

Appendices

Appendix 1. Surgical description of intra and extraperitoneal approach of Paraaortic Lymphadenectomy in MIS.

Paraaortic Lymphadenectomy:

General considerations:

Assessment of retroperitoneal nodes is an important part of the surgical staging of gynecologic cancers.

The aortic or lumboaortic area extends *caudally* from the iliac bifurcation *caudally* to left renal vein *cranially* where it crosses the aorta and is limited *laterally* by both ureters and *dorsally* by psoas muscle and the spine.

It includes different ganglion or lymphatic groups from right to left: latero-caval, pre-caval, interaorto-caval, pre-aortic and latero-aortic. Posteriorly there are retrocaval and retroaortic lymph node groups.

Inferior mesenteric artery divides lumboaortic lymphadenectomy into two levels:

- Inframesenteric, between aortic bifurcation and inferior mesenteric artery.
- Supramesenteric, between inferior mesenteric artery and left renal vein.

This technique can be performed by laparotomy, laparoscopy and robotically.

This document will focus on the description of surgical steps during trans and extraperitoneal approach by minimally invasive surgery.

Inframesenteric Paraaortic laparoscopic *transperitoneal* approach was first described by J. Childers¹ and Netzhat CR² in 1992 and finally *infrarenal* Paraaortic laparoscopic *transperitoneal* was described by D. Querleu and E Leblanc³ in 1994 and later on in 1995 by Nick M. Spirtos⁴. While laparoscopic *extraperitoneal* approach was first used in 1995 by Vasilev A.⁵, and developed by D. Dargent⁶ and subsequently by D. Dargent and D. Querleu⁷

Anatomical landmarks:

Renal arteries:

- Their origin is usually , but not always, cranial to the left renal vein.
- A careful dissection must be performed around left renal vein because renal arteries may originate lower than the level of renal veins.

Renal veins:

- *Left renal vein* is located behind duodenopancreatic complex. It has three afferent veins (left gonadal vein, azigo-lumbar vein and left suprarenal vein). In case of a large lesion over the pre-aortic area, left renal vein can be clamped without problems thanks to the protective anastomosis with the azigolumbar vein.
- *Right renal vein* is usually placed caudally to the left one. It is the cranial and right limit of the latero caval dissection. In case of a serious injury, it should be reimplanted to preserve the right kidney.

Ovarian arteries:

- Both ovarian arteries are located cranially to inferior mesenteric artery. Right ovarian artery originates from the anterior face of the aorta and left ovarian artery comes from the lateral surface, usually at the same level. They can be sacrificed, unless ovaries are preserved.

Ovarian veins:

- *Right ovarian vein* is inserted directly into VCI just above the level of the mesenteric artery. It can be clipped to avoid possible injury to VCI.
- *Left ovarian vein* is inserted in left renal vein and helps to find the lateral limit of supramesenteric paraaortic dissection.

Inferior Mesenteric Artery:

- Originates on the left lateral side of aorta at its 1/3 inferior part.

Lumbar arteries:

- They are placed laterally to the aorta and run in the anterior face of the vertebral column. Their injury in the upper lumbar or thoracic area can cause paraplegic condition.

The **cisterna chyli** is located approximately at the level of L2 vertebra, made by the confluence of the right and the left lumbar lymphatic trunks with the intestinal trunk.

Ventral tributaries to the inferior vena cava:

- Cautious dissection in the anterior surface of IVC is needed to avoid the damage to the ventral tributaries^{8,9}. The anchoring of the ventral tributaries near the IVC intima is the *locus minoris resistentiae*, which explains easy tear and bleeding from the wall of IVC.

Autonomic Innervation:

- Abdominal aortic plexus is located on the sides and in front of the aorta.
- Superior hypogastric plexus is located at the base of the mesentery before joining the sympathetic chains at the level of T10 – L2.

