da Vinci® Surgery
for both Oncologic and Benign Gynecologic Conditions
Including Simple & Complex Cases

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Benefis Medical Group
Overview

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- Patient Preparation & Positioning
- Uterine Manipulation
- Port Placement
- OR Setup
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- Summary
Introduction
Key Robotic Applications by Sub-Specialty

- General Gynecologist
  - Hysterectomy
- Gynecologic Oncologist
  - Radical Hysterectomy for Cervical Cancer
  - Hysterectomy for Endometrial Cancer with Staging
- Urogynecologist
  - Sacrocolpopexy
- Reproductive Surgeon
  - Myomectomy
Pelvic Anatomy Diagram

- Round Ligament
- Fallopian Tube
- Ovary
- IP Ligament (ovarian vessels)
- Bladder
- Uterus
- Uterus Anteverted
- Sigmoid
- Aorta
- External Iliac Artery
- Internal Iliac Artery
- Ureter
- Vena Cava
Lymphadenectomy Illustration

**Yellow shading:** Area of para-aortic lymph node dissection

**Green shading:** Area of pelvic lymph node dissection

**NOTE:** Exposure of the upper para-aortic lymph nodes (light yellow) is possible with *da Vinci* S, depending upon patient anatomy.
Hysterectomy Facts

- Approximately 600,000 hysterectomies are performed each year in the U.S.\(^1\)
- By age 60, 1 in 3 women in the U.S. will have had a hysterectomy\(^2\)
- 90% are performed for elective benign indications\(^3\)
  - Fibroids
  - Abnormal uterine bleeding
  - Endometriosis
  - Chronic pelvic pain

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\(^2\)US Department of Health & Human Services, womenshealth.gov, Hysterectomy FAQ. [www.4woman.gov/faq/hysterectomy.htm](http://www.4woman.gov/faq/hysterectomy.htm)

\(^3\)American College of Surgeons “About Hysterectomy” brochure. [http://www.facs.org/public_info/operation/hysterectomy.pdf#search=%2290%25%20hysterectomies%20performed%20are%20elective%22](http://www.facs.org/public_info/operation/hysterectomy.pdf#search=%2290%25%20hysterectomies%20performed%20are%20elective%22)
Evolution of Hysterectomy

- Total abdominal (TAH) & vaginal hysterectomy (TVH)
- Laparoscopic-assisted vaginal hysterectomy was introduced by Reich in the late 1980s (LAVH)
- Laparoscopic supracervical hysterectomy (LSH)
- Total laparoscopic hysterectomy (TLH)

Roughly 2/3 of all hysterectomies performed in the U.S. are abdominal\(^1\)

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Endometrial Cancer Statistics

• 40,100 new cases in 2008\(^1\)
• 69% will be localized disease\(^1\)
• 95.5% 5-year survival rate for localized disease\(^1\)

Risk Factors:
- Hormone Replacement Therapy
- Selective Estrogen Receptor Modifiers
- Combination of Early Menstruation Onset and Late Menopause Onset
- Obesity
- Carriers of the HNPCC (Hereditary Non-Polyposis Colorectal Cancer) Gene
- Polycystic Ovarian Syndrome Sufferers
- Nulliparous Women

\(^1\) Source: http://www.cancer.gov/cancertopics/types/endometrial
Vaginal Vault Prolapse Facts

Vaginal vault prolapse occurs when the apex of the vagina descends below the vaginal opening (introitus). The prolapse results from poor support of ligaments that normally maintain vaginal position.

- **200,000 women have prolapse surgery each year**
  
  **Risk factors: Age, Obesity, Multiparity, Hysterectomy**
  - 1 in 9 women will undergo a hysterectomy in their lifetime
  - up to 10% of these women may need surgical repair of a major vaginal prolapse

- **Sacrocolpopexy with mesh:**
  - Represents the gold standard for surgical repair

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Uterine Myomas

- Benign tumors of fibrous tissue and smooth muscle
- Most common pelvic tumor in women
  - Slowly growing, estrogen-dependant tumors
  - Occurs in 20-40% of all women during reproductive years\(^1\)
  - Accounts for 33% of 600,000\(^2\) hysterectomies in US/year
  - Higher incidence in African American women (3-5x)\(^2,3\)

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1 Wallach, Vlahos, Am Col OBGYN, 2004
2 Myers et al, Am Col OBGYN, 2002
3 Uterine Fibroids (05-7103), NIH, DHHS. (2005)
Surgeon Benefits

Compared to conventional laparoscopy, the unsurpassed visualization, dexterity and control of the da Vinci® Surgical System allows gynecologists:

