Racial Disparities in Post-Operative Outcomes Following Ventral Hernia Repair

Van Hoang, MD[1]; Li-Ching Huang, PhD[2]; Murphy Mostellar, MD[1]; Arielle J Perez, MD, MPH, MS, FACS[1];
[1]The University of North Carolina at Chapel Hill; [2]Vanderbilt University Medical Center

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Background

- Racial differences exist in initial pre-operative screening and referral patterns for ventral hernia (VH) and rates of emergent VH repair
- This study will assess disparities in overall VH post-operative outcomes.

Methods

- Patients ≥ 18 y.o who underwent elective VH repair in the Abdominal Core Health Quality Collaborative (ACHQC) database
- Primary outcomes
  - 30-day surgical site occurrences (SSO), surgical site infections (SSI), SSO requiring procedural interventions (SSOPI), Hernia-Related Quality of Life (HerQLes) scores
- Secondary outcomes:
  - 30-day readmission, 30-day and long-term recurrence, postoperative outcomes, intraoperative complications

Results

Patient and Operative Characteristics

Table 1. Demographic and Pre-operative Evaluation.

	*N	White N=26962	Black or AA N=3008	Hispanic N=1605	Other N=617	Combined N=32192	P-value
Age	32192	47 **58** 67	40 **50** 61	40 **49** 59	41 **52** 63	46 **57** 66	<0.001[1]
Gender	32192						<0.001[2]
Male		56% (15105)	37% (1107)	50% (810)	46% (284)	54% (17306)	
Female		44% (11857)	63% (1901)	50% (795)	54% (333)	46% (14886)	
BMI	32014	27 **31** 35	28 **32** 37	28 **31** 36	26 **30** 34	27 **31** 36	<0.001[2]
ASA Class	32182						<0.001[1]
1		9% (2516)	10% (286)	16% (251)	17% (105)	10% (3158)	
2		45% (12094)	46% (1385)	54% (859)	49% (300)	45% (14638)	
3		44% (11754)	42% (1261)	30% (478)	33% (202)	43% (13695)	
4		2% (462)	2% (67)	1% (13)	1% (8)	2% (550)	
5		0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	
None Assigned		0% (128)	0% (9)	0% (2)	0% (2)	0% (141)	
Hepatic Insufficiency/ Liver Failure	32192	1% (274)	1% (19)	1% (13)	1% (7)	1% (313)	0.2[2]
Hypertension	32192	45% (12260)	49% (1478)	33% (535)	40% (249)	45% (14522)	<0.001[2]
Diabetes Mellitus	32192	15% (4107)	19% (571)	18% (283)	21% (132)	16% (5093)	<0.001[2]
ESRD on Dialysis	32192	0% (96)	2% (57)	0% (7)	1% (7)	1% (167)	<0.001[2]
COPD	32192	5% (1445)	4% (132)	2% (36)	2% (15)	5% (1628)	<0.001[2]
Anti-platelet medications	32192	13% (3394)	10% (302)	6% (90)	10% (59)	12% (3845)	<0.001[2]
Anti-coagulation medications	32192	6% (1551)	3% (103)	4% (68)	3% (20)	5% (1742)	<0.001[2]
Immunosuppressants	32192	4% (1139)	4% (130)	3% (48)	5% (29)	4% (1346)	0.1[2]
Current Smoker	32192	9% (2456)	12% (376)	6% (97)	8% (50)	9% (2979)	<0.001[2]
Heart failure	20088	2% (315)	3% (63)	2% (18)	1% (4)	2% (400)	<0.001[2]
Distress score	31622	13 **32** 59	33 **65** 88	25 **53** 75	14 **35** 61	15 **35** 64	<0.001[1]
Distress score	31622						<0.001[2]
Prosperous		35% (9180)	15% (447)	21% (327)	34% (201)	32% (10155)	
Comfortable		23% (6223)	14% (407)	17% (263)	22% (132)	22% (7025)	
Mid-tier		18% (4728)	16% (471)	20% (316)	17% (102)	18% (5617)	
At risk		14% (3586)	18% (531)	26% (407)	14% (84)	15% (4608)	
Distressed		10% (2781)	37% (1102)	17% (265)	12% (69)	13% (4217)	

