

Association of Comorbid OSA and Bronchial Asthma with Postoperative Pneumonia in Children



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Introduction

- Postoperative pneumonia is a benchmark outcome that can lead to significant morbidity and mortality in hospitalized patients.¹⁻³
- The dual diagnosis of obstructive sleep apnea (OSA) and bronchial asthma has become more common in children.⁴
- It is currently known that patients with either bronchial asthma or OSA are at increased risk of developing postoperative pneumonia.
- Whether the association of comorbid OSA and asthma increases the risk of a major postoperative pulmonary complications like pneumonia has not been previously explored.

Table 1: Incidence and Odds Ratio of Diagnosis per Outcome

Outcomes (Total)	Asthma/OSA Status	Incidence (%)	Unadjusted Analysis		Adjusted Analysis	
			OR (95% CI)	P-Value	OR (95% CI)	P-Value
Postoperative Pneumonia (N=3,969)	No OSA/ No Asthma	2,873/67,616 (04.3)	Reference		Reference	
	No OSA/ With Asthma	313/6,037 (05.2)	1.23 (1.09 - 1.39)	0.001	1.26 (1.11 - 1.44)	<0.01
	With OSA/No Asthma	596/12,035 (05.0)	1.17 (1.07 - 1.29)	0.001	1.01 (0.91 - 1.12)	0.807
	With OSA/With Asthma	187/2,946 (06.4)	1.53 (1.31 - 1.78)	<0.01	1.36 (1.16 - 1.60)	<0.01
ICU Admission (N=34,689)	No OSA/ No Asthma	26,206/67,616 (38.8)	Reference		Reference	
	No OSA/ With Asthma	2,590/6,037 (42.9)	1.19 (1.13 - 1.25)	<0.01	1.25 (1.18 - 1.33)	<0.01
	With OSA/No Asthma	4,618/12,035 (38.4)	0.98 (0.95 - 1.02)	0.423	1.65 (1.58 - 1.74)	<0.01
	With OSA/With Asthma	1,275/2,946 (43.3)	1.21 (1.12 - 1.30)	<0.01	1.97 (1.81 - 2.14)	<0.01
Extended LOS (N=22,785)	No OSA/ No Asthma	18,924/67,616 (28.0)	Reference		Reference	
	No OSA/ With Asthma	1,824/6,037 (30.2)	1.11 (1.05 - 1.18)	<0.01	1.13 (1.07 - 1.20)	<0.01
	With OSA/No Asthma	1,589/12,035 (13.2)	0.39 (0.37 - 0.41)	<0.01	0.62 (0.58 - 0.65)	<0.01
	With OSA/With Asthma	448/2,946 (15.2)	0.46 (0.42 - 0.51)	<0.01	0.67 (0.61 - 0.75)	<0.01

OSA: obstructive sleep apnea; OR: Odds Ratio; CI: Confidence Interval; ICU: Intensive Care Unit; LOS: Length of Stay

Conclusions

- Compared to children without either OSA or asthma or both, those with the dual diagnosis of OSA and asthma are at increased risk of developing postoperative pneumonia and ICU admission.
- Clinical implications of our study endorse the following:
 - Further research into the interactions between OSA and asthma.
 - Optimization of respiratory status prior to surgery in patients with OSA or asthma with the implementation of perioperative pathways.

Methods

- Following IRB approval, we performed a retrospective review of the Pediatric Health Information System (PHIS) dataset.
- The study cohort included children younger than 18 years of age who presented for an elective, inpatient, non-cardiac surgical procedure between the years 2016 – 2021.
- We used a multilevel logistic regression model to estimate the odds ratio (OR) of postoperative pneumonia and compared this across four groups: OSA with asthma, OSA alone, asthma alone, and no OSA or asthma.
- All analyses were controlled for baseline covariates that included sex, age, race, year of operation, admitting service line, and preoperative comorbidities.

Results

- The study population included 88,634 children. A total of 3,969 (4.5%) developed postoperative pneumonia, 34,689 (39.1%) required ICU admission, and 22,785 (25.7%) required extended length of stay (Table 1).
- The incidence of postoperative pneumonia, ICU admission, and extended LOS among patients with a dual diagnosis of asthma and OSA was 6.4% (187/2,946), 43.3% (1,275/2,946), and 15.2% (448/2,946), respectively.
- Compared to individuals without asthma or OSA, patients with both diagnoses were more likely to develop postoperative pneumonia (OR: 1.52, 95% CI: 1.31 – 1.78) and be admitted to the ICU (OR: 1.21, 95% CI: 1.12 – 1.30). Similar results were observed after adjusting for sex, age, race, insurance, region, and surgical type.

References

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