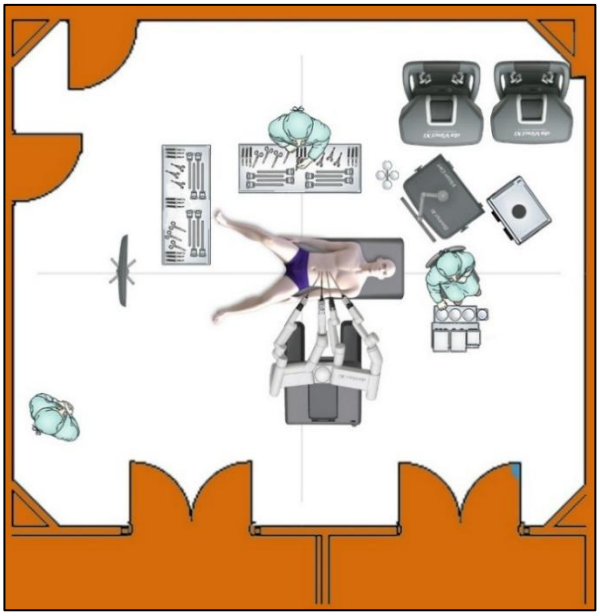
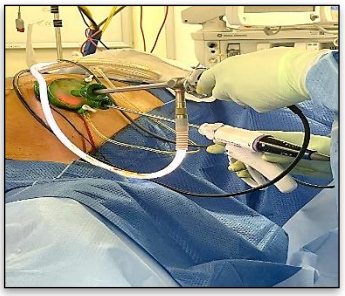
Contents

1. Hartmann's Reversal / Robotic / Arun Naik





Position: Both arms tucked in, Lithotomy position. bladder catheterized. The axis of the patient is aligned in such a way that an imaginary line can be drawn from the ankle to the knee and to the opposite shoulder as a straight line. The feet are placed flat on the stirrups and the legs kept down low enough that they do not interfere with the robotic arm movements

Part 1 of the procedure:

Colostomy taken down, anvil of ECS 9A circular stapler placed into the colostomy, purse string tightened. Gelpoint mini inserted into the stoma site 3, ports are placed through the gel point port. pneumoperitoneum is created and laparoscopy is done

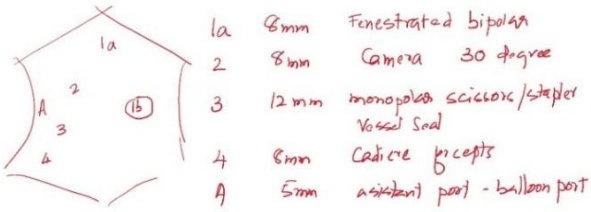
Until laparoscopy is done, and decision to proceed with robot is not atken, robotic ports and instruments should not be opened.

Flexy sigmoidoscopy can be done in the beginning of the procedure to assess the length of the rectal stump and also irrigate and wash out all the mucus secretions. It also helps to rule out any a stricture in the rectal stump. This will help the safe advancement of the EEA stapler.

It is necessary to clear out adhesions to the entire abdominal wall before all the ports can be safely placed. If adhesions prevent visualisation of one or more of the proposed port sites, ports can be placed one after the other during adhesion lysis and clear out the regions along the entire abdominal wall until there is enough space to put the all the ports. Laparoscopic scissors are required for this. A small sponge and a Raytec is left in the peritoneal cavity (Instruments to open- hand held diathermy, suction, purse string applicator, ECS 29 circular stapler, Gelpoint Mini – it comes with its ports. Lap DeBakey, ATrack retractors, lap scissors, small pack, a raytec).

Part 2 of the procedure: Ports are placed in an oblique fashion from left upper quadrant to RIF as below, R1, R2 and R4 ports are 8mm, R3 is 12mm port which can be planned in a way that it comes through the ileostomy site in case it is likely be required. Assistant port (5mm, ballon port) is placed in between / and behind R3 and R4 in the right flank. an additional 8 M robotic port is placed through the Gel point mini in the previous stoma site.

The initial positioning is slightly head up position with the left side up tilt with the targeting done to the left flank. subsequently after the splenic flexure mobilisation, the robot is redocked at after changing the position to steep head down so as to retract all the loops of small bowel from the pelvis. R1 is changed to the robotic port put in the stroma site and the previous left upper quadrant port can be used as a second assistant port Targeting now will be centred around the pelvis.



