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Impact of atrial fibrillation in patients with lung cancer: Insights from National Inpatient Sample

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Lung cancer is one of the leading causes of cancer mortality and thus remains a major medical concern [1]. Atrial fibrillation (AF) is commonly associated with different cancers and contributes to overall morbidity. Few data are available regarding the incidence of AF in patients with lung cancer. The presence or absence of AF may be useful to predict prognosis of lung cancer patients and may affect the in-hospital morbidity as well as contributing to an increased length of stay (LOS) and cost [2]. Hence, we conducted a retrospective study using the National Inpatient Sample (NIS) database from 2016 to determine the impact of the presence of AF on patients with a diagnosis of lung cancer.

We included all the patients with lung cancer both with and without AF by using the appropriate ICD-10 codes. Primary outcomes of interest were mortality, acute kidney injury, length of stay and cost of care. Multivariate logistic regression was used for adjustment of potential confounders including age, gender, race, socioeconomic status, diabetes, hypertension, smoking, alcohol use, chronic kidney disease, obesity, dyslipidemia, Charlson Comorbidity Index, hospital location, hospital region, teaching status, and hospital size. STATA/IC 15.1 was used for statistical analysis.

We found a total of 159,615 patients with a diagnosis of lung cancer in 2016 after excluding missing values. Among them, 10,050 (6.29%) patients had a concurrent diagnosis of AF. Mean age of patients was 73 years (range 72.6–73.5) in lung cancer patients with AF, whereas it was 68.4 years (range 68.2–68.6) in those without AF [Table 1]. Women were significantly fewer in number (44%) in the lung cancer with AF group. Comorbidities like hypertension (52%), diabetes (31%), dyslipidemia (44%), obesity (8.6%), and chronic kidney disease (20%) were significantly more common in lung cancer patients with AF as compared to those without AF. Those with AF (46.7%) were more likely to be smokers. The average length of stay in lung cancer with AF group was 6.8 days (range 6.57–7), significantly longer compared to those without AF (5.4 days, range 5.3–5.5, p value < 0.001). Presence of AF was associated with a considerably higher cost of care in patients with lung cancer (p value < 0.001). After adjusting for variables as mentioned above, there was no significant difference in overall mortality between the two groups (Odds ratio [OR] - 1.02, 95% confidence interval [CI] 0.88–1.2, $p = 0.77$). Stroke was also not significantly more prevalent in patients of lung cancer with AF, as compared to lung cancer without AF (OR - 0.83, 95% CI - 0.58–1.2, $p = 0.27$).

The earliest publications regarding the association of cancer and AF are in the 1940s and 1950s with reports of neoplastic cardiac infiltration. It is possible that lung cancer may cause AF due to systemic inflammation. This association has been supported by a recent study by Yao et al. The study provides valuable insights into the significance of NLRP3 inflammasome activation as a mediator of inflammatory signaling in atrial tissue [3]. Inflammation may induce structural and electrical remodeling of the atria resulting in AF. Also, AF may be triggered through pulmonary micro-embolism due to the hypercoagulable state associated with the malignant condition [4]. A Danish cohort study involving 7,920,831 people between January 1, 1980, and December 31, 2011, found a strong association between AF and cancers of the lung, kidney, and colon [4]. In this study an increased the risk of cancers (lung, kidney) and AF was found in those with high-risk behaviors like smoking. There may be other common factors related to the occurrence of AF as well as lung cancer. Further studies are required to find this association. The presence or absence of AF has an impact on the management of cancer patients. Cancer is a hypercoagulable state and also increases the bleeding risk. Thus, the treatment of AF in patients with malignancies is challenging. Antithrombotic therapy may result in an increased risk

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Table 1
Baseline demographics, comorbidities and in-hospital outcomes for patients with lung cancer (n = 159,615) with and without atrial fibrillation (AF).

	Lung cancer with AF (n = 10,050)	Lung cancer without AF (n = 149,565)	Adjusted Odds ratio (OR) or β coefficient (95% CI) (Lung cancer with AF compared to Lung cancer without AF)	p value
Mean age (yrs)	73 (72.6–73.5)	68.4 (68.2–68.6)	..	0.06
Female gender (%)	44%	48.7%	..	<0.001
Race				0.49
White	75.8%	73.7%		
Black	12.3%	14.2%		
Hispanic	6.4%	3.5%		
Hypertension (%)	52%	48%	..	0.002
Diabetes (%)	31%	24%	..	<0.001
Smoker (%)	46.7%	43%	..	0.001
Dyslipidemia (%)	44%	32%	..	<0.001
Obesity (%)	8.6%	6%		<0.001
CKD (%)	20%	12%		<0.001
Length of stay	6.8 (6.57–7)	5.4 (5.3–5.5)	β coefficient (95% CI): 1.37 (1.1–1.6)	<0.001
Cost of care	69,821 (66,166–73,476)	51,817.5 (50,235–53,399.6)	β coefficient (95% CI):16,485 (12,847.6–20,122)	<0.001
Mortality			OR: 1.02 (0.88–1.2)	0.77
Acute kidney injury			OR: 1.16 (1.035–1.30)	0.011
Cardiogenic shock			OR: 1.3 (0.96–1.7)	0.08
Cardiac arrest			OR: 1.06 (0.74–1.53)	0.75
Stroke			OR: 0.83 (0.58–1.2)	0.27

of either bleeding or thrombosis. Often, we can encounter an unpredictable anticoagulation response [5]. The management of this unique group of patients must require an interdisciplinary approach including cardiologists, oncologists, primary care physicians, and other subspecialists.

Our nationwide study showed that AF is not uncommon in hospitalized patients with lung cancer. The presence of this arrhythmia significantly prolongs the length of stay and cost of care in these patients, although, the incidence of stroke and overall mortality did not differ significantly between groups with and without AF. Clinicians should be vigilant in early detection of AF in patients with lung cancer, and timely intervention may improve morbidity in these patients.

Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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