

Practice advisory

Anesthesia for Robotic (daVinci) Non- Cardiac, Steep Trendelenburg Surgery

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Key concerns:

- Significantly prolonged surgical times
- Steep (extreme) Trendelenburg position
- Prolonged pneumoperitoneum
- Proper patient positioning/ pressure points
- Limited access to the patient after the robot is engaged
- Judicious IV fluid management/Monitoring
- Ocular risks
- Communication with surgeon

➤ ***Steep (extreme) Trendelenburg position and prolonged pneumoperitoneum:***

- Optimizes exposure by moving the abdominal viscera away from the operative field.
- Table angulation will vary by procedure and by surgeon preference.
- The patient may slide cephalad and will have to be supported. Ideally, the patient should not be supported by shoulder braces as literature demonstrates increase possibilities of neural injury, particularly to the brachial plexus.
- Risk of endobronchial intubation after final positioning of the patient.
Recheck tube positioning and note any significant change in airway dynamics.
- Gravity causes an increase in pulmonary blood volume, increasing risk of pulmonary interstitial edema. The abdominal viscera push the diaphragm cephalad leading to a significant decrease in FRC and compliance. An increase in *plateau airway pressure* is expected immediately after the institution of the Trendelenburg position and pneumoperitoneum.
Vigilant monitoring of airway pressure is important.
- CO₂ retention occurs mainly in obese patients and may lead to post-extubation hypercapnia.
- Increased intracranial pressure. (ICP) In most patients this is well tolerated. However, patients with a history of increased ICP or with co-morbidities in which an increased ICP may be detrimental, are poor candidates for robotic surgery.

- With prolonged surgery and pneumoperitoneum patients may complain postoperatively of shoulder pain. This is caused by retained CO₂ gas irritating the diaphragm, and it is usually treated with IV analgesics and requires no further interventions.

➤ ***Proper positioning/Pressure Points***

- Arms will be tucked in – 2 peripheral IVs (preferably bilateral) are highly recommended.
- The final position of the arms, legs and all pressure points should to be checked for padding and adequate support to prevent neurological injury. Most commonly the ulnar nerve is found to be affected, however all the nerves of upper and lower limbs, along with brachial plexus, can be affected.
- Special attention should be paid to head pressure points; massage of the scalp may be suggested for long procedures.
- All pressure points, intravenous access, and monitors must be rechecked after final positioning of the patient and before the robot is engaged.
- Fig 1 (kindly provided by Kerri Wolverson RN - Main Operating Rooms) is an example for positioning for left-sided robotic procedures.

➤ ***Limited access to the patient after the robot is engaged***

- Once the robot is engaged it takes minimum 2 minutes to disengage before regaining access to the patient. However, head butler and arms can be accessed much more quickly if communication is made to the surgical/nursing team.
- The patient cannot be repositioned once the robot is engaged.
- Appropriate neuromuscular blockade must be administered throughout the procedure to prevent patient movement while surgical instruments are engaged.
- A platform is attached to the bed to protect the patient's head from the robotic arms.

➤ ***Judicious IV Fluid Management/Monitoring***

- Arterial line is indicated if the patient's comorbidities necessitate it or if frequent labs are anticipated.
- Fluid restriction would minimize the risk of upper airway and facial edema which may result from the prolonged use of the steep Trendelenburg positioning. IV fluids can be restored rapidly after the patient is placed supine and the end of the procedure. Colloid administration may be considered.
- Use a fluid warmer is recommended.
- *Check the endotracheal tube cuff leak prior to extubation*

➤ **Ocular Risks:**

- Expect significant increases in intraocular pressure (IOP) by up to 13 mm Hg. This is well tolerated in most patients, however a minimal chance of associated post operative blindness exists. Surgical duration and ETCO₂ are significant predictors of IOP increase in the Trendelenburg position.
- Eye injury also has been reported due to iatrogenic trauma and irritation of the eye. Due to positioning of the patient, gastric secretions may find their way under eye dressings. (placement of a NG/OG tube is recommended)
- It is very important to make sure the eyes are properly lubricated, taped (Tegaderm) and protection goggles applied.

➤ **Pain Control:**

- As with most laparoscopic procedures, epidural analgesia is not indicated for robotic surgery. IV postoperative pain control should be adequate for pain relief.

➤ **Communication:**

- Since the surgeon is at the console and not at the bedside, communication with the surgeon is very important.

Figure 1:

STEP 1: Patient will be positioned left side up. Right arm will be secured to arm board, or bent resting on the bed in front of the face. Left arm will be secured across the chest or secured behind the back.

STEP 2: All LED/EKG pads **cannot** be placed below sternum or left side of patient's abdomen and flank region. The wires will run off the upper body, under the armboard, and down the side of the bed.

