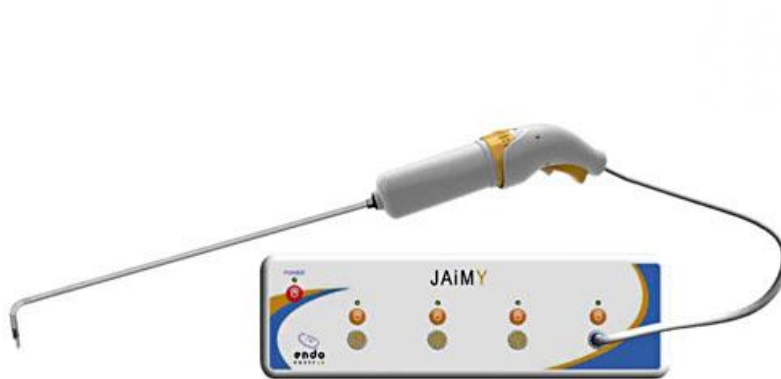


Haptic feedback for dexterous laparoscopic surgery instruments

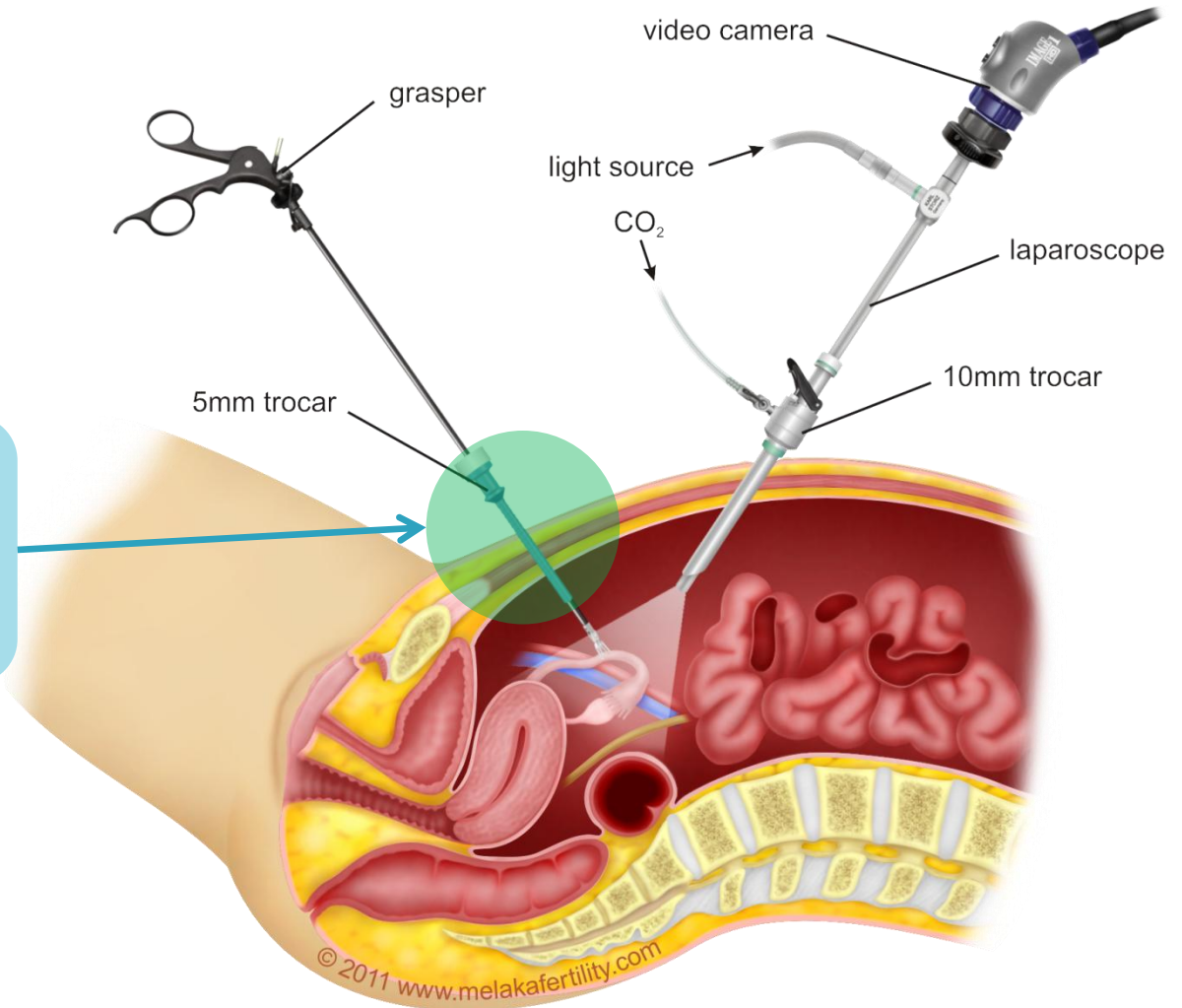


Thomas Howard, Jérôme Szewczyk, (ISIR)
Nabil Zémiti (LIRMM)

