Robotic Retroperitoneal Surgery

Mathew C. Raynor, MD, FACS
Department of Urology
The University of North Carolina
School of Medicine
@Matt_Raynor_uro
@UNCurology
Consultant

» Intuitive Surgical

» Teleflex Medical
History

When was “laparoscopy” first described?

» 1842
» 1895
» 1910
» 1938
History

When was “laparoscopy” first described?

» 1842 – first use of ether as anesthetic

» 1895 – first x-ray performed

» 1910

» 1938 – Veress described needle technique for pneumo
History

Jacobaeus demonstrating the thoracoscopic approach (c.1920).
History

• 1969 – first laparoscopic retroperitoneal approach described
  » Dr. Bartel (Germany)

THE NEW ENGLAND JOURNAL OF MEDICINE
May 9, 1991

Ralph V. Clayman, M.D., Louis R. Kavoussi, M.D., Nathaniel J. Soper, M.D., Stephen M. Dierks, M.D., Shimon Meretyk, M.D., Michael D. Darcy, M.D., and Stephanie R. Long, B.A.

• 1992 – Gaur describes retroperitoneal balloon dilator

• 1993 – Gaur describes first retroperitoneal lap nephrectomy
Benefits

• **Avoids peritoneal cavity**
  » Prior abdominal surgeries
  » Peritoneal dialysis

• **Access to renal hilum**
  » Direct access to hilum

• **Location of tumor**
  » Posterior tumors (especially upper pole) ideal
Risks

• Small working space

• Lack of anatomic landmarks
  » Psoas
  » Major vessels
  » Two reports of vena cava transection

• Peritoneal entry
  » Pneumoperitoneum
  » Compression of retroperitoneal working space
Anatomy

- Superficial fascia—fatty layer (Camper’s fascia)
- Superficial fascia—membranous layer (Scarpa’s fascia)
- External oblique muscle
- Internal oblique muscle
- Transversus abdominis muscle
- Transversalis fascia
- Skin
- Parietal peritoneum
- Extraperitoneal fascia
UNC Experience
Retroperitoneal Robotic Partial Nephrectomy

• Retrospective review 2011-2016
  » 42 patients (42 tumors)
  » Age 54.5
  » BMI 30.7
  » Tumor size 2.9cm
  » RENAL score 7.3

• Peri-operative outcomes
  » OR time 193 min
  » EBL 113 mL
  » WIT 19 min
  » LOS 1.7 days

  » 34/42 RCC, all negative margins
UNC Experience
Retroperitoneal Robotic Partial Nephrectomy

- **Complications**
  - 23.8% Clavien Grade ½
  - 5% Clavien Grade 3+
    - 2 patients with delayed bleed

- **Long term complications**
  - Flank/hip pain
    - 5 patients with persistent pain/numbness
  - Flank hernia
    - 4 patients developed hernia in follow-up
    - 2 required eventual repair
Flank Hernia
Access

• Various methods
  » Below tip of 12th rib
    • Open access (Hasson) technique
    • Enter retroperitoneal fat
    • Balloon dilation
    • Place 12mm port

  » Optical trocar placement
    • Enter with port to retroperitoneal fat
    • Balloon dilation

  » Modified mini-Gibson access
    • Medial to ASIS
    • Enter retroperitoneal fat
    • Balloon dilation
    • Place 15mm assistant port
Evolution of Technique

• With Si robot
  » Hasson approach below tip of 12th rib
  » 3-arm robotic approach
  » Assistant port medial to ASIS
  » Second assistant above iliac crest, if needed
  » Extract via camera port

• Learning points
  » Difficult closure of flank extraction site (hernia)
  » Only 2 robotic working arms
  » Clashing and lack of room for assistant
Ports
Evolution of Technique

• Use of SILS port
  » Allow for large incision for proper access
  » 2cm incision could be used for extraction
  » Additional assistant through SILS port

• Learning points
  » Extra cost
  » Difficult assistant port
  » Still difficult to close flank incision
Evolution of Technique

• **Access through mini-Gibson incision**
  » Medial to ASIS
  » Easier visualization of muscle layers
  » Easier extraction site
  » Easier closure of fascia in multiple layers
  » SILS port – two assistant ports

• **Learning points**
  » Still difficult to fit 4 robotic arms
  » Still using SILS port
  » Balloon dilation below kidney
    • Dilation anterior to kidney possible
Evolution of Technique

• Xi robot
  » Smaller working distance
  » Use of 4 arms
  » All 8mm ports
  » No need for additional assistant
    • Only one assistant port needed
Access
Balloon Dilation

- Different options
  - Oval
  - Round
  - Glove
Balloon Dilation
Initial Port Placement
Initial Port Placement
Increase Working Space
Increase Working Space
Troubleshooting
Peritoneal Entry

- **Easiest points of entry**
  - Anterior-medial
    - Reflection of peritoneum to create space
    - Finger dissection toward pelvis
  - Superior
    - Beneath liver/spleen

- **Solutions**
  - Oversew defect, suction pneumo
  - Vent peritoneum (Veress or 5mm port)
  - Open peritoneum
Peritoneal Entry

- **Easiest points of entry**
  - Anterior-medial
    - Reflection of peritoneum to create space
    - Finger dissection toward pelvis
  - Superior
    - Beneath liver/spleen

- **Solutions**
  - Oversew defect, suction pneumo
  - Vent peritoneum (Veress or 5mm port)
  - *Open peritoneum*
    - Exception → PD
Peritoneal Entry
Open Peritoneum
Anterior Dissection Plane

- **Balloon dilation inferior to kidney**
  - Instead of posterior to kidney off 12th rib

- **Lack of anatomic landmarks**
  - May be difficult to visualize psoas
  - Excess retroperitoneal fat
  - Surface of kidney can resemble psoas

- **Visualize psoas**
  - Open peri-renal fascia above psoas
  - Keep psoas fascia down
Anterior Dissection
Identifying Correct Plane
Posterior Dissection
Partial Nephrectomy
Conclusions

• Great approach for posterior tumors
  » Or prior extensive abdominal surgery
• Proper access is most important
  » Not many “outs”
• Xi is ideal
• Beware – anatomy can be confusing
  » Pay attention
  » Use psoas as home base
• Unique complications
  » Hernia – difficult to close small flank incisions
    • Especially in obese
  » Counsel about possible neuropathic pain/numbness
• Learn from each case
  » Improve on each case