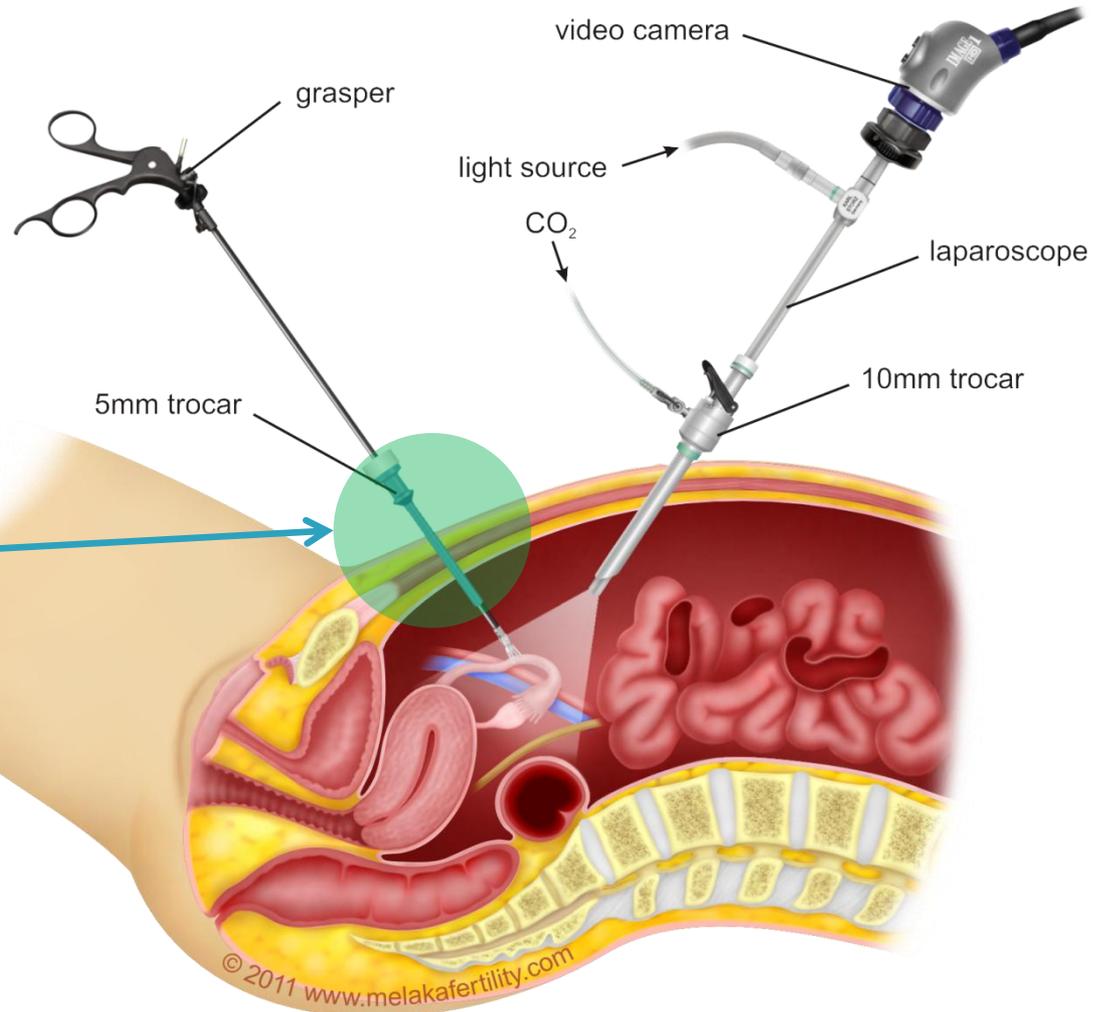


Haptic feedback for dexterous laparoscopic surgery instruments



Thomas Howard, Jérôme Szewczyk, (ISIR)