Camera is placed through R2 and mono polar scissors through R3. Fenestrated bipolar in R1 and Tip up or Cadier forceps in arm 4. (1Left,2 Right approach)

The DaVinci XI cart should be positioned perpendicular from the left of the patient. This allows rotation of the arm towards the deep pelvis as well as splenic flexure. The assistant surgeon, scrub nurses and all sterile trays will be on the right side. A colonoscopy cart is located towards the feet of the patient and is available for evaluation of anastomosis.

Adhesiolysis proceeds with sharp dissection with monopolar scissors, when adhesions are clear. But blunt dissection can also be employed using the side of the robotic scissors to carefully push on the adhesions which made them separate. Sufficient traction is necessary to do adhesionolysis in this regard it is always safer to push the bowel away to generate traction as opposed to pulling towards you when possible

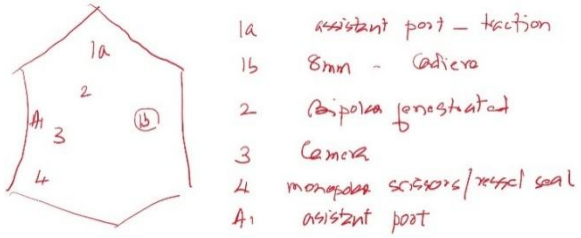
Free any small bowel that may be adherent to Colostomy site and omentum.Omentum is released from the colon and lesser sac is opened to expose the distal transverse colon.

Next step is splenic flexure mobilisation

The lesser sac is entered after the omentum is divided off the distal transverse. The spleno colic attachments are to be divided and left colon is mobilised after opening the left paracolic gutter. Vessel Seal device is useful for this part of the procedure. IMV is secured with vessel seal /stapler or Hemolock. It is important confirm that colon is mobilised enough to bring it down for tensionless anastomosis.

(Instruments to open- 4 x8mm robotic ports,1x 5mm ballon port, robotic 30-degree camera, Bipolar fenestrated, monopolar scissors, Vessel seal, Cadiere OR Tip up, lap suction, optionally robotic stapler-Sure Form 60mm White OR robotic hemoloc).

Part 3 of the procedure: Once the colon is completely mobilised the robotic instruments are removed, and robot is redocked after changing the position to steep head down. R1 is changed to port placed through the stoma site-gelpoint mini. (2 right, 1 left approach) robot is targeted to the pelvis. Next step would be rectal stump mobilisation. The rectal sizers or sizers in the vagina may sometimes be required to help identify the rectal stump.



Peritoneum on either side of the rectal stump is opened. Retro rectal space/TME space is opened. Dissect just enough to straighten the rectal stump. If the IMA or superior rectal pedicle is still intact, it can be secured with Vessel seal. This may help to open the posterior space. SureForm 60MM blue staplers is used to transact the excess rectal stump. this is the time to inject ICG and check the viability of the bounce using Firefly mode. Check the orientation of the colonic conduit to make sure it is not twisted.

Anastomosis is done with ECS29A circular staplers. Air test is done with the flexible sigmoidoscopy. Instruments are removed. It is possible to sometimes place additional reinforcing stitches over the anterior aspect of the anastomosis.

Robot is undocked. Sponge and raytec removed. The stoma site is closed with intermittent figure of 8 stitches with the No 1 PDS. Wound washed with cetrimide.12 mm port fascial defect is closed with to 0 Maxon figure of 8stitches. The skin incisions are closed with 3-0 Maxon.

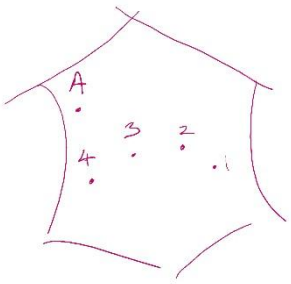
Comfeel dressings for port sites. Tegaderm, and combined with hypafix for pressure on the stoma site (Instruments to open- Rectal sizers J@J, Sure Form staplers 60mm blue. Robotic needle holder -optional. Syringe for air test or flexible sigmoidoscopy. - Sutures- 3-0 PDS, no1 PDS,0-Maxon, 3-0 Monocryl)

2. Pelvic Lymph Node Dissection / Robotic / Arun Naik

Port placement will be the one for ULAR or APR as this procedure is done most often with these two procedures. For right sided PLND, an additional 8mm port in left mid clavicular line just below the level of umbilicus may be necessary, with re docking with retargeting to right side of the pelvis. Placement of port no 4 is crucial, particularly for Right sided PLND, should not be too lateral as the bony pelvic brim, will limit the movement of the instrument in arm 4.

