

Abstract

BACKGROUND: Vocal cord dysfunction is a well-known complication after thoracic surgery. The course and location of recurrent laryngeal nerves, especially on the left side, makes them vulnerable to injury during various thoracic procedures.

PURPOSE: The purpose of the current study is to retrospectively evaluate the risk factors for vocal cord dysfunction in patients undergoing thoracic surgery for lung cancer treatment. We have created a database of all patients undergoing video laryngoscopy within the department of thoracic surgery. This database was used to examine an at-risk population and create a rational clinical pathway for the management and prevention of aspiration and its sequelae.

METHODS: A review of all patients from the thoracic surgery department undergoing video laryngoscopy was retrospectively performed from 2012-2016 (5 years). Patients with a previous history of neck surgery that would put the recurrent laryngeal nerves at risk were excluded from review. Out of 305 patients referred to the speech therapy department following diagnosis of lung cancer, 248 were included in the study. All these patients underwent video laryngoscopy exam to discern the status of vocal cord mobility and dysfunction. Most of the patients were referred for complaints like hoarseness (54%), aspiration, ineffective cough (21.5%), dysphagia (4%) and pneumonia (18.5%). Various parameters including tumor stage, size, histological grade, stage, type of pulmonary procedure, use of anticoagulant therapy, and history of radiation and/or chemotherapy were included in the study to identify the factors that increase the risk of vocal cord injury during thoracic surgery.

RESULTS: Our patient demographic was evenly (50%) divided among sexes with an average age of 68.4 years. Review of the data suggest a higher incidence of VCD on the left than the right (p=0.001) and this is consistent with existing literature. In this patient cohort, VCD is associated with advanced tumor stage (p=0.07) and with history of prior radiation (p<0.005). The patients with VCD were also noted to have prolonged ICU stay (p<0.001) with prolonged need for intubation (p<0.009). We also noted higher incidence of postop tracheostomy (p<0.007) in these patients. As is obvious, patients with VCD were more likely to have postop voice dysfunction (p<0.001) and weak cough (p<0.001). However, we did not identify higher incidence of postop pneumonia in these patients. This may be due to early detection of VCD and aggressive management. Also, visualization of recurrent laryngeal nerve during surgery did not portend better vocal cord outcome. There was no significant association with gender, BMI, type of procedure, histology or anticoagulation.

CONCLUSION: As is reported in published literature, thoracic surgeries for lung cancer treatment are known to be associated with VCD and more significantly on the left than the right side. Advanced stage disease and history of prior radiation are predisposing risk factors. Video laryngoscopy is an inexpensive and relatively non-invasive office procedure that can accurately diagnose and predict VCD and help guide further management to prevent complications such as pneumonia.

Methods

An IRB-approved review of all patients from the thoracic surgery department undergoing video laryngoscopy was retrospectively performed from 2012-2016 (5 years). Patients with a previous history of neck surgery that would put the recurrent laryngeal nerves at risk were excluded from review. Out of 305 patients referred to the speech therapy department following diagnosis of lung cancer, 248 were included in the study. All these patients underwent video laryngoscopy exam to discern the status of vocal cord mobility and dysfunction. Most of the patients were referred for complaints like hoarseness (54%), aspiration, ineffective cough (21.5%), dysphagia (4%) and pneumonia (18.5%). Various parameters including tumor stage, size, histological grade, stage, type of pulmonary procedure, use of anticoagulant therapy, and history of radiation and/or chemotherapy were included in the study to identify the factors that increase the risk of vocal cord injury during thoracic surgery. Data analysis was carried out in IBM SPSS statistical package v26.

Results

- The only surgical factors significantly associated with vocal cord dysfunction are pneumonectomy and intraoperative bleeding.
- There was a statistically significant risk of vocal cord injury during more extensive procedures such as pneumonectomy compared to other thoracic surgical procedures, such as lobectomy, wedge resection.
- We identified a higher risk of vocal cord injury when intraoperative bleeding was present.
- Vocal cord dysfunction was associated with the number of positive lymph nodes. However, overall disease stage and the total number of lymph nodes examined were not statistically associated with vocal cord injury.
- Radiation within one year prior to surgery was strongly associated with post-operative vocal cord injury (p=0.005).
- Elevated BMI and thoracotomy approach also trended toward association with VCD (p=0.076 and 0.062 respectively)

Table 1: Patient demographics.

Variable	Mean or N (%)
male	113 (48.3%)
female	121 (51.7%)
age	68.78
BMI	27.83
pack yrs	42.2
pos. LN	1.39
pre-op RT	11 (4.7%)
pneumonectomy	11 (4.7%)
thoracotomy	35 (15%)
lobectomy	129 (55.1%)
wedge resection	51 (21.8%)
intraop. bleeding	13 (5.6%)

Table 2: Correlation between risk factors and vocal cord injury

vocal cord dysfunction	coeff	p
BMI	-0.094	0.142
pack years	0.017	0.789
pre-op radiation	0.178	0.005
tumor stage	0.097	0.134
positive nodes	0.14	0.038
thoracotomy	0.040	0.539
pneumonectomy	0.156	0.017

Results

- We also found, in agreement with the literature, higher incidence of left vocal cord paralysis/paresis compared to right mostly associated with thoracic procedures on the left upper lobe.
- Pre-operative anticoagulation but not antiplatelet therapy was associated with vocal cord injury (p=0.011).
- The post-operative course of patients with vocal cord injury also appeared to be complicated by extended ICU stay and prolonged intubation (p=0.124) this also trended toward a higher association with post-operative tracheostomy tube insertion.

Conclusions

- As is reported in published literature, thoracic surgeries for lung cancer treatment are known to be associated with vocal cord dysfunction and more significantly on the left than the right side.
- Advanced stage disease and history of prior radiation are predisposing risk factors.
- Our data identify additional risk factors predisposing toward vocal cord dysfunction.
- Attention to these variables in surgical and post-surgical care may reduce the incidence of complications and patient morbidity.
- Video laryngoscopy is an inexpensive and relatively non-invasive office procedure that can accurately diagnose VCD and help guide further management to prevent complications such as pneumonia and tracheostomy.