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ORIGINAL ARTICLE

Positional Complex Sleep Apnea: Not So Complex

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Abstract Complex sleep apnea (CxSA) is commonly seen during PAP therapy and it is often difficult to treat. Here we are reporting a case of positional complex sleep apnea in which CxSA was more prominent in supine position and it was treated with Bilevel PAP-S/T mode along with position therapy. This case highlights that postural therapy can be tried along with basic PAP modes in management of CxSA in setting of resource limitations before moving to costlier therapies like Adaptive servo ventilation.

1 Introduction

Complex sleep apnea (CxSA) is defined as when during diagnostic polysomnography (PSG), obstructive events are seen as predominant abnormality and with titration with positive airway pressure (PAP) without back up rate eliminates significantly obstructive events but the central apnea or central hypopneas emerges or persist [1]. Here we are adding to literature with report of a case of positional CxSA while on PAP therapy.

2 Case History

61 year old retired government official came to sleep clinic with complaints of loud snoring, hypersomnia and excessive fatigability. He was sleeping about 8–9 h per night. Patient gave history that he prefers to sleep in lateral position. There was no history suggestive of narcolepsy, restless leg syndrome or nocturia. There was no history of any addiction. There was no history of diabetes mellitus, hypertension, thyroid disorder or heart disease. His Epworth sleepiness score (ESS) was 7, STOP BANG score was 5. On examination, his neck circumference was 16 inches, his body mass index (BMI) was 26.8; modified mallampatti score was 2, macroglossia was present and uvula was large. His routine investigations including fasting blood sugar, lipid profile, hemogram, thyroid functions, echocardiography, arterial blood gas analysis and spirometry were within normal range. With possibility of obstructive sleep apnea (OSA), level I polysomnography was done.

3 Polysomnography

Diagnostic part of split night PSG revealed severe OSA (AHI 39.6) which was actually NREM predominant (NREM AHI 47.3, REM AHI 10.0) as well as supine predominant (supine AHI 99.6, left AHI 17.3, right AHI 26.9). During supine sleep, only hypopneas were present and no apneas were observed (neither central nor obstructive) (Table 1). His etco2 did not show any evidence of hypocapnia or hypercapnia.

During titration part of split night, even at CPAP pressure of 4 cm H_2O in supine position, patient developed complex sleep apnea (Fig. 1); which was mainly seen in NREM stage (N1 and N2). The important part which was missed by sleep technician during titration was that complex sleep apnea were predominantly present in supine position and it resolved with turning to lateral position (Fig. 2). Patient did not settle with CPAP or Bi-level PAP (S/T) during first split night study.

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Table 1 Polysomnography data

