect location				
Supra-umbilical	359 (22.1)	9 (15.3)	1 (reference)	
Peri- and infra-umbilical	955 (58.7)	45 (76.3)	1.80 (0.88–3.68)	0.11
Lateral	288 (17.7)	5 (8.5)	1.08 (0.42–2.81)	0.87
Defect width (cm)				
0–2	567 (28.6)	11 (14.7)	1 (reference)	–
3–4	632 (31.9)	34 (45.3)	2.62 (1.32–5.19)	**0.0057**
5–10	658 (33.2)	27 (36.0)	2.08 (1.02–4.27)	**0.0450**
>10	124 (6.3)	3 (4.0)	1.32 (0.39–4.51)	0.66

Conclusion: For primary and incisional hernias, mainly defects of 3–4 cm were associated with incarceration. For primary hernias, mainly defects located in the peri- and infra-umbilical region were associated with incarceration.
Based on patient and hernia characteristics, patients with increased odds for incarceration may be selected and these patients may benefit from elective surgical treatment

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The Risk of Incarceration During Nonoperative Management of Incisional Hernias: A Population-based Analysis of 30,998 Patients

Esmaeel R Dadashzadeh [1 2 3], Lauren V Huckaby [1 3], Robert Handzel [1 2 3], M Shanaz Hossain [1],

	Overall N = 29,475	Elective Repair N = 8,708	Non-operative Management N = 20,767	P-value
Age (years) – mean (SD)	58.1 (15.9)	55.8 (14.1)	59.0 (16.5)	<0.001
Sex – no. (%)				<0.001
- Male	13,955 (47.4)	3,695 (42.4)	10,260 (49.4)	
- Female	15,520 (52.7)	5,013 (57.6)	10,507 (50.6)	
Race – no. (%)				<0.001
- Caucasian	26,238 (89.0)	7,895 (90.7)	18,343 (88.3)	
- African American	2,486 (8.4)	641 (7.4)	1,845 (8.9)	
- Other	751 (2.6)	172 (2.0)	579 (2.8)	
BMI >35 kg/m^2 – no. (%)	8,132 (29.1)	2,669 (32.1)	5,463 (27.8)	<0.001

Conclusions: Incarceration is an uncommon complication of NOM but is associated with a significant risk of death. Tailored decision making for elective repair and considering the aforementioned risk factors for incarceration provides an initial step toward mitigating the excess morbidity and mortality of an incarceration event.

Table 4
Multivariable logistic regression analysis of predictors associated with time to elective surgery >90 days from the index date of diagnosis.

	aOR	95% CI	P-value
Age (for every additional year)	0.99	0.99–0.99	0.001
Sex			
- Male	Reference	Reference	Reference
- Female	1.06	0.95–118	0.297
Race			
- Caucasian	Reference	Reference	Reference
- African American	1.16	0.94–1.44	0.155
- Other	1.37	0.92–2.05	0.121
BMI	1.01	1.00–1.01	0.001
Smoking			
- Never	Reference	Reference	Reference
- Current	1.23	1.02–1.47	0.026
- Former	1.36	1.17–1.58	<0.001
- Unspecified	0.42	0.31–0.59	<0.001
Distance to tertiary care hospital (for every 10 miles)	0.98	0.97–0.99	0.021
Distance to nearest hospital (for every 10 miles)	1.02	1.00–1.03	0.035
Insurance			
- Private	Reference	Reference	Reference
- Medicaid	1.40	1.18–1.66	<0.001
- Medicare	1.49	1.29–1.71	<0.001
- Uninsured	1.09	0.79–1.49	0.604
Socioeconomic status quintile			
- Q1 (lowest)	Reference	Reference	Reference
- Q2	0.98	0.80–1.20	0.832
- Q3	0.99	0.81–1.21	0.923
- Q4	0.97	0.79–1.19	0.796
- Q5 (highest)	0.88	0.71–1.09	0.231
Charlson comorbidity index			
- 0	Reference	Reference	Reference
- 1	1.22	1.06–1.41	0.006
- 2	1.32	1.13–1.56	0.001
- 3	1.23	0.97–1.56	0.088
- ≥4	1.38	1.06–1.80	0.017

