

Obesity, Adenoid Regrowth, and Pediatric Obstructive Sleep Apnea: Treatment Implications



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BACKGROUND

- The prevalence of pediatric obesity and pediatric obstructive sleep apnea (OSA) have risen in tandem.¹
- Previous studies have shown inflammatory markers to be elevated in pediatric patients with obesity and OSA.²
- Adenotonsillar hypertrophy is associated with increased inflammatory markers and has been shown to respond to anti-inflammatory agents.³
- Purpose:** To explore the connection between pediatric obesity and the need for secondary adenoid removal surgeries

METHODS

Retrospective cohort study of patients undergoing adenoid removal surgeries at a tertiary academic center. This study received IRB approval.

Patients undergoing initial adenoid removal surgeries between 2012-2017 who underwent secondary intervention or were followed for a minimum of 2 years were included for further analysis.

Data were analyzed by Pearson's chi-squared test and Wilcoxon's test with statistical significance set *a priori* at $p < 0.05$.

RESULTS

Table 1. Initial cohort demographics

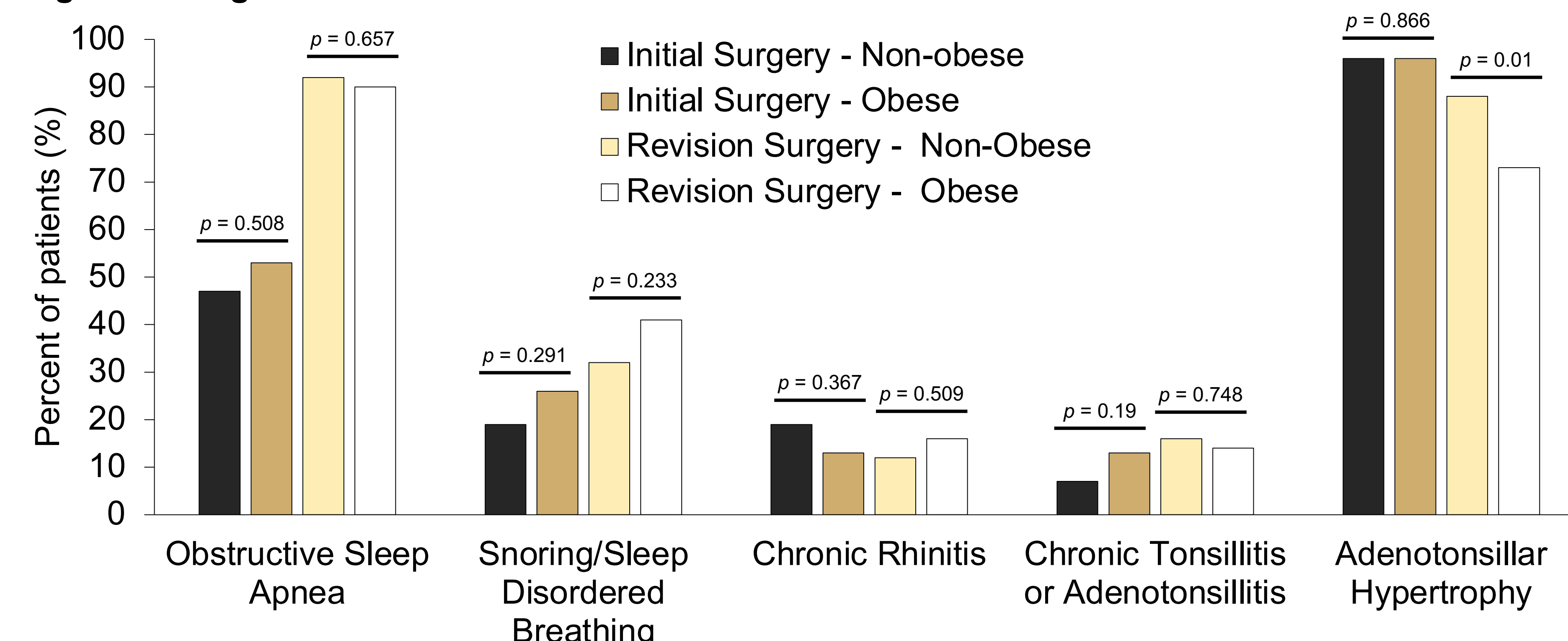
Demographics and Clinical Characteristics	Total (n=230) N (%)
Sex	
Female	38
Male	62
Birth History	
Premature	19
Full Term	81
Comorbid Diagnoses	
Down Syndrome	10
Cerebral Palsy	0
Hypotonia	0
Craniofacial Diagnosis	17
Neuromuscular Diagnosis	16
Laryngo/Tracheomalacia	10
None	62

