

# Wound Morbidity in Open Ventral Hernia Repair with Panniculectomy

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Novant Health – New Hanover Regional Medical Center  
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# Disclosures

## William Hope, MD

- BD-Honorarium-Research/Consulting/Speaking
- WL Gore-Honorarium-Research/Consulting
- Medtronic-Honorarium-Consulting
- Intuitive-Honorarium-Research/Consulting
- Allergan-Honorarium-Research/Consulting
- TAS Medical-Surgeon Advisory Board
- Deep Blue-Surgeon Advisory Board
- Absolutions-Surgeon Advisory Board

## Justin Leavitt, MD

- None

# VHR and Panniculectomy

## Panniculus – concerns:

- Hygiene
- Dermatitis
- Poor post op mobility
- Increased post op tissue strain

## Concurrent Panniculectomy

- Wider surgical exposure
- Decreased post-op tissue strain
- Fewer interventions and risk exposure
- Improved patient satisfaction
- Safety?



# Background: SSI

Author	Source	Year	VHR-PAN (n)	VHR (n)	VHR-PAN SSI	VHR SSI
Fischer et al	ACS-NSQIP (2005-2011)	2014	1510	54,027	7.6%	5.2%
Shubinetz et al	HCUP (2006-2010)	2017	1013	18,328	5.6%	4.1%
Diaconu et al	Univ of Maryland	2019	122	101 (BMI > 30)	35%	21%
Akiska et al	ACS-NSQIP (2015-2020)	2023	481	13,634	7.1%	4.8%

Akiska YM, et al. Concurrent abdominal body contouring and hernia repair are safe choices J Plast Reconstr Aesthet Surg. 2023

Diaconu SC, et al. Ventral Hernia Repair versus Ventral Hernia Repair with Concurrent Panniculectomy. Plast Reconstr Surg. 2019

Fischer JP, et al. Concurrent panniculectomy with open ventral hernia repair has added risk versus ventral hernia repair. J Plast Reconstr Aesthet Surg. 2014

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# Background: Outcomes

Author	Source	Year	VHR-PAN Recurrence	VHR Recurrence	VHR-PAN DVT	VHR DVT
Fischer et al	ACS-NSQIP (2005-2011)	2014			1.9%	1.0%
Shubinetz et al	HCUP (2006-2010)	2017			1.88%	0.80%
Diaconu et al	Univ of Maryland	2019	28 (35%)	29 (29%)		
Akiska et al	ACS-NSQIP (2015-2020)	2023			0%	0.6%

