Robotic Hysterectomy: Managing the Complex Cases, Avoiding Conversions, and Eliminating TAH

John P. Lenihan Jr., MD
Medical Director for Robotics and MIS
MultiCare Health Systems, Tacoma WA
Clinical Associate Professor, OB-GYN
University of Washington School of Medicine
Disclosures

Speaker and Proctor

Speaker and Proctor
GOALS

1. Convince you that you can lower your TAH rate
2. Show how robotics can help you do this
3. Help with tips to make you successful at converting all your hysterectomies to robotics.
# Nationwide Trends in Hysterectomy

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>543,812</td>
</tr>
<tr>
<td>2000</td>
<td>619,255</td>
</tr>
<tr>
<td>2002</td>
<td>681,234</td>
</tr>
<tr>
<td>2004</td>
<td>600,302</td>
</tr>
<tr>
<td>2006</td>
<td>568,350</td>
</tr>
<tr>
<td>2008</td>
<td>491,785</td>
</tr>
<tr>
<td>2010</td>
<td>433,621</td>
</tr>
</tbody>
</table>

- Increasing use of medications
- Mirena
- Endometrial Ablation
- Embolization, MRI Focused US
- Less Surgeries for fibroids and AUB
- More Outpat Hysts
- Costs

Frequency of Hysterectomies by Type in USA

TAH: 60 – 65%
TVH: 25 – 30%
Lap: 10 - 14%

1. CDC-MMWR: Hysterectomy Surveillance-1994-99 July, 2002/51 (SS05); 1-8
So What’s the Problem?

- Although LAVH’s and TLH’s have been around for almost 20 years, ONLY 10% of patients nationally have this approach to their surgeries.

Main Reasons:

- Lack of TRAINING -71%
- Too much Time – 53%
- Inadequate Equipment – 52%
- Poor Compensation – 36%
- Perceived higher complications – 27%

1. Limits to Laparoscopy in Canada: Sung et al, AAGL Oct 2008
Current Recommendations

  - “TVH and LH offer substantial advantages over TAH”

- AAGL Position Statement (2010): Route of Hysterectomy to Treat Benign Disease
  - “Surgeons without the requisite training and skills required for the safe performance of VH or LH should enlist the aid of colleagues who do or should refer patients requiring hysterectomy to those surgeons.”

Obstet Gynecol. 2009;114:1156-1158
So What Does This Mean?

- Less Hysterectomies per surgeon
- How do you insure a minimally invasive approach for all of your patients?
But isn’t a Vag Hyst the least invasive type of hysterectomy?
### Post Operative Recovery

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Time to Normal</th>
<th>Return to Work</th>
<th>Family Time Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAH</td>
<td>5.70 weeks</td>
<td>5.93 weeks</td>
<td>4.63 days</td>
</tr>
<tr>
<td>TVH</td>
<td>5.25 weeks</td>
<td>5.00 weeks</td>
<td>8.0 days</td>
</tr>
<tr>
<td>LAVH</td>
<td>3.17 weeks</td>
<td>3.80 weeks</td>
<td>2.38 days</td>
</tr>
</tbody>
</table>

Can you offer a TVH to all of your patients?

- No visibility of abdominal pathology
- Nullip, Obese, prior C-S, prior Abdominal Surgery
- National Data: 20-25% of all hysts (after >100 years)
- Poor ergonomics for surgeon and assistant!

IF NOT, WHAT TECHNIQUE COULD YOU USE TO OFFER A MIS APPROACH TO ALL OF YOUR PATIENTS?
MultiCare Health Care System

- Tacoma General
- Allenmore
- Good Samaritan
- Community Clinics
Comparison of Hysterectomy Surgery Types 2008

South King County
- TAH: 69%
- LAVH: 20%
- Vag Hyst: 11%
- Robotic Asstd Cases: 0%

East Pierce County
- TAH: 59%
- LAVH: 14%
- Vag Hyst: 27%
- Robotic Asstd Cases: 0%

West Pierce County
- TAH: 19%
- LAVH: 38%
- Vag Hyst: 12%
- Robotic Asstd Cases: 31%
GOAL: TAH rate < 10% at all MHS hospitals
Frequency of Hysterectomy types at Tacoma Women’s Specialists

- **Before Robotics**
  - 2003-2005
  - TAH: 9%
  - TVH: 13%
  - Lap: 78%

- **After Robotics**
  - 2005-2008
  - TAH: 2%
  - TVH: 7%
  - Lap: 5%
  - Robotic: 86%

- **After 300 cases**
  - 2009 - 2010
  - TAH: 0.4%
  - TVH: 4%
  - Lap: 2%
  - Rob: 93.6%
GOAL FOR THE FUTURE:

