

Background

- The International Study Group of livery Surgery’s (ISGLS) criteria defines and grades PHLF severity to predict patient prognosis: A (mild), B (moderate), and C (severe)
- Grade A PHLF represents abnormal laboratory parameters of liver function that requires no change in the clinical management of the patient
- It is unclear if outcomes for grade A patients differ in the short term post-operative period than non-failure patients
- A closer look at the clinical relevance of grade A patients is warranted

Research Objectives

To compare the outcomes of patients with grade A who underwent major hepatectomies against those with grade B/C PHLF or without PHLF:

- Identify risk factors associated with grade A PHLF
- Assess morbidity and mortality of major hepatectomy patients with and without PHLF

Methods

- Data obtained from the ACS NSQIP hepatectomy-targeted dataset from 2014 to 2018
- Included patients undergoing an elective major hepatectomy identified by CPT codes 47122, 47125, 47130.
- Bivariate analysis was used to compare patient and operative characteristics against PHLF grades using Chi-square tests
- Multivariable logistic regression was used to evaluate the association between PHLF grade and outcomes

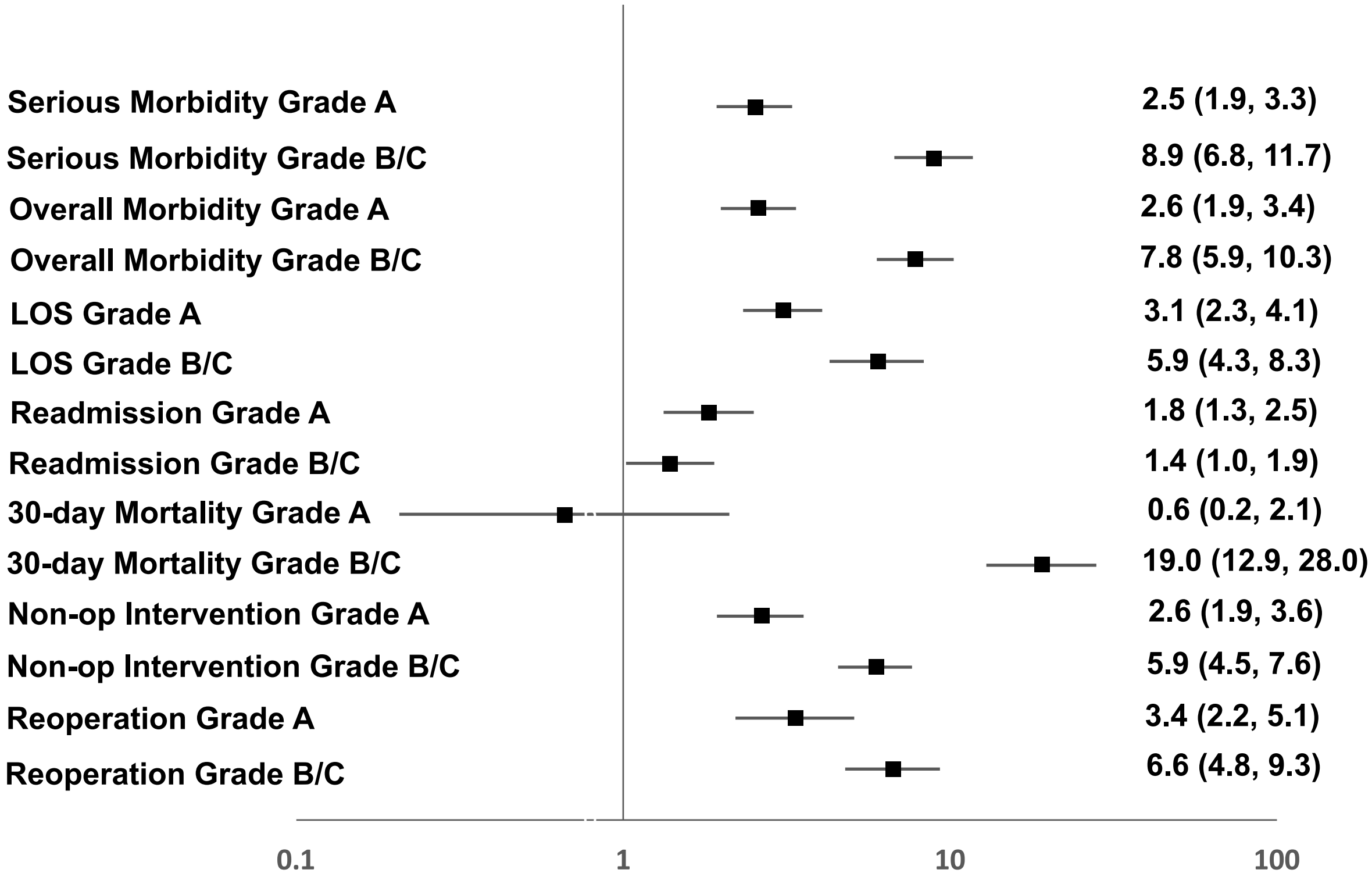
Table 1. Patient Characteristics by PHLF Grade