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# Population

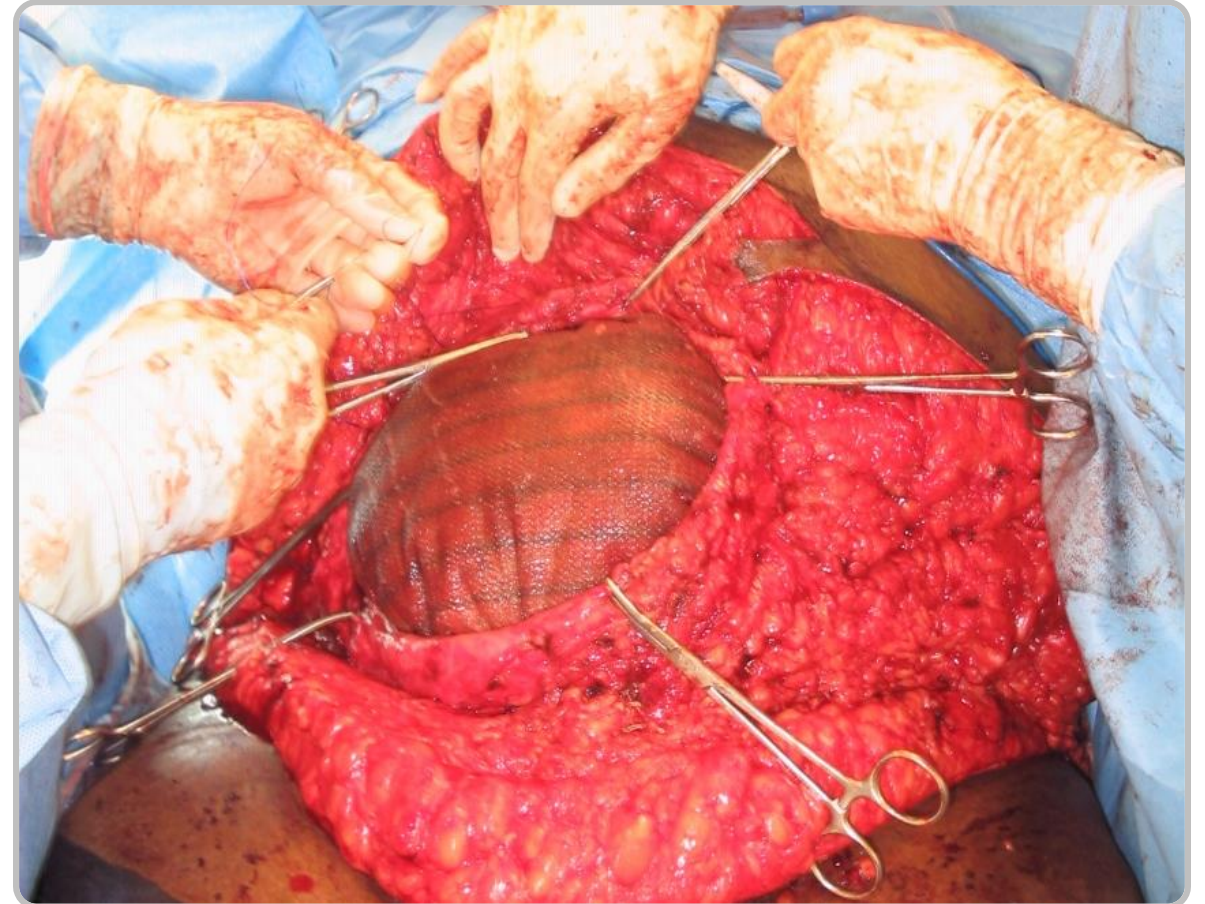
ACHQC data, 2012-2023

## Inclusion

- Age 18 and older
- Open ventral hernia repair

## Exclusion

- No panniculectomy data



# Variables and Analysis

## Patient characteristic variables:

- Age
- Gender
- BMI
- Current Smoker
- Recurrent hernia

## Surgical variables:

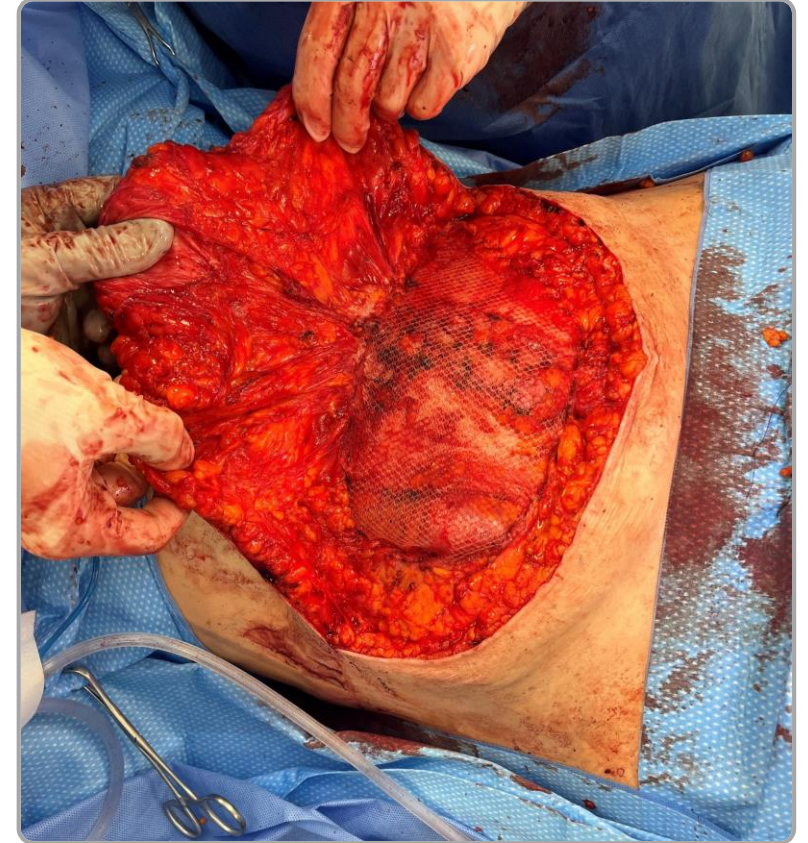
- Mesh used
- Mesh location
- Hernia size
- Panniculectomy