PLND is done after the TME dissection is completed. In case of APR, perineal wound will need to be packed and sealed to maintain pneumo peritoneum.

Boundaries for LPLND are defined laterally by the external iliac artery, medially by the inferior hypogastric nerve and pelvic plexus, cranially by the common iliac bifurcation, and caudally by the obturator internus and pelvic floor.



Side: Left PLND / Right PLND

Arm 1: Bipolar Fenestrated / Tip-UP

Arm 2: Camera / Camera Midline

Arm 3: Scissors - VesselSeal / Bipolar

Arm 4: Scissors / Tip Up

Note: Arm 4 not too lateral

Camera port which is arm 2 should be as close to midline as possible

In the Japanese Classification of Colorectal, Appendiceal, and Anal Carcinoma, lateral lymph nodes are classified into the proximal internal iliac, distal internal iliac, obturator, common iliac, external iliac, lateral sacral, median sacral, and aortic bifurcation nodes. The boundary between the proximal and distal internal iliac nodes is the superior vesical artery, which branches from the internal iliac artery.

The lateral /PLND area to be dissected can be defined by four planes: **1.** Medial plane **2.** Intermediate plane **3.** Lateral plane **4.** Dorsal plane

Medial plane (prehypogastric nerve fascia)

The prehypogastric nerve fascia is located between the mesorectal fascia and the hypogastric nerve at the posterior wall of the rectum, which extends ventrally along the lateral wall of the rectum and connects to Denonvillier's fascia at the anterolateral wall. It covers the hypogastric nerve, pelvic plexus, and pelvic splanchnic nerves, and as it extends further ventrally, it becomes adjacent to the ureter and is referred to as the Uretero hypogastric fascia.

This fascia forms a plane between the mesorectum and the lateral lymph nodes, and its lateral aspect is closely related to the internal iliac vessels. When lateral lymph node dissection is initiated, the lateral aspect of the medial plane is first dissected to avoid damage to the pelvic plexus and pelvic splanchnic nerves. During this procedure, the middle rectal artery may penetrate the prehypogastric nerve fascia, which needs to be transected . Dissection extends caudally beyond the pelvic splanchnic nerves of S4.

As we start this part of the dissection, peritoneum overlying the CIA bifurcation opened, ureter identified. Dissected along the uretero hypogastric fascia, thereby safeguarding hypogastric plexus. Uretero hypogastric fascia is retracted medially with tip up grasper. This forms the medial border of PLND. This plane is developed deep until the origin of levator ani, which is the tendinous arch of the obturator internus fascia and the ischial spine.

Lateral plane

The lateral extent of the Pelvic lymph nodes is defined by the pelvic wall, including the external iliac vessels, major psoas muscle, internal obturator muscle, levator ani muscle,and the tendinous arch of the levator ani muscle. Metastasis to the external iliac lymph nodes is rare; therefore, dissection is typically limited to exposure of the external iliac vein.

Care should be taken at this step to avoid injury to the small vessels penetrating into the pelvic wall. Anteriorly, the obturator foramen is identified, and the obturator vessels can be ligated at this entry point if necessary, with preservation of the obturator nerve. Further caudally, the dissection plane between the levator ani muscle and the lateral bladder merges with the space created after rectal mobilization and removal of the rectum. Communicating with the TME space at this step may prevent postoperative lymphocele, Ocelli et al. described the tendinous arch of the levator ani muscle as a thickening of the levator ani tendon extending from the inner pubic insertion to the ischial spine. This serves as a useful landmark for identifying the ischial spine.

As we start this part of the dissection, peritoneum is dissected over the EIA from its origin to where it is crossed by Vas deferens.

Lateral paravesical space creation: The obliterated umbilical artery is pulled medially, allowing for dissection along the lateral border, which creates the lateral paravesical space. Laterally, this exposes the external iliac vein, while medially, the dissection extends to the pubic bone.

The medial paravesical space is created by opening the plane along the medial border of the umbilical artery,also known as the vesicohypogastric fascial plane. This space is crucial for accessing lymph nodes around the inferior vesical vessels, because of their high risk of metastasis.

