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Original Article

Quality of life in patients with congestive heart failure and central sleep apnea ☆

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Abstract

Objective: To assess the impact of Cheyne-Stoke respiration-central sleep apnea (CSR-CSA) on quality of life (QOL) in patients with congestive heart failure (CHF). QOL was established using the MLHFQ (Minnesota Living with Heart Failure Questionnaire), and the FOSQ (Functional Outcomes of Sleep Questionnaire).
Methods: We examined 90 patients with CHF. The diagnosis of CSR-CSA was performed by polysomnography. We established a correlation between the apnea–hypopnea index (AHI) and the MLHFQ and FOSQ scores.
Results: Five patients were excluded (obstructive sleep apnea). Of the 85 remaining patients, 25 presented CSR-CSA. The mean MLHFQ score was higher in patients with CHF and CSR-CSA (25.8 ± 2.97 vs. 16.6 ± 2.05; $p = 0.01$), and showed a significant yet moderate correlation with the AHI. A lower mean FOSQ score was obtained for the group of patients with CHF and CSR-CSA (78.4 ± 4.31 vs. 88.47 ± 2.4; $p = 0.03$), showing weak negative correlation with the AHI.
Conclusion: According to the MLHFQ scores, it seems that CHF patients with CSR-CSA have a worse QOL than those with CHF alone. Although this could be attributable to a greater impairment of heart function in the former group, the FOSQ scores indicate some influence of their sleep disorder on the impairment of QOL.

Keywords: Congestive heart failure; Central sleep apnea; Minnesota living with heart failure questionnaire; Functional outcomes of sleep questionnaire

1. Introduction

Despite recent advances in the management of patients with congestive heart failure (CHF), the incidence of this disease has doubled in the past few years, mainly because of the higher survival rate of patients with myocardial infarction [1]. In addition, the reduced mortality rates observed in several clinical trials performed on numerous drugs [2,3] have not been accompanied by a decrease in the number of deaths or hospital admissions of patients with CHF from the general population [4].

Sleep-related breathing disorders (SRBD), especially Cheyne-Stoke respiration associated with central sleep apnea syndrome (CSR-CSA), are common in patients with CHF [5–7]. Their presence has been associated with a worse prognosis of the heart disease, and has also been linked to higher blood levels of brain natriuretic peptide [8] and to higher numbers of hospital stays, heart transplants, and deaths [9,10].

☆ The authors declare no conflicts of interest related to the information provided herein.

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Chronic heart failure is among the chronic diseases that most affects the quality of life (QOL) of the patients [11] because of the limitations produced by the symptoms of the disease itself, such as shortness of breath or loss of muscle mass. The results of some studies suggest that when CHF is associated with CSR-CSA, the impact on QOL could be greater [12]. This could be due to the CSR-CSA promoting a greater impairment of heart function. Moreover, the sleep disorder itself can result in a worse quality of sleep, possibly also reducing the QOL of the patient [13].

There are several questionnaires designed to assess QOL, specifically in patients with heart failure. The Minnesota Living with Heart Failure Questionnaire (MLHFQ) is even able to discriminate patients with more severe heart failure [14]. To evaluate the impact of excessive daytime sleepiness, Weaver et al. developed the Functional Outcomes of Sleep Questionnaire (FOSQ) [15]. This questionnaire has been useful in patients with obstructive sleep apnea (OSA) [16–18], but there are no published reports of its use in patients with CSR-CSA.

The present study was designed to assess the impact of the association between CHF and CSR-CSA on quality of life, as determined by both the MLHFQ and FOSQ.

2. Materials and methods

2.1. Patients

We prospectively analysed 90 patients with CHF due to systolic dysfunction (left ventricular ejection fraction, LVEF $\leqslant$ 45%), consecutively recruited in our cardiology unit. All the patients were clinically stable, having experienced no changes in the signs, symptoms or medication of CHF in the four weeks prior to their inclusion in the study, and they were all receiving standard medical treatment for their heart disease.

Exclusion criteria were as follows: (1) CHF unstable during the study period; (2) acute myocardial infarction in the previous three months; (3) unstable angina; (4) congenital heart disease; (5) daytime $PaO_2 < 60$ mmHg; (6) treatment with morphine or derived products and/or theophyllines; and (7) obstructive sleep apnea (OSA).

2.2. Study protocol

All the participants were subjected to the following tests: (1) a questionnaire designed for heart failure patients, including the New York Heart Association (NYHA) functional class and the MLHFQ; (2) a questionnaire for SRBD, including the FOSQ; (3) an echocardiogram to determine the LVEF; and (4) a sleep study with conventional polysomnography (PSG). The local Committee on Ethics approved the study. Written informed consent was obtained from each participant prior to inclusion.

2.3. Quality of life questionnaires

The MLHFQ, developed at the University of Minnesota, Minneapolis, USA, has 21 items designed to evaluate the perception of the effects of CHF and its treatment on the life of patients. Its questions refer to the signs and symptoms of CHF, social relationships, physical and sexual activity, work and emotions. The possible scores for each question range from 0 (no effects) to 5 (considerable effects), and the final test result is between 0 and 105, the higher the score, the greater the effects on the quality of life of the patients.

To establish the impact of daytime sleepiness on everyday activities, we used the FOSQ, designed by Weaver et al. [15]. This is a self-assessment questionnaire including 30 items that evaluates the difficulty in performing a task as a consequence of feeling tired or sleepy. Contrary to the MLHFQ, a high score in the FOSQ indicates the least effects of sleepiness.

2.4. Echocardiogram

Each patient underwent an echocardiogram performed by a single cardiologist using a digital instrument (Acuson Aspen, Acuson Corporation, Mountain View, CA, USA). Appropriate transducers (3 and 2 MHz) were used to define the cardiac structures. An M-mode and two-dimensional echocardiogram were performed from the standard views (long axis, short axis, apical two-chamber, four-chamber, and subcostal) in the supine or left lateral position. Measurements were made during three cardiac cycles and the mean values were obtained. The standard M-mode measurements of internal dimensions at end-diastole were made from the parasternal long axis view as recommended by the American Society of Echocardiography [19]. Ventricular dimensions were assessed at the peak of the R-wave of a simultaneous electrocardiogram. Fractional shortening, left ventricular ejection fraction, and cardiac output were derived from M-mode measurements [20]. Ejection fractions were calculated from the apical four-chamber view using the biplane area–length method.

2.5. Polysomnography

Neurophysiological and cardiorespiratory variables were continuously monitored using standardized equipment (Somnostar 4100, SensorMedics Corporation, Yorba Linda, CA, USA) overnight at the sleep clinic. Surface electrodes were used for the electroencephalogram (C4/A1, C3/A2), electrooculogram, submental electromyogram, and electrocardiogram. Oronasal airflow was detected using a thermistor, and the breathing effort was