	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

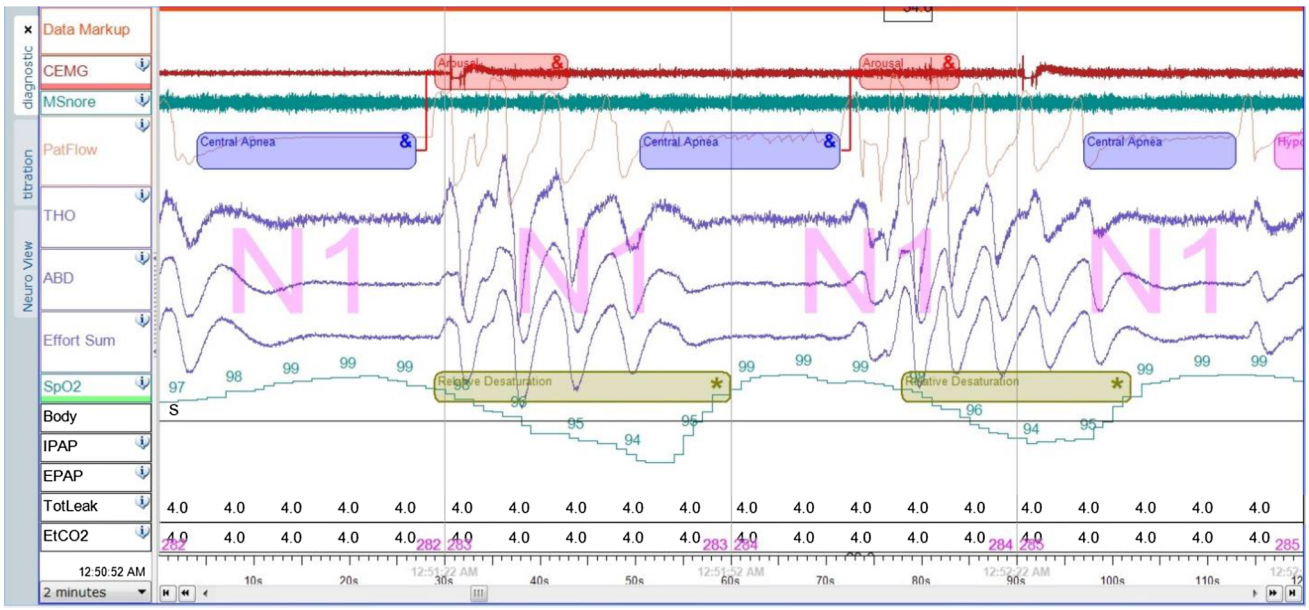

Fig. 1 Figure depicting complex sleep apneas in supine position at start of CPAP at 4 cm H_2O

The following night re-titration study was done starting with position therapy with CPAP at 4 cm H_2O. During titration in lateral position, central events were occasionally seen and pressure was increased mainly due to airflow limitations (i.e., for hypopneas). Patient finally settled with Bi-level PAP (S/T mode) 8/4 with back up rate 12/min. At this pressure along with position therapy, AHI was 1.3 (Table 1; Fig. 3).

4 Discussion

In our case, CxSA was predominantly seen in supine position while on PAP therapy that resolved when patient turned in lateral positions and this position dependency was more commonly observed during stage N1 and N2 as compared to supine REM sleep. The percentage of CxSA may vary from 6.5 to 15% on initial PAP titration study that may depend on methodology and characteristic of group studied [2]. However, most of CxSA patients usually settle with long term and compliant use of CPAP [3].

The proposed mechanism of increasing supine central sleep (CSA) apnea are related to increase in caudal cranial venous blood return, decreased cardiac output, effect on lung volumes and decreased metabolic demands of body in supine posture that leads to increased plant gain [4].

Although adaptive servo ventilation (ASV) mode is highly effective in eliminating CxSA [5] but its high cost precludes use in the resource depleted settings like ours. There are other off label therapies which have been advised for CSA or CxSA such as CO_2 supplementation, oxygen

