

A novel hook-attached magnetic traction/retraction for non-invasive surgery

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There have been difficult to ensure good visibility around dissection position because of the limitation of traction and/or retraction when the surgeon performs non-invasive surgery like laparoscopic or NOTES (natural orifice transluminal endoscopic surgery). In this study, we developed a novel hook-attached magnetic traction/retraction devices and the applied it to a swine model surgery to investigated the technical feasibility of laparoscopic or NOTES cholecystectomy. To tract and/or retract small organs easily, the hook-attached magnetic traction/retraction is proposed and implemented. The device has an external hand-held magnetic manipulator and an internal ferrous "attractee" which is connected with a hook by a fishline. The attractee can be pulled and pushed easily by a surgeon when using endoscopic or laparoscopic grasper because the fishline is flexible and the attractee is shaped like small dumbbell. The novel traction/retraction device applied to a series of transgastric NOTES surgery in non-survival porcine model (n=3, 35~45 kg) to make sure it feasibility. The hook was engaged on the gallbladder and then the attractee was pulled to a specific position on inner peritoneal wall by the magnetic manipulator. The surgeon can gain a sufficient exposure in Calot's triangle by dragging the internal attractee using the external manipulator. They transected the cystic duct and artery, dissected the gallbladder from the liver bed, and then delivered it through the stomach. The NOTES cholecystectomies were successfully mainly due to the novel traction/retraction device because it gives a effective and adequate exposure. However, the procedure to engage the hook on a organ is so difficult to do using endoscopic tool that the surgeon was assisted by laparoscopic graspers. The surgery took mean procedure time with 170 minutes (range, 140 to 190 minutes). No hemodynamic instability or intraoperative complication were found. The novel hook-attached magnetic traction/retraction is feasible to applying to non-invasive surgery but hooking procedure is preferable to be improved to be achieved by endoscopic tool alone.

Biography

Moon Gu Lee has completed his Ph.D at 2003 from KAIST (Korea Advanced Institute of Science and Technology), developed equipments for liquid crystal display and semiconductor from Samsung Electronics. He is a professor of Dept. of Mechanical Engineering, Ajou University and interested in surgical devices and NOTES (Natural Orifice Transluminal Endoscopic Surgery). He has published more than 30 papers in reputed journals and been serving as a research board member of K-NOTES (Korean NOTES Society).

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