



The Effect of Smoking on Complications in Adults Undergoing Elective Anterior Cervical Discectomy and Fusion (ACDF)

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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 anterior cervical discectomy and fusion (ACDF).

Methods

Patients were identified by CPT (Current Procedural Terminology) code in the American College of Surgeon’s National Surgical Quality Improvement Program (ACS-NSQIP) database. Patients 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 demographic and comorbidity 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 $p = 0.05$.

Learning Objectives

By the conclusion of this session, participants should be able to understand the potential risks of smoking on patients undergoing ACDF.

Results

Smokers were more likely to fall into the age range of 18-64 years than their non-smoking counterparts (93.08% vs. 73.36%, $p < 0.0001$). Non-smokers were diabetic (16.69%) more often than smokers (10.41%). As expected, smokers had an increased rate of pulmonary, cardiac and peripheral vascular comorbidities than non-smokers. With regards to multilevel fusions there were no difference between the two cohorts. There were no significant differences in complications between smokers and non-smokers. Multivariate analysis confirmed that smoking status was not a significant predictor of wound complications in patients undergoing ACDF.

Conclusions

Although smoking is associated with increased complication in surgery, it does not appear to increase the incidence of major 30-day complications, including wound infections in patients undergoing ACDF.

Table 1

Univariate of Demographics and Clinical Characteristics Comparing those with and without current smoking history					
	Non-smokers, N = 2,558		Smokers, N = 1,287		P value
Demographics					
Sex					
Female	1285	50.23%	626	48.64%	0.3508
Male	1273	49.77%	661	51.36%	
Race					
White	1870	73.10%	952	73.97%	0.0145
Black	239	9.34%	144	11.19%	
Hispanic	159	6.21%	49	3.80%	
Other	290	11.34%	142	11.03%	
Age					
18 to 64	2030	79.36%	1198	93.08%	<.0001
>=65	528	20.64%	89	6.92%	
BMI Class					
Non-obese (18.5-29.9)	1333	52.11%	786	61.07%	<.0001
Obese I (30-34.9)	692	27.05%	312	24.24%	
Obese II (35 - 39.9)	302	11.81%	132	10.26%	
Obese III (>=40)	231	9.03%	57	4.43%	
ASA>=3	949	37.1	483	37.53	0.7947
Diabetes	427	16.69	134	10.41	<.0001
Alcohol	60	2.35%	62	4.82%	<.0001
Dyspnea	148	5.79%	112	8.70%	0.0007
Dependent Functional Status Prior to Surgery	73	2.85%	28	2.18%	0.2147

Univariate of demographics and clinical variables

Table 2

Comorbidities and Operative Variables for those with and without current history of smoking					
	Non-smokers, N=2558		Smokers, N=1287		P value
	N	%	N	%	
Comorbidities					
Pulmonary Comorbidity	59	2.31%	73	5.67%	<.0001
Cardiac Comorbidity	1224	47.85%	490	38.07%	<.0001
Peripheral Vascular Disease	16	0.63%	16	1.24%	0.0466
Dialysis	9	0.35%	2	0.16%	0.2818
Impaired Sensorium	3	0.12%	2	0.16%	0.7569
Neuromuscular Injury	113	4.42%	61	4.74%	0.6501
Stroke	55	2.15%	27	2.10%	0.9158
Steroid Use	81	3.17%	30	2.33%	0.1442
Recent Weight Loss	10	0.39%	3	0.23%	0.4263
Bleeding Disorder	27	1.06%	12	0.93%	0.7192
Preoperative Laboratory Values	Mean	SD	Mean	SD	
Albumin	4.14	0.47	4.16	0.41	0.3981
Hematocrit	40.97	4.14	42.21	4.15	<.0001
PTT	28.57	4.22	28.91	3.58	0.0565
INR	1.01	0.16	0.997	0.3	0.4179
Operative Variables	N	%	N	%	
Procedure Subtypes					
Multi-level Fusion	390	15.25%	197	15.31%	0.9607
Operative Time > 4 hours	167	6.53%	85	6.60%	0.9284

Comorbidities and Operative values

Table 3

Morbidity Univariate Analysis between Cohorts					
Outcome	Non-smokers, N=2558		Smokers, N=1287		P Value
Complications					
Any Complication	86	3.36%	29	3.03%	0.5842
Death	7	0.27%	3	0.23%	0.8158
Pulmonary Complication	36	1.41%	18	1.40%	0.9826
Renal Complication	1	0.04%	1	0.08%	0.6203
CNS Complication	4	0.16%	2	0.16%	0.9943
Peripheral Nerve Injury	3	0.12%	2	0.16%	0.7569
Cardiac Complication	7	0.27%	2	0.16%	0.474
PE/DVT	13	0.51%	5	0.39%	0.6078
Sepsis/Septic Shock	1	0.04%	4	0.31%	0.0274
Intra/post-op Blood Transfusion	14	0.55%	4	0.31%	0.3107
UTI	16	0.63%	6	0.47%	0.5366
Wound Complication	21	0.82%	9	0.70%	0.6858
Graft/Flap Failure	1	0.04%	0	0.00%	0.4781
Other Outcomes					
Return to OR	55	2.15%	17	1.32%	0.0735
Unplanned Reoperation (2011-2012)	17	1.48%	5	0.91%	0.3322
Unplanned Readmission (2011-2012)	42	3.65%	12	2.18%	0.1064
LOS > 5	157	6.14	64	4.97	0.1431

Univariate Analysis of Morbidity and Smoking

Table 4

Multivariate Logistic Regression to Assess Impact of Smoking and other Risk Factors on Wound Complications, N=3,845				
Risk Factors	Adjusted OR	95 CI		P Value
Smoking	0.852	0.389	1.868	0.6895
ASA>=3	2.091	1.009	4.333	0.0473
Operation Time > 4 Hour	3.33	1.342	8.263	0.0095

Multivariate Analysis