Tools: TVH, LSH, LAVH, TLH, RLSH, RTLH
A Novel Program: 2008

- GOAL: Lower TAH rate to \( \leq 10\% \)

- METHOD:
  - Education regarding National Recommendations
  - Quarterly Feedback on TAH Rate to all surgeons
  - Offer training in MIS and Robotics
  - Encourage referrals for complex cases to avoid TAH
Initial Responses

- I’m already minimally invasive! Your data is wrong!
- My situation is unique, all difficult patients.
- My patients do well with my current approach, so why should I change?
- It’s not fair to ask me to refer my patients to a colleague or competitor!
Program Milestones

- Initial Surgeon Education: Spring, 2008
  Met with each hospital’s OB-GYN Dept.
- Quarterly feedback of Hysterectomy rates: 2009
- System newsletter congratulating surgeons with low rates of TAH 2010
- Robotics and MIS Newsletters sent to all physicians in regions advertising surgeons with <10% TAH Rates: 2011
- Direct patient marketing: FALL 2012
A Novel Program to Lower the Open Hysterectomy Rate

In 2008, we started a program to lower the open (TAH) hysterectomy rate to less than 10% for all of our hospitals. Since then, surgeons at Tacoma General and Allenmore hospitals have lowered the open hysterectomy rate from 44% in 2006 to 10% in 2011 (Figure 1). Surgeons at Good Samaritan Hospital have lowered their rate from 56% in 2008 to 16% in 2011 (Figure 2). The main reason for these excellent results has been the increasing utilization of vaginal and robotic surgery. Robotic hysterectomy patients usually feel normal in less than two weeks.

Below is a list of all of our OB-GYN surgeons who do more than ten hysterectomy surgeries per year and who have an open hysterectomy rate of < 10%. We congratulate these surgeons for achieving the skills necessary to offer minimally invasive surgeries to almost all of their patients!

**Tacoma General/Allenmore**
- Moritz Bartels MD
- Don Boully, MD
- Claire Cammarano, MD
- Carol Kovanda, MD
- Roque Lanza, MD
- George McClure, MD
- Karen Nelson, MD
- Stephen Pone, MD
- Richard Schroeder, MD
- Laura Spirt, MD
- John Lenihan Jr., MD
- Orates Mollina, MD

**Good Samaritan Hospital**
- Paul Eun, MD
- Debra McAllister, MD
- Carrie Wong, MD

---

In 2006, the American College of OB-GYN (ACOG) issued a statement stating that "most hysterectomies should be done by surgeons who can do either vaginal or laparoscopic approaches." In 2010, another prestigious organization, the AAGL (Advancing Minimally Invasive GYN Surgery Worldwide) went further to state that "surgeons who couldn't offer their patients a minimally invasive hysterectomy should either commit to training or refer those patients to a surgeon who could." MultiCare Health System has a few GYN surgeons who can offer minimally invasive hysterectomies to > 96% of their patients!
### Table 4: Number of Benign Gyn Surgeons Trained in Robotics at TGH and GSH

<table>
<thead>
<tr>
<th>Year</th>
<th>TGH/AH Total GYN’s</th>
<th>TGH/AH Robot GYN’s</th>
<th>GSH Total GYN’s</th>
<th>GSH Robot GYN’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>23</td>
<td>6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>24</td>
<td>6</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>22</td>
<td>6</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>19</td>
<td>7</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>25</td>
<td>10</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>28</td>
<td>12</td>
<td>11</td>
<td>6</td>
</tr>
</tbody>
</table>

TGH/AH: Tacoma General and Allenmore Hospital, GSH: Good Samaritan Hospital

**Percent of GYN Robotic Surgeons 2011: 46%**
Results: TGH/AH

- TAH
- TVH
- LH
- RH

1st Robot 2nd Robot 3rd Robot
Results: GSH

[Graph showing percentage changes from 2007 to 2011 with markers indicating program start and 1st robot.]

