Do Differences in Complications of Hospital Stays Exist for Patients that Undergo Different Biopsy Methods?

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Introduction

The advent of imaging modalities to aid in the diagnosis of pancreatic cancer has greatly reduced the need for routine invasive diagnostic procedures, however, a biopsy remains the confirmatory test for diagnosis of pancreatic cancer. We hypothesize that of the choice between endoscopic (EB), percutaneous (PB), and surgical biopsies (SB)- endoscopic and percutaneous biopsies carry reduced risks of complications than surgical biopsies due to their less invasive nature.

Methods

A retrospective analysis of the National Inpatient Sample 2001-2013 database where patients with a diagnosis of pancreatic cancer were extracted using the International Classification of Diseases, Ninth Revision (ICD-9) codes. Endoscopic ultrasound biopsy, closed percutaneous, and open surgical biopsies were identified with their respective ICD-9 codes. A chi-square analysis was performed to determine variables to be included in a multivariable analysis. A multivariable logistic regression analysis was used to examine medical complications (myocardial infarction, pancreatitis, pneumonia, urinary tract infection, and acute renal failure) and demographic variables, with a significance level of p <0.01.

Results

Table 1. Predictors of Myocardial Infarction (MI)

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 20	Reference	
30 to 50	.395	1.48 (0.69-3.64)
51 to 60	.098	2.13 (0.87-5.23)
61 to 79	.003	3.95 (1.61-9.67)
≥ 80	.001*	4.33 (1.77-10.62)
Race		
Caucasian	Reference	
African American	.000*	0.81 (0.76-0.87)
Hispanic	.305	0.96 (0.88-1.04)
Asian, Pacific Islander, Native American	.030	1.10 (1.01-1.20)
Gender		
Males	Reference	
Females	.000*	0.79 (0.76-0.82)
Insurance Status		
Private Insurance	Reference	
Medicaid	.003	0.84 (0.75-0.94)
Medicare	.000*	1.20 (1.14-1.27)
No insurance	.466	0.94 (0.81-1.10)
Other insurance status	.005	0.79 (0.67-0.93)
Biopsy Type		
No Percutaneous	Reference	
Percutaneous	.000*	0.66 (0.59-0.72)
Biopsy Type		
No Endoscopic	Reference	
Endoscopic	.081	0.74 (0.53-1.04)
Biopsy Type		
No Surgical	Reference	
Surgical	.000*	1.49 (1.29-1.72)

*significance level p<0.001

Table 2. Predictors of Acute Renal Failure (ARF)

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 20	Reference	
30 to 50	.001*	1.76 (1.28-2.43)
51 to 60	.000*	2.28 (1.66-3.14)
61 to 79	.000*	2.86 (2.08-3.93)
≥ 80	.000*	3.54 (2.57-4.87)
Race		
Caucasian	Reference	
African American	.000*	1.74 (1.70-1.79)
Hispanic	.000*	1.14 (1.09-1.18)
Asian, Pacific Islander, Native American	.000*	1.20 (1.15-1.25)
Gender		
Males	Reference	
Females	.000*	0.73 (0.72-0.74)
Insurance Status		
Private Insurance	Reference	
Medicaid	.000*	1.23 (1.18-1.28)
Medicare	.000*	1.23 (1.20-1.26)
No insurance	.000*	1.20 (1.13-1.28)
Other insurance status	.000*	0.87 (0.81-0.94)
Biopsy Type		
No Percutaneous	Reference	
Percutaneous	.005	1.06 (1.02-1.10)
Biopsy Type		
No Endoscopic	Reference	
Endoscopic	.000*	1.41 (1.25-1.58)
Biopsy Type		
No Surgical	Reference	
Surgical	.000*	0.80 (0.73-0.87)

*significance level p<0.001

Table 3. Predictors of Urinary Tract Infection (UTI)

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 20	Reference	
30 to 50	.639	1.06 (0.84-1.34)
51 to 60	.054	1.26 (1.00-1.59)
61 to 79	.000*	1.64 (1.30-2.07)
≥ 80	.000*	2.34 (1.85-2.95)
Race		
Caucasian	Reference	
African American	.000*	1.17 (1.14-1.20)
Hispanic	.000*	1.13 (1.09-1.17)
Asian, Pacific Islander, Native American	.002	1.07 (1.02-1.11)
Gender		
Males	Reference	
Females	.000*	2.38 (2.33-2.43)
Insurance Status		
Private Insurance	Reference	
Medicaid	.000*	1.39 (1.33-1.44)
Medicare	.000*	1.36 (1.32-1.40)
No insurance	.000*	1.20 (1.13-1.28)
Other insurance status	.637	
Biopsy Type		
No Percutaneous	Reference	
Percutaneous	.000*	1.11 (1.07-1.15)
Biopsy Type		
No Endoscopic	Reference	
Endoscopic	.000*	1.39 (1.24-1.55)
Biopsy Type		
No Surgical	Reference	
Surgical	.000*	0.79 (0.72-0.86)