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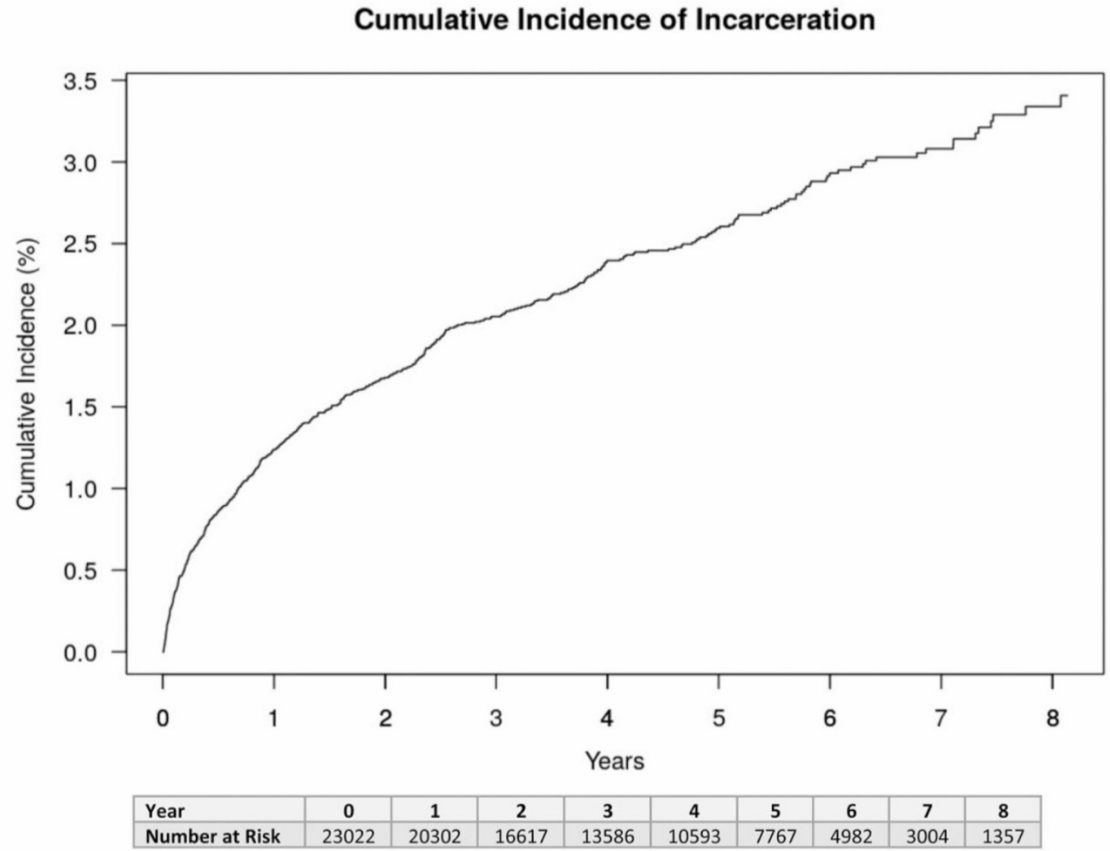
The Risk of Incarceration During Nonoperative Management of Incisional Hernias:

A Population-based Analysis of 30,998 Patients

Esmaeel R. Dadashzadeh, MD, MS[*,†,‡], **Lauren V. Huckaby, MD**[*,‡], **Robert Handzel, MD, MS**[*,†,‡], **M. Shanaz Hossain, MD**[*], **Gloria D. Sanin, MD**[*], **Vincent P. Anto, MD**[*], **Patrick Bou-Samra, MD**[*], **J. B. Moses, MD**[*], **Stephen Cai, MD**[§], **Heather M. Phelos, MPH**[*,‡], **Richard L. Simmons, MD**[*], **Matthew R. Rosengart, MD, MPH**[*,‡], **Dirk J. van der Windt, MD, PhD**[*,‡,✉]



Year	0	1	2	3	4	5	6	7	8
Number at Risk	23022	20302	16617	13586	10593	7767	4982	3004	1357

FIGURE 2.
Cumulative incidence function for incarceration among those undergoing NOM. Utilizing late elective repair as a competing risk, the cumulative incidence for incarceration among those undergoing NOM is plotted as a function of the time of observation. The cumulative incidences of incarceration at 1 and 5 years are 1.24% and 2.59%, respectively.

