Abstract:

We aimed to model esophageal bolus transit based on esophageal pressure topography (EPT) landmarks, concurrent intrabolus pressure (IBP), and esophageal diameter as defined with fluoroscopy. Ten healthy subjects were studied with high-resolution impedance manometry and videofluoroscopy. Data from four 5-ml barium swallows (2 upright, 2 supine) in each subject were analyzed. EPT landmarks were utilized to divide bolus transit into four phases: phase I, upper esophageal sphincter (UES) opening; phase II, UES closure to the transition zone (TZ); phase III, TZ to contractile deceleration point (CDP); and phase IV, CDP to completion of bolus emptying. IBP and esophageal diameter were analyzed to define functional differences among phases. IBP exhibited distinct changes during the four phases of bolus transit. Phase I was associated with filling via passive dilatation of the esophagus and IBP reflective of intrathoracic pressure. Phase II was associated with auxotonic relaxation and compartmentalization of the bolus distal to the TZ. During phase III, IBP exhibited a slow increase with loss of volume related to peristalsis (auxotonic contraction) and passive dilatation in the distal esophagus. Phase IV was associated with the highest IBP and exhibited isometric contraction during periods of nonemptying and auxotonic contraction during emptying. IBP may be used as a marker of esophageal wall state during the four phases of esophageal bolus transit. Thus abnormalities in IBP may identify subtypes of esophageal disease attributable to abnormal distensibility or neuromuscular dysfunction.

Keywords:

impedance; manometry; bolus transit; esophageal emptying; fluoroscopy

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