Legend:
- TAH
- VH
- LH
- RALH

Program Start
1st Robot
# Results for Entire System

<table>
<thead>
<tr>
<th>Date</th>
<th>Number</th>
<th>TAH (%)</th>
<th>TVH (%)</th>
<th>LH (%)</th>
<th>RALH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>788</td>
<td>36%</td>
<td>25%</td>
<td>29%</td>
<td>9%</td>
</tr>
<tr>
<td>2008</td>
<td>788</td>
<td>27%</td>
<td>32%</td>
<td>29%</td>
<td>14%</td>
</tr>
<tr>
<td>2009</td>
<td>888</td>
<td>25%</td>
<td>30%</td>
<td>22%</td>
<td>22%</td>
</tr>
<tr>
<td>2010</td>
<td>877</td>
<td>15%</td>
<td>27%</td>
<td>17%</td>
<td>36%</td>
</tr>
<tr>
<td>2011</td>
<td>867</td>
<td>13%</td>
<td>22%</td>
<td>17%</td>
<td>48%</td>
</tr>
<tr>
<td>2012</td>
<td>870</td>
<td>12%</td>
<td>20%</td>
<td>13%</td>
<td>55%</td>
</tr>
<tr>
<td>2013*</td>
<td>229</td>
<td>11%</td>
<td>15%</td>
<td>14%</td>
<td>60%</td>
</tr>
</tbody>
</table>

* 1st six months 2013

TAH: Total Abdominal hysterectomy; TVH: Total Vaginal Hysterectomy
LH: Laparoscopic hysterectomy; RALH: Robotic Hysterectomy
Results 2013

Program Start

Robotic
TVH
Lap Hyst
TAH
Summary of Findings

1. TGH/AH: Decrease in TAH Rate due to
   1. Clear increase in robotic surgery
   2. Increase in referrals to MIS Surgeons
   3. TVH remained stable, LAVH/TLH decreased

2. GSH:
   1. Initial decrease due to increase in TVH prior to robot
   2. Subsequent improvement due to robotics
   3. LAVH/TLH decreased, TVH remained stable
   4. One ultimate “Nay Sayer” TAH Surgeon trained on robotics 2012
Robotic Trained Surgeon’s Choice for Hyst Route

- If robotic route is typically less reimbursement, then why?
- Better for
  - PATIENT
  - SURGEON

18 GYN surgeons with robotic privileges
Conclusions

- Hospital Systems can lower their TAH Rate
  - Establish a formal Minimally Invasive Program
  - Educate Physicians
  - Give Feedback on TAH rate compared to Peers
  - Advertise successes
  - Offer training including robotics
  - Encourage referrals if TAH considered
My Toughest Robotic Hysterectomy Ever

- 44YO, BMI: 48
- Prior Abd. Myomectomy, Gastric Bypass, C-Sections x’s 2,
- Ectopic
- 488 Gram uterus
Outcome

- 4 hours op time
- Overnight Stay
- 2 weeks: cuff seroma
- 4 weeks: RTW as bus driver
- 8 weeks: 😊
How to Prepare???

- Pre-op Planning is crucial!
- Should you refer?
- Should you get help?
  - Can’t sleep
  - Worried beyond normal
  - Previous surgery
  - Many risk factors
  - Anticipate likely conversion
- YES!
Most Common Reasons to Convert

- More difficult than anticipated
  - Too Large
  - Too many Adhesions
  - Unsure of anatomy
  - Poor trocar placement
  - Poor assistance
  - Anesthesia issues
  - Being uncomfortable with a retroperitoneal dissection
  - Frustration with exposure
  - Intraoperative fear of causing injury
Complex Cases: How to approach

- Learn how to enter the retroperitoneum
- Learn anatomy and how to develop the pararectal space and the Paravesical space
- Isolate uterine artery
- Isolate the IP Ligament
- Mobilize the ureter
Avascular Spaces of the Pelvis

- Paravesical” bordered by
  - Medial obliterated umbilical ligament, internal illiac artery, and obturator nerve complex/muscle

- Pararectal space
  - Cardinal Ligament, ureter, and internal illiac artery
Avascular spaces
Find uterine artery

- Follow common iliac down to internal iliac
- Follow vesical artery back to Uterine
- Look for ureter going under uterine.
Case difficult? Primary Issue Is Usually:

Poor Exposure
Reasons for Poor Exposure

- Morbid Obesity
- Adhesions (Prior Surgeries)
- Inadequate bedside assist
- Inadequate MUM
- Poor Port Placement
- Complex anatomy
Morbid Obesity: What is the Concern?

- Many studies have quantified increased difficulties and poor outcomes with surgery performed on obese women when compared to normal weight women.

1. Vaginal Hysterectomy in Obese Women, Pitkin RM, Obstet Gynecol May 1977 49(5)
What are the attributes of the ideal surgical technique for an obese patient?

