CRACKLE RATE DURING SHALLOW AND DEEPER THAN NORMAL BREATHING IN PATIENTS WITH IPF, CHF, AND PNEUMONIA

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PURPOSE

To determine the influence of breathing effort and cough on the crackle rate in patients with IPF, congestive heart failure (CHF), and pneumonia (PN).

METHODS

A convenience sample of 9 patients with IPF, 10 patients with CHF, and 17 patients with PN in a community teaching hospital were examined with a 6-channel lung sound analyzer (Stethographics, Inc., Model 1602). The Stethograph (STG) automatically identifies and quantifies number of acoustic parameters including the crackle rate (CR).

RESULTS - PATIENT WITH PNEUMONIA (PN)

- Each patient's crackle count during the 3rd breath was significantly lower than the crackle count during the 1st breath (P=0.05).
- Paired two-sample t-test for means was performed on this data.
- Statistically significant changes are indicated by arrows (p<0.05) in the graphs on the right.
- All other changes are not statistically significant.

RESULTS - PATIENT WITH INTERSTITIAL PULMONARY FIBROSIS (IPF)

- Each patient's crackle count during the 3rd breath was significantly lower than the crackle count during the 1st breath (P=0.05).
- Paired two-sample t-test for means was performed on this data.
- Statistically significant change is indicated by arrows (p<0.05).
- All other changes are not statistically significant.

RESULTS - PATIENT WITH CONGESTIVE HEART FAILURE (CHF)

- Each patient's crackle count during the 3rd breath was significantly lower than the crackle count during the 1st breath (P=0.05).
- Paired two-sample t-test for means was performed on this data.
- All changes are not statistically significant.

CONCLUSION

In this study, asking patients to breathe more deeply than normal yielded similar crackle counts whether or not the deeper than normal breath was preceded by shallow breathing or a vital capacity maneuver. Crackles counts decrease after cough in patients with PN and IFP, but not in these with CHF.

CLINICAL IMPLICATIONS

The usual clinical practice of asking patients to breathe more deeply than normal appears to be supported by these data.

Assuming that the acoustic RMS multiplied by the time of expiration over the trachea correlates with the depth of respiration, there was little correlation of the crackle counts with depth of respiration in IFP and CHF. There was a correlation in PN.