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‘Human Extensions’ Hand-Held Device: First Human Trials

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Laparoscopic instruments have limited degrees of freedom and are not ergonomic. Our goal was to combine the advantages of robotic surgery with those of hand-held laparoscopic instruments.
We have designed and built a hand-held electro-mechanical system that can support several end-effectors. The instrument is composed of a sophisticated user interface that enables unrestricted hand movement, and a novel, motor driven articulating tool that is controlled by the interface. The system is cordless, lightweight, doesn’t require any set up time, and can be easily moved between laparoscopic trocar.
Following validation in an animal model the instruments were used in human surgery. We have performed several procedures, including cholecystectomy, colectomy and splenectomy using the device. The surgeon was able to perform complex tasks such as complex tissue manipulation and intra-corporeal suturing easily.
The new hand held motorized system seems to address a real clinical need.

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Use of Intuitive Touch-Free Technology for Image-Guided Minimally Invasive Surgery: An International Case

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The objective is to prove the feasibility and usefulness of using touch-free technology and describe our experience of interacting remotely between Amsterdam and Spain in an image-guided intervention.
Two partial hepatectomies and one partial nephrectomy were performed, after the creation of an experimental porcine model of hepatic and renal pseudotumour. The location, extent and vascular anatomy of each pseudotumour were analyzed by CT scan. For interacting with the preoperative imagining during the intervention the TedCube system was used with different gestural control sensors such as Kinect, Leap Motion, MYO and voice control. During the partial nephrectomy a surgeon from Amsterdam supported the intervention in Spain by interacting remotely with the preoperative studies. Participants completed a questionnaire about their experience with the system.
Surgeons were able to interact properly with the image-guided system, even remotely, during the course of the surgical procedures. This touch-free technology improved the access to preoperative information.

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Transrectal Pure Notes Cholecystolithotomy and Gallbladder Polypectomy with Gallbladder Preserved: The First Human Cases Report

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Background: Transrectal NOTES was not performed in human cases due to fecal contamination. Cholecystectomy for gallstones and polyps didn’t meet the needs of gallbladder preservation.
Aim: A detachable balloon for blocking the colonic lumen was developed. Cholecystolithotomy and polypectomy with gallbladder preserved were performed in 5 patients.
Project description: The distal colonic cavity was disinfected after the balloon placement. A rectal incision was made and an endoscope was advanced into the upper peritoneal cavity. An incision was made on the gallbladder wall after aspirating the bile. Polyps and stones were removed by electric biopsy forceps and stone extractor. The gallbladder and rectal incision were closed with endoclips and endoloops. The balloon was pulled out after being deflated.
Preliminary results: The operative field was kept clean with the balloon. The gallbladder stones and polyps were removed with the gallbladder preserved successfully. All the patients were discharged without any adverse events.

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Asymmetric: A Novel Vessel Sealing Technology, Using Low Energy and a Flexible Laser Fiber

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Objective: Vessel sealing during minimally invasive surgery is still a challenge, especially when applied through articulating or flexible devices. Additional disadvantages of current systems include high-energy needs, low precision and collateral tissue heating.
Technology: The core technology is an asymmetric laser fiber that enables controlled energy emission laterally. This allowed the design and production of several vessel sealing and tissue cutting devices including an articulating grasper, a hook and a loop snare for endoscopy. The devices can be articulating or flexible, and made to diameters as low as 3 mm.
Preliminary results: The devices were tested in an animal model with successful sealing of arteries up to 5 mm diameter, using low energy and with a durable seal.
Future perspectives: We are currently finalizing the first product design for minimally invasive surgery.