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CPAP and Epistaxis: Is there a Connection in OSA patients?

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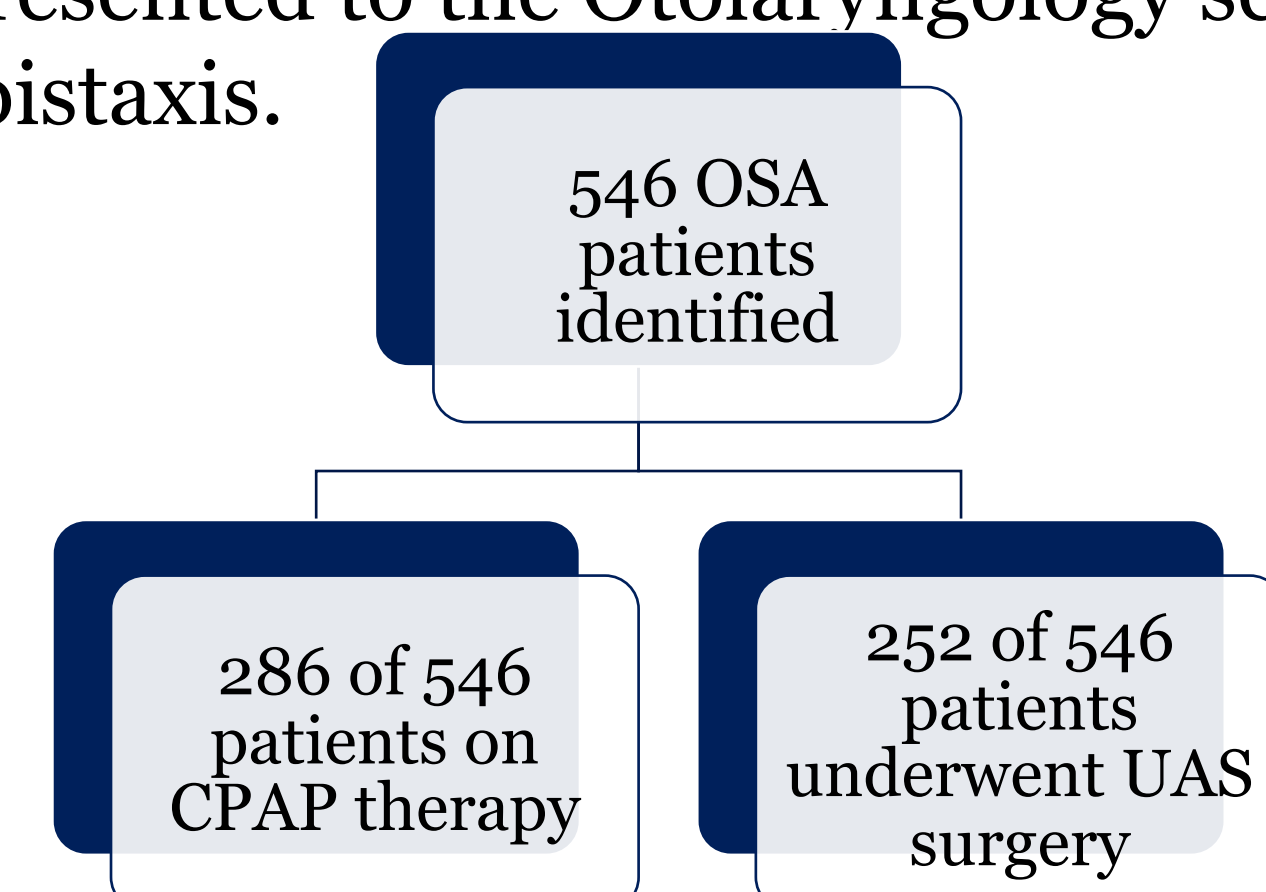
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Introduction

Nasal continuous positive airway pressure (CPAP) has become a standard form of therapy for patients with obstructive sleep apnea (OSA).^{1,2} There are reports of patients suffering from episodes of epistaxis within the initial few weeks of starting CPAP therapy, believed to be due to the high flow rate of air during use, nasal CPAP purportedly dries the nasal mucosa, leading to an increased risk of scabbing, ulceration, and ultimately epistaxis.⁴⁻⁶ This study seeks to analyze whether epistaxis is common in patients following CPAP initiation and then compare this rate of epistaxis amongst OSA patients that received upper airway stimulation (UAS) surgery in lieu of CPAP therapy.

Materials and Methods

- A single-center, retrospective chart review from November 2014 through March 2021 was performed on all patients seen by the Sleep Medicine service with OSA and cross-referenced with those patients who presented to the Otolaryngology service with a chief complaint of epistaxis.



- Any patients on anticoagulation, history of clotting disorders, septal perforations, or cocaine use were excluded. Patients that underwent a sinonasal procedure within 1 month of epistaxis were also excluded.
- Total included in study: 185 CPAP and 158 UAS patients
- Patients were followed for 1 year to assess for epistaxis following initiation of CPAP or UAS surgery

Statistical Analysis

All patients were grouped by demographics and medical history. All data were imported into statistical analysis software, JMP Statistical Discovery 16 (SAS Institute, Cary, NC). Statistical analysis conducted paired student t-tests and Pearson's chi-square tests between patient characteristics. Significance testing for all groups was carried out using log-rank test with significance set at $\alpha = 0.05$.