*significance level p<0.001

Table 4. Predictors of Pneumonia (PNA)

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 20	Reference	
30 to 50	.070	0.79 (0.61-1.02)
51 to 60	.694	0.95 (0.74-1.23)
61 to 79	.425	1.11 (0.86-1.43)
≥ 80	.135	1.22 (0.94-1.57)
Race		
Caucasian	Reference	
African American	.517	0.99 (0.95-1.02)
Hispanic	.528	1.01 (0.97-1.06)
Asian, Pacific Islander, Native American	.000*	1.11 (1.05-1.16)
Gender		
Males	Reference	
Females	.004	0.80 (0.77-0.81)
Insurance Status		
Private Insurance	Reference	
Medicaid	.000*	1.17 (1.11-1.23)
Medicare	.000*	1.22 (1.18-1.26)
No insurance	.902	1.00 (0.92-1.08)
Other insurance status	.697	1.02 (0.94-1.10)
Biopsy Type		
No Percutaneous	Reference	
Percutaneous	.000*	0.59 (0.56-0.62)
Biopsy Type		
No Endoscopic	Reference	
Endoscopic	.000*	0.55 (0.44-0.67)
Biopsy Type		
No Surgical	Reference	
Surgical	.001*	0.84 (0.76-0.93)

*significance level p<0.001

Table 5. Predictors of Pancreatitis in study population

Variable	P-Value	Odds Ratio (95% CI)
Age		
19 to 20	Reference	
30 to 50	.269	0.88 (0.70-1.11)
51 to 60	.006	0.72 (0.57-0.91)
61 to 79	.000*	0.56 (0.45-0.71)
≥ 80	.000*	0.59 (0.46-0.74)
Race		
Caucasian	Reference	
African American	.000*	1.13 (1.09-1.18)
Hispanic	.926	1.00 (0.95-1.05)
Asian, Pacific Islander, Native American	.000*	1.13 (1.07-1.20)
Gender		
Males	Reference	
Females	.004	0.96 (0.94-0.99)
Insurance Status		
Private Insurance	Reference	
Medicaid	.000*	1.14 (1.09-1.21)
Medicare	.075	1.03 (1.00-1.07)
No insurance	.000*	1.33 (1.24-1.43)
Other insurance status	.000*	0.77 (0.70-0.85)
Biopsy Type		
No Percutaneous	Reference	
Percutaneous	.000*	3.03 (2.92-3.14)
Biopsy Type		
No Endoscopic	Reference	
Endoscopic	.000*	4.13 (3.71-4.59)
Biopsy Type		
No Surgical	Reference	
Surgical	.000*	1.99 (1.82-2.16)

*significance level p<0.001

824,162 patients were identified with pancreatic cancer, of which 50,194 (6.1%) were PB, 3817 (0.5%) EB, and 11,668 (1.4%) SB. Patients with a PB were less likely to have an MI compared to SB patients (OR .67 and 1.49 respectively, p<0.001). Patients with an EB were more likely to have acute renal failure (ARF) compared to SB patients (OR 1.41 and .80 respectively, p<0.001). Patients with EB or PB were more likely to have a urinary tract infection (UTI) compared to surgical patients (OR 1.39, 1.11, .79 respectively, p<0.001). All biopsy types were less likely to have pneumonia during their hospital stay. Patients with EB were most likely to have pancreatitis compared to PB and SB (OR 4.13, 3.03, 1.98 respectively, p<0.001).

Discussion

Patients with endoscopic biopsies were more likely to develop ARF, UTI and pancreatitis than surgical biopsies. This may be due to the closed and operant-dependent nature of the EUS requiring technique and ability to accurately gauge anatomy on ultrasound. Traversing the pancreatic tissue via a needle certainly predisposes patients to developing pancreatitis. It is worth exploring further the relationship between the biopsy type and other factors that may predispose the patient to these complications.

Disclosures

No disclosures.