- To treat more pathology minimally invasively - including patients with:
  - Adhesive disease\(^1,2\)
  - Large pathology\(^1,2\)
  - Obesity\(^3\)
- Greater access, precision and control for improved dissections
- Quicker and easier suturing
- Control of the camera and of all three operative arms for the ultimate in surgical autonomy and efficiency

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\(^2\) Statement from Dr. Arnold Advincula (University of Michigan, Ann Arbor, MI), reference document, PN 871184

\(^3\) Gehrig, et al. What is the Optimal Minimally Invasive Surgical Procedure for Endometrial Cancer Staging in the Obese and Morbidly Obese Woman? J Gyn Onc. 2008 (111) 41-45
Patient Benefits

• The *da Vinci®* System enables GYNs to extend the benefits of minimally invasive surgery to their patients, including:
  - Significantly less pain²
  - Minimal blood loss and need for transfusion³,⁴
  - Fewer complications⁴,⁵
  - Shorter hospital stay⁴,⁵
  - Quicker recovery and return to normal activities¹,²
  - Small incisions for minimal scarring
  - Better outcomes and patient satisfaction, in many cases⁴

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Getting Started
Tips for Success

- Establish a team
- Onsite training
- Lab training
- Case observations
- Minimize the interval between training and the first case
- Proctoring
- Record and review cases together
- Record operative times
- Perform cases every week to gain proficiency and to move through the learning curve quickly
Patient Selection for Early Cases

- Relatively thin patient: BMI <30
- Healthy, few co-morbidities
- No previous intra-abdominal or pelvic surgery
- Reasonably sized uterus; less than or equal to 8 weeks
- Early stage endometrial cancer - if applicable
- Single, less than 5 cm, fundal subserosal myoma - if applicable
- Avoid using Gonadotropin Releasing Hormone-agonists (GnRH-a) due to distortion of capsule & softening of myoma - if applicable
Suggested Pre-operative Imaging for Myomectomy

- Determine size, number, and location of myomas
- Plan strategy for port placement and uterine incision(s)
  - Ultrasound
  - MRI: Added benefit of ruling out adenomyosis
OR Setup
4-Arm OR Configuration
**da Vinci System Positioning**

- Prior to rolling the patient cart into place, the patient cart column, the camera arm and the camera port are all configured in straight alignment with each other.
- The patient cart is rolled into position between the legs of the patient and locked. The base of the patient cart will straddle the base of the operating table.
- The patient cart’s arms should be positioned high enough to clear the patient’s legs (the patient’s legs may have to be lowered if too high).
- All overhead lights, booms and equipment should be pushed aside to prevent contamination of the steriley draped patient cart.
- Place the patient in a steep Trendelenberg position (>20°) before rolling in the cart.
- Place the Mayo stand towards the head of the table for instrumentation if desired.
Assistant Positioning

- The patient-side surgical assistant stands on either the left or right side of the operating table based on the surgeon’s preferred OR configuration.
- The scrub nurse stands on the opposite side of the patient-side surgical assistant.
- Each person is able to access and exchange their respective da Vinci instruments.
Role of the Surgical Assistant

• Surgical assistants are an important part of the team.
• It’s important to establish good communication.
• Alternating roles provides valuable experience to accelerate the learning curve.
• Tasks include:
  ✓ Facilitating uterine manipulation
  ✓ Instrument changes
  ✓ Applying traction and countertraction
  ✓ Passage/retrieval of suture
  ✓ Using the suction/irrigator
  ✓ Cleaning the endoscope
  ✓ Trocar depth repositioning
Patient Preparation & Positioning
Patient Preparation

General Tips:
- Pad the pressure points; use the shoulder supports and anti-skid aids (e.g., gel pad or bean bag).
- DVT prophylaxis
- Decompress the stomach using the orogastric or nasogastric tube.
- Insufflate the abdomen to 15 mmHg.

Anesthesia Tips:
- Run the patient dry to collapse vessels and aid in lymphadenectomy (reduces the risk of pulmonary and facial edema).

Pelvic Preparation:
- Insert a 16 Fr Foley catheter for bladder drainage.
- Sterilely prepare and drape the abdomen, upper thighs, vaginal and peri-anal region.
- Drape the legs individually.
- Place the colpotomy ring, uterine manipulator and pneumo-occluder balloon.
Patient Positioning

• Place the patient in the dorsal lithotomy position with her legs in adjustable boot stirrups.

• Abduct her legs, flex her knees and place her thighs at the table level.

• Tuck her arms, pad her bony prominences and place adequate restraints.

• Place her in a maximum Trendelenburg position (>20°) before docking.