- It would allow excellent access to and visualization of the surgical field
- It would be physically easy for the surgeon to operate resulting in low stress for the surgeon
- It would be minimally invasive so that obese patients could expect the same outcomes as normal weight patients
- SOUNDS LIKE A ROBOT…
The Outcome of Robotic Hysterectomies in Obese Women Compared to Normal Weight Women. Lenihan JP, Kovanda C, Cammarano C; PCOGS Presentation Sep 2009

<table>
<thead>
<tr>
<th>Variable</th>
<th>TOT</th>
<th>RCT</th>
<th>EBL</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal &lt;25</td>
<td>---</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Overweight 25-29</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Obese 30-34</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Morbid Obese &gt;35</td>
<td>NS</td>
<td>NS</td>
<td>Sig</td>
<td>NS</td>
</tr>
<tr>
<td>p values</td>
<td>P=.142</td>
<td>P=.918</td>
<td>P=.010</td>
<td>P=.850</td>
</tr>
</tbody>
</table>
# Robotic vs. Laparotomy ECS in Obese Women

<table>
<thead>
<tr>
<th>Winter</th>
<th>n</th>
<th>EBL (mL)</th>
<th>MC (%)</th>
<th>LOS (d)</th>
<th>Total LN</th>
<th>OT (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob</td>
<td>129</td>
<td>160*</td>
<td>13.9% *(wound c/o)</td>
<td>1.5*</td>
<td>16.1*</td>
<td>188</td>
</tr>
<tr>
<td>Lap</td>
<td>110</td>
<td>292</td>
<td>32.7%</td>
<td>4.1</td>
<td>10.7</td>
<td>128*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paley¹</th>
<th>n</th>
<th>EBL (mL)</th>
<th>MC (%)</th>
<th>LOS (d)</th>
<th>Total LN</th>
<th>OT (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob</td>
<td>189</td>
<td>59.8*</td>
<td>5.8%*</td>
<td>1.4*</td>
<td>15.4*</td>
<td>184</td>
</tr>
<tr>
<td>Lap</td>
<td>70</td>
<td>197.6</td>
<td>36%</td>
<td>5.3</td>
<td>13.1</td>
<td>139*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seamon²</th>
<th>n</th>
<th>EBL (mL)</th>
<th>MC (%)</th>
<th>LOS (d)</th>
<th>Total LN</th>
<th>OT (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob</td>
<td>92</td>
<td>109*</td>
<td>13%*</td>
<td>1*</td>
<td>25</td>
<td>228</td>
</tr>
<tr>
<td>Lap</td>
<td>162</td>
<td>394</td>
<td>44%</td>
<td>3</td>
<td>24</td>
<td>143*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subramaniam³</th>
<th>n</th>
<th>EBL (mL)</th>
<th>MC (%)</th>
<th>LOS (d)</th>
<th>Total LN</th>
<th>OT (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob</td>
<td>73</td>
<td>95.9*</td>
<td>13.7%*</td>
<td>2.73*</td>
<td>8.01</td>
<td>246</td>
</tr>
<tr>
<td>Lap</td>
<td>104</td>
<td>408.9</td>
<td>50%</td>
<td>5.07</td>
<td>7.24</td>
<td>138*</td>
</tr>
</tbody>
</table>

³Gynecol Oncol 2011; 122: 604-607.

MC: Major Complication
ECS; Endometrial cancer staging
What about conversion rates in obese women?

*Endometrial Cancer Staging*

<table>
<thead>
<tr>
<th>Author</th>
<th>Surgical Approach</th>
<th>N</th>
<th>EBL (mL)</th>
<th>Conversion Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walker J Clin Oncol 2009</td>
<td>laparoscopy</td>
<td>-</td>
<td>-</td>
<td>26.5% (BMI 34-35)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57.1% MO</td>
</tr>
<tr>
<td>Winter</td>
<td>robotic</td>
<td>129</td>
<td>160</td>
<td>10.9%</td>
</tr>
<tr>
<td>Gehrig Gyn Oncol 2008</td>
<td>robotic</td>
<td>49</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>Paley Am J Obst Gyn 2011</td>
<td>robotic</td>
<td>190</td>
<td>59.8</td>
<td>3.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.8% MO</td>
</tr>
<tr>
<td>Seamon Obstet Gynecol 2009</td>
<td>robotic</td>
<td>109</td>
<td>109</td>
<td>15.6%</td>
</tr>
<tr>
<td>Subramaniam Gyn Oncol 2011</td>
<td>robotic</td>
<td>73</td>
<td>95.9</td>
<td>11%</td>
</tr>
</tbody>
</table>

MO: morbidly obese
**OBESSE Patients Tips**

- Positioning is critical
  - Shoulder braces
  - Uterine manipulator: consider 4\textsuperscript{th} arm

- Entry Tricks
  - Increase initial insufflation pressure – 20 mm Hg
  - Use long trocars
  - Test Trendelenburg vs. ability to ventilate
  - Can decrease IAP to 8-10 mm Hg
Importance of the MUM

- Training protocols
- Standardized communications
- Consider ergonomics

Or, get very good with your third arm
Rumi vs. V-Care

- Harder to attach
- Better uterine mobility
- Ring cuts above U-S ligaments
- Able to adapt to Cooper Uterine Positioning System
- Preferred by MUMs

Easier to attach
- Limited Mobility
- Ring cuts through U-S Ligaments: Need to reattach
- Can adapt to Vicky Uterine positioning system
Positions

Anteflexed

Neutral

Retroflexed
Rumi Manipulation Positions

• **Always Push IN**!