## Outcome variables:

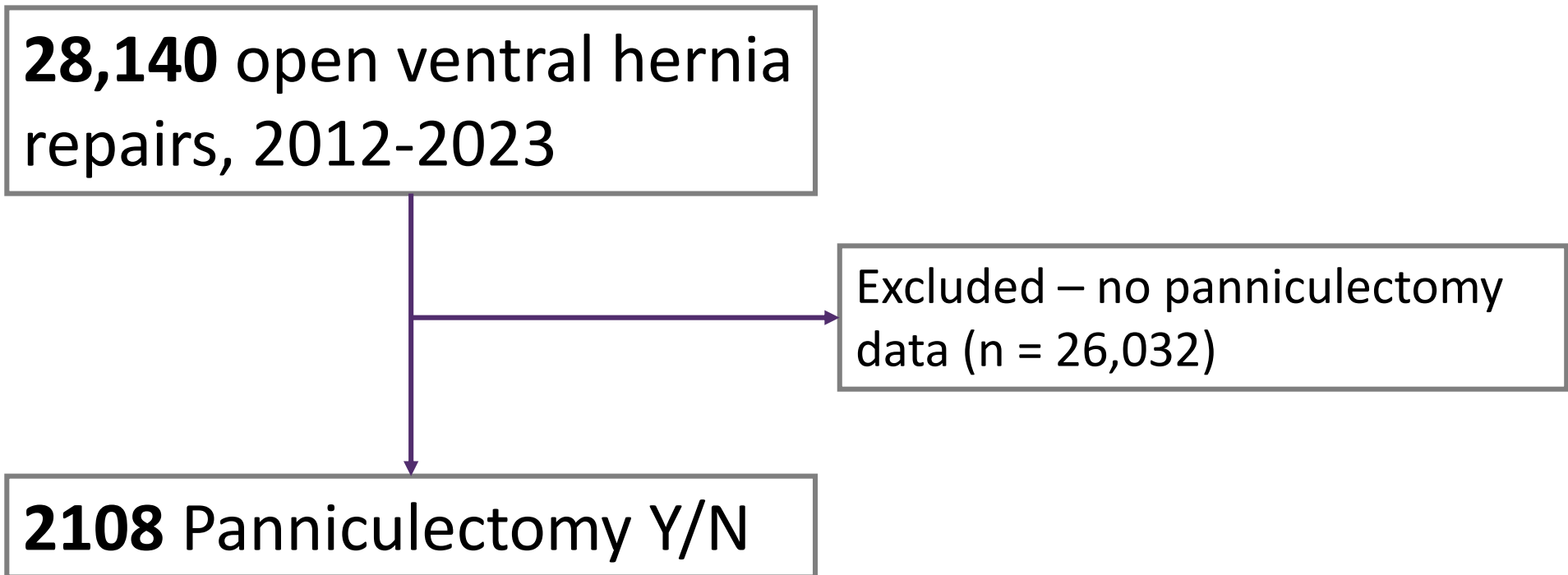
- SSI
- SSO
- SSI/SSO Requiring Intervention
- 1-year recurrence

## Analyses:

- Overall panniculectomy
- Panniculectomy only subgroup
- Matched overall panniculectomy



# Results



# Patient Characteristics

		Panniculectomy No (n = 1238)	Panniculectomy Yes (n = 870)	Total (n = 2108)	P value
Sex	Female	<b>685 (55.3%)</b>	<b>681 (78.3%)</b>	1366 (64.8%)	<0.001
	Male	<b>553 (44.7%)</b>	<b>189 (21.7%)</b>	742 (35.2%)	
Age		<b>56.0 [45.0, 66.0]</b>	<b>57.0 [47.0, 66.0]</b>	57 [46, 66]	0.0507
BMI		<b>30.8 [26.6, 35.1]</b>	<b>34.5 [30.3, 39.1]</b>	32.5 [27.9, 36.9]	<0.001
Recurrent	No	<b>802 (64.8%)</b>	<b>414 (47.6%)</b>	1216 (57.7%)	<0.001
	Yes	<b>436 (35.2%)</b>	<b>456 (52.4%)</b>	892 (42.3%)	
Hernia size (cm <sup>2</sup> )		<b>100.0 [12.0, 240.0]</b>	<b>160.0 [72.0, 308.0]</b>	129 [35, 270]	<0.001

