

Case of postural complex sleep apnea: Effect of gravitational forces

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ABSTRACT

We report a case of an elderly male with predominant obstructive sleep apnea and who developed or complex sleep apnea (CxSA) at the start of continuous positive airway pressure (CPAP) titration. This CxSA was more prominent in supine position, and he was not settling with either CPAP/bilevel positive airway pressure (PAP) in supine position. He finally settled with CPAP along with position therapy. This case highlights the importance of treating CxSA with basic PAP modes like CPAP along with positional therapy before switching to costlier therapies such as adaptive servo-ventilation.

KEY WORDS: Obstructive sleep apnea, positional central sleep apnea, treatment-emergent central sleep apnea

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INTRODUCTION

The association between severity of obstructive sleep apnea (OSA) in terms of apnea-hypopnea index (AHI) and supine posture is well documented^[1-3] as compared to the relationship between central sleep apnea (CSA) and supine posture where the literature is scarce.^[4] We hereby report a case whereby treatment-emergent CSA or complex sleep apnea (CxSA) was associated with supine position while being on positive airway pressure (PAP) therapy.

CASE REPORT

A 62-year-old nonalcoholic, nonsmoker, and normotensive man presented to sleep clinic with the complaint of loud snoring for the past two decades with associated excessive fatigability. History of initiation insomnia along with a history of choking spells during sleep was present. There was a history of nocturia and dry mouth in night and on waking up in the morning. His Epworth Sleepiness Scale was 4 and STOP-BANG score was 5. There was no history of any

memory disturbances. There was neither history of habitual daytime naps nor was any history of motor vehicle accidents related to sleepiness. There was nothing suggestive of any sleep-related movement disorder or poor sleep hygiene. The patient's spouse reported that patient prefers to sleep in the lateral position. He had a history of diabetes mellitus and hypothyroidism; both controlled on oral drugs.

On examination, his body mass index was 34.22 kg/m², neck circumference was 16 inches, and waist/hip ratio was 1.02. There were no apparent craniofacial abnormalities, and Mallampati score was 2. Arterial blood gas analysis was within normal limits, with no evidence of hypoventilation. Other biochemical parameters, namely, serum electrolytes, complete blood count were within normal limits. The patient was taken up for level I polysomnography (PSG).

Polysomnography

The initial diagnostic part of the PSG revealed severe OSA with AHI of 86.9 (rapid eye movement [REM] AHI 80 and non-REM AHI 87.2). During this diagnostic study, only 5 central apnea events were scored out of a total

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As his AHI decreased from 86.9 to 3 at 11 cm H₂O along with position therapy, this fulfills the criteria of optimal titration.^[5] The patient was advised CPAP @ 11 cm H₂O only along with positional therapy. However, the patient was not willing to use CPAP due to financial constraints, and he lost to follow-up.

DISCUSSION

OSA/hypopnea is characterized by complete/partial cessation of airflow while patient's respiratory efforts are going on whereas in central apnea, there are no respiratory efforts leading to complete cessation of airflow. The effect of body position is well established in patients of OSA (worsening in supine posture) where AHI gets worsened in more than 50% of such patients.^[1-3] If there is more than 50% reduction in lateral posture as compared to supine posture, it is labeled as positional OSA.^[2,6] The relevance of the effect of body position in cases of central apnea is far less documented^[4] except in patients of Cheyne–Stokes breathing where it is worsened in supine posture.^[7,8]

CxSA or treatment-emergent central apnea (CxSA) means that the predominant initial abnormality was obstructive or mixed apnea on diagnostic PSG and during titration with positive pressure therapy; central apneas either emerge or persist despite optimal PAP therapy.^[9] Possible suggested mechanisms for this are high loop gain and/or failure to adjust to CPAP leading to arousals and subsequently CSA.^[9]

Table 1: Polysomnography report during diagnostic sleep study and CPAP Titration study