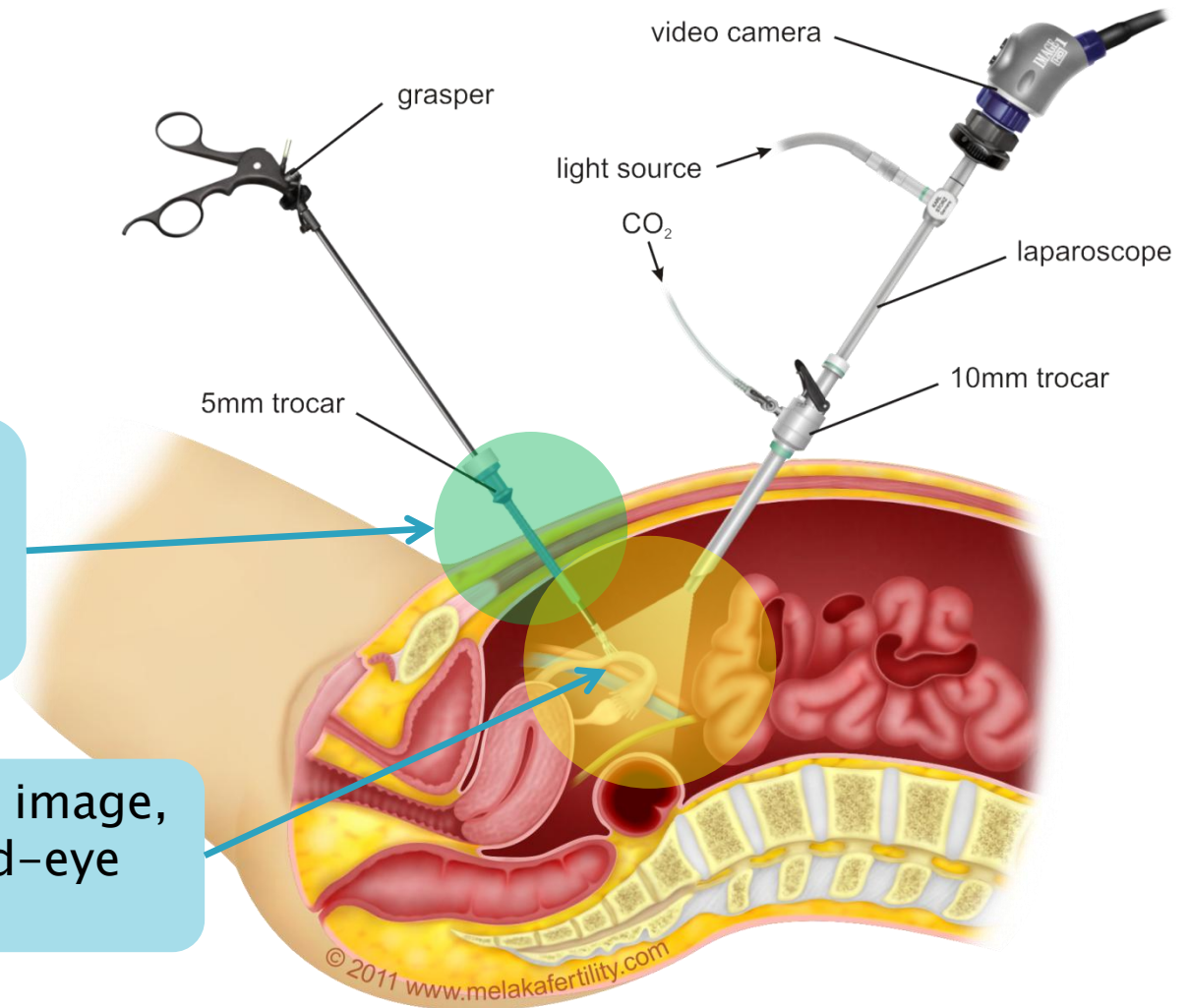
Challenges is laparoscopic surgery

Trocar introduces friction and acts as a fulcrum :

