Robotic Surgery: Applications in Gynecologic Oncology

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Do YOU Want a Robot Doing Your Surgery?
The daVinci-S Robot
How things have Changed

Conventional laparotomy

Laparoscopic Surgery

Robotic Surgery
Minimally Invasive Surgery

**PROs:**

- Shorter LOS
- Faster recovery and better QOL
- Less scarring
- Less Pain
- Lower wound infections
- Possibly:
  - Less blood loss
  - Fewer complications
Which Incision Does Your Patient Prefer?

- Minimally invasive: ability to operate through small incisions
- Better visualization than open surgery

Open Vertical Incision
Open Transverse Incision
Laparoscopic or da Vinci® Incision
# Minimally Invasive Surgery: Potential Patient Benefits

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Open</th>
<th>Laparoscopic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incision size</td>
<td>Long incision with visible scaring</td>
<td>4-6 dime-sized incisions with minimal scaring</td>
</tr>
<tr>
<td>Hospital stay</td>
<td>3-5 days</td>
<td>1-2 days</td>
</tr>
<tr>
<td>Recovery</td>
<td>4-6 weeks</td>
<td>1-3 weeks</td>
</tr>
<tr>
<td>Pain or discomfort</td>
<td>Weeks</td>
<td>Days</td>
</tr>
<tr>
<td>Return to normal activities</td>
<td>Weeks</td>
<td>Days</td>
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Why Robotic Surgery?.....

We have traditional laparoscopy?

Pelvic laparoscopy is a less-invasive procedure than open surgery and recovery is quicker.
Minimally Invasive Surgery in Gynecologic/Gynecologic Oncology

- **Almost 30 years ago:** Gynecologists were the first surgeons to perform laparoscopic surgery years ago.
- **Over last TEN YEARS:** Plateau in the growth of laparoscopic procedures in gynecology.
- **Today:** Fewer than 10% of hysterectomies performed laparoscopically in US.
- **2008:** Most gynecologists have not “embraced” minimally invasive surgery.
Minimally Invasive Surgery in Gynecology

Why has growth of laparoscopy “stalled”? 

- 2 dimensional vision
- Straight instruments
- Counter intuitive hand movements
- Unsteady image controlled by assistant
- Difficulty suturing and knot tying
- Long learning curve
- Surgeon fatigue
- Long operating times
- Dependent on expert assistant surgeon
Robotic Surgery Overcomes Many of the Drawbacks of Conventional Laparoscopy
Evolution of Robotic Surgery

- **NASA and the military**: Conceptualized telesurgery to provide surgical expertise to remote locations
- **Telesurgery** “drove” first development of robotic surgery platforms... limited by bandwidth limitations
- **Telepresence** surgery: today’s modern robotic surgery
Evolution of Robotic Surgery

- **AESOP** (Computer Motion, Goleta, CA): first robotic-assisted surgical technology: robot only controlled camera
- **Zeus Robotic System**: (Computer Motion, Goleta, CA): the first robotic system to provide instrument control
  - 2 dimensional image
- **Intuitive Surgical** (Sunnyvale, CA) purchased Computer Motion; Zeus Robotic System; abandoned in favor of *da Vinci® Robotic Surgical System*
Multi-Specialty FDA Clearance

*da Vinci® Robotic Surgical System*

- 2001: Radical prostatectomy
- 2002: Thoracoscopically assisted cardiotomy procedures
- 2002: Intracardiac procedures
- 2004: Coronary revascularization
- 2005: Gynecologic laparoscopic surgery
da Vinci® Surgical System U.S.
Robotic Surgery

Surgeon has...

