# Cheyne-Stokes respiration: poor prognostic sign in a patient with heart failure

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## DESCRIPTION

Patients with congestive heart failure (CHF) have high incidence of sleep-disordered breathing. Two distinct types are known: obstructive sleep apnoea (OSA) and Cheyne-Stokes respiration (CSR).[1] Effective heart failure treatment improves CSR but not OSA, indicating that the development of CSR is secondary to heart failure. CSR is characterised by recurrent episodes of central apnoea/hypopnoea interposed with periods of hyperpnoea with waning and waxing pattern of tidal volume. A 5-month-old girl who presented with acute onset of poor appetite and tachypnoea had cardiomegaly on chest X-ray. Echocardiography showed severely depressed left ventricular (LV) function with ejection fraction of 10%. She was diagnosed with LV non-compaction cardiomyopathy and placed on heart transplant list. Her heart failure management included milrinone infusion, diuretics and digoxin. She subsequently worsened with increasing heart rate and tachypnoea. Her telemetry showed evidence of CSR with clinical and echocardiographic evidence of worsening LV function (figure 1). She had normal pH and not receiving any respiratory depressants. Her oxygen saturation varied from 90% to 100%. The Berlin EXCOR LV assist device was placed with stabilisation of cardiac output. CSR has been commonly observed in acute as well as chronic heart failure with LV systolic dysfunction. The pathophysiology includes hyperventilation from CHF, resulting in a decrease in $P_{CO2}$ below apnoeic threshold, triggering cyclic central apnoea.[2] The apnoea–hypopnoea index is defined as the numbers of apnoea and hypopnoea per hour and is an independent predictor of poor prognosis in a clinically stable patient with heart failure.[3]

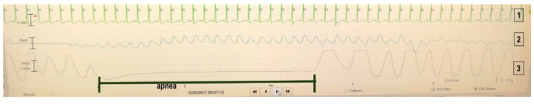


**Figure 1** This figure demonstrates central apnoea indicated by a black line. 1: Telemetry showing sinus tachycardia. 2: Plethysmography showing varying amplitude indicative of poor cardiac output. 3: Respiration pattern showing apnoea and hyperpnoea.

### Learning points

- Cheyne-Stokes respiration is characterised by recurrent episodes of central apnoea/hypopnoea interposed with periods of hyperpnoea with waning and waxing pattern of tidal volume.
- The pathophysiology includes hyperventilation from congestive heart failure, resulting in a decrease in $PCO_2$ below apnoeic threshold, triggering cyclic central apnoea.
- The apnoea–hypopnoea index is defined as the numbers of apnoea and hypopnoea per hour and is an independent predictor of poor prognosis in a clinically stable patient with heart failure.

**Contributors** AB, RD and VA were responsible for planning, conducting, reporting, conception and design, acquisition, analysis and interpretation of data.

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