# 30D and Outcomes

		Panniculectomy No (n = 1238)	Panniculectomy Yes (n = 870)	Total (n = 2108)	P value
30D SSI	No	<b>1185 (95.7%)</b>	<b>816 (93.8%)</b>	2001 (94.9%)	0.0474
	Yes	<b>53 (4.3%)</b>	<b>54 (6.2%)</b>	107 (5.1%)	
30D SSO	No	<b>1074 (86.8%)</b>	<b>728 (83.7%)</b>	1802 (85.5%)	0.0485
	Yes	<b>164 (13.2%)</b>	<b>142 (16.3%)</b>	306 (14.5%)	
30D Any	No	<b>969 (78.3%)</b>	<b>643 (73.9%)</b>	1612 (76.5%)	0.0201
	Yes	<b>269 (21.7%)</b>	<b>227 (26.1%)</b>	496 (23.5%)	
30D	No	<b>1155 (93%)</b>	<b>782 (90%)</b>	1937 (92%)	0.0047
Procedure	Yes	<b>83 (7%)</b>	<b>88 (10%)</b>	171 (8%)	

# 1-Year Hernia Recurrence

		Panniculectomy <b>No</b> (n = 227)	Panniculectomy <b>Yes</b> (n = 142)	Total (n = 369)	<i>P</i> value
Recurrence	No	<b>177 (78.0%)</b>	<b>122 (85.9%)</b>	299(81.0%)	0.0591
	Yes	<b>50 (22.0%)</b>	<b>20 (14.1%)</b>	70 (19.0%)	

Recurrence by PRO or Surgeon Report

# Subgroup Analysis

## Panniculectomy = Yes

- SSI
- SSO
- SSI/SSO req procedure
- 1yr recurrence

# Panniculectomy and SSI

		SSI No (n = 816)	SSI Yes (n = 54)	Total (n = 870)	P value
Sex	Female	<b>630 (77.2%)</b>	<b>51 (94.4%)</b>	681 (78.3%)	0.0029
	Male	<b>186 (22.8%)</b>	<b>3 (5.6%)</b>	189 (21.7%)	
BMI		<b>34.2 [30.1, 38.95]</b>	<b>37.8 [34.7, 39.5]</b>	34.5 [30.3, 39.1]	0.0003
Hernia size (cm <sup>2</sup> )		<b>154.0 [72.0, 300.0]</b>	<b>225.0 [120.0, 494.0]</b>	160 [72, 308]	0.0037

Female with SSI: 51/681 (7.5%)

Male with SSI: 3/189 (1.6%)

Not significant: Age, smoking, mesh use, recurrence

# Panniculectomy and SSO

		SSO No (n = 816)	SSO Yes (n = 54)	Total (n = 870)	P value
Sex	Female	<b>564 (77.5%)</b>	<b>117 (82.4%)</b>	681 (78.3%)	0.1932
	Male	<b>164 (22.5%)</b>	<b>25 (17.6%)</b>	189 (21.7%)	
BMI		<b>34.2 [30.2, 38.6]</b>	<b>36.7 [32, 41.4]</b>	34.5 [30.3, 39.1]	0.0005
Recurrent	No	<b>358 (49.2%)</b>	<b>56 (39.4%)</b>	414 (47.6%)	0.0335
	Yes	<b>370 (50.8%)</b>	<b>86 (60.6%)</b>	456 (52.4%)	
Hernia size (cm <sup>2</sup> )		<b>150.0 [70.0, 300.0]</b>	<b>197.0 [112.5, 400.0]</b>	160 [72, 308]	0.0004

Female with SSO: 117/681 (17.2%)

Male with SSO: 25/189 (13.2%)

Not significant: Age, smoking, mesh use

# Panniculectomy and SSI/SSO Req Procedure

		Procedure <b>No</b> (n = 782)	Procedure <b>Yes</b> (n = 88)	Total (n = 870)	<i>P</i> value
Sex	Female	<b>605 (77.4%)</b>	<b>76 (86.4%)</b>	681 (78.3%)	0.0523
	Male	<b>177 (22.6%)</b>	<b>12 (13.6%)</b>	189 (21.7%)	
BMI		<b>34.2 [30.1, 38.7]</b>	<b>37.7 [32.95, 41.55]</b>	34.5 [30.3, 39.1]	0.0007
Recurrent	No	<b>385 (49.2%)</b>	<b>29 (33.0%)</b>	414 (47.6%)	0.0037
	Yes	<b>397 (50.8%)</b>	<b>59 (67.0%)</b>	456 (52.4%)	
Hernia size (cm <sup>2</sup> )		<b>150.0 [70.0, 300.0]</b>	<b>242.0 [137.5, 420.0]</b>	160 [72, 308]	<.0001

