Influence of Smoking on Wound Complications in Adults Undergoing Elective Posterior Lumbar Fusion

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Introduction

Smoking has been shown to increase the risk of pseudoarthrosis after fusion and has been linked to complications after spinal surgery. However, it is unclear to what extent smoking status has on the development on wound infections in patients undergoing posterior lumbar fusion.

Methods

Patients were identified by CPT (Current Procedural Terminology) code in the American College of Surgeon's National Surgical Quality Improvement Program (ACS-NSQIP) databasePatients were divided into those with and without current smoking history. Univariate (chi-square and Student t-test) analysis was performed on demographics, comorbidities and operative variables (including procedure subtypes). Only variables with p<0.2 were evaluated for inclusion in the final step-wise multivariate logistic regression to determine if smoking was an independent risk factor for wound complications [Superficial Surgical Site infection (SSI), Deep SSI, Wound Dehiscence, Organ space SSI]. Level of significance was set at p=0.05.

Results

Smokers were likely to be younger and male (50.18% vs. 43.38%, p<0.0001) than non-smokers. Patients who smoked were less likely to be diabetic (12.44% vs. 18.61%, p<0.0001) and also less likely to be identified as obese class III (6.47% vs. 7.69%, p<0.0001) than nonsmokers. Smokers were observed to have a significantly increased rate of pulmonary, cardiac and peripheral vascular disease than their non-smoking counterparts. Despite some increased comorbidities in smokers, ASA = 3 was more commonly seen in nonsmokers than smokers (47.04% vs. 42.84%, p=0.006). Prior to undergoing surgery, non-smokers were more likely to have a dependent functional status than smokers (4.39 vs. 2.98%, p=0.020). Multivariate logistic regression did not show smoking to be an independent predictor of wound complication [Odds Ratio (OR)=1.00, p=0.994)].

Conclusions

Smoking is not an independent predictor of surgical site infection when adjusted for other risk factors

Table 1

Univariate of Demographics and Clinical Characteristics Comparing those with and without current smoking history

	Non-smokers, N=4,719		Smokers, N=1,375		P value
Demographics					
Sex					
Female	2672	56.62%	685	49.82%	<.0001
Male	2047	43.38%	690	50.18%	
Race					
White	3699	78.39%	1090	79.27%	
Black	288	6.10%	105	7.64%	0.0785
Hispanic	243	515.00%	63	4.58%	
Other					
Age					
18 to 64	2400	50.86%	1171	85.16%	
65-79	1978	41.92%	195	14.18%	<.0001
80+	341	7.23%	9	0.65%	
BMI Class					
NonObese (18.5-29.9)	2390	50.65%	836	60.80%	
Obese I (30-34.9)	1327	28.12%	307	22.33%	<.0001
Obese II (35 - 39.9)	639	13.54%	143	10.40%	
Obese III (>=40)	363	7.69%	89	6.47%	
ASA>=3	2220	47.04	589	42.84	0.0059
Diabetes	878	18.61	171	12.44	<.0001
Alcohol	129	2.73%	78	5.67%	<.0001
Dyspnea	355	7.52%	146	10.62%	0.0002
Dependent Functional Status Prior to Surgery	207	4.39%	41	2.98%	0.0203

Patient demographics

Learning Objectives

By the conclusion of this session, participants should be able to understand the risks of smoking on posterior lumbar fusion.

Table 2

Comorbidities and Operative Variables for those with and without current history of smoking

	Non-smokers, N=4,719		Smokers, N=1,375		P value
	N	%	N	%	
Comorbidities					
Pulmonary Comorbidity	151	3.20%	120	8.73%	<.0001
Cardiac Comorbidity	2914	61.75%	637	46.33%	<.0001
Peripheral Vascular Disease	41	0.87%	23	1.67%	0.0101
Dialysis	8	0.17%	0	0.00%	0.1266
Impaired Sensorium	5	0.11%	2	0.15%	0.7036
Neuromuscular Injury	287	6.08%	46	3.35%	<.0001
Stroke	121	2.56%	35	2.55%	0.8644
Steroid Use	151	3.20%	35	255.00%	0.2145
Recent Weight Loss	12	0.44%	10	0.30%	0.3628
Bleeding Disorder	75	1.59%	16	1.16%	0.2521
Preoperative Laboratory Values					
Albumin	4.096	0.43	4.11	0.46	0.6186
Hematocrit	40.13	4.29	41.79	4.37	<.0001
PTT	28.64	3.68	29.25	4.25	0.0005
INR	1.02	0.22	0.99	0.17	0.0011
Operative Variables					
Total RVU, mean (SD)	53.42	26.45	50.03	26.44	<.0001
Procedure Subtypes					
22612	3411	72.28	892	64.87	<.0001
22630	1055	22.36	408	29.67	<.0001
22633	236	5.00%	68	4.95%	0.9336
Operative Time > 4 hours	1568	33.23%	444	32.29%	0.5158

Comorbidities and operative conditions

Table 3

Morbidity Univariate Analysis between Cohorts

	Non-smokers, N=4719		Smokers, N=1375		P Value
	N	%	N	%	
Wound Complication	114	2.42%	29	2.11%	0.5086

Univariate analysis of wound complications and smoking

Table 4

Multivariate Logistic Regression to Assess Impact of Smoking and other conditions on Wound Complications, N=6,094

Risk Factors	Adjusted OR	95 CI		P Value
Smoking	1.002	0.66	1.521	0.9941
Operation Time > 4 Hour	1.491	1.063	2.092	0.0208
Obese Class I	1.743	1.144	2.657	0.5943
Obese Class II	1.751	1.041	2.947	0.6928
Obese Class III	4.083	2.512	6.637	<.0001
Diabetes	1.686	1.156	2.458	0.0066
Bleeding Disorder	4.861	2.352	10.046	<.0001

Multivariate analysis for wound complications