Venous thromboembolism in patients undergoing neck dissection

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ABSTRACT

OBJECTIVE:
To determine the incidence of venous thromboembolism following neck dissection and identify associated risk factors.

STUDY DESIGN:
Retrospective cohort study.

METHODS:
All patients who underwent neck dissection in 2011-2013 were identified from American College of Surgeons National Surgical Quality Improvement Program Participant Use Data File. Univariate and multivariate analysis were used to determine risk factors associated with venous thromboembolism.

RESULTS:
7850 cases were identified. The 30-day venous thromboembolism incidence was 0.46%. Univariate analysis showed significant association (p<0.05) between the development of venous thromboembolism and age, diabetes, dyspnea, chronic obstructive pulmonary disease, >10% weight loss in the previous 6 months, bleeding disorders, and intraoperative transfusion of greater than 1 unit of packed red blood cells. Multivariate logistic regression demonstrated wound classification of 2 (OR = 2.909, p = 0.008), American Society of Anesthesiology physical status classification 3 (OR = 2.33, p = 0.031), and prolonged total operative time (odds ratio [OR] = 1.002, p = 0.027) were independent risk factors for VTE following neck dissection.

CONCLUSION:
Following neck dissection, the incidence of venous thromboembolism is 0.46%, which is considered very low risk. The American College of Chest Physicians recommends against the use of mechanical or pharmacologic venous thromboembolism prophylaxis in very low risk groups. This study establishes wound classification of 2, American Society of Anesthesiology physical status classification 3, and prolonged total operative time as risk factors for venous thromboembolism. Further investigation is needed before additional prophylaxis can be endorsed in patients who undergo neck dissection with these risk factors.

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INTRODUCTION

- Neck dissection is a common surgery performed by otolaryngologists to manage head and neck malignancies.[1] This surgery is associated with identified risk factors for venous thromboembolism (VTE) including malignancy, increased operative times, and prolonged bed rest.[2]
- Despite the recognized benefits, the use of VTE prophylaxis by practicing otolaryngologists widely ranges from 43%-88%.[3,4]
- Currently, there is dearth of data available regarding the incidence of and risk factors for VTE following neck dissection.
- This study reviews all neck dissections included in the ACS-NSQIP database between 2011-2013 to determine the incidence of VTE and establish risk factors for development of VTE.

Table 1. Comparison of demographics and comorbidities between patients undergoing neck dissection with or without VTE

	No VTE present	VTE Present	P Value
Age in yrs., (SD)	53.5 (16.1)	59.3 (14.1)	0.018
BMI in kg/m^2 (SD)	28.5 (7.5)	29.2 (7.1)	0.57
BMI, by category			0.893
<30	5126 (65.6%)	24 (66.7%)	
>=30	2688 (34.4%)	12 (33.3%)	
Sex, N (%)			0.08
Male	3326 (42.6%)	22 (61.1%)	
Female	4487 (57.4%)	14 (38.9%)	
Race, N (%)			0.919
American Indian or Alaska Native	34 (0.4%)	0 (0%)	
Asian	352 (4.5%)	2 (5.6%)	
Black or African American	385 (4.9%)	1 (2.8%)	
Native Hawaiian or Pacific Islander	36 (0.5%)	0 (0%)	
White	6073 (77.7%)	27 (75%)	
Other/Unknown	934 (12%)	6 (16.7%)	
Diabetes, N (%)			0.049
No	6904 (88.4%)	28 (77.8%)	
Yes	910 (11.6%)	8 (22.2%)	
Current smoker, N (%)			0.397
No	6492 (83.1%)	28 (77.8%)	
Yes	1322 (16.9%)	8 (22.2%)	
Dyspnea, N (%)			0.004
No	7382 (94.5%)	30 (83.3%)	
Yes	432 (5.5%)	6 (16.7%)	
COPD, N (%)			0.001
No	7562 (96.8%)	30 (83.3%)	
Yes	252 (3.2%)	6 (16.7%)	
>10% weight loss in 6 months, N (%)			0.048
No	7638 (97.7)	33 (91.7%)	
Yes	176 (2.3%)	3 (8.3%)	
Bleeding disorder, N (%)			0.022
No	7686 (98.4%)	33 (91.7%)	
Yes	128 (1.6%)	3 (8.3%)	
Transfusion >1 units PRBCs, N (%)			0.036
No	7807 (99.9%)	35 (97.2%)	
Yes	7 (0.1%)	1 (2.8%)	
Chemotherapy, N (%)			0.069
No	2392 (96.4%)	10 (83.3%)	
Yes	89 (3.6%)	2 (16.7%)	
Radiotherapy, N (%)			0.569
No	2403 (97.1%)	11 (100%)	
Yes	71 (2.9%)	0 (0%)	
Sepsis, N (%)			0.141
No	7782 (99.6%)	35 (97.2%)	
Yes	32 (0.4%)	1 (2.8%)	
Wound classification, N (%)			<0.001
1-Clean	6396 (81.9%)	17 (47.2%)	
2-Clean/Contaminated	1335 (17.1%)	19 (52.8%)	
3-Contaminated	68 (0.9%)	0 (0%)	
4-Dirty/Infected	15 (0.2%)	0 (0%)	
ASA Classification, N (%)			<0.001
1	442 (5.7%)	0 (0%)	
2	4079 (52.2%)	8 (22.2%)	
3	3070 (39.3%)	25 (69.4%)	
4	216 (2.8%)	3 (8.3%)	
5	1 (0%)	0 (0%)	
Total operation time in min., mean (SD)	206.8 (144)	332.5 (172)	<0.001