Results

3 of the 185 CPAP patients presented with epistaxis, at a rate of 1.6%, compared to 0 of the 158 UAS patients. This finding, however, was borderline statistically insignificant ($p = 0.054$). In fact, all 3 patients that developed epistaxis had hypertension. Of these 3 patients, one required significant surgical management (sphenopalatine artery ligation) whereas the other two were treated conservatively.

Table 1 illustrates the demographics in groups as well as the disparities in patient characteristics present. In general, patients undergoing sleep surgery were more likely to be male, white, lower average BMI, and less comorbidities ($p < 0.05$).

Table 1. Characteristics of all Sleep Apnea Patients

	All		CPAP		Sleep Surgery		p-value
	N	%	N	%	N	%	
Total	343	100.0%	185	100%	158	100%	
Gender							0.048
Female	141	41.1%	85	45.9%	56	35.4%	
Male	202	58.9%	100	54.1%	102	64.6%	
Race							<.0001
White	230	67.1%	76	41.1%	154	97.5%	
Black	91	26.5%	90	48.6%	1	0.6%	
East Asian	4	1.2%	4	2.2%	0	0.0%	
Hispanic	18	5.2%	15	8.1%	3	1.9%	
BMI Group							<.0001
<25	53	15.5%	11	5.9%	42	26.6%	
25-29.9	99	28.9%	30	16.2%	69	43.7%	
30-34.9	76	22.2%	36	19.5%	40	25.3%	
35-39.9	43	12.5%	37	20.0%	6	3.8%	
>40	72	21.0%	71	38.4%	1	0.6%	
Average BMI (+/- SD)			38 (9.5)		27.9 (4.1)		<.0001
Medical History							
Hypertension	145	42.3%	96	51.9%	49	31.0%	<.0001
Diabetes	49	14.3%	35	18.9%	14	8.9%	0.007
History of epistaxis	3	0.9%	3	1.6%	0	0.0%	0.054

Efforts to determine if any of these differences represent confounding factors are provided in **Table 2**, which compares these factors amongst epistaxis and non-epistaxis groups. In this table, hypertension was the only factor that was statistically significant.

Table 2. Comparison of Factors by Epistaxis

	Epistaxis		No Epistaxis		p-value	
	N	%	N	%		
Total	3	100%	340	100%		
Gender					0.7809	
Female	1	33.3%	140	41.2%		
Male	2	66.7%	200	58.8%		
Race					0.5106	
White	1	33.3%	229	67.4%		
Black	2	66.7%	89	26.2%		
East Asian	0	0.0%	4	1.2%		
Hispanic	0	0.0%	18	5.3%		
BMI Group					0.5975	
<25	1	33.3%	52	15.3%		
25-29.9	1	33.3%	98	28.8%		
30-34.9	0	0.0%	76	22.4%		
35-39.9	0	0.0%	43	12.6%		
>40	1	33.3%	71	20.9%		
Average BMI (+/- SD)			36.5 (17.2)		33.3 (9)	0.5378
Medical History						
Hypertension	3	100.0%	142	41.8%	0.023	
Diabetes	1	33.3%	48	14.1%	0.4037	
Treatment Modality					0.054	
CPAP	3	100.0%	182	53.5%		
Sleep surgery	0	0.0%	158	46.5%		

Discussion

Currently, commonly cited adverse effects of CPAP use include irritation, rhinorrhea, epistaxis, post-nasal drip, nasal congestion, and nasal dryness.¹⁰ Of these adverse effects, there is a paucity of data demonstrating the validity of CPAP commonly causing epistaxis.^{4,11} The goal of this study is to bridge this gap by examining the incidence of epistaxis upon initiation of CPAP therapy, with comparison of epistaxis rates amongst OSA patients receiving surgery in lieu of CPAP therapy, serving as a control.

We demonstrate herein that the cohort of OSA patients initiating CPAP therapy presented no significant rates of epistaxis with the UAS patient cohort. To identify as many possible confounding variables (race, gender, body mass index, medical history and recent endonasal surgical history), a detailed comparison was conducted, exploring risk factors for epistaxis patients. This comparison demonstrated that CPAP usage was only found to be a risk factor in patients with hypertension. Studies have demonstrated the drying effect of CPAP usage on the nasal mucosa and can therefore potentiate epistaxis, particularly in patients with other risk factors.¹⁰

These data suggest that this risk is negligible at 1.6%. Excluding all hypertensive patients results in a 0% epistaxis rate, regardless of CPAP usage. Thus, any claim that CPAP poses a significant risk factor for epistaxis should not be extrapolated onto clinical significance, nor should it be considered a limiting factor when deciding on a treatment modality for OSA.

This study further prompts research on how to overcome OSA patient non-compliance of CPAP usage, out of fear of adverse effects such as epistaxis, nasal dryness, and congestion. Studies have identified humidifying the inspired air as a possible preventative measure.¹⁴ Another study demonstrated that heated humidity may increase compliance with CPAP, as patients experience adverse effects to a lesser degree.¹⁵ Such literature lays the foundation for future studies on the adverse effects of CPAP therapy, as well as methods to increase patient compliance.

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