*da Vinci®* Prostatectomy

Procedure Guide
Disclaimer

The following material has been reviewed and approved by an independent surgeon, who is not an Intuitive Surgical employee:

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While clinical studies support the use of the da Vinci Surgical System as an effective tool for minimally invasive surgery, outcomes cannot be guaranteed, as surgery is patient and procedure specific.

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A Clinical Approach to *da Vinci® Prostatectomy*

**Procedure Guide**

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1. INTRODUCTION:
*da Vinci®* Prostatectomy (dVP) represents a state-of-the-art approach to surgical removal of the prostate gland in patients diagnosed with prostate cancer. The precision, dexterity and superior visualization of the *da Vinci®* or *da Vinci® Surgical System* are essential to offering the ultimate, precise, minimally invasive surgical answer to prostate disease. When compared to the open surgical approach, the dVP procedure offers the patient numerous potential benefits including:

1. Improved cancer control
2. Early return of urinary continence
3. Improved outcomes for potency

- Shorter hospital stay
- Less pain
- Less risk of infection
- Less blood loss and transfusions
- Less scarring
- Faster recovery
- Quicker return to normal activities

2. PATIENT SELECTION, POSITIONING, PORT PLACEMENT AND DOCKING

2a. Patient Selection:

Useful guidelines for early patient selection are:

- Thin patient: BMI <30
- Healthy: Age <70, few co-morbidities
- No previous intra-abdominal or pelvic surgery
- Gland size: <70 cc but >25 cc
- No prior androgen deprivation
- Clinically localized prostate cancer (stages T1 and T2).
- Have low PSA level (<10 ng/mL) and
  - Low Gleason score <8
  - Impotent

2b. OR Configuration:

Overhead view
2c. Intraoperative Patient Preparation:

Important Anesthesia Considerations
- Prepare for surgery by having patient on low fluids intake - important because:
  - There is less blood loss in the laparoscopic approach.
  - If patient on high fluid intake, case can be “soupy” due to high urinary output.
- Because of the extreme Trendelenburg position (>30° and reflexed) used for much of the case, try to prop up patient’s head as much as possible to guard against edema in the face and throat areas
  - The low fluid intake preparation also helps in this regard.
- Use eye guards to protect the eyes from being scratched during patient recovery from anesthesia.
  - Foam type with “bubble” eyepieces.
- Place a gastric tube prior to surgery
- Treat like an outpatient case
  - Short acting drugs
  - Patient extubated on the table immediately after surgery

General Preparation
- The abdomen is shaved from the costal margins to the pubic bone.
- The abdomen, penis, scrotum, upper thighs, and peri-anal region are steriley prepared and draped - making sure to drape the legs individually.
- A Foley (18Fr) catheter and a rectal bougie (optional) are inserted.

2d. Patient Positioning:

After positioning the patient on the table supinely, the table is placed in steep Trendelenburg position (>20°), before rolling in the Patient Cart. All bony prominences MUST be padded.
- The patient’s legs are separated using spreader bars or stirrups, and flexed.
- The arms are then padded and tucked by the patient’s side with sleds or arm-boards
- All patient “pressure points” are well padded to insure against DVT and plexus injuries
- Patient draping.
- A strap is securely placed across the patient’s chest.
- For ease of access to surgical instruments, the Mayo Stand may be positioned directly over the patient’s head once the table is in position.
2e. Surgical Preparation and Pelvic Inspection:

Taking time to do this step will help in maintaining exposure of the surgical field throughout the case.
- Once the cannulae are in place and the patient is in the Trendelenburg position, and before rolling in the Patient Cart, the colon and small bowel should be retracted and repositioned away from the pelvis using conventional laparoscopic instruments.

2f. Port Placement:

Note that the pubic bone is a better landmark than the umbilicus for this procedure.
- Therefore, as the maximum working length of the da Vinci® instruments is 25 cm, the instrument ports should be positioned on an arc of approx 15 cm (do not exceed 18 cm) from the patient’s pubic bone.
  - Methods:
    - Visual
    - Measured
    - Geometry
  - Variability:
    - 2 instrument arms/3 instrument arms
    - Assistant position
    - Surgeon preference
  - Considerations:
    - Anatomy
    - BMI
    - Instrumentation
    - Interferences

**Ahlering's UCI Port Placement:**
- The camera (scope) port is a 12mm disposable cannula placed 1-2 cm directly above the umbilicus.
- The right instrument arm port is an 8mm cannula placed 10-12 mm from the mid-line slightly below the level of the camera port.
The left instrument arm port is an 8mm cannula placed 10-12 mm from the mid-line slightly below the level of the camera port.