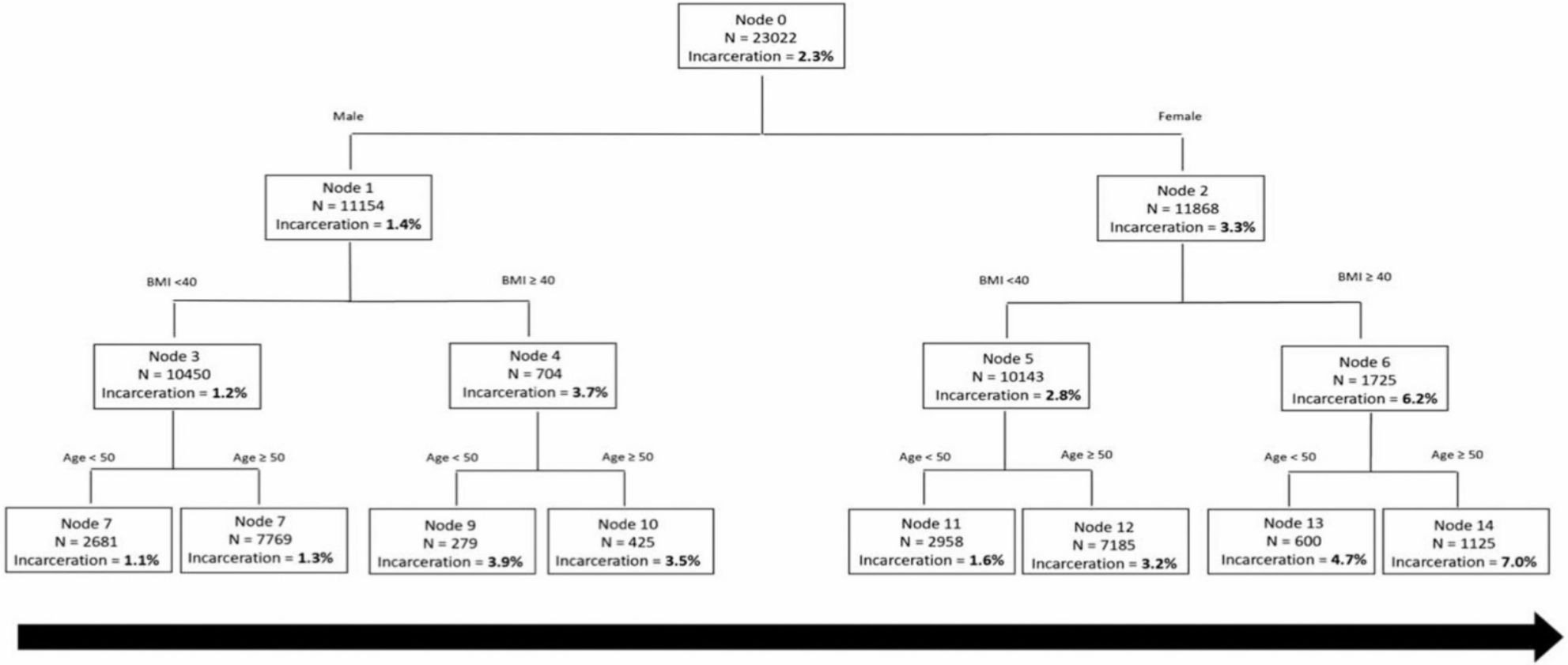


FIGURE 3.

Clinical prediction rule for incarceration risk among patients with incisional hernias undergoing nonoperative management. A machine learning algorithm was used to construct a clinical prediction rule utilizing the variables of sex, BMI, and age. Increasing risk is shown from left to right. The proportion of NOM patients experiencing an incarceration within each subdivision is shown in the corresponding nodes. For example, females with a BMI ≥40 and age ≥50 (node 14) display more incarceration events than females with comparable BMI but age <50 (node 13).

Key Points/Conclusions

1- Prehab compliant patients

2- Be careful with potential hernia complication prior to surgery

3- Correctly plane the kind of surgery/approach

4- Consider prehab with weight loss surgery if indicated