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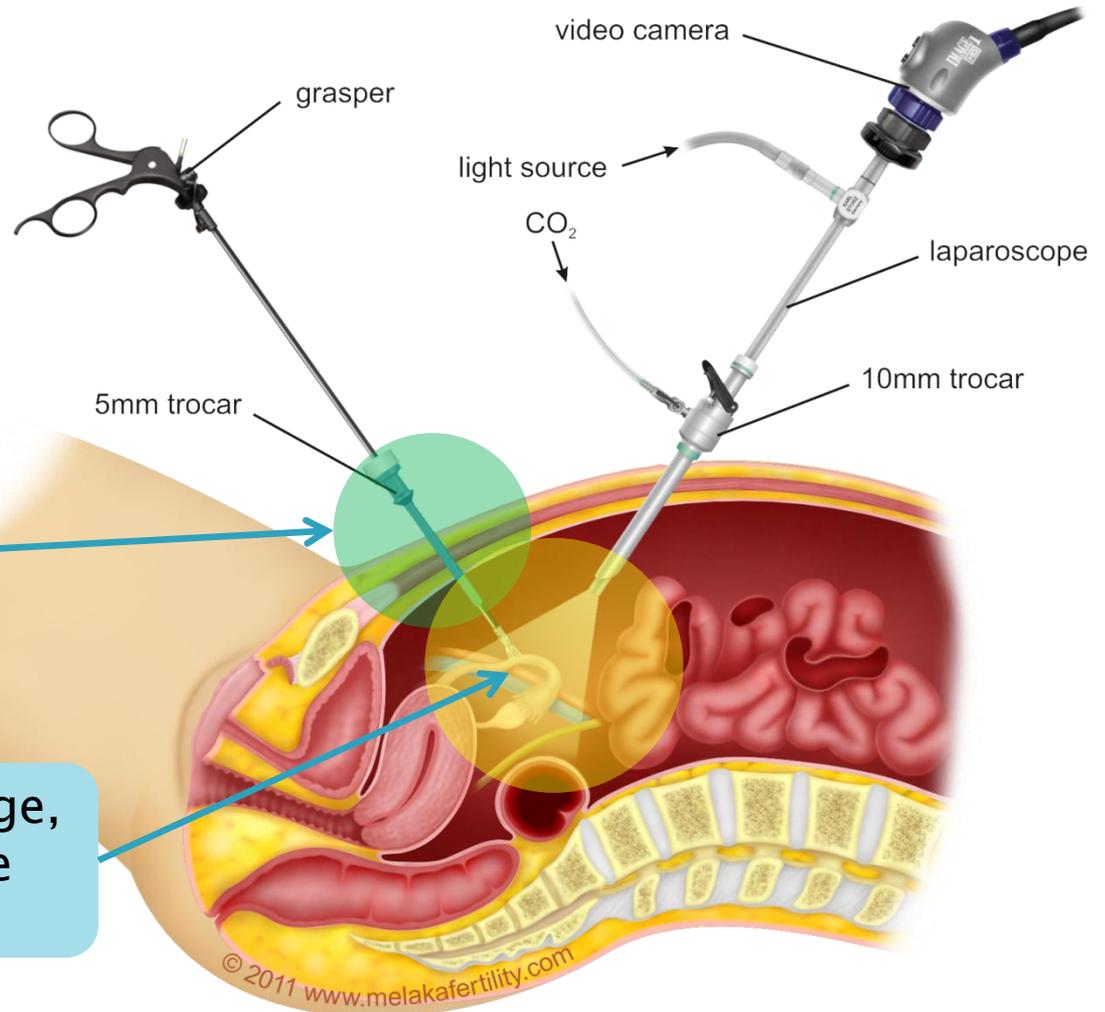
Challenges is laparoscopic surgery



Trocar introduces friction and acts as a fulcrum :