The 3rd instrument arm port is an 8mm cannula placed at the patient’s left side; one hand-breadth (8 cm) away from left instrument arm port.

The assistant port is a 10-12mm cannula placed at the patient’s right side; one hand-breadth (8 cm) away from right instrument arm port.

2g. Positioning and Docking the da Vinci Patient Cart:

Prior to rolling the Patient Cart into place, the Patient Cart should be positioned such that the Patient Cart center column, the camera arm and the endoscope port are all aligned, and in a straight line.

- The Patient Cart is then rolled into position.
- The Patient Cart center column will be between the legs of the patient, and the base of the Patient Cart will straddle the base of the operating table.
- The arms of the Patient Cart should be positioned high enough to clear the height of the patient’s legs (the patient’s legs may have to be lowered if they are too high).
- All overhead lights and equipment should be pushed aside to prevent contamination of the steriley draped da Vinci® Surgical System.

Assistant Positioning:

- The patient-side surgical assistant stands on the right side of the table.
- The scrub nurse stands on the left side of the table.
- Each is able to access and exchange their respective da Vinci® instruments.
- The assistant’s role is primarily restricted using conventional laparoscopic forceps and suction/irrigation.

Docking the robot:

- The camera arm is connected, or docked, to the scope port first.
- The instrument arms can be docked in any order.
- The instrument arm remote center is indicated by the thick, center black band on the instrument cannula. The thin black band located...
1cm from the instrument cannula tip should be used as the insertion-depth reference and should be located at the peritoneum.

3. INSTRUMENTS AND ACCESSORIES

3a. Recommended General Instrumentation List
   - 5 mm endoscopic suction irrigator
     - Long (45 mm)
   - 5 mm endoscopic scissor
   - 5 mm endoscopic graspers
     - Endoscopic Maryland suture passer
     - Endoscopic Babcock (locking)
   - 10 mm Endoscopic Babcock (long)
   - 10/12 mm specimen retrieval pouch

3b. Recommended Sutures
   - DVC (figure of eight or sliding square)
     - 0 - Vicryl on CT-1
     - Alternate: Stapler (vascular)
   - Back-bleeding stitch/high (SH)
     - 0 - Vicryl on CT-1
     - 2-0 - Vicryl on SH
   - Bladder neck repair (Int)
     - 2-0 or 3-0 - Vicryl/Monocryl on RB-1/SH
   - Anastomosis (running or interrupted)
     - 2-0 or 3-0 Vicryl/Monocryl (SH/RB1)

3c. Recommended Intuitive Surgical Instruments
   - Large needle drivers (2 required)
   - Hot Shears™ (Monopolar Curved Scissors)
   - Maryland Bipolar Forceps
   - Cobra Grasper

3d. Alternate Intuitive Surgical Instruments
   - Fenestrated Bipolar Forceps
   - Cadiere Forceps
   - Monopolar Hook Cautery
   - Monopolar Spatula Cautery
   - Curved Scissors
   - Round-Tip Scissors
4. Procedure Steps - The Anterior Approach:

4a. Dropping the Bladder

The aim of this dissection is to cause the bladder to fall posteriorly to allow access to the space of Retzius

- By freeing the bladder completely from its anterior attachments, a tension-free urethrovesical anastomosis can be achieved
- Follow the rim of the pubis round to the vas on both sides
- The entire dissection of the prevesical space is performed in a virtually bloodless field. If any bleeding is encountered in this area, the dissection is probably in the wrong plane, usually to close the bladder wall
- Cautery levels for this step: Begin with levels of 20 for both monopolar and bipolar instruments
- After the bladder is freed from its anterior and lateral attachments, it is then emptied with a syringe. Because the patient is in a steep Trendelenburg position, the bladder will not empty spontaneously

![Incising the peritoneum & dropping the bladder](image)

4b. Opening the Endopelvic Fascia

The aim of this dissection is to mobilize the prostate from the urogenital diaphragm, preserve urethral length and to maximize exposure to the apex of the prostate.