STEP 3: Ventilation tubing will be secured with tube tree, and also run under the armboard, and down the side of the bed.

STEP 4: The Foley catheter will also run down side of the bed.

ALL VENTILATION/EXTENSION TUBING, END TIDAL CO2 LINES, EKG LINES, AND FOLEY CAN BE SECURED WITH TOURNIQUET ALONG SIDE OF THE BED. BE PREPARED BEFORE TURNING THE BED!!!!!!

STEP 5: ALL IV LINES whether they are located in the right or left upper extremity, will run off the head of bed, to the IV pole on the patient's right side, which will be used for draping. The robot will be docked over the patient's left shoulder.

THE SURGICAL TEAM WILL BE STANDING IN FRONT OF THE PATIENT ABDOMEN. AN OPEN PATH MUST BE KEPT OPEN BETWEEN THE BED AND YOUR DRUG PYXIS MACHINE!



References:

1. Goswami S, Nishenian E, Mets B. Anesthesia for Robotic Surgery in Miller's Anesthesia, 7th Edition, Churchill Livingstone Elsevier, Philadelphia, PA. 2010; pp 2389 – 2403.
2. Awad H, Santilli S, Ohr M, et al. The effects of steep Trendelenburg positioning on intraocular pressure during robotic radical prostatectomy. Anesth Analg 2009; 109: 473–8.
3. Phong SV, Koh LK. Anaesthesia for robotic-assisted radical prostatectomy: considerations for laparoscopy in the Trendelenburg position. Anaesth Intensive Care 2007; 35: 281–5.
4. Kalmar AF, Foubert L, Hendrickx JF et al. Influence of steep Trendelenburg position and CO2 pneumoperitoneum on cardiovascular, cerebrovascular, and respiratory homeostasis during robotic prostatectomy. Br J Anaesth. 2010 ;104:433-9.

Acknowledgements:

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Figure 1 is kindly provided by Kerri Wolverton, RN - Main Operating Rooms.
The picture in Figure 1 is kindly provided by Kelly Chambers CRNA.

What specific procedure would you like to use with the robotic technology?

What is your anticipated case volume (number of cases/week or month)?

What is your current case load for these types of procedures?

Will the cases be done emergently or scheduled in advance?

Is FDA approval needed?

If procedure is not FDA approved, how will you address this situation?

Are practices already established or is this new technique development?

Are there financial implications to consider? Other considerations?

[Institution name here]
PHYSICIAN EQUIPMENT PRIVILEGE PROFILE

Robotic Surgery

DATE: _____

_____, M.D. has made application for equipment privileges to perform surgery using the Computerized da Vinci Surgical Platform at [Institution Name]. A physician requesting these privileges must present appropriate documentation of training to the da Vinci Privileging Committee. A physician will be credentialed on an individual basis based on his/her qualifications.

I. PHYSICIAN CRITERIA

Initials

1. The physician must be Board Certified or Board Eligible or equivalent competency within his/her surgical specialty. _____

2. The physician must be privileged for the surgical procedure being performed on the da Vinci Surgical Platform. _____

3. **Newly Trained Physician:**

a) The physician must show evidence of successful completion of the Intuitive Clinical Pathway in use of the da Vinci Surgical Platform. _____

b) Must show evidence of successful completion of a minimum of TWO (2) proctored patient uses of the da Vinci Surgical Platform. In the absence of a credentialed proctor, a second surgeon who has met steps 1-3 may serve as a co-surgeon, or as the proctor. _____

Trained Physician at Previous Institution: Letter of documented da Vinci credentials or prior six (6) month case volume from previous institution. _____

Fellowship/Residency Trained Physician: Trained in a Residency or Fellowship program. Provide letter demonstrating proficiency and case volume in past six (6) months. _____

Maintenance of Robotic Privileges: Robotic privileges will be reviewed by Department Chairs for each reappointment cycle as is documented in the HMC Clinical Privileges form.

Physician

Department Chair

Surgical Director, Robotics

Original and Supporting Documentation to be retained by the Medical Staff Office
Copy: Department

{Your Letterhead}

{Recipient name and address}

{Date:}

RE: Robotic credentials for *{Candidate name}*

To Whom It May Concern:

{Candidate name} has completed an online robotics training module, a hands-on orientation session, at least 8 hours of simulator experience, and at least 10 cases as bedside assistant throughout their *{Residency/Fellowship}* at *{Institution name}*.

They have performed *{x number} {cases}* in the role of the assisting console surgeon and *{x number} {cases}* as the independent console surgeon. *{Additional comments on the candidate as appropriate.}*

I attest to *{Candidate's name}* training and competency for performing robotic surgery. I would therefore recommend *{Candidate's name}* for robotic privileges without reservation.

Sincerely,

{Your name}

Enclosure: Robotic case list