Robotic and Laparoscopic GU Surgery: What the Radiologist Needs to Know

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Objectives/Goals

• Background
• Benefits and limitations
• Current use
• Possibilities
Background

• Robot
  – Term introduced by Capek in 1921
  – da Vinci sketched humanoid robot in 1495

• Classification
  – Autonomous
  – Surgical Assist Device
  – Teleoperator (master-slave)
Background

• Laparoscopy
  – Term from Greek Λαπάρα and σκοπέω
  – First uses reported in 1902 and 1910
  – Gynecological surgery

• Technical innovations
  – Instruments
  – Computer chip television
  – Clip applier
Benefits and limitations

- Benefits laparoscopic and robotic
  - Smaller incisions
  - Decreased postoperative analgesia
  - Decreased overall hospital stay
Benefits and limitations

Robotic and Laparoscopic GU Surgery
Benefits and limitations

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Benefits and limitations

Robotic and Laparoscopic GU Surgery

Peak = Start of LASIX
LASIX given form 3–6 Min
LASIX given form 3–6 Min
lower
upper

THE UNIVERSITY OF CHICAGO MEDICINE
Comer Children's Hospital
Benefits and limitations
Benefits and limitations

• Limitations laparoscopic and robotic
  – Difficulty increases with smaller patients
  – Steep learning curve
  – Longer operative durations
Benefits and limitations

- Benefits laparoscopic
  - Affordable
  - Readily available
  - Established technology
  - Some force feedback (haptics)
Benefits and limitations

• Limitations laparoscopic
  – Two dimensional visualization
  – Compromised dexterity
  – Limited degrees of motion
  – Fulcrum effect
Limitations laparoscopic - Two dimensional visualization
Benefits and limitations

• Benefits robotic
  – Tremor filtration
  – Increased dexterity
  – Stereoscopic visualization
  – Six (or seven) degrees of freedom
  – Better hand-eye coordination
  – Ergonomic positioning
  – Elimination of fulcrum effect
Benefits and limitations

• Limitations robotic

  – No force feedback (haptics)
  – Expensive equipment
  – Increased operative times
  – Decreased size and variety of instruments
  – Restriction of anesthesiologist access
Current use

• Almost all urological surgical procedures
  – Pyeloplasty, nephrectomy/heminephrectomy, ureteral reimplantation
  – Augmentation cystoplasty, appendicovesicostomy
  – Hypospadias repair
Future possibilities

• Hybrid/flexible technology
  – Robot/US/MRI/CT/GPS