In female patients,the procedure begins by ligating the round ligament and extending the peritoneal incision along the external iliac vessels. The peritoneal edge is then mobilized

External iliac vein exposure: The external iliac vein is defined, and the nodal packet (fibrofatty tissue) is care-fully dissected away along the medial border of this vessel and off the floor of the pelvis. The dissection continues more deeply along the vein up to the medial branch, which communicates with the obturator vein (also known as the "vein of sorrow"). The nodes are cleared from the obturator fossa, taking care to preserve or excise the communicating vein.

The obturator nerve is carefully separated from the lymph nodes using a "split and roll" technique, ensuring the nerve is not damaged. The nodes are then moved medially for en bloc removal with the internal iliac group of nodes.

In certain difficult cases such as anorectal melanoma and more commonly in patients who have undergone radiotherapy with boost therapy, start dissection lateral to external iliac vessels. The vessels are fully detached and mobilized away from the psoas muscle to expose the iliac bifurcation and obturator nerve from behind. Special care is taken to preserve the genitofemoral nerve,which runs on the psoas muscle, close to the site where external iliac artery mobilization begins.

Intermediate plane (vesicohypogastric fascia)

The vesicohypogastric fascia covers the visceral branches of the internal iliac artery (such as the umbilical artery and superior/inferior vesical arteries), attaches caudally to the lateral side of the bladder and forms a boundary with the medial margin of the obturator lymph nodes.

Historically, the internal iliac artery was referred to as the "hypogastric artery," which is the origin of this naming. When dissecting the lateral aspect of the vesico-hypogastric fascia from the cranial to caudal direction, the umbilical artery is an important anatomical landmark to begin the dissection. Dissection along the avascular plane of the vesicohypogastric fascia starting from the lateral aspect of the umbilical artery will sequentially expose the anatomical structures: the superior vesical artery, inferior vesical artery and vein, bladder, and levator ani muscles at the bottom. Lateral lymph node metastasis is common around the inferior vesical vessels. If a positive lymph node is suspected around the inferior vesical vessels, it is advised not to expose the inferior vesical vessels, bladder, or levator ani muscles at this step to avoid exposure of cancerous tissues, but consider selective combined resection of the vesical branches. If metastasis is suspected around the main trunk of the internal iliac artery, en bloc resection of the internal iliac artery with its visceral branches is required. If metastatic lymph nodes are adhered or invade to the main trunk of the internal iliac vein, en bloc resection of the internal iliac vein may be required. Careful manipulation is needed to avoid injury to the small dorsal venous branches from the main trunk. In general, en-bloc combined resection of the main internal iliac vein is technically more challenging than resection of the main internal iliac artery. The cranial end of the dissection is at bifurcation of the external and internal iliac veins. At this step,

care must be taken to avoid injury to the obturator nerve. Common iliac lymph node metastasis is rare and associated with poor prognosis, and dissection of this area is not routinely performed unless a metastatic node is suspected.

Dorsal plane

The dorsal plane of the dissection is defined by the lumbosacral nerve plexus, piriformis muscle, coccygeus muscle, and internal iliac vessels. The branching pattern of the internal iliac artery varies, but a common pattern is branching into the internal pudendal and inferior gluteal arteries which exit the pelvis through the infra piriformis foramen (Alcock canal) and the greater sciatic foramen, respectively. The Alcock canal lies between the piriformis and coccygeus muscles, and the internal pudendal artery runs dorsally to the coccygeus muscle.

Hamabe et al. analyzed contrast-enhanced computed tomography and found that multiple internal iliac veins were present in one or both pelvic halves in 52% of the cases. The inflow pattern of the obturator vein into the internal iliac vein also varies. Accidental bleeding from an enlarged internal iliac vein extending towards the pelvic wall can be difficult to control.

Dissection of internal iliac group of nodes.

Medial dissection: The dissection extends medially toward the bladder and pelvic floor until the inferior vesical veins are identified. The nodal packet is care-fully dissected, and obturator vessels are transected if needed.

Lumbosacral trunk identification: The dissection proceeds deeper along the proximal portion of the obturator nerve to identify the lumbosacral trunk, which is traced toward the greater sciatic notch.Venous tributaries from the obturator muscle often cross the lumbosacral trunk and must be carefully managed during this step.

Internal iliac artery branches: The dissection follows the internal iliac artery, with the first branch, the obturator artery, being clipped at its origin if necessary. The dissection continues anteriorly along the internal iliac artery branches, such as the pudendal and inferior vesical arteries, as they exit the lateral pelvic wall. Variations in venous drainage may necessitate clipping of the obturator vein, inferior vesical vein, or the common trunk of the inferior vesical and pudendal veins. Small branches feeding into the nodal packet are clipped or ligated while preserving the superior gluteal artery.