	Duration (min)	Sleep (%)	REM (%)	NREM (%)	CA (#)	OA (#)	MA (#)	HYP (#)	AHI (#/h)
Diagnostic									
Supine	28.3	78.8	0.0	78.8	0	0	0	37	99.6
Left	26.4	92.0	0.0	92.0	0	0	0	7	17.3
Right	133.6	93.4	35.9	57.5	2	0	0	54	26.9
Titration (split night)									
Supine	293.1	79.7	20.3	59.4	141	3	1	56	51.6
Right	119.6	92.2	12.5	79.7	12	1	0	19	17.4
Titration with Bilevel PAP 8/4 with back up rate 12/min with positional therapy									
Left	89.0	100	69.1	30.9	0	0	0	2	1.3

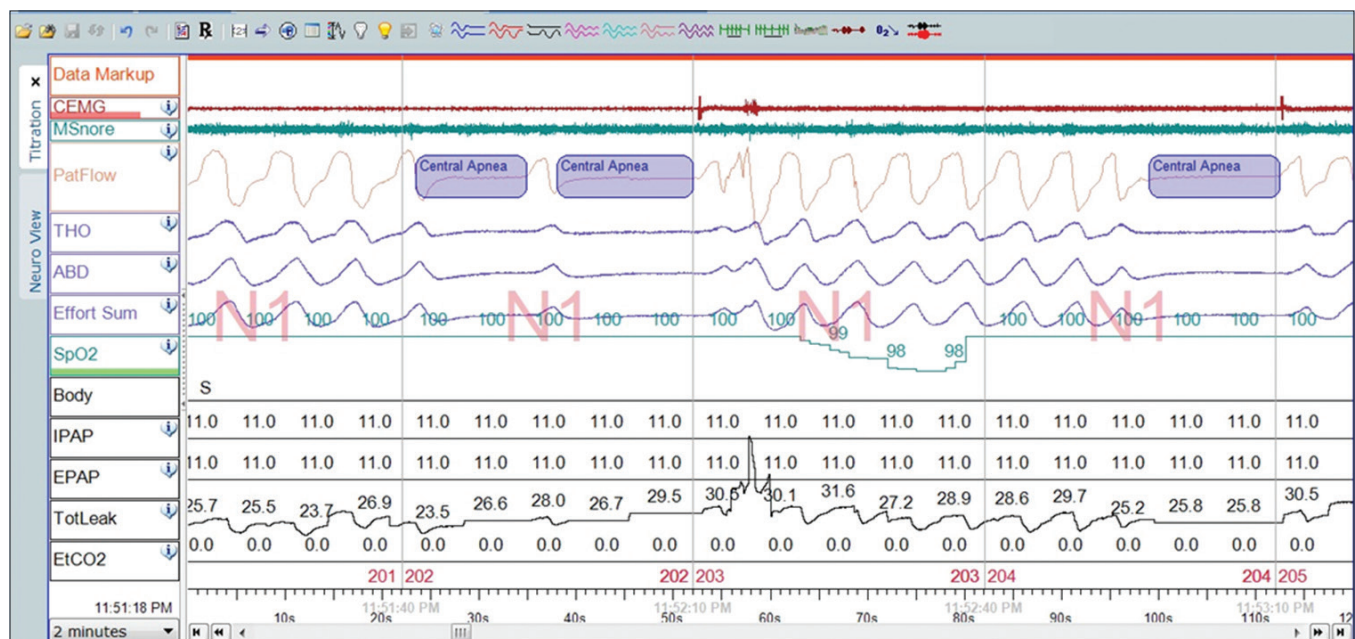


Figure 1: Depicting complex sleep apnea @ 11 cm H₂O in supine position

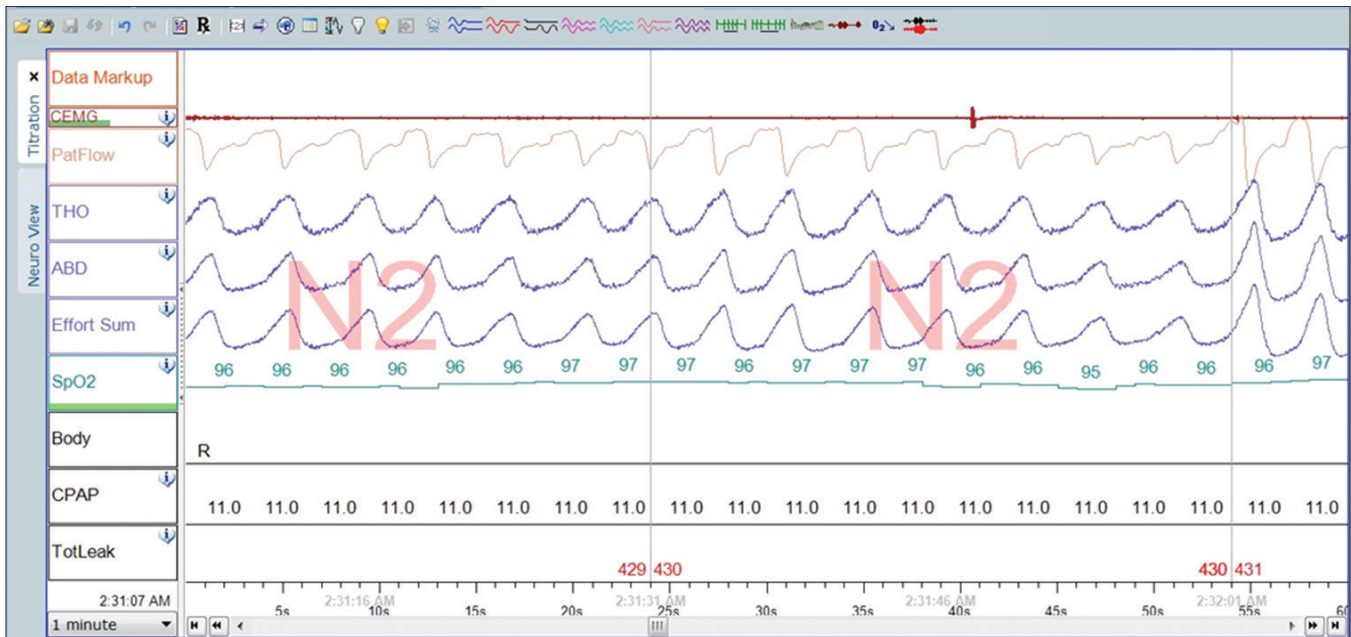


Figure 2: Depicting normalization of flow @ 11 cm H₂O in lateral position

In most patients with CxSA, the central apneas tend to disappear with the continued and compliant use of PAP therapy.^[10] Some patients do need advanced modes such as BiPAP-ST or adaptive servo-ventilation (ASV).^[11,12]

To the best of our knowledge, this is the first reported case of positional CxSA in India. Issa and Sullivan treated eight patients of predominant CSA with CPAP therapy.^[13] They reported an association between CSA and supine posture in all their patients, both during diagnostic PSG as well as during titration with PAP.^[13] Similar kind of a positional effect was described by Allam *et al.* whereby they treated 47 patients of CxSA with CPAP.^[12] They found a reduction in AHI index in nonsupine postures as compared to supine posture.^[12] Furthermore, in their results, this positional effect was diminished by the use of ASV as compared to CPAP therapy.^[12]

Another case of positional (supine) worsening of idiopathic CSA has been reported by Zaharna *et al.*^[4] Possible suggested mechanisms for worsening of CSA in supine posture include a decrease in cardiac output, decrease in functional residual capacity, and corresponding increase in plant gain.^[4]

Similarly, our patient also had worsening of CxSA in supine posture despite being on PAP therapy. Although we could not document this kind of association during diagnostic PSG as our patient slept in lateral posture only during that time. Our patient finally settled with CPAP mode and concomitant positional therapy.

In authors' experience, patients who develop CxSA at minimal PAP, i.e. @ 4 cm H₂O in supine position do not

respond to CPAP or BiPAP but turning these patients to lateral position helps in sleep stabilization along with PAP therapy. Although ASV is now one of the treatment options for CxSA, due to high cost, it is still out of reach for most patients in third world countries. So if a patient develops CxSA which is not improving with CPAP, BiPAP or ASV; then positional therapy along with PAP therapy can be tried in this subset of patients. Hence, treating CxSA with positional therapy along with CPAP/BiPAP is a cheaper alternative which can be effective in some of the patients. However, since this is a case report, it needs to be further validated by systemic studies.

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Conflicts of interest

There are no conflicts of interest.

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