**NOTE:** The use of shoulder blocks with the patient’s arms extended to her side can result in nerve injury; therefore, her arms should be tucked at her side.
Uterine/Vaginal Manipulation
Uterine Manipulation

• Uterine Positioning System (*CooperSurgical*®): Designed to mount, position and secure *RUMI*® uterine manipulators
  - Securely holds the uterus in position for optimal visualization, access and patient safety
  - Frees your assistant to perform other tasks during the procedure
  - Works with the *RUMI*® and *RUMI Arch™* uterine manipulators
  - Connects to any operating table

• Various uterine manipulators and colpotomy rings exist to help identify the interface of the cervix and vagina, thereby delineating the vaginal fornices during colpotomy.

• Planning is required to maintain intra-operative access to the uterine manipulator.

• The surgical assistant will have to reach over the patient’s thigh and under the instrument arm to position the uterine manipulator intra-operatively.
Vaginal Manipulation

- Vaginal manipulation is necessary for *da Vinci* Sacrocolpopexy.
- Special planning is required to maintain intra-operative access to the vaginal and rectal manipulators:
  - Use rounded *EEA™* (End-to-End Anastomosis) sizers to manipulate the vagina
  - An *EEA™* sizer in both the vagina (31-33 mm) and rectum (29 mm) allows for clear identification and easy dissection of the rectovaginal septum
  - Other forms of vaginal stents can be used as well (e.g., Lucite stents, narrow malleable, Breisky-Navratil retractors)
Port Placement
Port Placement - Benign Hysterectomy

- Critical to the success of your GYN case!
- Perform a bimanual exam under anesthesia to facilitate the planning of port placement.
- The endoscope is placed after primary insufflation.
- The remaining ports are placed after insufflation and under direct visualization
  - The endoscopic trocar is placed 8-10 cm superior to the uterine fundus.
  - The instrument ports are placed in the right and left lower quadrants.
  - The accessory port is lateral and cephalad to the umbilical port.
  - There are special considerations for large uteri.
  - Use long cannulae for high BMI patients.
4-Arm Port Placement - Benign Hysterectomy

- **da Vinci Camera Port, 8.5 or 12 mm (Blue)**: Place the port 8-10 cm cephalad to the uterine fundus.

- **Right da Vinci Instrument Port, 5 or 8 mm (Yellow)**: Place the port on the patient’s right side, slightly distal to the camera port along an arc centered at the public symphysis.

- **Left da Vinci Instrument Port, 5 or 8 mm (Green)**: Place the port on the patient’s right side, slightly distal to the camera port along an arc centered at the public symphysis.

- **4th Arm da Vinci Instrument Port, 5 or 8 mm (Red)**: Place the port on the patient’s left side, slightly cephalad to the camera port on an arc at the midpoint between the camera port and the left da Vinci instrument port.

- **Assistant Port #1, 12 mm (White)**: Place the port on the patient’s left side, slightly cephalad to the camera port on an arc at the midpoint between the camera port and the right da Vinci instrument port. The port size may be adjusted (between 8 to 15 mm) as needed for assistant instrumentation.
4 Arm Port Placement - Cancer Hysterectomy

*da Vinci Endoscope Port, 12 mm (Blue)*: Place superior to the umbilicus, 24-28 cm from the pubic symphysis.

**Right da Vinci Instrument Port, 8 mm (Yellow)**: Place on the patient’s right side, 8-10 cm lateral and 3-5 cm inferior to the endoscope port.

**Left da Vinci Instrument Port, 8 mm (Green)**: Place on the patient’s left side, 8-10 cm lateral and 3-5 cm inferior to the endoscope port.

**3rd da Vinci Instrument Port, 8 mm (Red)**: Place 8-10 cm from the left instrument port on a diagonal line, 1-2 cm superior to the left anterior iliac spine.

**Assistant Port, 12 mm (White)**: Place 1 cm inferior to the subcostal margin on the left mid-clavicular line.

**NOTE:** Measurements should be made AFTER insufflation to 15 mmHg.
4-Arm Port Placement - Sacrocolpopexy

*da Vinci Endoscope Port, 12 mm (Blue)*: Place at or cephalad to the umbilicus.

*Right da Vinci Instrument Port, 8 mm (Yellow)*: Place 10 cm to the right of the umbilicus and ~30° inferior to the endoscope port.

*Left da Vinci Instrument Port, 8 mm (Green)*: Place 10 cm to the left of the umbilicus and ~30° inferior to the endoscope port.

*3rd da Vinci Instrument Port, 8 mm (Red)*: Place as far lateral to the patient’s left side as possible, ~3 cm from the iliac crest and ≥10 cm from the left instrument port, just inferior to the endoscope port.

*Assistant Port, 12 mm (White)*: Place at the patient’s far right side, ~10 cm from the right instrument port, just inferior to the endoscope port.