Female with procedure: 76/681 (11.2%)

Male with procedure: 12/189 (6.3%)

Not significant: Age, smoking, mesh use

# Panniculectomy and 1-Year Recurrence

		Recurrence <b>No</b> (n = 122)	Recurrence <b>Yes</b> (n = 20)	Total (n = 142)	<i>P</i> value
Sex	Female	<b>94 (77.0%)</b>	<b>17 (85.0%)</b>	111 (78.2%)	0.5653
	Male	<b>28 (23.0%)</b>	<b>3 (15.0%)</b>	31 (21.8%)	
BMI		<b>34.1 [31, 38.6]</b>	<b>35.0 [29.4, 40.4]</b>	34.1 [30.9, 38.9]	0.8248
Recurrent	No	<b>57 (46.7%)</b>	<b>12 (60.0%)</b>	69 (48.6%)	0.2708
	Yes	<b>65 (53.3%)</b>	<b>8 (40.0%)</b>	73 (51.4%)	
Hernia size (cm <sup>2</sup> )		<b>180.0 (81.0, 330.0)</b>	<b>198.0 [48.0, 265.0]</b>	180 [80, 322]	0.5525

Female with recurrence: 17/111 (15.3%)

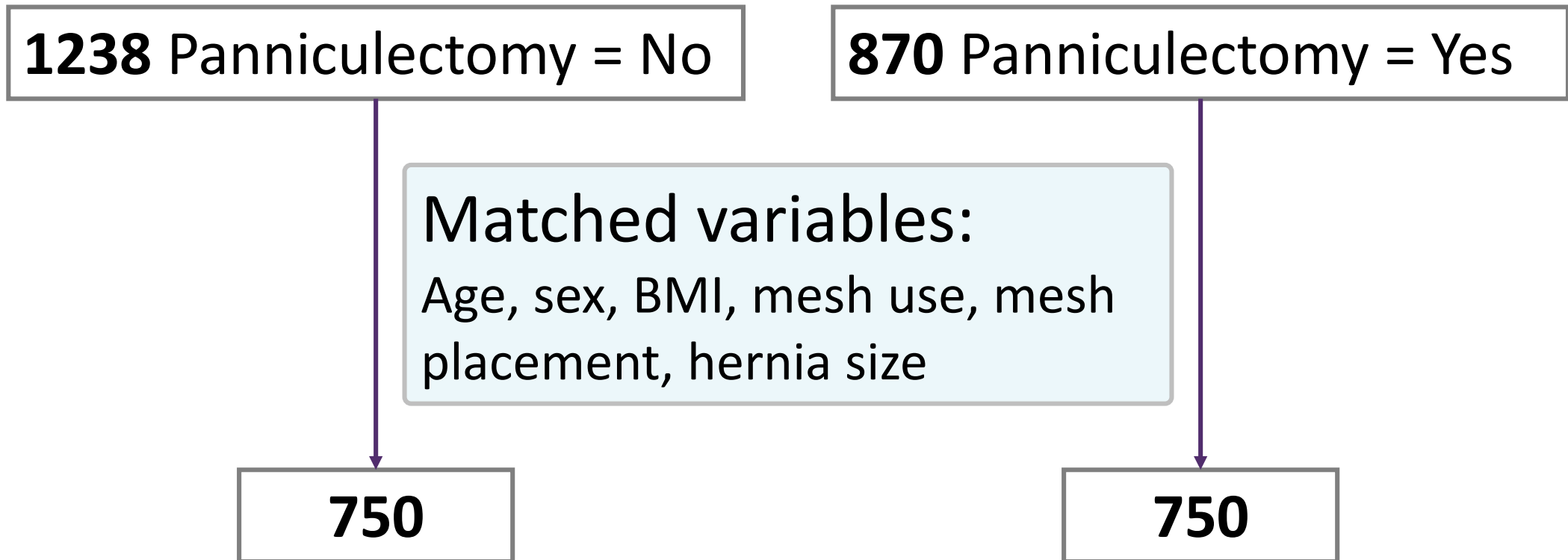
Male with recurrence: 3/31 (9.7%)

