

Non-Mask-based Therapies for Central Sleep Apnea in Patients with Heart Failure

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KEYWORDS

- Central sleep apnea • Heart failure • Phrenic nerve stimulation • Theophylline • Acetazolamide
- Cardiac resynchronization therapy

KEY POINTS

- Central sleep apnea (CSA) is highly prevalent in the heart failure (HF) population.
- Untreated CSA increases HF hospitalization and mortality.
- Treatments are limited currently to oxygen and positive airway pressure (PAP), which suffer from compliance issues and lack of randomized long-term data.
- Neurostimulation of the phrenic nerve offers a new therapeutic approach to treat CSA.

INTRODUCTION

CSA affects approximately one-third of patients with HF and is characterized by periods of shallow or absent breathing followed by periods of rapid, deep breathing (Fig. 1).^{1,2} CSA results from a failure of the brain to appropriately recognize and respond to changes in carbon dioxide resulting in a cyclic breathing pattern.³ CSA is uniquely tied to HF; HF can cause CSA and CSA can worsen HF resulting in increased mortality.¹ This inter-relationship requires that both parts of the cardio-sleep syndrome must be treated for either to improve. Identification of CSA is now simple and can often be done at home. A high index of suspicion is needed because patients present differently than the more common obstructive sleep apnea (OSA).

Although CSA has long-term detrimental effects, few treatment options are currently available. Oxygen, inhaled carbon dioxide, and medications have shown short-term benefit but lack any long-term randomized data.⁴⁻⁶ PAP

therapies have been the primary therapeutic option, but questions have been raised in light of data from recent trials.^{7,8} A newer treatment based on neurostimulation of the phrenic nerve has recently published a large randomized trial and represents a new therapeutic option for patients with CSA.⁹

Because the cardio-sleep syndrome involves both the cardiologist and the sleep physician, it is of growing importance for the 2 specialties to work together to identify and treat patients with CSA. Continuing to develop an understanding regarding the inter-relationship of sleep and cardiovascular disease is important to identify the most appropriate therapeutic options for each patient.

PATHOPHYSIOLOGY

Each CSA cycle results in hypoxia and surges in sympathetic activity. Thus, each apnea-hyperpnea cycle contributes significant stress on the body, including disturbed sleep, sympathetic nervous system activation, acute pulmonary and

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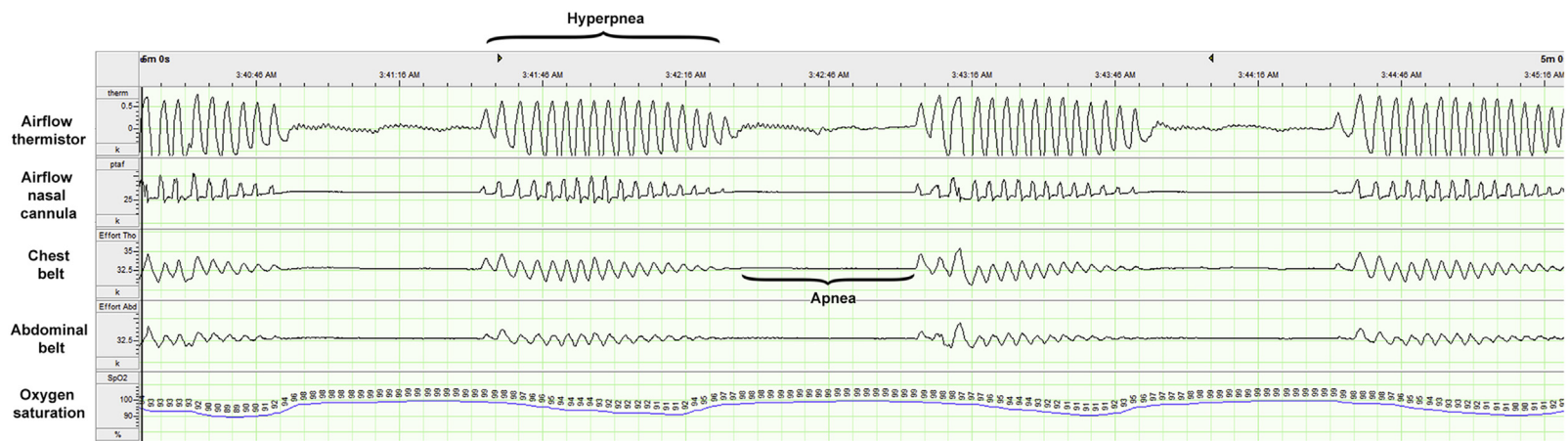


Fig. 1. Example of CSA.

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