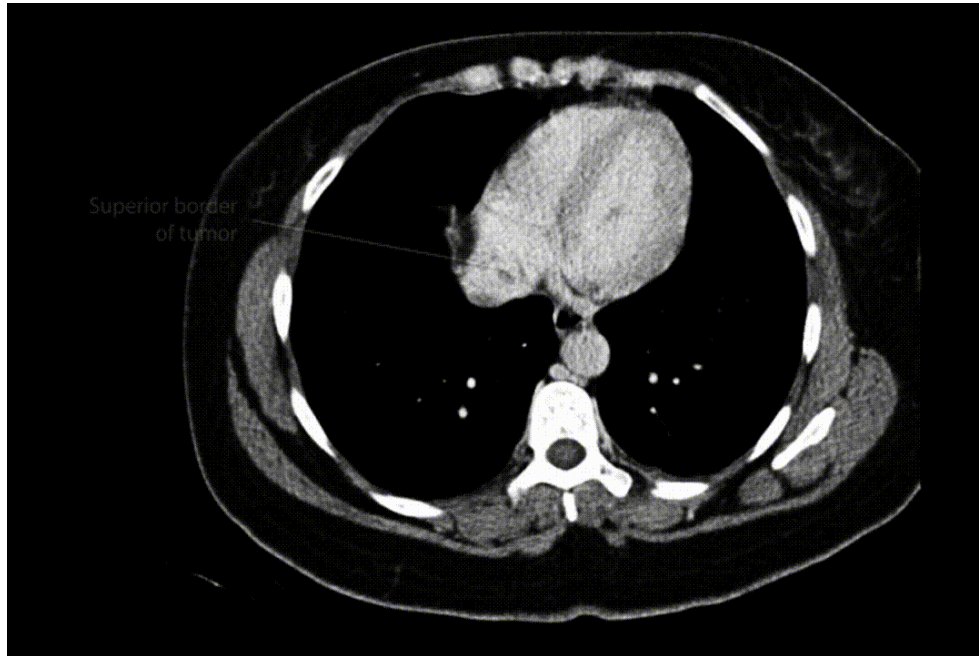




Background

Conventional hepatectomy faces many challenges.

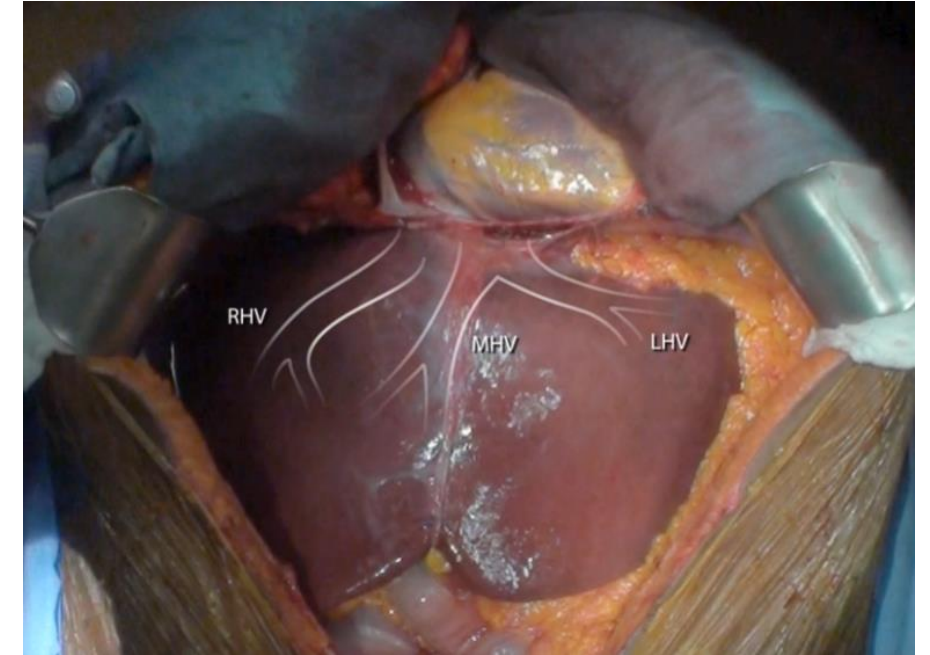
Preoperative CT [1]