- 3D image...improved visualization
- Better instrumentation, surgical control & precision
- Fully wristed instruments
- Better surgical dexterity for complex aspects of procedure
- Easier & faster suturing
- Better ergonomics

Surgeon in control: less dependent on quality of surgical assistant
Wrist and Finger Movement

- Conventional laparoscopic instruments are rigid with no wrists
- *EndoWrist®* Instrument tips move like a human wrist
Small Instruments Through Keyhole Incisions

*da Vinci® System EndoWrist®* instruments are small and fit through keyhole incisions.
Taking the “Mystery” out of Robotic Surgery: anatomy of the robot
Anatomy of the Robotic Surgical System

A computer enhanced surgical system with three components:

- **Side Surgical Cart**: 3-4 arms for controlling camera and surgical instruments
- **Vision Cart**: Processes video signals
- **Surgeon Console**: Surgeon sits remote from patient and controls robotic instruments
Side Surgical Cart

- Surgical arms are “docked” to laparoscopic trocars placed in patient’s abdomen:
  - One arm for 12-mm 3D camera
  - Two arms (standard da Vinci® system) or Three arms (da Vinci S® system) for 8 mm instrument trocars

- Tops of da Vinci® trocars are fitted to attach to robot arms
Vision Cart

- Independently processes video signals from each of two cameras
- Signals delivered to surgeon console and monitors (at bedside)
- View at console is **3D + magnified**
  (right and left eye have separate cameras)
Surgeon Console

Surgeon Immersed in 3D image of surgical field
Surgeon Console

- Surgeon controls robotic instruments via:
  - two surgical joy sticks (called “masters”)
  - Foot-controlled clutches to control:
    - Camera movement
    - positioning of masters
    - activation of energy sources (cautery)

- Surgeon’s movements are:
  - translated in REAL TIME to the robotic instruments
  - Scaled and processed to reduce tremor
Robotic Surgery “Set up”
Robotic Surgery Team

The quality of the team makes a huge difference!

- Scrub Tech
- Circulating RN
- Anesthesiologist
- Assistant (s)
- and the Surgeon
- and others......
Place Laparoscopic Ports
Docking the Robot

- Robot is “docked” to patient trocars
- Robotic instruments placed through trocars into abdomen
Laparoscopic Hysterectomy vs da Vinci Hysterectomy

Laparoscopic

Robotic
Completion of Case

- Surgeon goes “off-console”
- Robot is “undocked”
- Laparoscopic ports are closed
Robotic Surgery in Gynecologic Oncology

- Allows more complex cases to be performed in a minimally invasive fashion
- Obese patients
- Shorter learning curve than laparoscopy
- Conventional laparoscopy may fall short in adequately removing and treating gynecologic cancers
## Gynecologic Cancers: 2008

<table>
<thead>
<tr>
<th>Type</th>
<th>Incidence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uterus</td>
<td>40100</td>
<td>7470</td>
</tr>
<tr>
<td>Ovary</td>
<td>21650</td>
<td>15520</td>
</tr>
<tr>
<td>Cervix</td>
<td>11070</td>
<td>3870</td>
</tr>
<tr>
<td>Vulva</td>
<td>3460</td>
<td>870</td>
</tr>
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Treatment of Most GYN Cancers Involves Hysterectomy and BSO
Current Robotic Gynecologic Applications

- Endometrial Cancer
- Early Stage Cervical Cancer
- Endometriosis
- Fibroids
- Vaginal Vault Prolapse
- Genetic Susceptibility to Cancer
- Pelvic Masses
- Obese Patients
Endometrial Cancer

- The most common indication for Robotic Surgery in Gynecologic Oncology
- Hysterectomy, BSO +/- LND
The Obesity Factor

- Endometrial Cancer:
  - Obesity is the biggest risk factor
- There is an obesity epidemic
- Incidence of uterine cancer is increasing
Surgery in Obese Patients

- Is NOT JUST a *LITTLE HARDER*!
- Longer surgical procedures
- Often have other co-morbidities
  - Diabetes
  - Hypertension/Cardiac Disease
  - Sleep Apnea
  - Joint problems/decreased mobility
- Increased risk of complications
  - Wound infections
  - Bleeding
  - Deep Venous Thrombosis/Pulmonary Embolism
  - Incisional Hernia
  - Anesthetic complications
Obesity Trends* Among U.S. Adults
(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)
Body Mass Index: examples

