

Concurrent abdominal body contouring and hernia repair is a safe choice: An analysis of the 2015-2020 ACS-NSQIP database

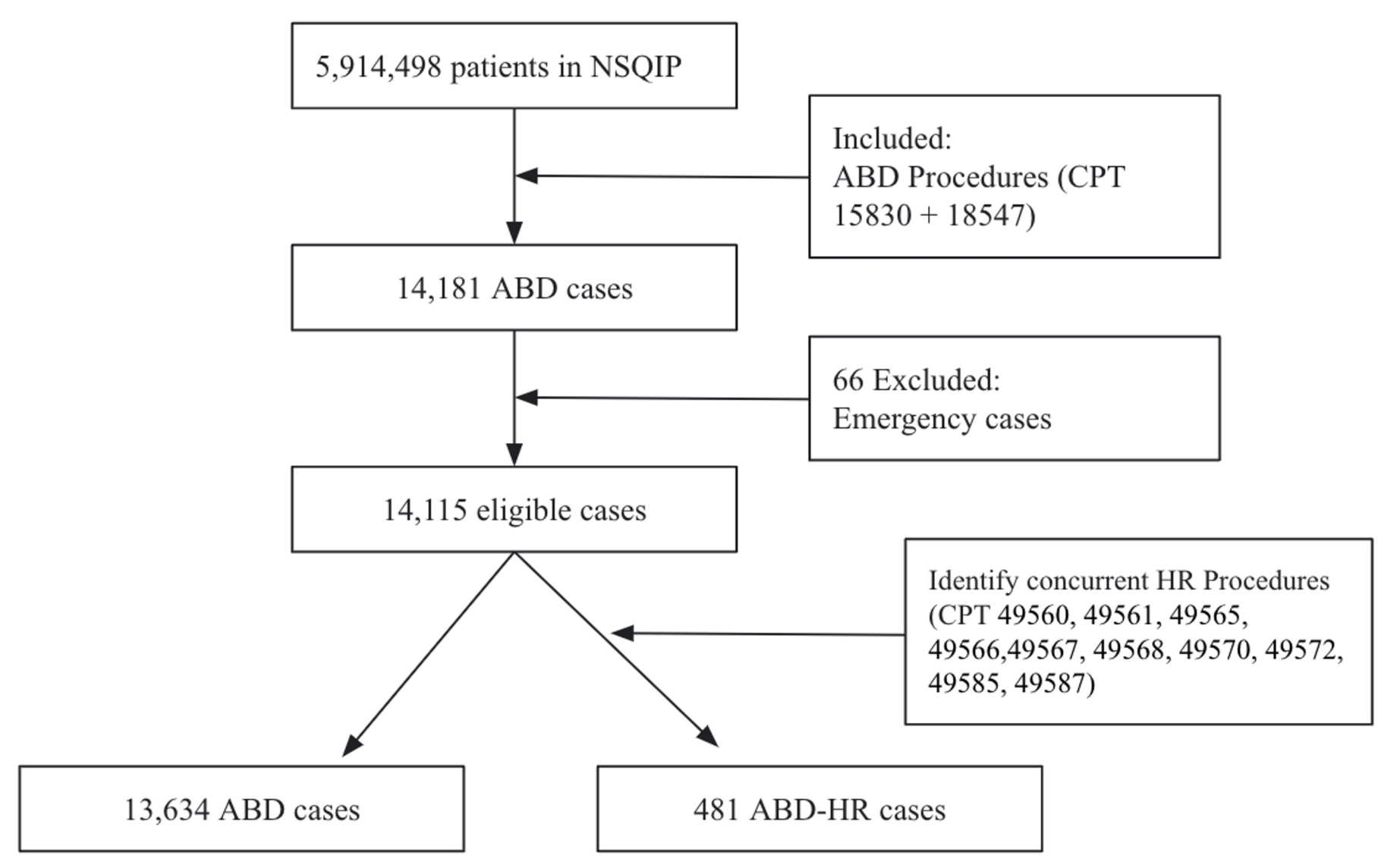
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Background

- The prevalence of obesity in the US has increased over the last 20 years, from 30.5% to approximately 41.9% in 2020. In turn, bariatric surgery has increased in popularity^{1, 2}
- Abdominal body contouring procedures, panniculectomy and abdominoplasty, remain the standard for excess skin after significant weight loss or bariatric surgeries.
- Given the significant co-existing nature of hernias at the time of abdominal body contouring procedures, concurrent hernia repair (HR) with abdominal body contouring (ABD) has been proposed and discussed as a strategy to complete both procedures at one time in order to decrease postoperative morbidity or risks in patients who are candidates for both procedures.^{3,4,5,6}
- This study evaluated potential medical and surgical complications following combined ABD procedures, with a greater emphasis on cosmetic abdominoplasty, concurrently done with HRs by examining 30-day postoperative outcomes at more than 700 community and academic hospitals that contribute to the ACS-NSQIP.

Methods

- The American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP) was accessed on June 13, 2022, and queried to identify patients who underwent ABD or ABD-HR between 2015 and 2020.
- CPT Codes: ABD procedures: 15830 (panniculectomy) and 15847 (abdominoplasty), Concurrent open HRs: 49560, 49561 and 49566 (ventral/incisional), 49570 and 49572 (epigastric), and 49585 and 49587 (umbilical).