Medical Image

Real Anatomy

Intraoperative Liver

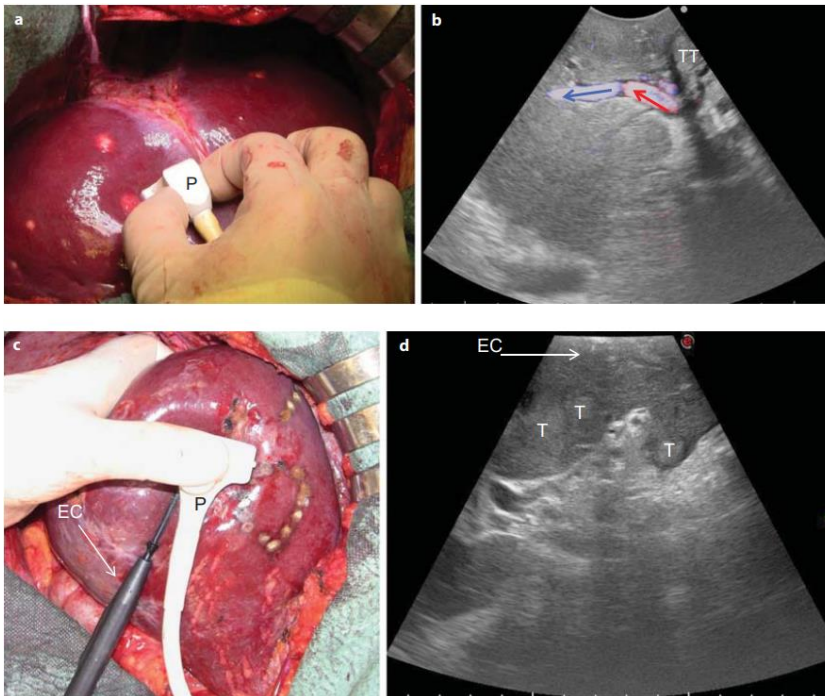




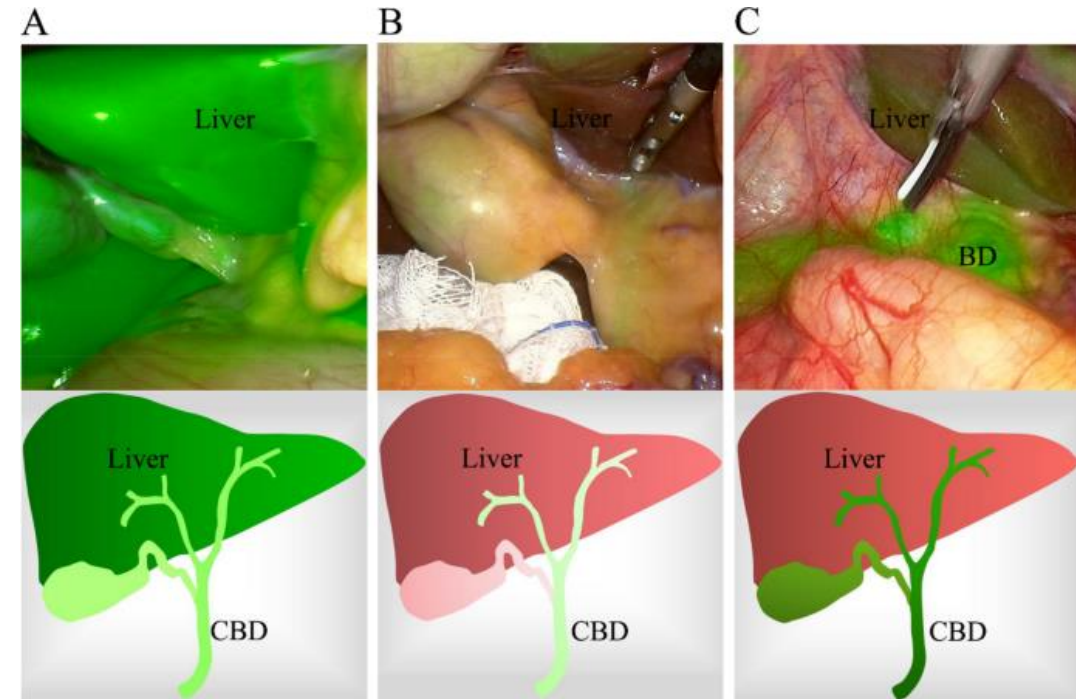
Background

Current intraoperative imaging modalities:

Intraoperative ultrasonography (IOUS) [1]



Indocyanine green-fluorescence imaging (ICG) [2]