Larger nodes: When larger nodes are located along the internal iliac vessels or inferior vesical nodes, it may be necessary to ligate the internal iliac artery and,in some cases, the vein at their origins, particularly beyond the superior gluteal artery. The distal ends of these vessels are then dissected close to the bladder to ensure complete clearance.

Final nodal packet dissection: Once the nodal packet is free from the obturator nerve, lumbosacral trunk,and proximal branches of the internal iliac vessels, it remains attached to the bladder via the vesical vessels and endopelvic fascia. These nodal packets, especially larger ones, are often missed in dissection. The packet is carefully separated from the bladder and perivesical fat, with inferior vesical vessels either preserved or sacrificed depending on the case. The final portion of the nodal packet is then detached from the endopelvic fascia and levator muscles to complete the dissection. In cases with larger nodes or when vessels are taken at their origin, the terminal branches of the pudendal artery and vein may need to be sacrificed.

Approach to bilateral nodes: For bilateral LPLND, the procedure typically begins on the less affected side to ensure the preservation of at least one superior vesical vessel. Failure to preserve these vessels can com-promise bladder blood supply, potentially leading to complications such as cystectomy or pelvic exenteration.

The most critical and difficult area is the distal internal iliac nodes group, which is an entry of lateral lymphatic flow from the rectum. Complete dissection should be performed along the terminal branches of the internal iliac vessels until identifying the internal pudendal artery, because it is the site most commonly containing metastatic lymph nodes. The specimen is collected in a plastic bag and retrieved.

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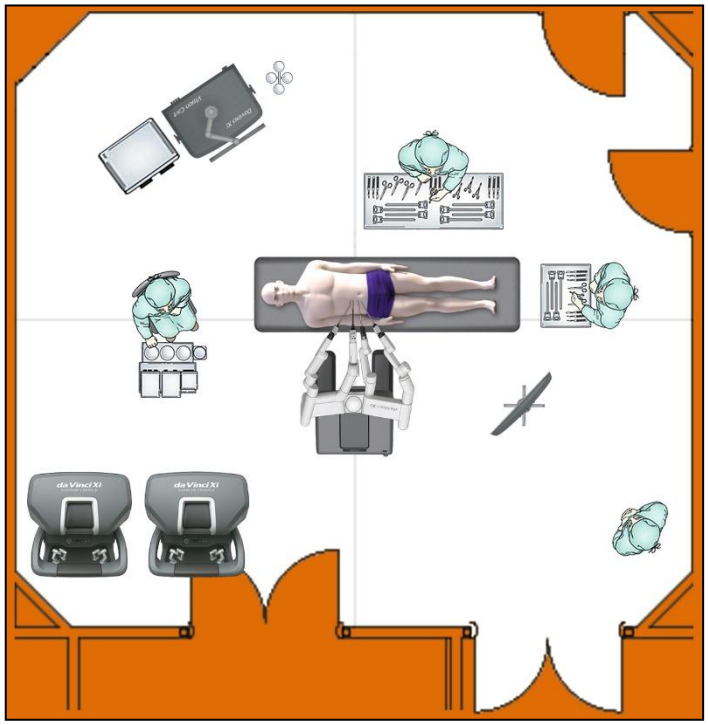
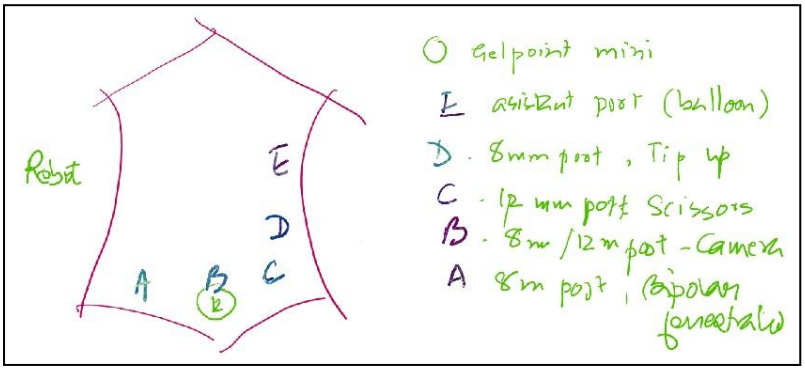
3. Right Hemicolectomy/ Robotic / Arun Naik



