

GASTROINTESTINAL PHYSIOLOGY ASSOCIATES GROUP (AGIP) SYMPOSIUM

OC-046

HIGH RESOLUTION OESOPHAGEAL MANOMETRY: ADDRESSING THERMAL DRIFT

doi:10.1136/gut.2011.239301.46

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Introduction High resolution manometry (HRM) is a sophisticated and widely used technology allowing detailed examination of oesophageal function. A described limitation of the HRM system is its propensity to 'thermal drift'. Thermal drift is a false change in the measured pressure attributed to the change from ambient to body temperature. In prolonged studies this effect can be marked. We sought to investigate the nature and magnitude of this phenomenon and to validate the currently employed corrections.

Methods Six experiments were performed with the HRM catheter placed in a water bath at a constant depth and temperature of 37°C. Recordings were carried out for 2 h. Pressure readings for the thirty-six sensors were plotted against time.

Results The mean pressure change for six experiments and thirty six sensors was 13.1 mmHg (range 1.9–44.7 mmHg). The rate of drift varied between sensors and for an individual sensor between experiments. For an individual sensor within an experiment the pressure increase was linear ($R^2 > 0.9$ in 211 of 216 graphs).

In the standard correction for thermal drift, the pressure increase in each sensor at the end of the study is subtracted from the data set to reset the baseline. This was replicated in the recorded pressures and the residual error calculated. The mean error increased with study duration and for a given study was maximal for the early data. For data captured at the start of a 15-min study the mean error with 95% confidence intervals was 1.4 +/- 0.12 mmHg. Corresponding values for a 30-min study were 2.8 +/- 0.24 mmHg and for a 60-min study 6.1 +/- 0.52 mmHg. The distal border of the lower oesophageal sphincter, used to calculate sphincter length, is defined by an increase in pressure of 2 mmHg from intragastric pressure. Errors of this magnitude therefore have the potential to affect measured physiological parameters.

A linear correction was then applied to the data, using the best fit line for each sensor within each experiment. For this tailored correction the mean error with 95% confidence intervals was 0.4 +/- 0.017 mmHg and was independent of study duration.

Conclusion Thermal drift is better considered as 'Baseline drift' a continuous upward drift of the baseline pressure with time rather than a 'once and for all' baseline change. A correction process which takes into account the ongoing and linear nature of the drift reduces the error associated with this phenomenon. Incorporating this correction into existing software would improve the accuracy of the system without impact on ease of use.

Competing interests None.

Keywords high resolution manometry, oesophagus, thermal drift.