Abstract Submitted
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Peristaltic regimes in esophageal transport[1] GUY ELISHA, SHASHANK ACHARYA, Mechanical Engineering, Northwestern University, SOURAV HALDER, Theoretical and Applied Mechanics, Northwestern University, JOHN E. PANDOLFINO, PETER J. KAHRILAS, Feinberg School of Medicine, Northwestern University, NEELESH A. PATANKAR, Mechanical Engineering, Theoretical and Applied Mechanics, Northwestern University — An EndoFLIP device, which is a balloon catheter, gives cross-sectional area along the length of the esophagus vs. time and one pressure measurement. Deducing mechanical properties of the esophagus including wall material properties, contraction strength, and wall relaxation from this data is a challenging inverse problem. Knowing mechanical properties can change how clinical decisions are made because of its potential for in-vivo mechanistic insights. To obtain such information, we conducted a parametric study to identify peristaltic regimes and applied it to clinical data. The results gave insightful information about the effect of relaxation pattern, relaxation strength, tube stiffness, and fluid/bolus density on the resulting esophagus shape. Our analysis also revealed the mechanics of the opening of the contraction area as a function of bolus flow resistance. Our eventual goal is to use these insights to develop a mechanics-informed deep learning technique that is clinically relevant. This will represent a new class of diagnostic tools for esophageal disease classification.

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