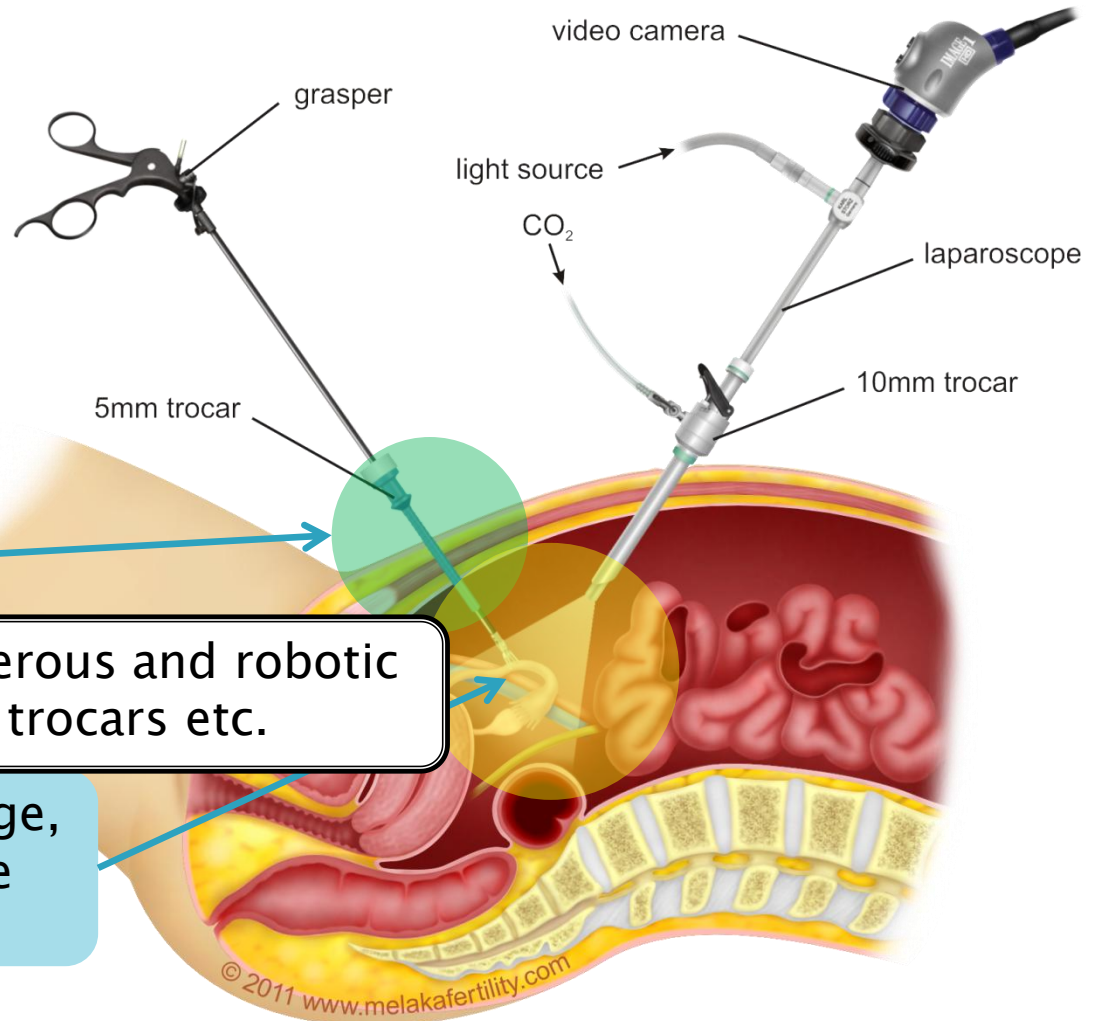
- Reduced dexterity



Challenges is laparoscopic surgery



Challenges in laparoscopic surgery



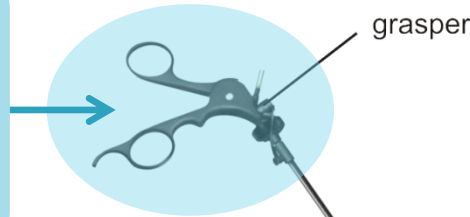
Trocar introduces friction and acts as a fulcrum :