- Reduced dexterity

Challenges is laparoscopic surgery

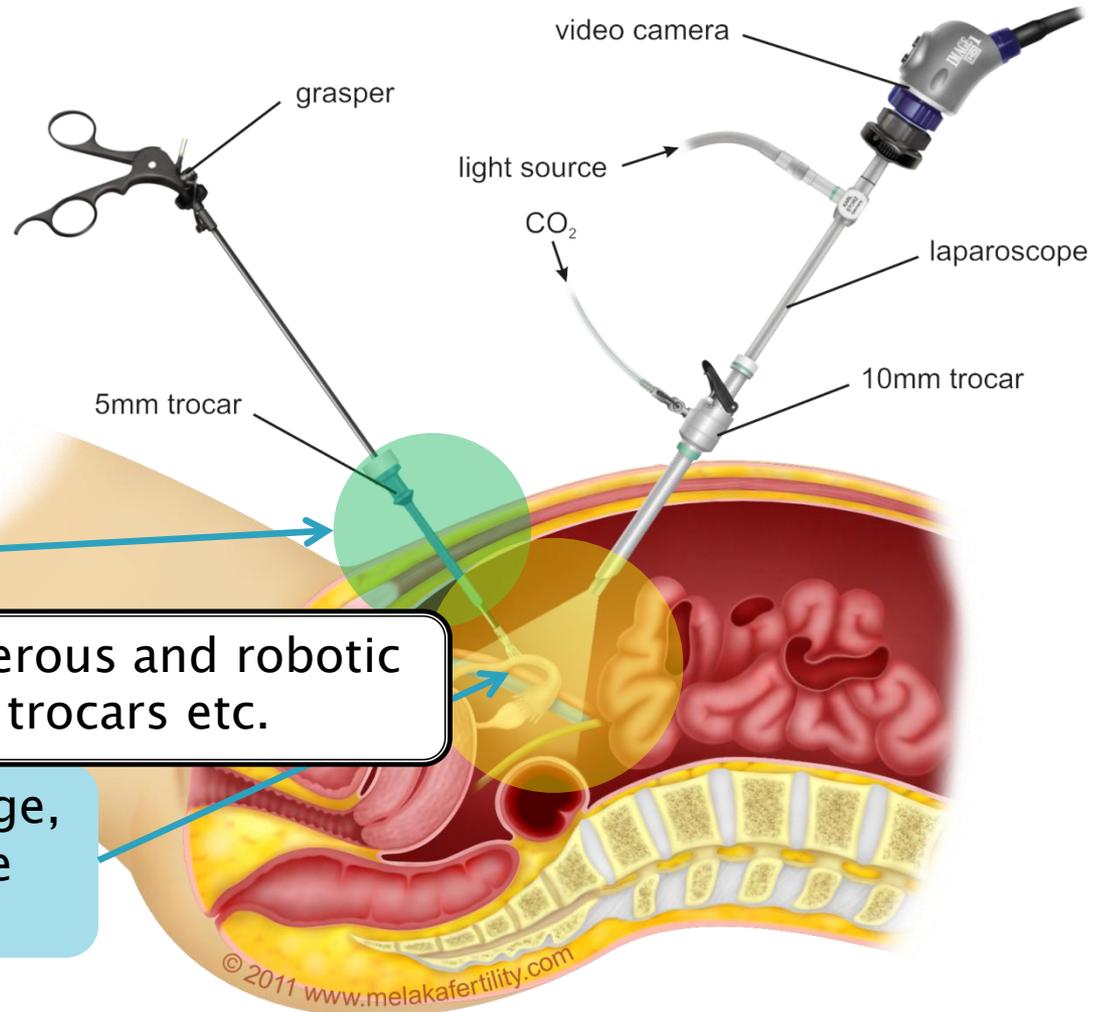


Trocar introduces friction and acts as a fulcrum :

- Reduced dexterity

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

Challenges is laparoscopic surgery



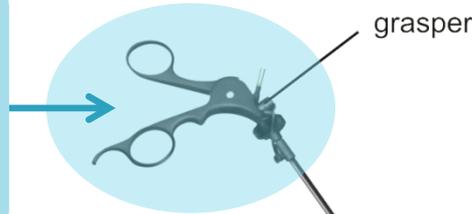
Trocar introduces friction and acts as a fulcrum :

