Evaluating Inflammatory Markers as a Predictor of Adenotonsillectomy (AT) Success

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INTRODUCTION

- Obstructive sleep apnea (OSA) is prevalent in the overweight and obese pediatric population.[1]
- Systemic inflammatory markers such as C-reactive protein (CRP) and tumor necrosis factor-alpha (TNF-a) are elevated in pediatric patients with obstructive sleep apnea (OSA) and obesity.[2,3]
- Inflammatory marker levels have been seen to decrease post-adenotonsillectomy.[3-5]
- Furthermore, decreases in inflammatory markers have been associated with improvement in apnea-hypopnea index values (AHI).[5]

Aim: To evaluate the ability of CRP and TNF-a to predict clinical outcomes after adenotonsillectomy (AT) in pediatric patients with OSA.

HYPOTHESIS

- **Primary hypothesis:** Decreased postoperative levels of inflammatory markers will be associated with improved clinical outcomes.
- **Secondary hypothesis:** The economic impact of measuring preoperative inflammatory markers will be minimal.

METHODS

POPULATION:
- 20 pediatric patients diagnosed with OSA undergoing AT
- VCH from August 2018 – October 2019

EXPOSURE:
- Preoperative CRP and TNF-a levels
- Measured via standard of care blood draw prior to surgery

OUTCOMES:
- Primary: polysomnogram data (lowest arterial oxygen saturation (SaO2), total apnea hypopnea index (AHI), and obstructive apnea hypopnea index (OAHI)
- Secondary: cost per patient

STATISTICAL ANALYSIS:
- IRB-approved prospective case series
- Analysis: Spearman's rank correlation

RESULTS

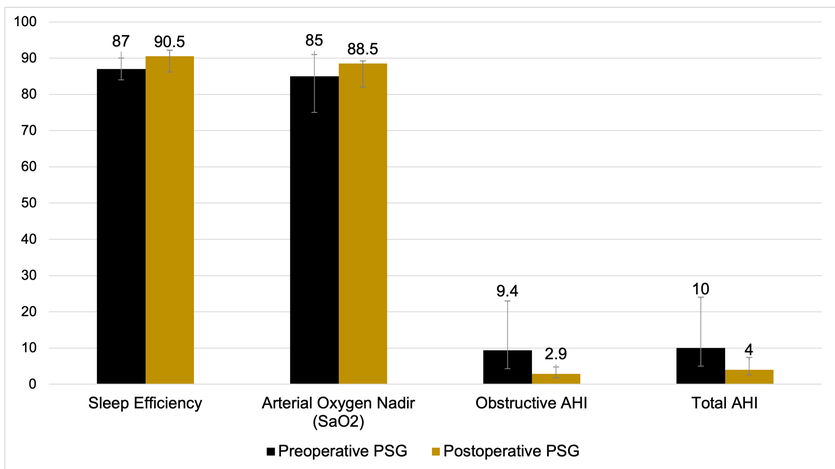
Table 1: Patient Baseline Characteristics

Characteristic	N	Median (IQR) or N (%)
Median Age	20	9.5 (7.0, 11.5)
Sex	20	
Female		10 (50%)
Male		10 (50%)
Race	20	
Asian		1 (5%)
Black/African American		11 (55%)
White		25 (5%)
Unknown/Not reported		3 (5%)
Preoperative Diagnoses	20	
Obstructive sleep apnea		19 (95%)
Snoring/Sleep disordered breathing		18 (90%)
Chronic tonsillitis/adenotonsillitis		3 (15%)
Tonsillar hypertrophy		16 (80%)
Baseline PSG Data		
Sleep efficiency	20	87 (84, 90)
Arterial oxygen nadir (SaO2)	19	85 (75, 91)
Obstructive AHI	20	9.4 (4.3, 23.0)
Total AHI	20	10 (5, 24)

Table 2: Overall Clinical Outcomes

Outcome	N	Median (IQR) or N (%)
Postoperative PSG Data	8	
Sleep efficiency		90.5 (86.2, 92.2)
Arterial oxygen nadir (SaO2)		88.5 (82.0, 89.2)
Obstructive AHI		2.9 (1.8, 4.8)
Total AHI		4.0 (2.6, 7.4)
Postoperative follow-up	20	17 (85%)
Resolution of OSA	20	11 (65%)
Persistent OSA Symptoms	20	
Mild snoring		3 (15%)
Mouth breathing		1 (5%)
Pauses and gasping		1 (5%)
None		14 (70%)
Preoperative Biomarkers		
CRP elevated	20	17 (85%)
TNF-a elevated	17	0 (0%)

Figure 1: Pre vs Postoperative Polysomnogram Data



RESULTS (CONTINUED)

Table 3: CRP and Clinical Outcomes

Outcome	Test statistic	p-value
Postoperative SaO2	r=0.12	p=0.786
AHI	r=-0.26	p=0.528
OAHI	r=-0.26	p=0.528

Table 4: TNF-a and Clinical Outcomes

Outcome	Test statistic	p-value
Postoperative SaO2	r=-0.15	p=0.749
AHI	r=0.19	p=0.691
OAHI	r=0.19	p=0.195

Table 5: Cost Analysis

Item	Cost per patient
Venipuncture	$18.01
CRP lab test	$8.00
TNF-a lab test	$61.44
Total	$87.45

CONCLUSION

- There is no association between inflammatory biomarkers and postoperative clinical measurements (p>0.05).
- The institutional cost of labs per patient was approximately $87.40 per patient.
- These findings differ from previous studies on inflammatory markers.
- Further investigation needs to be completed before implementation of biomarkers as a predictor of treatment success.
- **Limitations**: Single-center study, small study population, limited postoperative PSG data
- **Future directions**: Study of the relationship between biomarkers and other signs of clinical improvement with OSA post-AT.

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REFERENCES