CLINICAL VIGNETTE

Mask Choices in OSA Management

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Introduction

Mask choice in the continuous positive airway pressure (CPAP) therapy may impact patients pressure needs and residual apnea hypopnea index (AHI).[1-5]

We present a patient with multiple failed attempts at controlling severe obstructive sleep apnea (OSA) over many years. Despite visits to multiple sleep physicians, he continued to have elevated residual AHI and lack of improvement in OSA symptoms.

Report of Case

An 87-year-old male presented to the sleep medicine clinic via video encounter with difficulty treating OSA. His severe OSA was initially diagnosed 10 years prior though previous records were not accessible. He was started on a ResMed Airsense 10 Automatic positive airway pressure (APAP) device but he was noted to have elevated residual AHI. A prior download from APAP 5-12 cm H2O showed an elevated residual AHI of 29.8/hr with a 95% pressure of 11.6cm H2O and a median leak of 12.9 L/min and 95% leak of 31 L/min. The patient was seen by multiple providers in another state over the years. After multiple attempts at improving residual AHI and leak, the patient continued to have elevated AHI. His daytime symptoms were also not significantly improved with CPAP therapy.

Per history, an initial titration study was done which showed improvement with CPAP, but elevated residual AHI was noted on PAP download. He had a repeat titration 2 years prior to presentation and was titrated to Bilevel PAP average volume assured pressure-support (BIPAP AVAPS) but continued to have elevated AHI. Given his lack of improvement, it was recommended that he consider a hypoglossal nerve stimulator implantation.

His most recent download from his Phillips Respironics BIPAP AVAPS device showed a residual AHI of 29.4-39.5 per hour (Table 1). Leak remained elevated. Clear airway apnea index was also elevated. A recent home sleep apnea test for central sleep apnea that showed mostly obstructive events. A prior home sleep apnea test in 2021 showed an AHI of 52/hr with an oxygen nadir of 75%. The download from the BIPAP AVAPS device showed significantly elevated exhaled tidal volume of 10cc/kg despite low average pressures of 8/5 cm H2O.

After initial evaluation the device pressure setting was changed to a CPAP only with a lower pressure of 8cm H2O. He hoped to reduce risk of overventilation with current BIPAP AVAPS setting. The new setting had mild improvement with residual AHI of 23-24/hr.

Before repeat titration in our sleep lab, the patient was switched to a nasal mask. With a nasal mask and a CPAP pressure of 8cm H2O, the residual AHI improved immediately to a residual AHI of less than 2/hr with minimal leak. The pressure was further decreased to 6cm H2O, and the residual AHI has remained under 2/hr since.

The patient reports improvement in nighttime sleep, and daytime cognitive symptoms. No significant leak was noted with the nasal mask.

Discussion

Prior studies have shown that mask choice may impact residual AHI and pressure requirements.[1-5] Some studies also reported mask choice may affect initial compliance.[1] Our patient, a thin elderly male responded positively with minimal CPAP pressure. The initial choice of full-face mask may have created inadequate therapy for years. Overtightening of the full-face mask to counteract leak can also worsen sleep apnea and create a vicious cycle of overtightening and increased pressure requirements. Over-titration may also contribute to the development of central events as our patient experienced. This may also contribute to over-treatment and performing expensive titration studies as well as considering alternative treatment such as BIPAP, BIPAP adaptive servo ventilation (BIPAP ASV). Our patient was considered for possible surgical intervention.

Most patients should start with a nasal or nasal pillows mask for initial therapy. If a high oral leak is suspected a trial of a chin strap or full-face mask could be indicated.

Clinicians should carefully assess pressure requirements, especially if the patient's body habitus does not correlate with the treatment pressure requirements. This is important with full-face masks as overtightening to counteract leak may contribute to increased pressure needs.

Ventilator Statistics by week

		2/7/2021	2/14/2021	2/21/2021	2/28/2021	3/7/2021	3/14/2021	3/21/2021	3/28/2021	4/4/2021
AHI	Min	23.2	24.4	24.7	25.2	29.4	14	27.1	28.4	30.3
	Max	36.8	39.7	43.6	44	47.7	59.2	41.1	39.4	42.6
	Avg	29.4	34.1	39.3	36.2	39.5	34.1	33.1	34.9	36.3
Attained EPAP Pressure	Min	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
	Max	4.9	5	5	5	5	5	5	4.9	5
	Avg	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Attained IPAP Pressure	Min	8.3	8.2	8	8.2	8.2	8.2	8.3	8.3	8.2
	Max	8.8	8.7	8.5	8.5	9.5	8.6	8.8	8.9	8.9
	Avg	8.6	8.5	8.3	8.4	8.5	8.4	8.5	8.6	8.5
Breath Rate	Min	10.5	11	11	10.4	10.1	10.2	10.3	10.5	10
	Max	15	14.3	12.7	12.5	15	14.5	13.2	13.4	12.1
	Avg	12.5	12.2	11.5	11.6	11.7	12.2	11.9	12	11.5
Exhaled Tidal Volume	Min	515.2	546.3	516.9	608.6	571.3	542.7	571.5	550.3	587.6
	Max	640.4	677.4	690.1	709	734.4	708.5	675.7	635.7	721.8
	Avg	581	597.9	623.6	650.8	638.2	637.6	610.1	583.2	646.6
Unintentional Leak	Min	42.1	19.5	23.8	25.3	14.6	16.6	19.2	26.1	16.5
	Max	63.9	50.5	50.2	59.3	51.4	38	56.4	40.5	57.3
	Avg	50.3	39.4	36.7	38.1	35.7	28.6	39.6	33.2	29.9
	Med	47	42	39	29	28	21	33	30	19
Percent Patient Triggered Breaths	Min	100	100	100	100	100	100	100	100	100
	Max	100	100	100	100	100	100	100	100	100
	Avg	100	100	100	100	100	100	100	100	100
Minute Vent	Min	7.1	8.1	7.6	8	8	7.5	8	8	7.8
	Max	8.4	9	9.4	10	9.5	10	9.2	8.7	9.8
	Avg	7.6	8.5	8.8	9.4	9	8.8	8.3	8.4	8.8

Table 1. Apnea hypopnea index (AHI), Exhaled positive airway pressure (EPAP), Inhaled positive airway pressure (IPAP).

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