# Panniculectomy and 1-Year Recurrence

		Recurrence <b>No</b> (n = 122)	Recurrence <b>Yes</b> (n = 20)	Total (n = 142)	P value
Mesh	No	<b>2 (1.6%)</b>	<b>4 (20.0%)</b>	6 (4.2%)	0.0037
	Yes	<b>120 (98.4%)</b>	<b>16 (80.0%)</b>	136 (95.8%)	

Recurrence	<b>Onlay</b> (n = 15)	<b>Inlay</b> (n = 7)	<b>Sublay</b> (n = 114)	<b>None</b> (n = 6)	Total (n=142)	P value
No	<b>13 (86.7%)</b>	<b>5 (71.4%)</b>	<b>102 (89.5%)</b>	<b>2 (33.3%)</b>	122 (85.9%)	0.0033
Yes	<b>2 (13.3%)</b>	<b>2 (28.6%)</b>	<b>12 (10.5%)</b>	<b>4 (66.7%)</b>	20 (14.1%)	

# Matched Analysis



# Outcomes – Matched Analysis

		Panniculectomy <b>No</b> (n = 750)	Panniculectomy <b>Yes</b> (n = 750)	Total (n = 1500)	<i>P</i> value
30D SSI	No	<b>711 (94.8%)</b>	<b>703 (93.7%)</b>	1414 (94.3%)	0.3743
	Yes	<b>39 (5.2%)</b>	<b>47 (6.3%)</b>	86 (5.7%)	
30D SSO	No	<b>630 (84.0%)</b>	<b>632 (84.3%)</b>	1262 (84.1%)	0.8876
	Yes	<b>120 (16.0%)</b>	<b>118 (15.7%)</b>	238 (15.9%)	
30D Any	No	<b>559 (74.5%)</b>	<b>558 (74.4%)</b>	1117 (74.5%)	0.9528
	Yes	<b>191 (25.5%)</b>	<b>192 (25.6%)</b>	383 (25.5%)	

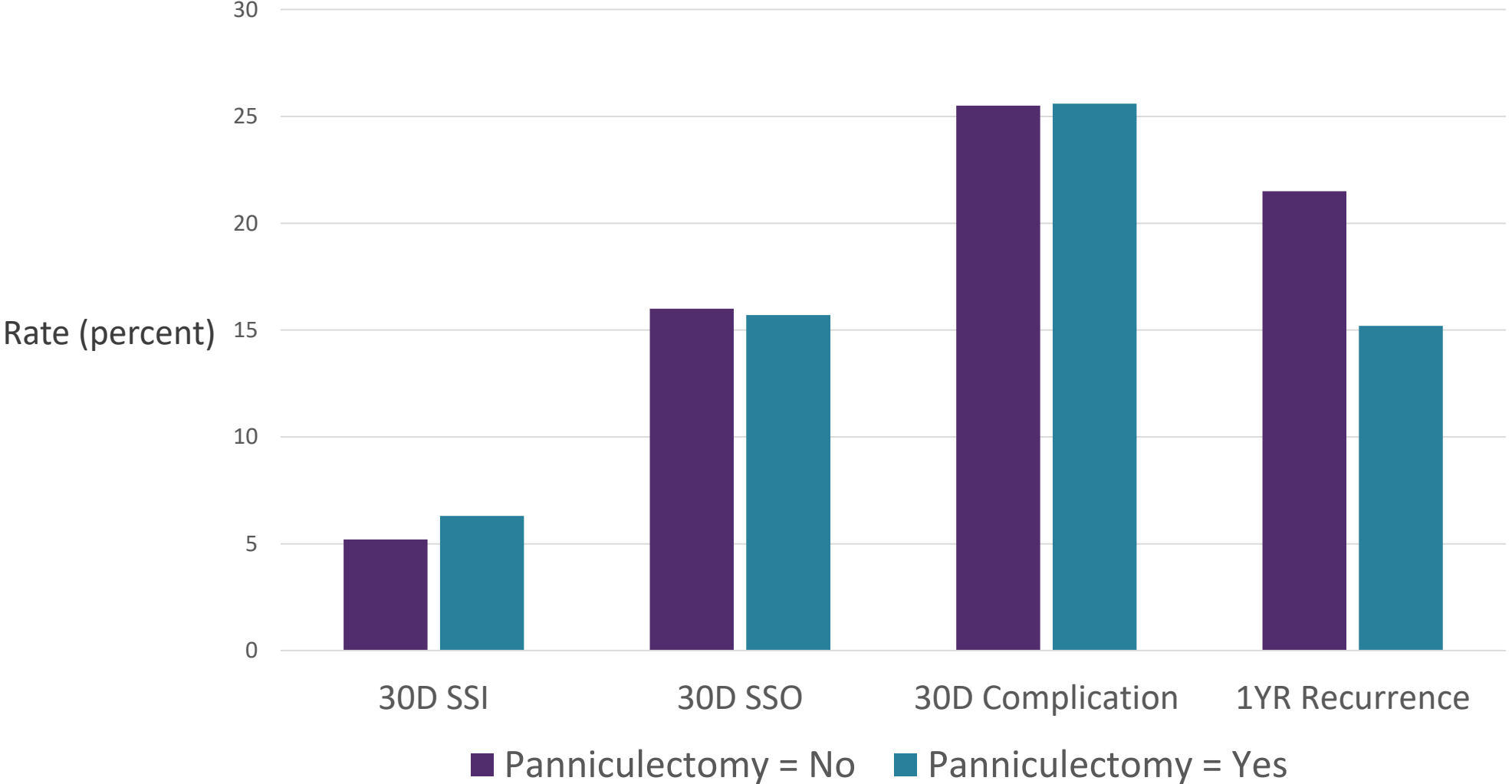
Matched variables: Age, sex, BMI, mesh use, mesh placement, hernia size