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

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

Challenges is laparoscopic surgery

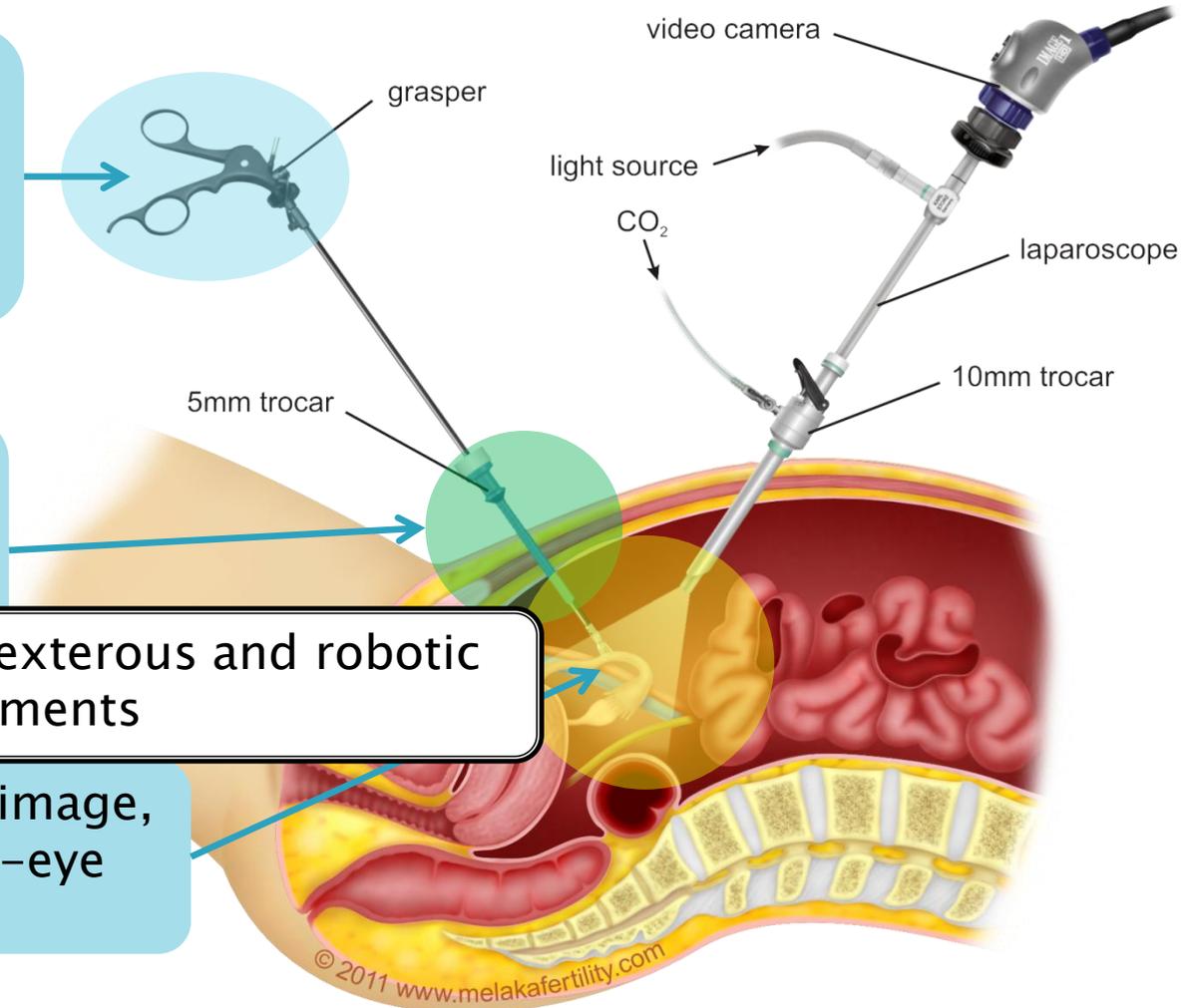
Distortion and partial loss of haptic perception through the surgical instrument and trocar



Trocar introduces friction and acts as a fulcrum :

Existing solution : Dexterous and robotic instruments

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



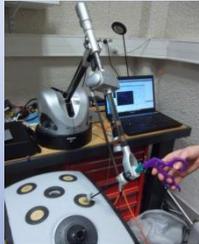
Assisting laparoscopic surgical procedures via haptic feedback



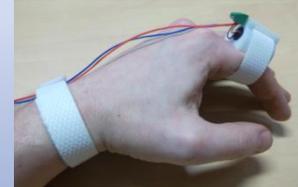
Assisting laparoscopic surgical procedures via haptic feedback

Forms of haptic feedback :

- ▶ Kinesthetic feedback



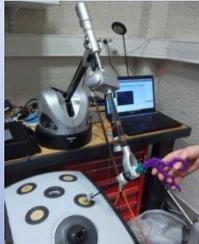
- ▶ Tactile feedback



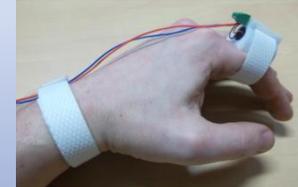
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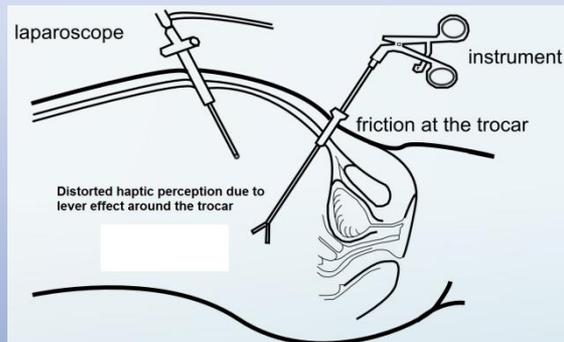


▶ Tactile feedback



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?