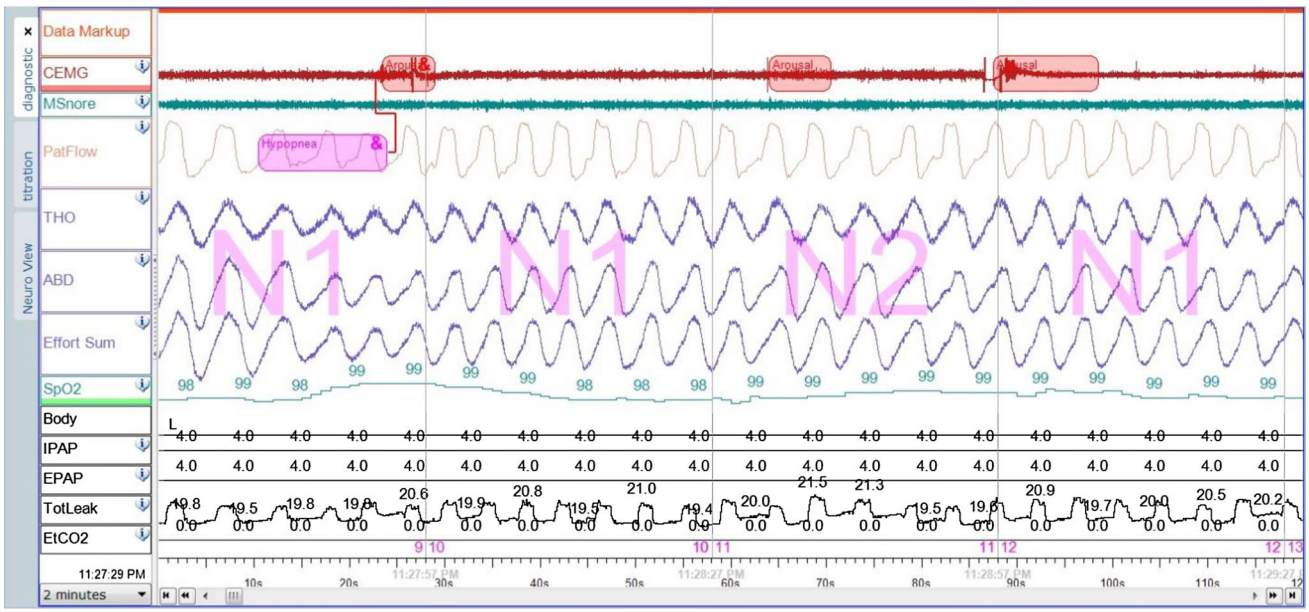

Fig. 2 Figure depicting resolution of complex sleep apnea in lateral position while on CPAP at 4 cm H_2O. (although hypopneas persisted)

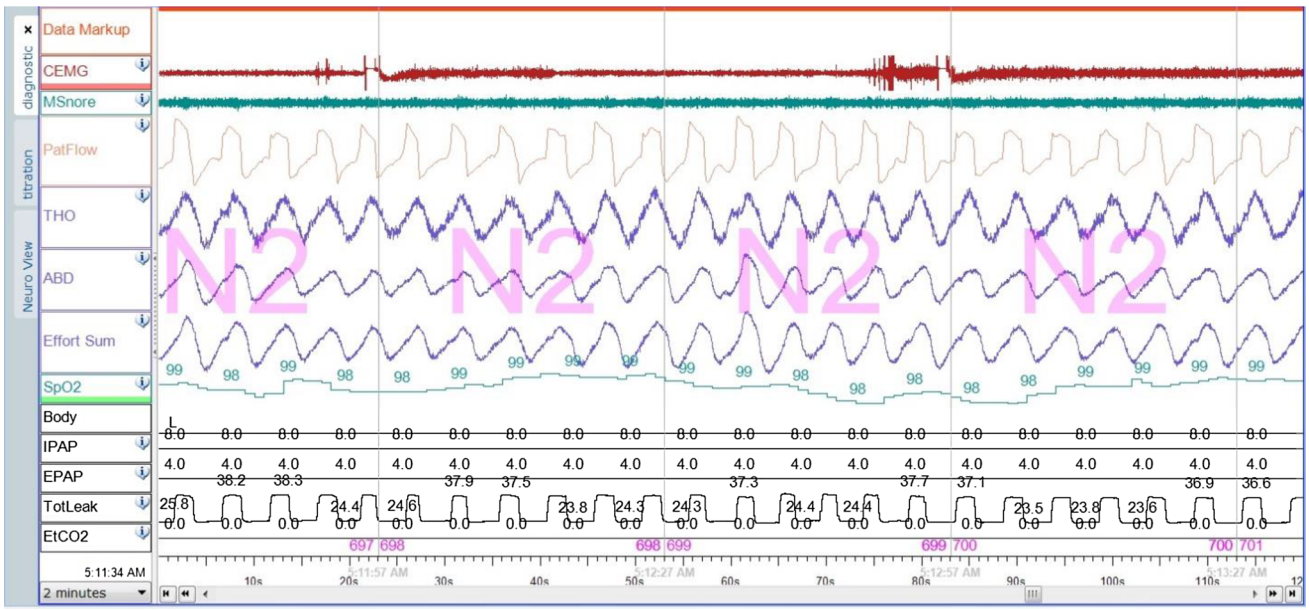

Fig. 3 Figure depicting patient settled with Bilevel PAP (S/T) mode along with position therapy

supplementation, acetazolamide [6] but all these therapies are costly and are with potential side effects. Most important factor for not using PAP therapy in India and third world countries is the prohibitive cost. A CPAP costs around $500 and ASV machine costs around $2000. Positional sleep devices are now available in India which costs around $15. When central events start from minimal CPAP pressures in supine position, it is probably a hint that patient will not settle with CPAP or Bi-level PAP and before shifting to advanced and costlier modes such as ASV, we recommend to change to lateral position and start titration with CPAP followed by Bi-level PAP.

In our sleep lab, we now follow this protocol and we found it to be very useful in our patients. Our patient settled with Bi-level 8/4 (S/T) PAP therapy with position therapy. Our patient has shown significant improvement in his symptoms following use of Bi-level PAP along with position therapy.

Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interest.

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