# Outcomes – Matched Analysis

		Panniculectomy <b>No</b> (n = 149)	Panniculectomy <b>Yes</b> (n = 125)	Total (n = 274)	<i>P</i> value
1Y Recurrence	No	<b>117 (78.5%)</b>	<b>106 (84.8%)</b>	223 (81.4%)	0.1837
	Yes	<b>32 (21.5%)</b>	<b>19 (15.2%)</b>	171 (8%)	

Matched variables: Age, sex, BMI, mesh use, mesh placement, hernia size

# Outcomes – Matched Analysis



# Conclusions

## Results:

- Unmatched VHR vs VHR-Pan SSI: 4.3% vs 6.2%
- Unmatched Procedures: 7% vs 10%
- Matched 30d outcomes similar
- Matched 1yr recurrence: 21.5% vs 15.2% ( $p = 0.1837$ )

## Limitations:

- Patient selection: Plastics Procedure Panniculectomy
- 1 yr outcomes: 142 of 870 (16.3%) cases
- Matched variables: BMI, age, and mesh

Thank you to Victor Heh  
and the statistics team at  
Ohio State University

# Appendix

# Panniculectomy and Mesh

		Panniculectomy <b>No</b> (n = 1238)	Panniculectomy <b>Yes</b> (n = 870)	Total (n = 2108)	P value
Mesh	No	<b>209 (16.9%)</b>	<b>50 (5.7%)</b>	259 (12.3%)	<.0001
	Yes	<b>1029 (83.1%)</b>	<b>820 (94.3%)</b>	1849 (87.7%)	
Position	None	<b>209 (16.9%)</b>	<b>50 (5.7%)</b>	259 (12.3%)	<.0001
	Sublay	<b>890 (71.9%)</b>	<b>671 (77.1%)</b>	1561 (74.1%)	
	Inlay	<b>56 (4.5%)</b>	<b>28 (3.2%)</b>	84 (4.0%)	
	Onlay	<b>83 (6.7%)</b>	<b>121 (13.9%)</b>	204 (9.7%)	

# Outcomes – Unmatched Analysis

		VHR (Excluding Panniculectomy = Yes)	Panniculectomy Yes	P value
30D SSI	No	<b>26,149 (95.9%)</b>	<b>816 (93.8%)</b>	0.0023
	Yes	<b>1121 (4.1%)</b>	<b>54 (6.2%)</b>	
1Y Recurrence	No	<b>4210 (81.3%)</b>	<b>122 (85.9%)</b>	0.1068
	Yes	<b>970 (18.7%)</b>	<b>20 (14.1%)</b>	

Chi-square test