- Identifying the correct plane along the lateral border of the prostate is a requirement when opening the endopelvic fascia
- Careful use of sharp and blunt dissection should be employed while avoiding the use of electrocautery
- This dissection should be carried up to the dorsal venous complex
4c. Ligating Dorsal Venous Complex (DVC)

During this step, the goal is to control the dorsal venous complex and set-up the plane for the apical dissection

- A six-inch length of 0-Vicryl suture on a CT-1 taper needle is then used to ligate the dorsal venous complex
- The needle is passed horizontally, right to left, anterior to the urethra and behind the dorsal venous complex
- The needle is then passed backwards, left to right, anterior to the urethra creating a figure of eight stitch.
- The suture is knotted, a sliding square knot is useful here, securing the dorsal venous complex
- Use of the da Vinci 4th arm facilitates proper traction/retraction of the prostate
- An additional stitch placed midway between the apex and the base of the prostate can be useful for applying traction during the posterior dissection and to help with delineation of the plane between the prostate and bladder (bunching stitch)

- **Instruments:**
  - Large Needle Driver (left hand)
  - Large Needle Driver (right hand)

- **Suture for ligation:**
  - 0-Vicryl suture on a CT-1

- **Anatomical Landmarks:**
  - DVC
  - Urethra
  - Prostatic apex
  - Puboprostatic ligaments

- **Consideration:**
  - Ligation strategy
  - Stitch/Knot/Placement
  - Catheter
4d. Bladder Neck Dissection and Transection

Note: This is often the most difficult anatomy to identify and requires careful attention to avoid entering the capsule of the prostate

- Use a 30° scope with the lens angled down to carefully identify the bladder neck junction
- The fat covering the anterior prostate is dissected off
- The mucosa at the posterior bladder neck is incised using bipolar graspers and a Monopolar Cautery Hook/Hot Shears
- It is helpful to clear either side of the bladder neck prior to attempting the transection
- Both the bipolar and monopolar energy levels should be set no higher than 20 for this whole exercise because it is easier to see when no charring is present
- Make a "pit" to transect the bladder neck, following the plane across
- Transect the lateral edges last, especially with median lobe

*Instruments used here:*
  - Maryland Bipolar Forceps (left hand)
  - Hot Shears or Monopolar Cautery Hook (right hand)

*Anatomical Landmarks:*
  - Bladder neck
  - Prostatic base

*Considerations include:*
  - Median lobe
  - NVB
  - Vascular pedicle
  - Additional stitch:
    - Back bleeding, handle, or "bunching stitch"
    - Helps to identify bladder neck
    - Anterior tag
4e. Dissection of Vas Deferens and Seminal Vesicles

In the initial cases, most emphasis is placed on getting into the correct surgical plane, identifying the vasa & seminal vesicles and maintaining adequate hemostasis while performing this dissection.

- After transecting the posterior bladder neck, the vas deferens is identified and transected.
- The vas deferens is then circumferentially mobilized and retracted anteriorly.
- An arterial branch at the tip of the seminal vesicle is best controlled with bipolar electrocautery.
- The contralateral seminal vesicle is freed in the same manner.
- A longer vas dissection gives better exposure to the seminal vesicles.
- Most of the cautery application is on the vas side, not on the seminal vesicle side.
- In the initial cases, most emphasis is on getting into the surgical plane and maintaining hemostasis.
- Later on, one can be more judicial in the use of cautery.
- If the seminal vesicles are very long, they can be shortened using the linear stapler, otherwise they can be difficult and get in the way.
- For a "nerve-sparing" approach, dissect the seminal vesicles with cold scissors and the Maryland Bipolar Forceps.
- Before grasping the seminal vesicles, dissect sufficiently to be able to get a "full grasp," to avoid tearing the seminal vesicles.
- It is important the surgical assistant be in sync with the surgeon’s moves.
- The neurovascular bundle is very close to the tip of the seminal vesicle, so care is needed here in using little to no cautery.

**Anatomical Landmarks include:**
- Prostatic urethra
- Bladder neck
- Seminal vesicles
- Vas deferens

**Instruments:**
- Maryland Bipolar Forceps (left hand)
- Hot Shears/Monopolar Spatula/Hook Cautery (right hand)
• **Identify:**
  - Prostatic urethra
  - Bladder neck
  - Vas deferens & seminal vesicles
• **Considerations:**
  - Correct plane
  - Rectum
  - Pedicles

4f. **Opening Denonvilliers Fascia**
Carefully opening Denonvilliers fascia allows for a complete posterior dissection while releasing the space between the prostate and the rectum
  - Sharp dissection with the Curved Scissors/Round Tip Scissors is carried through Denonvilliers fascia, carefully exposing the perirectal fat
  - The assistant can use the suction cannula to provide atraumatic counter-traction on the rectum
4g. Nerve-Sparing Technique