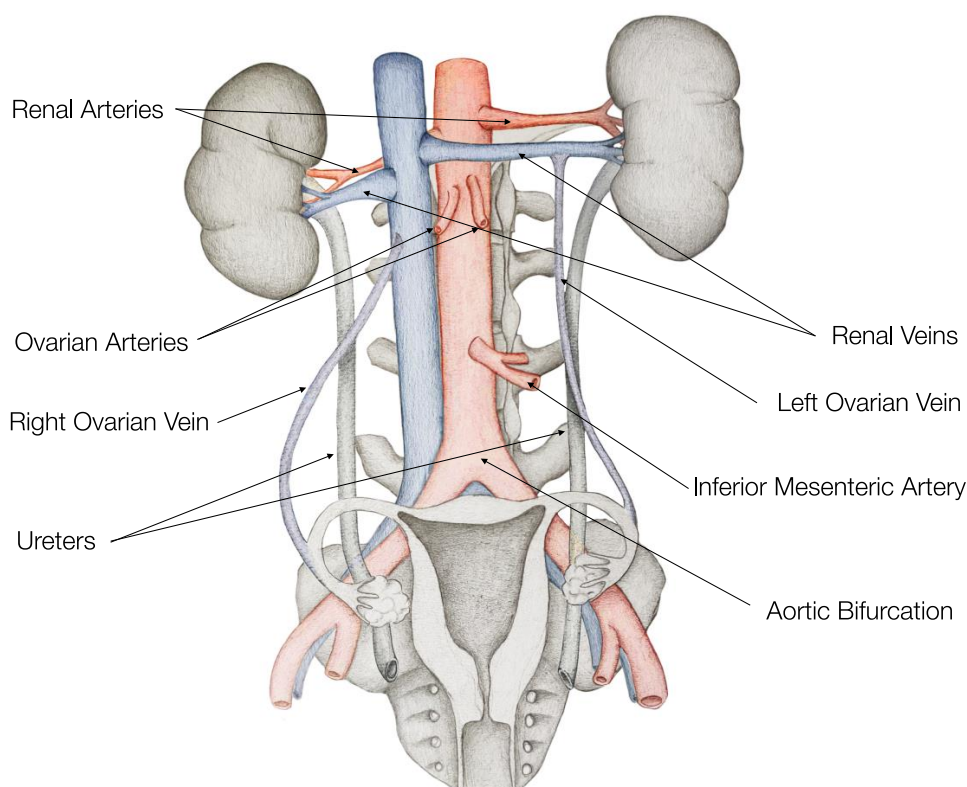


Figure 1. Anatomical paraaortic landmarks.

Anatomical variations¹⁰:

Vascular abnormalities can occur in the vena cava, renal, azygos, pre-vertebral and ascending lumbar venous systems, as well as the renal arteries. As many major variations are identifiable by imaging, I would recommend careful preoperative reading of the imaging, which is mandatory before engaging in aortic dissection.

Arterial variations¹¹:

- *Renal arterial variants:*
 - Accessory renal arteries are quite common, with prevalence as high as **30-40%**.
 - Right renal arteries are classically described as passing posterior to the IVC (there are around 5% pre-caval renal arteries).
 - There are also some rare cases of *unique ascending renal arteries*. Care must be taken with the right renal artery, which can be injured below the level of the left renal vein, between the aorta and the vena cava.
- *Accessory renal polar arteries:*
 - Occur unilaterally or bilaterally as a single or a double vessel with a frequency of **9-30%**. Usually originate from the abdominal aorta, run ventrally over the vena cava to the right kidney and directly to the lower pole of the kidney on the left side.
 - In addition, polar arteries may originate from the common iliac artery or the median sacral artery.

- Their accidental transection may lead to infarction of the lower kidney pole and, in some occasion, renal hypertension.
- *Polar renal arteries* (the most frequent), especially on the left side.
- Variations in *gonadal arteries* origin.

Venous variations¹²:

Occur in about 3% of cases and they include:

- Left-sided IVC (situs inversus) (0.2-0.5%)
- Double vena cava (2.2-3%)
- Retroaortic left renal vein (1.8-2.4%)
- Circum-aortic renal vein (1.5-8.7%)
- Interrupted IVC.

Less than 0.3% of the general population have horseshoe kidneys, which are seen in approximately 1 in 300 pyelographies.

Paraaortic Lymphadenectomy - Transperitoneal technique:

I. Operative room set-up and operative access

An appropriately equipped operation theatre and correct positioning of the laparoscopic tower and of surgeons are key factors to ensure the surgical procedure can be performed safely.

1	Operative room organization	
1.1		Patient
1.2		Laparoscopic screen and surgical instruments
1.3		Surgical team
2	Abdominal access. Pneumoperitoneum creation	
2.1		Before pneumoperitoneum creation
2.2		Achieve intraperitoneal access using a recognized method
3	Initial inspection of the abdominal cavity	Perform diagnostic laparoscopy
4	Trocar insertion	
4.1		Checking anatomy before trocar insertion
4.2		Trocar insertion
5	Inspection of the abdominal cavity	
5.1		Optimal pelvic and abdominal exposure
5.2		Exploration of the peritoneal cavity

1. Operative room organization:

1.1. Patient:

- Patient must be placed in lithotomy with legs spread apart in minor ventral flexion.
- Arms should be placed along the patient's body to avoid brachial plexus injury.
- Buttocks must be placed slightly over the edge of the operating table.
- The use of shoulder braces or antislid pads or chest bondage is worthwhile, especially in cases where forced Trendelenburg position is needed. Patient must not slide cephalad during Trendelenburg position.
- Nasogastric/orogastric tube should be checked (if used).