Existing solutions : Dexterous and robotic instruments, active trocars etc.

Reduced FoV, 2D image, complicated hand-eye coordination

Challenges in laparoscopic surgery

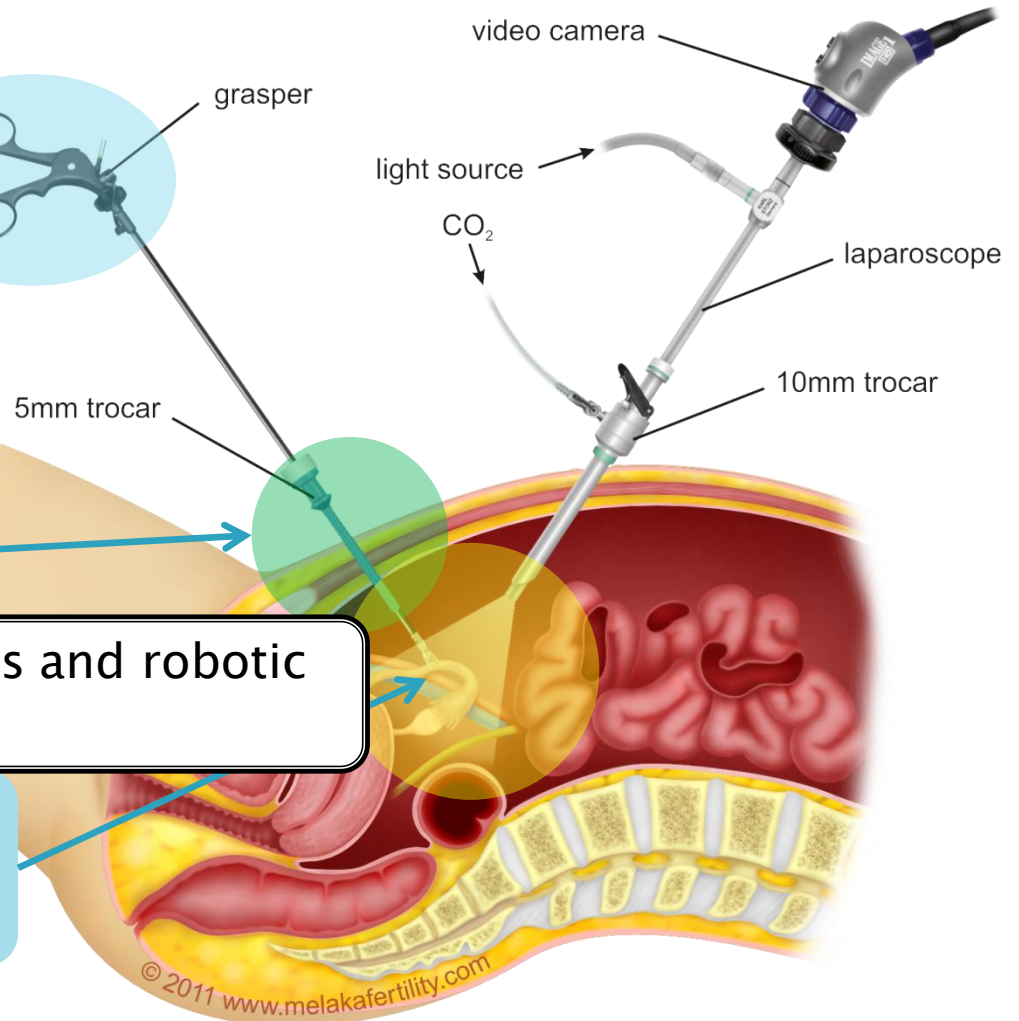
Distortion and partial loss of haptic perception through the surgical instrument and trocar



