Effect of BMI on operative time in patients undergoing distal pancreatectomy with or without splenectomy

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Background

- Obesity is linked to adverse surgical outcomes, including increased infection rates and longer operative times.
- Current literature focuses on obesity's impact on pancreaticoduodenectomy, but its effect on distal pancreatectomy (DP) with or without splenectomy is understudied.
- Prolonged operative time is relevant due to the complexity of DP and potential increased morbidity.

Objectives

- Investigate the relationship between BMI and operative time in patients undergoing DP.
- Assess whether BMI, as a continuous or categorical variable, influences intraoperative factors like conversion rates, blood loss, and ICU admission.
- Provide data to inform preoperative planning for patients with elevated BMI.

Methods

Study Design: Retrospective cohort analysis at Advent Health Orlando.
Population: 48 patients who underwent DP with or without splenectomy (October 2019 – April 2024).
Exclusions: Laparoscopic hand-assisted cases.
Data Collected: Preoperative BMI, patient demographics, operative time, blood loss, conversion to open, splenectomy status, and ICU admission.
Statistical Analysis: Pearson correlation for BMI vs. operative time, chi-square/Fisher's exact test for categorical comparisons ($p < 0.05$ significant

Results

BMI and Operative Time: Increased BMI was significantly associated with longer operative time (r = 0.333, p = 0.021).

ICU Admission: Patients requiring ICU admission had significantly higher BMI (44.9 vs. 28.1, p = 0.008).

BMI Categories: No significant differences in operative time when BMI was analyzed categorically (p = 0.24).

Other Outcomes: No significant association between BMI and intraoperative blood loss (p = 0.32), conversion to open surgery (p = 0.79), or splenectomy rates.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
BMI	48	18.7	44.4	28.9	6.0
Operative Time	48	90	440	211.7	82.7
Age at surgery	48	25.0	82.0	61.75	15.35

Figure 1: Surgical Indications for distal pancreatectomy with or without splenectomy.

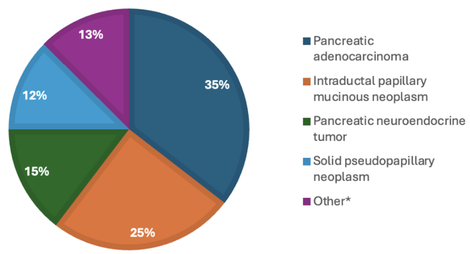


Figure 1 illustrates the surgical indications for distal pancreatectomy with or without splenectomy. The most common indication in this dataset is pancreatic adenocarcinoma (n=17), followed by intraductal papillary mucinous neoplasm (n=12) and pancreatic neuroendocrine tumor- (n=7). Solid pseudopapillary neoplasm (n=6) and other conditions (n=6) also contributed to the need for surgery. The "other" category includes lymphoepithelial cyst, mucinous cystic neoplasm, and metastatic cancer. This distribution highlights the diverse pathology that necessitates pancreatic resection.

Figure 2: BMI vs Operative Time in Distal Pancreatectomy with or without Splenectomy

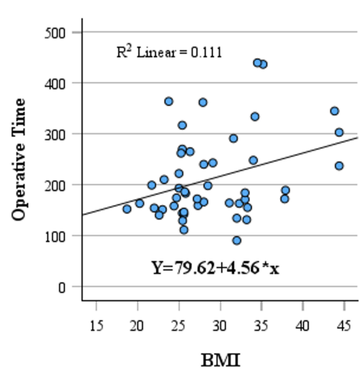


Figure 2 demonstrates the positive linear relationship between BMI and operative time in patients undergoing distal pancreatectomy (DP). In this analysis of 48 patients, the mean BMI was 28.9 kg/m² (SD = 6.0), and the mean operative time was 211.7 minutes (SD = 82.7). The Pearson correlation coefficient (r = 0.333, p = 0.021) indicates a statistically significant moderate correlation, suggesting that higher BMI is associated with longer operative time. This relationship is represented by the equation: *Operative time = 97.62 + 4.56 x BMI*

BMI vs all outcomes

Table 2: The relationship between BMI with all outcomes.

