

عنوان مقاله:

Numerical Investigation of Bile Secretion and Pressure Rise in Obstructed Human Common Bile Duct

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خلاصه مقاله:

A fully obstructed Common Bile Duct (CBD) could lead to severe implications such as jaundice, cholangitis, and pancreatitis. A 2-D CFD model with the employment of Fluid-structure Interaction (FSI) formulations is established to investigate the interactions of bile with its surroundings. Ascertaining bile secretion against a total CBD obstruction is a major interest of this study. Therefore, a function is assigned to bile secretion pattern such that the resulting intraluminal pressure complies with clinical data. To cover the variation in the parameters representing the mechanical properties of the biliary system as well as bile secretion, specific piecewise ranges are given for each of them and consequently, numerous cases are simulated. Models which after simulation lead to pressure rises in the interval of 700 Pa to 1300 Pa are picked. This interval could roughly include the actual pressure rise of a vast majority of patients. It is determined that among numerous cases, higher distention does not necessarily correlate with higher pressure increase. Furthermore, the effect of alteration in each parameter in pressure rise is determined. This model is the first numerical step towards understanding the pathogenesis of complications resulting from a fully obstructed CBD and deformation of the CBD in general.

کلمات کلیدی:

Biofluids, Fluid, ALE method, structure interaction, Cholelithiasis, CBD dilation

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