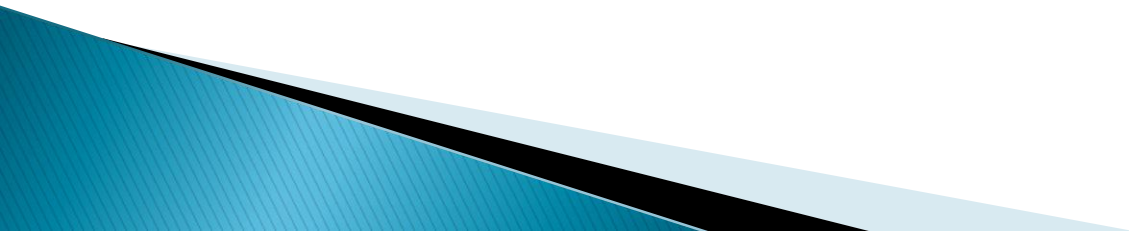
Trocar introduces friction and acts as a fulcrum :

Existing solution : Dexterous and robotic instruments

Reduced FoV, 2D image, complicated hand-eye coordination



Assisting laparoscopic surgical procedures via haptic feedback



Assisting laparoscopic surgical procedures via haptic feedback

Forms of haptic feedback :

- ▶ Kinesthetic feedback



- ▶ Tactile feedback



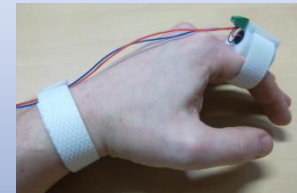
Assisting laparoscopic surgical procedures via haptic feedback

Forms of haptic feedback :

▶ Kinesthetic feedback

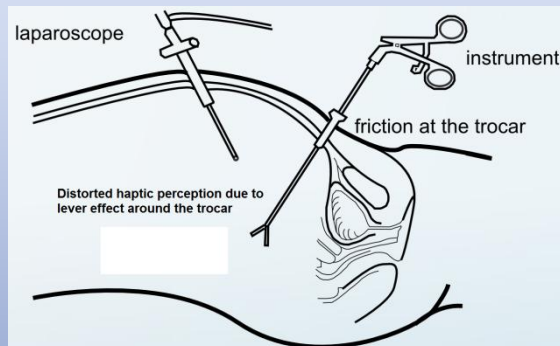


▶ Tactile feedback



Two potential clinical objectives

- Restituting useful haptic information that was lost



- Supplementing existing haptic perception with new useful information
 - Amplify specific perceived forces
 - Use tactile cues for guidance, warning etc.

Identified Axes and Current Work

- ▶ Assistance in controlling suturing forces
 - Substitution or augmentation of natural perception of applied force using tactile cues

Identified Axes and Current Work

- ▶ Assistance in controlling suturing forces
 - Substitution or augmentation of natural perception of applied force using tactile cues
- ▶ Tool guidance during resection tasks
 - Comparison of tactile cues, kinesthetic cues and virtual fixtures in guiding a comanipulated tool towards a plane of resection

Questions?