Variables	Overall, n(%) 48(100)	BMI (28.9±6.0)	P	BMI Group, n(%) Normal 10(20.8)	Overweight 20(41.7)	Obesity 18(37.5)	p
Operative time	211±82	Corr: 0.333	0.021	187±66	206±66	233±104	0.34
Intraoperative Blood Loss	66±78	Corr: -0.146	0.32	96±115	58±74	59±57	0.41
Conversion to Open			0.29				0.79
Yes	16(33.3)	27.5±4.9		4(40.0)	7(35.0)	5(27.8)	
No	32(66.7)	29.7±6.5		6(60.0)	13(65.0	13(72.2)	
Wound Infection	(47)		0.86				1.0
Yes	2(4.2)	28.7±6.2		0(0)	1(5.0)	1(5.6)	
No	45(93.8)	29.0±6.2		9(100)	19(95.0)	17(94.4)	
Reoperation	(47)		0.37				1.0
Yes	3(6.3)	26.8±3.7		1(10.0)	1(5.3)	1(5.6)	
No	44(91.7)	29.1±6.2		9(90.0)	18(94.7)	17(94.4)	
Readmission			0.56				0.85
Yes	14(29.2)	29.7±5.9		2(20.0)	6(30.0)	6(33.3)	
No	34(70.8)	28.6±6.2		8(80.0)	14(70.0)	12(66.7)	
ICU admission			-				-
Yes	-	-		-	-	-	
No	48(100)	28.9±6.0		10(100)	20(100)	18(100)	
Mortality within 30 Days			-				-
Yes	-	-		-	-	-	
No	48(100)	28.9±6.0		10(100)	20(100)	18(100)	
In Hospital Mortality			0.13				0.21
Yes	1(2.1)	21.7		1(10.0)	0(0)	0(0)	
No	47(97.9)	29.1±6.0		9(90.0)	20(100)	18(100)	
Deep infection			0.27				0.13
Yes	7(14.6)	31.9±7.2		1(10.0)	1(5.0)	5(27.8)	
No	41(85.4)	28.4±5.8		9(90.0)	19(95.0)	13(72.2)	
Post-operative Pancreatic Fistula			0.12				0.10
1	25(52.1)	28.1±6.0		6(60.0)	13(65.0)	6(33.3)	
2	17(35.4)	29.2±6.6		3(30.0)	7(35.0)	7(38.9)	
3	4(8.3)	34.0±1.2		0(0)	0(0)	4(22.2)	
4	2(4.2)	27.8±4.7		1(10.0)	0(0)	1(5.6)	
Exocrine Pancreatic Insufficiency	(47)		1.0				0.51
Yes	4(8.3)	28.3±4.7		0(0)	3(15.0)	1(5.6)	
No	43(89.6)	29.1±6.2		9(100)	17(85.0)	17(94.4)	

Table 2 shows the relationship between BMI and various clinical outcomes, including operative time, ICU readmission, and other procedural factors. The **Overall Column** presents descriptive statistics: continuous variables as mean ± standard deviation and categorical variables as frequencies and percentages. The **BMI Column & p-values** display the correlation between BMI and continuous variables, with a significant positive correlation between BMI and operative time (p=0.021). However, no significant association was found when BMI was categorized (p=0.20), likely due to the small sample size. The **BMI Group Column & p-values** presents the mean ± standard deviation for continuous variables and frequencies for categorical variables across BMI groups. A significant difference in BMI was found between ICU readmission groups (p=0.005), but no significant differences were observed for other outcomes.

Conclusions

- Higher BMI is modestly associated with prolonged operative times in DP.
- BMI as a continuous variable provides better predictive value than categorical classification.
- No significant effect on conversion rates, intraoperative blood loss, or splenectomy rates.
- Findings highlight the importance of preoperative planning for patients with higher BMI undergoing DP

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