	None (n=5672)	Grade A (n=271)	Grade B/C (n=331)	P-Value
ASA Classification (%)				
1 and 2	1574 (27.8)	76 (28)	55 (16.6)	<0.001
3 and 4	4098 (72.3)	195 (72)	276 (83.4)	
Gender (%)				
Female	2871 (50.6)	92 (34)	131 (39.6)	<0.001
Male	2801 (49.4)	179 (66.1)	200 (60.4)	
Age (%)				
<55	2023 (35.7)	90 (33.2)	77 (23.3)	<0.001
55-64	1560 (27.5)	66 (24.4)	83 (25.1)	
>=65	2089 (36.8)	115 (42.4)	171 (51.7)	
Race (%)				
White	3394 (59.8)	134 (49.5)	192 (58)	<0.001
Non-Hispanic Black	436 (7.7)	19 (7)	17 (5.1)	
Hispanic	270 (4.8)	10 (3.7)	11 (3.3)	
Other	1572 (27.7)	108 (39.9)	111 (33.5)	
Pre-op Bilirubin (%)				
<1.2 or unknown	5191 (91.5)	248 (91.5)	271 (81.9)	<0.001
>1.2	481 (8.5)	23 (8.5)	60 (18.1)	
Pathology (%)				
Benign	952 (16.8)	19 (7)	21 (6.3)	<0.001
Primary	1909 (33.7)	119 (43.9)	186 (56.2)	
Secondary or unknown	2811 (49.6)	133 (49.1)	124 (37.5)	
Liver texture (%)				
Abnormal	1265 (22.3)	79 (29.2)	103 (31.1)	<0.001
Normal or Unknown	4407 (77.7)	192 (70.9)	228 (68.9)	
Extent of resection (%)				
Total Left	1660 (29.3)	27 (10)	27 (8.2)	<0.001
Total Right	2707 (47.7)	176 (64.9)	178 (53.8)	
Trisegmentectomy	1305 (23)	68 (25.1)	126 (38.1)	
Biliary Reconstruction (%)				
No	5020 (88.5)	224 (82.7)	217 (65.6)	<0.001
Yes	652 (11.5)	47 (17.3)	114 (34.4)	
Concurrent Colorectal Procedure (%)				
Yes	199 (3.5)	16 (5.9)	19 (5.7)	0.018
No	5473 (96.5)	255 (94.1)	312 (94.3)	

Table 2. Incidence of Post-Operative Outcomes by PHLF Grade

	None (n=5672)	Grade A (n=271)	Grade B/C (n=331)
30 day Mortality (%)			
No	5603 (98.8)	268 (98.9)	247 (74.6)
Yes	69 (1.2)	3 (1.1)	84 (25.4)
Serious Morbidity¹ (%)			
No	4617 (81.4)	161 (59.4)	85 (25.7)
Yes	1055 (18.6)	110 (40.6)	246 (74.3)
Overall Morbidity¹ (%)			
No	4577 (80.7)	158 (58.3)	90 (27.2)
Yes	1095 (19.3)	113 (41.7)	241 (72.8)
Length of stay² (%)			
No	3442 (60.7)	79 (29.2)	45 (13.6)
Yes	2230 (39.3)	192 (70.9)	286 (86.4)
Readmission (%)			
No	5015 (88.4)	214 (79)	263 (79.5)
Yes	657 (11.6)	57 (21)	68 (20.5)
Non-operative intervention³ (%)			
No	5065 (89.3)	201 (74.2)	167 (50.5)
Yes	607 (10.7)	70 (25.8)	164 (49.6)
Unplanned Reoperation (%)			
No	5496 (96.9)	242 (89.3)	259 (78.3)
Yes	176 (3.1)	29 (10.7)	72 (21.8)

Figure I. Adjusted Odds-Ratios of Outcomes by PHLF Grade



¹Overall morbidity and Severe morbidity are ACS-NSQIP composite scores that include complications such as surgical site infections, renal failure, sepsis, unplanned intubations, and more. ²Length of Stay in the fourth quartile ³Non-operative interventions include any invasive procedures (i.e. ERCP)

Results

- Total study population n = 6274, Total PHLF=9.6%
- Incidence of PHLF grade A 4.3% and grades B/C 5.3%
- Overall, PHLF was associated with increased hospital length of stay, overall morbidity, serious morbidity, need for postoperative interventions, and mortality
- Patients with grade A had similar odds of mortality compared to patients without PHLF but had significantly worst odds of morbidity (NSQIP composite scores, length of stay, readmission, post-op invasive interventions and reoperations).

Limitations

- Analysis restricted to outcomes within 30 days of the post-operative period
- Could not measure pre and post-operative liver volumes and did not address affect of concurrent liver resections

Conclusions

- With the exception of mortality, grade A PHLF had worse outcomes than patients without PHLF.
- The ISGLS criteria correlates with clinical outcomes (overall and serious morbidity, length of stay, readmission, post-operative interventions, and mortality)
- Acknowledging the risks associated with grade A PHLF will allow surgeons and patients to anticipate complications and management.

Disclosures

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