Position: Supine, both arms padded and tucked in, bladder catheterised. Face covered with metallic frame to avoid robotic arms hitting the face. Robot is positioned on patient's right side.
Trendelenburg or reverse Trendelenburg- depends upon on the situation. If difficult to move small bowel loops, may need head down position. If Hepatic flexure is deep, may need slight head up position. Right side up tilt. Key is ability to expose the ileo colic pedicle
Small suprapubic incision, gelpoint mini inserted. 8mm robotic port through gel point mini inserted, a gauze kept in intraabdominal cavity

Port position:
4 port suprapubic port technique:
Arm1 8mm port, fenestrated bipolar
Arm2 8mm port, 30 degree scope
Arm3 12mm,with adapter- monopolar scissors, veseseal, stapler, needle holder
Arm 4 8mm port. Tip up grasper. Balloon port is used as assistant port.



Things to do before docking the robot
Release adhesions may need to use lap scissors.
Dock the camera port.
Target- target anatomy is the furthest point required to reach with in workspace, right flank.
Dock the other ports.

Burp.
Check the space between the arms.
Introduce instruments under vision.

Isolate the IC pedicle with scissors and Vesel seal. Secure it with sureform white stapler or vessel seal.
transect the small bowel with blue stapler-sureform blue.
Transect the colon with sureform blue.

ICG - dissolve 25mg in 10ml of saline, inject 3ml(7.5mg) IV, and then flush the IV line. Switch to firefly mode and watch

Anastomosis-orient small bowel and colon side by side. Hold the bowel with bipolar, and assistant holds on other side with DeBakey to apply counter traction.
Create enterotomy with scissors, repeat the same process on colon.
Introduce the stapler-blue, with cartridge side into colon, bend the staplers tip up slightly so than colon does not slip away, or assistant can hold it in place with grasper. Fix the stapler arm. Now with arm bipolar forceps and tip up move the enterotomy on small bowel to the other jaw of the stapler.
Once in the jaws,elbow of the bipolar to position the bowel in the jaws of the stapler.

3-0 PDS 12-15cm to the most proximal end of the enterotomy site.
In case where large part of transverse colon is removed, a stay stitch between small bowel and stapled end of the colon,may be required to move the part to be stapled away in the RUQ so as to accommodate the jaws of the stapler.
3-0 Stratfix- barbed suture is used to close the enterotomy. In two layers

12mm port- fascia closed with 0-Maxon

INSTRUMENTS
GelPOINT mini laparoscopic system
Atraumatic laparoscopic grasper, DeBakey, lap suction
Laparoscopic scissors (stand by)

Handheld diathermy, suction

3 x8mm ports, one 12mm port with size adapter, 5 mm ballon port
Robotic Tip up grasper, bipolar fenestrated, veseseal,
sureform staplers one white and 3 blue (not to open unless asked for), needle holder

3-0 PDS 15cm x2
3-0 stratafix x2

No 1 PDS /loop
3-0 monocryl for skin

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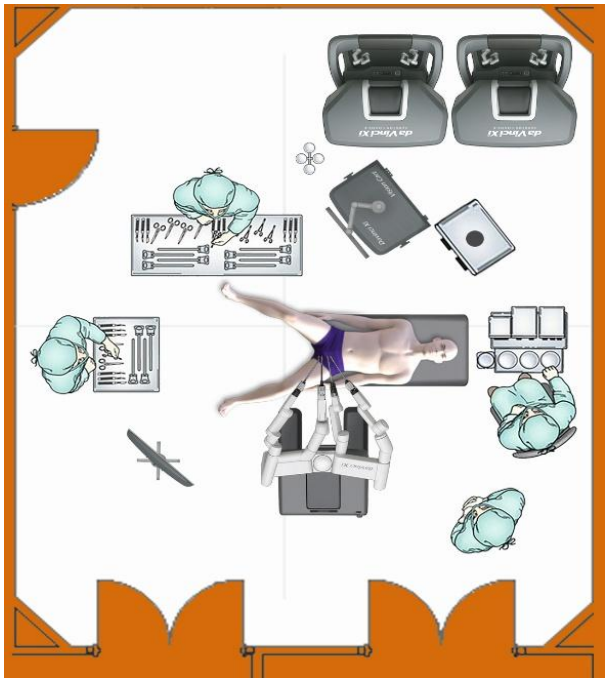
4. TAMIS (Trans Anal Minimally Invasive Surgery)



Position: Standard: Lithotomy position. Both arms tucked in. Perineum flush with the table to prevent pelvic tilt. **Alternatives:** Prone – Jack-knife for ventral wall polyps or use image inversion in lithotomy.