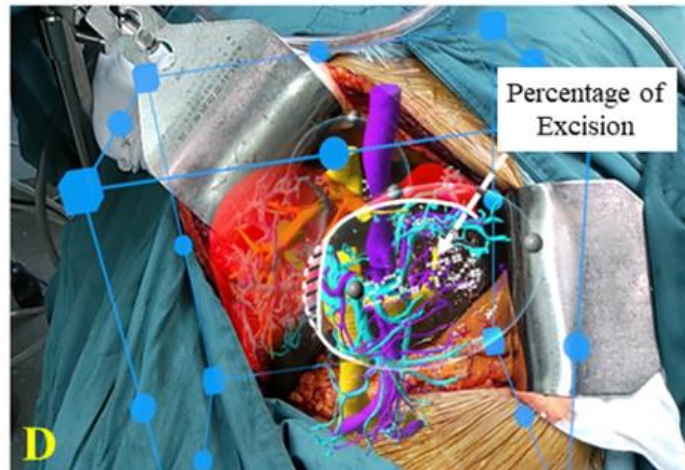
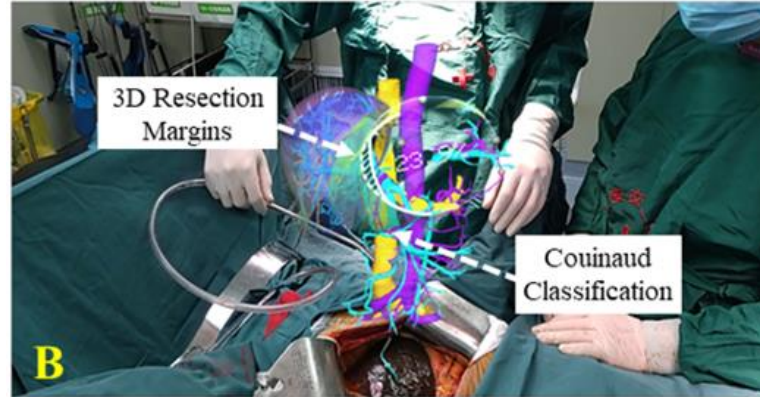
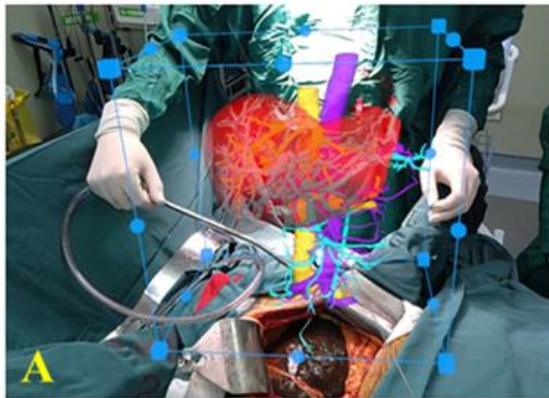
[1] Donadon, Matteo and Guido Torzilli. "Intraoperative Ultrasound in Patients with Hepatocellular Carcinoma: From Daily Practice to Future Trends." Liver Cancer 2 (2013): 16 - 24.

[2] Chen, Q., Zhou, R., Weng, J. et al. Extrahepatic biliary tract visualization using near-infrared fluorescence imaging with indocyanine green: optimization of dose and dosing time. Surg Endosc 35, 5573–5582 (2021)



Method

We developed the **first** interactive mixed reality operation-supportive system, and **integrated** it into the standard operating procedures for hepatectomy.



- The “Last-Minute” Simulation
- Holograms Sharing
- Non-Landmarks Registration
- Accurate Visualization of Surgical Anatomy
- Resection Design
- Real-Time Calculation of Residual Liver Volume



Results

- Two superiority trials have been carried out on **animals**. Experiments have demonstrated that our system **outperforms** intraoperative ultrasonography in terms of vascular identification and clinical operation.
- The project has passed the **ethical review** and entered the **clinical trial** stage.
- Our system has been **integrated into the standard operating procedure of hepatectomy** by the Department of Hepatobiliary Surgery of the First Affiliated Hospital of Xi'an Jiaotong University. So far, six patients have undergone mixed reality assisted hepatectomy.
- Questionnaires have showed that all surgeons participating in the trial agreed that our system played a positive role in reducing preoperative anxiety, fine-tuning and guiding the implementation of surgical plans.
- **Our findings have been compiled as a journal article which will be submitted to the Journal of the American Medical Association (JAMA, IF: 56.3).**
- The system will be made **publicly available**. We invite researchers worldwide interested in this work to take part in this prospective study that is expected to **push towards the development of precision surgery**.