H106 Predicting Fatal Intoxications in a Medicolegal Autopsy Population Using the Weight of the Lungs

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After attending this presentation, attendees will understand the issues with defining "heavy lungs" as well as the sensitivity of heavy lungs to identify fatal intoxication cases in a medicolegal autopsy setting.

This presentation will impact the forensic science community by providing clear information on the predictive power of heavy lungs as well as new, easily applicable methods to reduce pre-toxicology uncertainty.

Fatal intoxications are common in a medicolegal autopsy setting, constituting approximately 10% of medicolegal autopsies in Sweden (internal data); however, these cases are associated with sparse findings during autopsy.

Increased lung weight at autopsy has been suggested as a finding suggestive of such deaths.[1-7] Previous literature is generally limited by a descriptive approach, including only opioid deaths and lacking a definition of "heavy lungs". Different reference lung weights have been suggested.[8-14] There have also been attempts to create linear regression models using individual characteristics to estimate postmortem lung weight.[14] With the exception of one study, neither height, weight, age, nor BMI have yielded R2 values of practical importance.[8]

The goal was to: (1) create a model to identify cases with heavy lungs; and, (2) assess the predictive power of heavy lungs in identifying cases of fatal intoxications during autopsy.

This study identified all medicolegal autopsy cases in Sweden from 2000 through 2013 of persons older than 18 years, and the estimated lung weight was calculated in each case using a previously published linear regression model.

Additionally, the mean ratio between lung and heart weight was calculated overall as well as in groups stratified for age and sex. Raw lung weight and regression estimates as well as the ratios were used to identify cases with heavy lungs and evaluated the associations with fatal intoxications.

On average, cases of fatal intoxications had heavier lungs compared to other cases. This difference of 158g (145g–172g 95% Confidence Interval (CI)) was significant ($p<0.001$).

In predicting fatal intoxications, it was observed that raw lung weight had low performance and models based on the lung/heart weight ratio had better predictive power than models based on lung weight point estimates. The ratio may serve as an indication of a fatal intoxication with a sensitivity of 70% to 80% and specificity of approximately 60%.

These findings suggest that using only raw lung weight to estimate the probability of fatal intoxication is of little value in medicolegal autopsy cases. The ratio of lung-to-heart weight may, lacking better methods, be useful as an estimate of the degree to which the forensic pathologist should suspect fatal intoxication.

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