During this step, care must be taken to avoid thermal energy and traction injury to the neurovascular bundles
- Primary control of the prostatic vascular pedicle provides minimal bleeding during dissection of the neurovascular bundles
- Sharp dissection with use of the Curved Scissors/Round Tip Scissors allows for a correct anatomical dissection of the bundles

**Patel**
- Polymer Clips (Weck Hemolok®) are applied to the prostatic vascular pedicle and then the pedicle is transected using the Curved Scissors
- The dissection is carried from the pedicle along the lateral border of the prostate all the way to the apex - No cautery is used

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- A "Bulldog" endoscopic vascular clamp is applied to the prostatic vascular pedicle and then the pedicle is transected using the Curved Scissors
- The dissection is carried from the pedicle along the lateral border of the prostate all the way to the apex - No cautery is used

- **Instruments:**
  - Maryland Bipolar Forceps (left hand)
  - Hot Shears/Round Tip Scissor/Curved Scissor (right hand)

- **Identify:**
  - Prostate
  - Prostatic pedicle
  - Rectum
  - NV bundle
  - Urethra

- **Considerations:**
  - Rectum
  - NVB
  - Pedicle (clips or Bulldog)
  - Light retraction

*Nerve-Sparing Dissection - Controlling & transecting the prostatic vascular pedicle*
4h. Apical Dissection & Transecting the Urethra

- Careful sharp dissection is used to transect the ligated DVC, the striated sphincter and the membranous urethra
- Most bleeding during this dissection can be controlled with cautery. However, bleeding from the DVC should be controlled with suture ligature.
- The urethral catheter helps to guide the transection of the anterior urethra
- Extra care should be taken to stay in the right plane and not to cut into the prostate

4i. Bagging the specimen

- Once the prostate is free, it should be placed into a specimen retrieval bag
- The assistant should deliver the retrieval bag through the accessory 12mm trocar
- The surgeon places the specimen in the bag, and it is then closed and secured for removal at the end of the case
4j. Urethovesical Anastomosis

Use of the 4th arm at the commencement of the anastomosis can greatly help to approximate the bladder neck and urethra

- Instruments used to construct the anastomosis are two EndoWrist Large Needle Drivers
- Suture used for the anastomosis is 3-O Monocryl® on a RB1, UR6 or SH needle (one dyed & one un-dyed)
- Use a vas tissue pledget at initial knot site (optional)
- Use a sliding square knot, or surgeon’s knot to secure anastomosis
- Other techniques:

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  - A 30º down scope is used to place the first bladder stitch, the scope is then changed to a 0º scope for the remainder of the anastomosis
  - The anastomosis is constructed as a running anastomosis using a double-armed suture constructed with two 7” lengths of 3-0 Monocryl suture on SH needles. One length is dyed to facilitate identification
  - A vas pledget is used at the joining knot of the two sutures
  - Suturing commences on the posterior aspect of the junction being formed
  - Sewing outside to inside on the bladder neck and inside to outside on the urethra near the 6 o’clock position
  - Space the stitches appropriately to cater for any mismatch in the size of the urethra vs. the bladder neck
  - Try to avoid having leak potential of the posterior side
  - Do not cinch down on the sutures until the urethral catheter is visually placed into the bladder
  - Be careful not to break the suture during knot tying - go easy
  - Test for leaks
  - Lower pneumo to 3-5 mm Hg to test for any oozing
  - All patients receive a cystogram at one week; if no leak, then remove the catheter
  - Perform lymphadenectomy as required immediately prior to anastomosis so that the bladder does not obscure and/or obstruct vision
  - Lower pneumo to 5 mm Hg to check for bleeding - whole surgical site
  - **Identify:** Urethra, bladder neck & ureteral orifices
  - **Considerations:**
    - Running/interrupted
    - Locking
    - Ureteral orifices & bladder neck
    - Approximation
Suturing the urethovesical anastomosis

4k. Closing the Surgical Site:

- The specimen, in its specimen bag, is removed through one of the 12 mm trocar sites, enlarging the incision as necessary.
- Port site closure is done in the usual manner, using a port site closure device to close all wounds over 5mm diameter.
- The enlarged port site, if present, is closed in the usual surgical manner.

4l. Margins Assessment:

- Immediately, post specimen retrieval

5. POST-OPERATIVE CONSIDERATIONS:

- Immediate post-operative care
- Ambulation
- Catheter removal
- Pre-discharge follow up
- Long-term follow up