- Bivariate analyses of independent variables by our outcomes of interest were performed using Pearson Chi-Square and Fisher's Exact tests for categorical variables and the Wilcoxon rank-sum test for continuous variables.
- Complications examined were wound complications including superficial, deep, organ space infections and dehiscence, return to the operation room, and medical complications
- Before the inclusion of patient data, propensity score (PS) matching was utilized to reduce selection bias by equating groups based on these covariates given the nonrandomized assignment of concurrent hernia repair and the retrospective nature of this study.

Results

Table 1: Multivariate regression analysis of unmatched variables associated with concurrent hernia repair.

Variable	Odds Ratio	Confidence Interval	P-Value
Gender	0.49	0.34-0.72	<0.001
Age	0.99	0.98-0.99	0.016
Race	0.99	0.98-0.99	0.016
BMI	0.99	0.98-0.99	0.034
Baseline Functional Health Status	0.01	0.01-0.90	0.040
Outpatient Surgery	1.59	1.32-1.93	<0.001

Table 3: Bivariate analysis of propensity score-matched patient complications.

Complication	ABD n=481	ABD-HR n=481	P-Value
Wound Dehiscence	1.2%	1.0%	0.763
Venous Thromboembolism	0.6%	0%	0.083
Unplanned return to OR	5.0%	3.3%	0.170
Sepsis	0.6%	0%	0.083
Medical	1.7%	1.9%	0.586

Table 2: Bivariate analysis of propensity score-matched patient and procedure-related characteristics.

	ABD n=481	ABD-HR n=481	P-Value
Procedure-Related			<0.001
Outpatient	58.8%	55.7%	
Operation Time (minutes) (SD)	166.3 (86.1)	209.6 (85.9)	<0.001
Length of Stay (days) (SD)	1.12 (4.96)	1.91 (2.93)	<0.001
Wound Classification			0.487
Clean	94.6%	93.60%	
Clean-Contaminated	3.7%	4.80%	
Contaminated	1.0%	0.4%	
Infected	0.62%	1.2%	

- Multivariate logistic regression analysis of patient and procedure characteristics revealed several variables that were associated with undergoing ABD-HR. Concurrent HR with ABD was more often associated with the female gender (P < 0.001), white race (P < 0.001), higher BMI (P = 0.035), worse baseline health status (P = 0.04), history of diabetes (P = 0.037), and outpatient surgeries (P < 0.001). These characteristics along with age, smoking status, ASA physical status, and history of hypertension were used to match the two cohorts.
- Initially, the analysis combined all hernia types simultaneously between the two cohorts (ventral, epigastric, umbilical). Bivariate analysis of the propensity score-matched cohorts revealed that ABD-HR was associated with longer operative times (mean: 209.6 min) (P < 0.001) and longer hospital length of stay (mean: 1.9 days) (P < 0.001). Matched analysis also revealed that the incidence rate of postoperative complications defined by ACS-NSQIP such as wound dehiscence, venous thromboembolism, unplanned return to the operating room within 30 days, sepsis, and other medical complications (pneumonia, pulmonary embolism, postoperative renal insufficiency, UTI, stroke, MI, DVT) had no significant differences between the two cohorts.
- A Sub-group analysis was performed to inspect wound complications more meticulously. The sub-group analysis for superficial, deep, and organ-space wound infections revealed that ABD-HR was not significantly associated with increased complication risks compared to the ABD group.
- The same bivariate analysis was then conducted for each type of aforementioned hernia type above with new propensity score-matched cohorts. The cohorts consisted of ABD-Ventral/incisional hernia (ABD-VHR) (N = 235), ABD-Epigastric Hernia (ABD-EHR) (N = 8), and ABD-Umbilical hernia (ABD-UHR) (N = 195). Each of these groups was compared to an ABD group with the same number of participants respectively using propensity score matching. Bivariate analysis revealed the same results that the ABD-VHR, ABD-EHR, and ABD-UHR were all associated with longer operative times (P < 0.001) and longer length of hospital stays (P < 0.001). All of the other complications mentioned in the combined hernia type analysis remained the same for individual group analysis, and no significant difference between the cohorts was found.

Discussion

- The comparison revealed no statistically significant difference in the postoperative complications for this cohort. Bivariate analysis and propensity score-matching ultimately strengthen the validity of the results, which overall supports that ABD-HR can safely be performed as a combined procedure. A sub-group analysis of wound complications in ABD compared to ABD-HR demonstrated did not show any meaningful difference in wound complications, further supporting the safety of this procedure. However, compared to ABD alone, ABD-HR procedures had longer operative times (P < 0.001), and longer postoperative hospital stays (P < 0.001), which is to be expected.
- We also evaluated different hernia types in this study. Our analysis included ventral hernias, epigastric hernias, and umbilical hernias in the HR group. When we isolated each type of hernia repair in our analysis, no significant difference between the cohorts was found. Thus, suggesting that the type of hernia repair did not affect the safety of the overall combined ABD-HR procedure.
- The limitations of our study mainly stem from utilizing the ACS-NSQIP database, which only includes 30-day outcomes that may not factor in long-term postoperative outcomes. Moreover, data regarding wound closure techniques are not available. By using PS matching methods, we attempted to address several intrinsic limitations and variable peri-operative factors within our two analytic groups.^{7, 8} While the ACS-NSQIP captures thousands of patients at hundreds of hospitals across the US, the relatively small sample size of the PS-matched cohorts in this study limits the statistical power.
- In summary, our study of postoperative outcomes following ABD-HR versus ABD alone serves as a risk assessment in propensity score-matched patients derived from ACS-NSQIP data sets. Our results do not find statistically significant differences between the postoperative outcomes of ABD-HR versus ABD alone, indicating that these procedures can be safely performed concurrently, regardless of the type of hernia.

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