Knees bent to 90° and slightly rotated away from midline.

Drop knees during robot drive-in to clear patients' legs, then raise them before docking and targeting.

Port and Access Setup:

Use Lone Star Retractor to create an airtight seal for the GelPOINT path.

Optionally, suture GelPOINT sleeve to the perineum at 3 & 9 o'clock positions.

Insert blue 10mm GelPOINT cannulas at 12, 3 & 9 o'clock positions for easier air docking.

Avoid placing the gel cap latch over a suture anchor point.

Use a 5mm or 8mm AirSeal / Lexion port at 6 o'clock position.

Avoid irrigation as it may flood the AirSeal.

Use included blue bag if standard insufflation is used.

Instrument and Docking Tips:

Use a bariatric 8mm cannula at 12 o'clock position for endoscope to reduce cannula clashing. Adjust Trendelenburg and table height to in the assistant's comfort before air docking. Air dock ports above patient t0 facilitate insertion. Use 30° endoscope. Target with endoscope for optimal boom position. "Burp" ports outwards to stretch gel and maximise working space.

Instrument Preferences:

Dominant Hand: Hook and Monopolar Curved Scissors – Switch to Large Needle Driver for suturing.

Secondary Hand: Fenestrated Bipolar or Maryland Bipolar.

Specimen Retrieval: Use glove finger through AirSeal or 8mm port. Alternatively, use specimen bag clipped outside GelPOINT & remove via gel cap post-undocking.

Video resources: Dr Satish Warrier **1:** https://www.youtube.com/watch?v=qyAnVju1cMM&rco=1 **2:** https://www.youtube.com/watch?v=UdY421K2hGA

? Just fleet enema, if not clear, wash with flexi sig: Robot from left side of the patient: GelPoint mini for upper rectal lesions: GelPoint path for low rectal lesions near dentate line, trim with scissors at the quadrant where lesion is located. Alternatively lone star alone can be used without GelPoint: Robot docked outside anal canal: Airseal port at 15mm of HG: Nasogastric tube as suction catheter manipulated by robotic instruments.

Dissect from distal to proximal: 3_0 V loc 180 for closure, bring the suture towards the needle, not the needle towards the tissue. Suture towards you,

Use the dilator of the GelPoint (applied medical, orlando 2011) repeatedly before inserting the GelPoint path channel: Channel is hooked posterior to the canal, and then anterior part is pushed down and folded in: Go as far laterally as possible with ports: Mark the margin all around 5mm for rectal cancers_ ASCRS guidelines. Local excision is an appropriate treatment for carefully selected T1 rectal cancers without high-risk features: Rule of 2's_ too old, too sick, too obese:

Excisional biopsy Radiological evaluation of clinically benign rectal neoplasms may not be necessary before local excision_ lawrence Lee, manchester royal infirmary_ as MRI frequently over stages the lesion: Insufflation stabilisation bag If the polyp is very distal, use the hybrid technique. Do the distal part with hills furgussons retractor and then do the remaining part with GelPoint: Pin the specimen, as otherwise pathological assessment is difficult:

TESAR, t_ REC trials for pT2 lesions chemo rad adjuvant after local excision is equivalent to TME NEO trial, 3 months of pre op chemo stage 2 trial, 7 of 10 patients had no cancer. 58 patients. 99 and 90 percent of LR free at 1 and 2 years:

Relationship anterior lesion to the middle valve of houstan on MRI is important as it corresponds to anterior peritoneal reflection. If the lesion is above this reflection, a full thickness resection could result in an intraperitoneal defect.

Scopalamine 20mg (buscopan). All patients mechanical bowel prep

Left lateral position with knees bent: Robot from right.

Irrigate with dilute betadine

5 days course of oral Abs

Use a bariatric robotic port for the camera

Prone jackknife position_ sustaining a more stable pneumoperitoneum, and prevents the unintended diffusion of gas in to proximal bowel.

Robotic arm 123 with upper abdomen orientation

Stepped or staggered port depth also helps.
Gel point rings must be seen as another port, moving it will increase the range of vision

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