- BMI 30: 5’8” 200 lb
- BMI 40: 5’2” 220 lb
- BMI 50: 5’4” 295 lb
- BMI 60: 5’5” 363 lb
Robotic Surgery in Obese Patients

- Classic approach to hysterectomy for uterine cancer in obese patient is *LARGE VERTICAL INCISION*
- Obesity is NOT a contraindication to Robotic Surgery
- We believe it is the *PREFERRED* surgical approach
OBESITY is a MAJOR problem in US

• Like the economy and global warning need to “fix” the underlying problem

We need to take care of today’s patients today!
Women’s Cancer Care of Seattle: Robotic Surgery Experience

- June 2007-October 2008: n=?? Robotic Hysterectomies cases (2 surgeons)
  - 3 patients converted to laparotomy:
    (carcinomatosis n=1, large uterus and adhesions n=1, minilap for bleeding omentum n=1)

- Obese patients:
  - BMI > 30: n= 48 pts (?%)
    - BMI 30-39: n=26
    - BMI 40-49: n=16
    - BMI > 50: n=5
    - BMI = 60: n=1
Robotic Surgery: Disadvantages

- Training and learning curve: not as difficult as traditional laparoscopy
- Long Operative times: improves over time
- Cost $ of Robot and disposables
- No increase in reimbursement
- NOT applicable to multi-quadrant surgery
Better Patient Satisfaction
How to Become a Robotic Surgeon

- Basic Laparoscopic skills
- Case observations
- On-line da Vinci® “course”
- 2-hours hands on training with da Vinci® representative
- One-day “pig lab” training with da Vinci®
- Perform 3 “proctored” cases
Robotic Surgical Privileges at Northwest Hospital

- **Primary robotic surgeon:**
  - Intuitive Surgical Certificate of Robotic Basic Training
  - Documentation of performing 20 robotic surgical cases
  - 3 Proctored case

- **Assistant robotic surgeon:**
  - Basic Laparoscopic skills Case observations
  - On-line da Vinci® “course”
  - 2-hours hands on training with da Vinci® representative
Woman's Cancer Care of Seattle **at Northwest Hospital**

www.wccos.com

- **Board Certified Gynecologic Oncologists:**
  - Dr. Kathryn McGonigle
  - Dr. Howard Muntz

- Both surgeons listed on daVinciSurgery.com as experienced robotic gyn surgeon
- State of the art treatment for gynecologic cancers
- Genetic counseling/testing for women at risk for ovarian cancer
- Research protocols
Woman’s Cancer Care of Seattle  *Pelvic and Robotic Surgery Fellowship*

- **One year Fellowship at NWH**
- **Training:**
  - Robotic Pelvic Surgery
  - Advanced Laparoscopic Pelvic Surgery
  - Challenging Pelvic Surgery
  - Urogynecology and Pelvic Reconstructive Surgery
- **Gynecologic Oncologists:**
  - Kathryn McGonigle
  - Howard Muntz
- **Gynecologists**
  - Chau-Su Ou
- **Urologists and Colo-rectal surgeons**
The FACES of:

Howard Muntz MD
Kathryn McGonigle MD
Sonia Rebeles MD (Fellow 2008-2009)
Emily Vason PAC
Carrie Wieneke-Broghammer MD (Fellow 2008)
The Future

- Multi-Quadrant Surgery
- Improved instrumentation
- Expanded indications for other surgical specialties
  - ENT Surgery
  - General Surgery (Nissan Plication)
- Transoral Surgery (NO abdominal incision)
Single cannulation (transgastric) Surgery

TORS (Transoral robotic surgery) for ENT
Robotic Surgery...is here to stay even Leonardo could do it!

Thank you!