

Material Handling System for Robotic Natural Orifice Surgery

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In Natural Orifice Transluminal Endoscopic Surgery (NOTES), in vivo robots can be utilized to perform surgical procedures

within the peritoneal cavity. A NOTES approach has no external incisions, which decreases overall recovery time and reduces the risk of infection. Fully inserting in vivo robots into the peritoneal cavity eliminates the triangulation and multitasking limitations associated with more traditional endoscope-based NOTES approaches. One major limitation is that once inserted, the in vivo robots are isolated within the abdomen and cannot send or receive materials to the outside world. A steerable material handling system is being developed to bridge this deficiency. This paper presents the design rationale, methodology, and parameters associated with the system.

A 2D Model With Fluid-Structure Interactions for Coarctated Arteries

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Arterial coarctation especially that occurs in aorta is an extremely significant health problem. Though it is a result of numerous factors, hemodynamics factors and biomechanical forces have been widely accepted as the key roles in its mechanism, development, and complication. In this study, a 2D model, which incorporates fluid-structure interaction (FSI), has been developed. We

investigated the flow field and stress field for coarctation with different lengths and severities. The results show that the existence of coarctation will generate higher velocity at the coarctation region. The severity has great effect on the peak velocity while the length effect is slight. Coarctated vessels demonstrate less distensibility than health vessel by comparing the radial expansion displacement. The stress distribution also has significant variation among health vessel and the series of diseased vessels. The results from this investigation suggest that coarctation inhibit wall motion, resulting in higher blood velocities and higher peak wall stress than health vessel. These factors may contribute to further development and other complications.