Table 2. Operative Characteristics

	*N	White N=26962	Black or AA N=3008	Hispanic N=1605	Other N=617	Combined N=32192	P-value
OR Time > 2 hours	32192						0.002[1]
Yes		38% (10289)	36% (1075)	35% (564)	35% (213)	38% (12141)	
No		62% (16673)	64% (1933)	65% (1041)	65% (404)	62% (20051)	
VHWG grade	32192						<0.001[1]
1		33% (8908)	25% (750)	33% (522)	38% (233)	32% (10413)	
2		60% (16144)	71% (2128)	63% (1006)	56% (344)	61% (19622)	
3		7% (1882)	4% (130)	5% (77)	6% (39)	7% (2128)	
4		0% (28)	0% (0)	0% (0)	0% (1)	0% (29)	
Hernia grade	32192						<0.001[1]
1		35% (9302)	27% (826)	36% (571)	42% (261)	34% (10960)	
2		65% (17660)	73% (2182)	64% (1034)	58% (356)	66% (21232)	
3		0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	
History of open abdomen	32192	7% (1831)	6% (178)	8% (134)	7% (42)	7% (2185)	0.02[1]
History of abdominal wall SSI	32192	7% (1895)	4% (130)	5% (77)	6% (39)	7% (2141)	<0.001[1]
Infection location	2138						0.8[1]
Superficial SSI		41% (775)	44% (57)	36% (27)	36% (14)	41% (873)	
Deep SSI		45% (856)	40% (51)	47% (36)	51% (20)	45% (963)	
Organ Space SSI		14% (263)	16% (21)	17% (13)	13% (5)	14% (302)	
Hernia width	32067						<0.001[1]
<3cm		40% (10686)	42% (1271)	46% (736)	46% (278)	40% (12971)	
3-10cm		44% (11926)	49% (1460)	45% (728)	43% (259)	45% (14373)	
>10cm		16% (4246)	9% (267)	9% (138)	12% (72)	15% (4723)	
Mesh Used	32192	85% (22867)	83% (2487)	83% (1340)	81% (498)	84% (27192)	<0.001[1]
Drains used	32190	30% (8070)	25% (738)	20% (320)	23% (144)	29% (9272)	<0.001[1]

a ***b*** *c* represent the lower quartile *a*, the median *b*, and the upper quartile *c* for continuous variables.
*N is the number of non-missing values.
[1]Kruskal-Wallis test; [2]Pearson test .

- All cases were elective with clean wound classification
- Most common type of hernia was incisional (57%)
  - primary umbilical (36%)
  - recurrent VH (23%)
- Black patients had higher Ventral Hernia Working Group (VHWG) classification, and highest proportion of grade 2 and 3 hernias
- Black patients have higher BMI and higher rates of active smoker status, heart failure, and end-stage renal disease
- Non-White patients had higher ASA classification, rates of diabetes mellitus, and DCI scores

Outcomes

Table 3. Primary Outcomes at 30 Days

	White N=26962	Black or AA N=3008	Hispanic N=1605	Other N=617	Combined N=32192	P-value
SSI	2% (564)	1% (35)	1% (24)	1% (9)	2% (632)	0.002
SSO	8% (2217)	10% (298)	7% (106)	5% (33)	8% (2654)	<0.001
SSOPI	3% (790)	2% (70)	3% (43)	2% (15)	3% (918)	0.2

Table 4. Primary Outcome - HerQLes Summary Score

	*N	White N=26962	Black or AA N=3008	Hispanic N=1605	Other N=617	Combined N=32192	P-value
Baseline	11223	28 **50** 75	24 **43** 68	23 **45** 70	25 **49** 76	27 **50** 73	<0.001
At 30 Day	13005	42 **68** 88	35 **58** 83	42 **67** 88	39 **68** 85	40 **67** 88	<0.001
At 1 Year	5196	68 **90** 97	60 **87** 100	63 **92** 100	68 **91** 100	68 **90** 98	0.1
At 2 Year	4375	70 **92** 97	53 **82** 98	60 **92** 98	66 **90** 97	70 **91** 97	0.03
At 3 Year	3179	70 **92** 98	42 **75** 97	45 **80** 98	30 **72** 92	68 **90** 98	<0.001
At 4 Year	2316	70 **92** 97	42 **80** 96	73 **92** 100	82 **92** 99	68 **92** 97	0.01
At 5 Year	1711	71 **92** 98	44 **78** 94	85 **92** 97	83 **92** 100	70 **92** 98	0.006

- Black patients
  - had higher rates of SSO
  - lower HerQLes scores at baseline, 30-day and at 2-4 years