Table 2. Age of patients at initial and revision adenoid removal surgeries

Age (years)	Non-Obese	Obese	Significance
Initial surgery	3.17 ± 2.49	4.39 ± 3.84	$p = 0.087$
Revision surgery	4.94 ± 2.49	7.56 ± 3.82	$p < 0.001$

Patients with obesity were older at the time of their revision surgery than patients without obesity. Adenotonsillar hypertrophy was more likely to be an indication for patients without obesity undergoing a revision surgery.

Figure 1. Surgical indications.



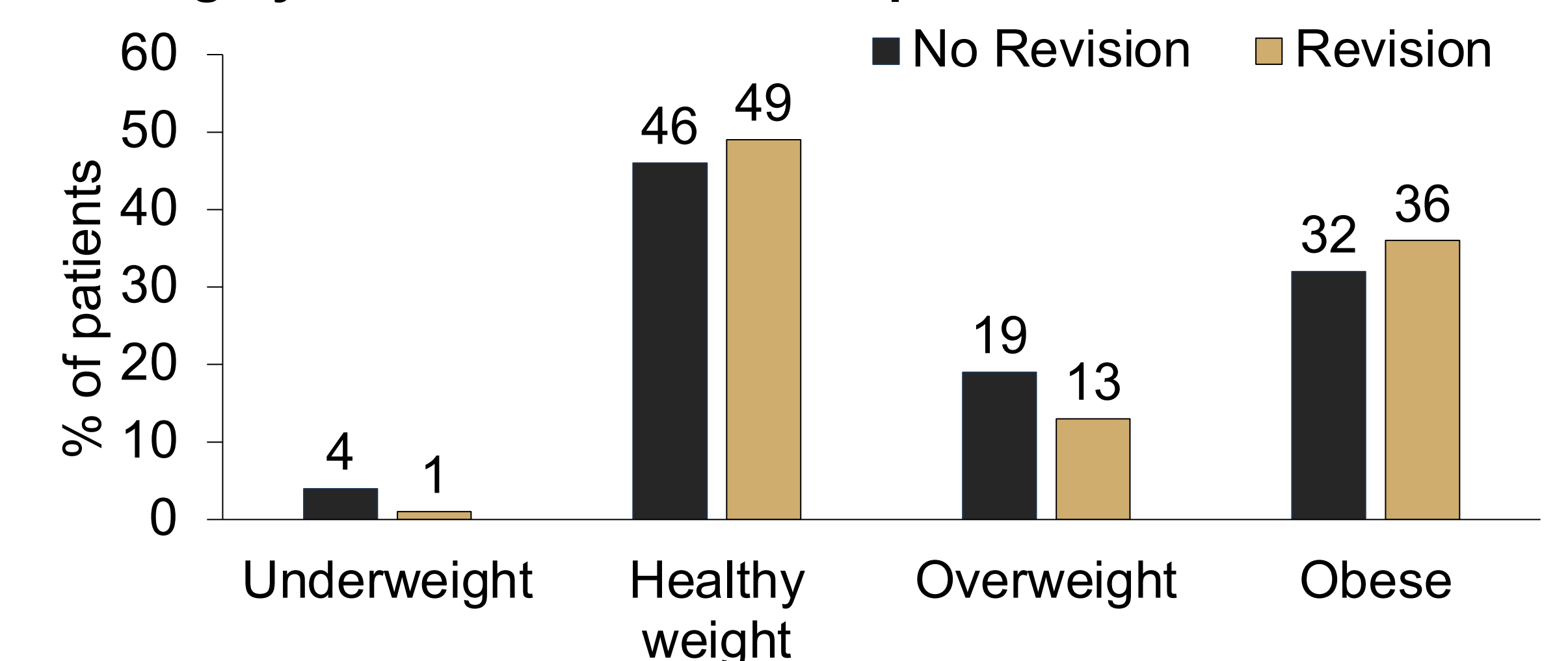
RESULTS

Table 3. Expanded cohort demographics, comorbidities, and primary surgical indications