NOTE: Measurements should be made AFTER insufflation.
4-Arm Port Placement - Myomectomy

**da Vinci Endoscope Port, 12 mm** (Blue): Place the cannula at the umbilicus; maintain 8-10 cm between the endoscope port and the uterine fundus/myoma.

**Right da Vinci Instrument Port, 8 mm** (Yellow): Place the cannula on the patient’s right side, 2-3 cm medial to the anterior superior iliac spine along the line diagonal to the endoscope port.

**Left da Vinci Instrument Port, 8 mm** (Green): Place the cannula on the patient’s left side; offset it ~15° superior to the endoscope port and 8-10 cm from the 3rd *da Vinci* instrument port.

**3rd da Vinci Instrument Port, 8 mm** (Red): Place the cannula on the patient’s left side, 2-3 cm medial to the anterior superior iliac spine along the line diagonal to the endoscope port.

**Assistant Port, 12 mm** (White): Place the cannula on the patient’s right side; offset it ~15° superior to the endoscope port and 8-10 cm from the right instrument port.

**NOTE:** Move all ports cephalad with the large pathology to avoid losing optical working space. Measurements should be made AFTER insufflation.

Allow adequate working distance between the superior-most border of the enlarged myoma/uterus and the primary port site (camera).
Docking
Docking the Patient Cart

- Dock the camera arm first
  - Align the camera port, target anatomy (uterus) and patient cart center column.

- Dock the remaining instrument arms
  - Keep the instrument arms in their center range of motion.
  - Point the *da Vinci* instrument ports toward the center of the target anatomy using setup joint release or port-clutch maneuvers.
  - Maximize the spacing between all instrument arms.
Surgical Videos
da Vinci Hysterectomy
da Vinci Hysterectomy for Endometrial Cancer with Staging
da Vinci Sacrocolpopexy
da Vinci Myomectomy
Myomectomy Case Overview Examples
Examples of Myoma Removals: Before, During, After

- Pedunculated Myoma

**Enucleation**

*Before*

*After*
Examples of Myoma Removals: Before, During, After

- Anterior Subserosal Myoma

**Before**

**After**

Enucleation
Examples of Myoma Removals: Before, During, After

- Posterior Subserosal Myoma

**Enucleation**
Examples of Myoma Removals: Before, During, After

- Cervical Myoma

Enucleation

Before

After
Tips & Tricks for Success
General Tips

- Establish a dedicated team
  - Nurses, a surgical technician and an anesthesiologist
- Follow an established clinical pathway:
  - Onsite training
  - Laboratory training
  - Case observation
  - Proctoring
  - Record and review cases together
  - Stay committed!
Technical Pearls or Potential Pitfalls

• **Vaginal cuff closure**
  ✓ Ensure adequate tissue bites and incorporate vaginal mucosa into each bite.
  ✓ Use interrupted figure-of-eight knots to ensure a strong cuff closure.
  ✓ Counsel patients to wait 8 weeks before resuming sexual intercourse.

• **Open surgical technique!**

• “**Don’t bite off more than you can chew**”
  ✓ Start with simple cases and proceed to more complex cases as you develop robotic proficiency.

• **Know your instruments**
  ✓ PK™ Dissecting Forceps (advanced bipolar): Tension-free coagulation followed by a cold transection.
  ✓ Skeletonize the vascular pedicles.
  ✓ “Too much of a good thing (energy) can be bad”
**da Vinci Sacrocolpopexy Tips & Tricks**

- Retract the small bowel and omentum; identify the sacrum BEFORE docking the patient cart.
- The thick black band, indicating the remote center, should be just visible at the level of the peritoneum.
- Begin with the 0° scope to place ports, hysterectomy +/- BSO and dissection.
- Use the 30° down scope for presacral dissection.
- Extend the presacral peritoneal dissection inferiorly to the vagina.
- Use the wide-weave polypropylene mesh (Y-configuration).
- Attach the anterior mesh first.
- Roll the sacral end of the mesh and lift anteriorly.
- Confirm the appropriate tension before suturing the mesh.
Managing Presacral Hemorrhage

- Remain calm
- Communicate with the patient-side team
- Apply pressure with an available *da Vinci* instrument.
- Use the *Ray-Tec™* X-Ray Detectable 4” x 4” Sponge to apply pressure.
- Consider attempting to control bleeding with the Maryland Bipolar Forceps
  - May require switching instruments
- Consider using *FloSeal™*
- “Emergency” undock as a last resort:
  - Release *da Vinci* instruments from tissue.
  - Remove instruments and trocars all in one step by depressing the set-up joint button.
  - Keep the assistant port holding pressure.
**da Vinci® Surgery**  
for both Oncologic and Benign Gynecologic Conditions  
Including Simple & Complex Cases

Thank You