Outcomes

Table 5. Secondary Outcomes

	*N	White N=26962	Black or AA N=3008	Hispanic N=1605	Other N=617	Combined N=32192	P-value
Readmission at 30 days	32125	3% (759)	3% (78)	2% (40)	3% (17)	3% (894)	0.8[1]
Hernia recurrence at 30 days	32124	0% (41)	0% (8)	0% (2)	0% (1)	0% (52)	0.5[1]
Hernia recurrence							
1 year	6510	12% (706)	16% (71)	10% (17)	12% (9)	12% (803)	0.1
2 year	4896	17% (780)	20% (52)	19% (20)	19% (11)	18% (863)	0.8
3 year	3464	19% (608)	26% (47)	17% (12)	19% (6)	19% (673)	0.2
4 year	2491	21% (477)	32% (40)	25% (11)	18% (4)	21% (532)	0.02
5 year	1892	18% (312)	31% (30)	7% (2)	0% (0)	18% (344)	<0.001
Any PE, stroke, DVT, sepsis, MI, UTI, ARF, PNA at 30 days	32192	1% (363)	1% (33)	1% (15)	1% (6)	1% (417)	0.3
Intra-op complications (hemorrhage, bowel/bladder/liver/gastri c/major vascular injury)	32189	1% (205)	1% (27)	1% (10)	0% (2)	1% (244)	0.4[1]

- Black patients had higher 5-year recurrence rates, no other significant secondary outcome differences

Table 6. Logistic Regression Modeling of SSI at 30 Days

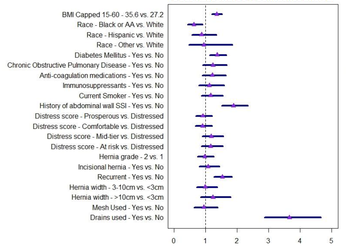
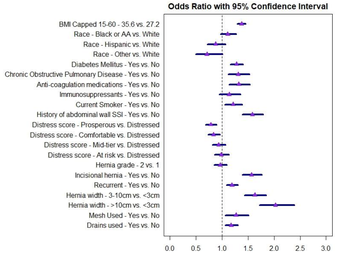


Table 7. Logistic Regression Modeling of SSO at 30 Days



- Black patients were less likely to have SSI compared to White patients (OR 0.63, 95% CI 0.40-0.90, p=0.01)
- No statistical difference between Non-White and White patients for SSO

Conclusions

- Non-White patients undergoing elective VH repair had more co-morbidities than White patients
- Similar overall postoperative outcomes in all racial cohorts
- Black patients had higher rates of SSO and lower postoperative quality of life scores
- Future studies could shift focus to improving disparities in patient-centered outcomes

References

1. Al-Mansour MR, Gabriel KH, Neal D. Gender, racial, and socioeconomic disparity of preoperative optimization goals in ventral hernia repair. *Surg Endosc*. 2023;37(12):9399-9405. doi:10.1007/s00464-023-10365-7
2. Handzel RM, Huckaby LV, Dadashzadeh ER, et al. Sex, race, and socioeconomic distinctions in incisional hernia management. *Am J Surg*. 2023;226(2):202-206. doi:10.1016/j.amjsurg.2023.04.001
3. Hodgkinson JD, Worley G, Warusavitarne J, Hanna GB, Vaizey CJ, Faiz OD. Evaluation of the Ventral Hernia Working Group classification for long-term outcome using English Hospital Episode Statistics: a population study. *Hernia*. 2021;25(4):977-984. doi:10.1007/s10029-021-02379-8
4. Holland AM, Mead BS, Lorenz WR, Scarola GT, Augenstein VA. Racial and Socioeconomic Disparities in Complex Abdominal Wall Reconstruction Referrals. *J Abdom Wall Surg*. 2024;3:12946. Published 2024 May 30. doi:10.3389/jaws.2024.12946
5. Katzen M, Sacco J, Ku D, et al. Impact of race and ethnicity on rates of emergent ventral hernia repair (VHR): has anything changed?. *Surg Endosc*. 2023;37(7):5561-5569. doi:10.1007/s00464-022-09732-7
6. Krpata DM, Schmotzer BJ, Flocke S, et al. Design and initial implementation of HerQLes: a hernia-related quality-of-life survey to assess abdominal wall function. *J Am Coll Surg*. 2012;215(5):635-642. doi:10.1016/j.jamcollsurg.2012.06.412