	No Revision Surgery N = 287	Revision Surgery N=120	Test Statistic
Sex (N=408)	Male 57% (163) Female 43% (124)	65% (78) 35% (42)	$\chi^2=2.36, P=0.1251$
Age at initial surgery (years) (N=407)	4.27 ± 2.95	3.12 ± 2.27	F=15.2, P<0.001
Comorbidities (N=409)	<i>Hypotonia</i>		
	No 78% (223)	72% (87)	$\chi^2=1.26, P=0.2621$
	Yes 22% (64)	28% (33)	
	<i>Asthma / Reactive airway disease</i>		
	No 91% (260)	86% (103)	$\chi^2=1.99, P=0.1591$
	Yes 9% (27)	14% (17)	
	<i>Chronic rhinitis / rhinorrhea</i>		
	No 61% (176)	69% (83)	$\chi^2=2.25, P=0.1341$
	Yes 39% (111)	31% (37)	
	<i>GERD</i>		
No 90% (259)	92% (110)	$\chi^2=0.2, P=0.6531$	
Yes 10% (28)	8% (10)		
<i>None</i>			
No 59% (170)	57% (68)	$\chi^2=0.23, P=0.6321$	
Yes 41% (117)	43% (52)		
Indication for initial surgery (N=409)	<i>Obstructive sleep apnea / Sleep disordered breathing</i>		
	No 47% (135)	51% (61)	$\chi^2=0.49, P=0.4851$
	Yes 53% (152)	49% (59)	
	<i>Recurrent infection</i>		
	No 77% (221)	87% (104)	$\chi^2=4.91, P=0.0271$
	Yes 23% (66)	13% (16)	
	<i>Middle ear disease</i>		
	No 49% (140)	42% (51)	$\chi^2=1.34, P=0.2471$
	Yes 51% (147)	57% (69)	
	<i>Adenoid hypertrophy</i>		
No 25% (73)	22% (26)	$\chi^2=0.65, P=0.4191$	
Yes 75% (214)	78% (94)		
<i>Other</i>			
No 97% (279)	98% (118)	$\chi^2=0.44, P=0.5051$	
Yes 3% (8)	2% (2)		

Patients who ultimately underwent a revision surgery were younger at the time of initial surgery. Recurrent infection was more often an indication for initial surgery in patients who did not later undergo a revision surgery. Patient BMI distribution was similar in patients undergoing revision surgery and those who did not undergo a revision surgery.

Figure 2. Patient BMI distribution at time of revision surgery or most recent follow up



CONCLUSIONS & FUTURE DIRECTIONS

- Patient BMI did not significantly differ between patients undergoing revision adenoidectomy and patients not requiring additional surgery.
- Differences in comorbidities were not associated with need for additional surgeries.
- Future works will benefit from further exploration of patient factors for patients requiring revision surgery.

ACKNOWLEDGEMENTS & REFERENCES

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- Kumar S, Kelly AS. Review of Childhood Obesity: From Epidemiology, Etiology, and Comorbidities to Clinical Assessment and Treatment. *Mayo Clin Proc.* 2017 Feb;92(2):251–65.
- Bhatt SP, Guleria R, Kabra SK. Metabolic alterations and systemic inflammation in overweight/obese children with obstructive sleep apnea. *PLOS ONE.* 2021 Jun 4;16(6):e0252353.
- Sakarya EU, Muluk NB, Sakalar EG, Senturk M, Aricigil M, Bafaqeeh SA, Cingi C. Use of intranasal corticosteroids in adenotonsillar hypertrophy. *J Laryngol Otol.* 2017 May;131(5):384–90.