MATERIALS AND METHODS

- The American College of Surgeons National Surgical Quality Improvement Program datasets from 2011 to 2013 were queried.
- Neck dissection cases were identified and extracted using the Current Procedural Terminology (CPT) codes: 31365, 31390, 31395, 38700, 38720, 38724, 41135, 41145, 41155, 41153, 42426, 60252, 60254, and 69155.
- The primary outcomes measured were DVT and PE within thirty days of surgery. In addition perioperative variables and patient demographic variables were extracted.
- Univariate analysis and multivariate logistical regression were performed to determine if any perioperative or patient demographic variables were associated with occurrence of VTE.

RESULTS

- Data from 7850 patients who underwent neck dissection between 2011-2013 were collected and analyzed.
- A total of 36 patients experienced VTE within 30 days of surgery, which corresponds to an incidence of VTE 0.46% among all individuals who underwent neck dissection. This included 16 cases or 0.20% of PE and 22 cases or 0.28% of DVT. Two cases or 0.03% had both DVT and PE.
- Univariate analysis demonstrated a significant association between the development of VTE and age, diabetes, dyspnea, COPD, >10% weight loss in the previous 6 months, bleeding disorder, intraoperative transfusion of >1 unit packed red blood cells, wound classification of 2, and ASA class 3, and total operative time (Table 1).
- Multivariate logistical regression demonstrated wound classification of 2, ASA classification 3, and total operative time were independent risk factors for VTE (Table 2).

Table 2. Multivariate analysis of risk factors associated with VTE in neck dissection

	OR (95% CI)	P Value
Age	1.004 (0.979-1.029)	0.774
Sex	0.922 (0.450-1.891)	0.825
Wound Classification of 2	2.909 (1.327-6.375)	0.008
ASA Classification of 3	2.33 (1.081-5.02)	0.031
Total Operation Time	1.002 (1.0002-1.004)	0.027

DISCUSSION

- Previous estimates of the incidence of VTE following head and neck surgery ranged from 0.00%-2.13%.[5-14] This study determined the incidence of VTE following neck dissection to be 0.46%, which was within the range of previous estimates.
- The American College of Chest Physicians (ACCP) established evidence based guidelines for VTE prophylaxis following non-orthopedic surgery.[15] The guidelines risk-stratify patients by incidence of VTE into the following categories: very low: <0.5%, low: ~1.5%, moderate: ~3.0%, and high: ~6.0%. According to this classification, the findings from this study indicate that neck dissection was within the very low risk category. The ACCP recommends no use of mechanical or pharmacologic prophylaxis among very low risk groups.
- Wound classification of 2, ASA classification 3, and longer operative times were determined to be associated with VTE occurrence using multivariate logistical analysis.
- This study is limited by the variables included in the database. For example, the ACS-NSQIP database does not incorporate information regarding VTE prophylaxis usage and screening surveillance protocols, which could have influenced the rates of VTE.

CONCLUSION

- Following neck dissection, the incidence of venous thromboembolism is 0.46%.
- The ACCP venous thromboembolism guidelines. recommended against the use of mechanical or pharmacologic prophylaxis for venous thromboembolism in patients in very low risk groups.
- Wound classification of 2, ASA classification of 3, and prolonged total operative time as risk factors for venous thromboembolism.

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