• **Flexion**: Anteflexed (up), neutral, and retroflexed (down). Rotate the Rumi Handle.

• **Elevation**: Push in and up to one side or the other. Aim for the shoulders.

• **Lift**: Lift the whole uterus up to the anterior abdominal wall out of the pelvis.
Location, Location, Location
Tough case? Have These Available!

- 3 way Foley
- EEA Sizers
- Flo-Seal / Fibrillar
- Cysto Set with indigo carmine
- Rigid Proctoscope
- Asepto Syringe
- Vessel Sealer/Harmonic
- IR Stents

- Morcellator
  - Gynecare Morcellex
  - Storz Roto-Cut
  - Blue Endo
  - Wolff
  - Gyrus Sword
  - Lina Loop
Adhesions / Previous Surgery?

- LUQ entry (5 mm scope)
- Use Laparoscope to lyse adhesions
- Go from “known to unknown”
- Sharp Dissection preferred: Avoid ripping and tearing!
Simple Bladder Flap

- Sharp Dissection, Don’t tear!
- Push with back curve of scissors
Complex Bladder Flap

- Three Way Foley
- Do posterior colpotomy first, then follow Koh Ring
- Sharp Dissection always; don’t try and tear or wipe bladder off uterus
Large Specimens
Pre-op Planning is Critical

- If > 250 Grams:
  - 4th Arm, Two-way foleys, OG Tubes

- If > 500 grams:
  - Consider referral or experienced surgeon to mentor/assist
  - Pre-op Lupron?
  - Morcellator practice
  - Requires 4th arm
  - Be cautious of instruments out of view
  - Be cautious of energy usage
  - Requires dissection of ureter
Large Specimens

8 mm
8 mm
8 mm
8 mm

umbilicus
uterus

Put Ports higher
Place in arc, not M

robot
Paradoxical Trocar insertion
Large Specimens Steps

- ID Ureters
- Release Upper Pedicles
- Rotate-Twist uterus
  - Get Camera in close
  - Keep track of ureter
- 30° for bladder flap

480 gr, 43 BMI, prior C-S
Handling Large Specimens

If too large to remove through the vagina:

- **< 300 gm**: Flap the uterus and remove vaginally
- **300-450 gm**: UnDock the robot, Morcellate vaginally, then re-dock to close the cuff
  - Side-Docking facilitates this step
  - Avoid the temptation of trying to close from below…☹️
- **> 450 gm**: Morcellate from above after closing the cuff.
- **> 1000 gm**: Small Mini-Lap, “Slash Technique”
MultiCenter Study of Robotic Hyst with Large Uteri – March 2010

- 5 Epicenter Surgeons in Community based hospitals, mostly on obese patients
- Techniques similar for all surgeons
- Two conversions out of 256 cases (1.6%)
- Uterine size: 250 – 3020 grams
- Average Op Times: 126 min (if >500 grams = 167 min)
- EBL: 50 cc if < 500, 100 cc if > 500 gram
- LOS: 1+ days
- Major complications: 2.0%

**CONCLUSIONS: Outcomes reproducible in different centers using robotics**

Complications

- Bladder injury
- Bowel injury
- Bleeding & vascular injury
Common Causes of Robotic Complications

- Inexperience controlling the robot
  - Not keeping instruments in view – blunt trauma
  - Poor port placement
  - Rapid jerky movements
- Not understanding anatomy
- Inadequate uterine elevation
- Improper use of energy
  - Wrong foot pedal
  - Capacitive coupling
- Morcellator trauma
Summary of Key Tips

- PRE-OP Planning is critical
  - Consider referral if case is clearly over your skill set
    (Having sleepless nights, concern and worry, anxious?)

- Get good help for tougher cases (Another experienced robotic surgeon is best)

- Consider port placement carefully, use 4th arm

- Always go from “Known to Unknown”

- Sharp dissection allows anatomy to reveal itself

- Learn to morcellate (have a good assistant!)
Thank You