Flow time through esophagogastric junction derived during high resolution impedance-manometry studies: a novel parameter for assessing esophageal bolus transit

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Abstract:

This study aimed to develop and validate a method to measure bolus flow time (BFT) through the esophagogastric junction (EGJ) using a high-resolution impedance-manometry (HRIM) sleeve. Ten healthy subjects were studied with concurrent HRIM and videofluoroscopy; another 15 controls were studied with HRIM alone. HRIM studies were performed using a 4.2-mm-outer diameter assembly with 36 pressure sensors at 1-cm intervals and 18 impedance segments at 2-cm intervals (Given Imaging, Los Angeles, CA). HRIM and fluoroscopic data from four barium swallows, two in the supine and two in the upright position, were analyzed to create a customized MATLAB program to calculate BFT using a HRIM sleeve comprising three sensors positioned at the crural diaphragm. Bolus transit through the EGJ measured during blinded review of fluoroscopy was almost identical to BFT calculated with the HRIM sleeve, with the nadir impedance deflection point used as the signature of bolus presence. Good correlation existed between videofluoroscopy for measurement of upper sphincter relaxation to beginning of flow [R 0.97, P 0.001 (supine) and R 0.77, P 0.01 (upright)] and time to end of flow [R 0.95, P 0.001 (supine) and R 0.82, P 0.01 (upright)]. The medians and interquartile ranges (IQR) of flow time through the EGJ in 15 healthy subjects calculated using the virtual sleeve were 3.5 s (IQR 2.3–3.9 s) in the supine position and 3.2 s (IQR 2.3–3.6 s) in the upright position. BFT is a new metric that provides important information about bolus transit through the EGJ. An assessment of BFT will determine when the EGJ is open and will also provide a useful method to accurately assess trans-EGJ pressure gradients during flow.

Keywords:

manometry; impedance; bolus transit

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