- Foley catheter should be checked in place.

1.2. Laparoscopic screen and surgical instruments:

- Laparoscopic screen should be placed at the head or at the right/left shoulder of the patient.
- Other surgical equipment should be organized appropriately to avoid mix-up during surgery.
- *Surgeon* uses: bipolar forceps, scissors, advanced sealing /ultrasonic device, suction irrigation, sponge.
- *Assistant* uses: forceps, retractor.
- Instruments should be checked before their use.
- 30° camera may be useful for some steps.

1.3. Surgical team:

- Surgeon and 1-2 assistants stand at different sides of the patient in relation to the optic and ancillary port placement.
- There are several options of trocar and surgical team placement depending on the experience and traditions of centers for both the laparoscopic and robotic approaches.

2. Abdominal access. Pneumoperitoneum creation:

2.1. Before pneumoperitoneum creation:

- Table should be placed in neutral position. Trendelenburg position before pneumoperitoneum creation should be avoided to limit the risk of vascular injury.

2.2. Achieve intraperitoneal access using a recognized method:

- Open access (Hasson technique).
- Veress needle access: the angulation of the needle depends on the size/obesity of the patient with a more perpendicular angle in obese patients. Safety tests for correct Veress needle placement should be performed.
- Direct entry technique using optical trocars.

3. Initial inspection of abdominal cavity. A diagnostic laparoscopy is performed:

- Once the pneumoperitoneum is created, the site of entrance should be checked, looking for possible bowel or vascular injuries or pre-pneumoperitoneum.
- All four quadrants of the abdominal cavity should be checked, including liver and diaphragm.

4. Trocar insertion:

4.1. Checking anatomy before trocar insertion:

- Define reference points: anterior superior iliac spine, epigastric vessels and umbilical artery localization.
- Ancillary trocar placement should be selected according to patient's anatomy and type of surgery.

4.2. Trocar insertion:

- Adhesiolysis before trocar insertion should be performed in order to ensure their optimal placement.
- Optimal trocar orientation is 90° from the abdominal plane. Trocar placement should allow free instrument movements. Ergonomic placement between trocars should be considered.
- Check the localization of epigastric vessels and umbilical artery before trocar insertion, avoiding injury through direct intraabdominal visualization (transillumination only permits visualization of subcutaneous vascularization). Possible trocar insertion injuries should be checked.

- The number and placement of trocars depends on the surgeon's preference. We represent different dispositions in the figures below^{13,14}.

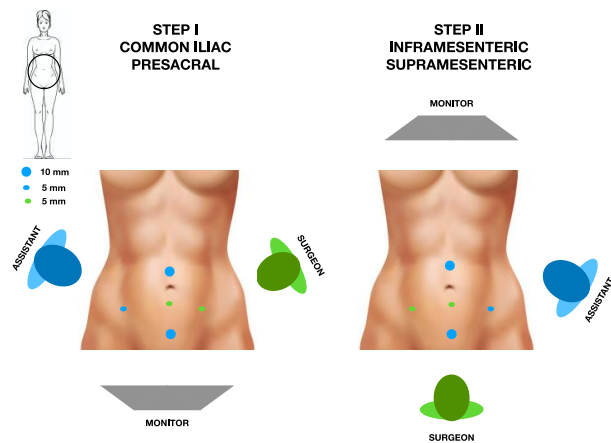


Figure 2. Laparoscopic **option A** for trocar placement in **transperitoneal** approach.

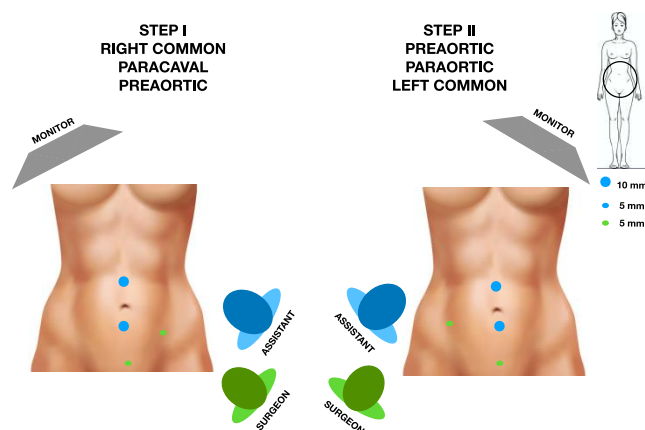


Figure 3. Laparoscopic **option B** for trocar placement in **transperitoneal** approach.

Robotic Transperitoneal S or Si

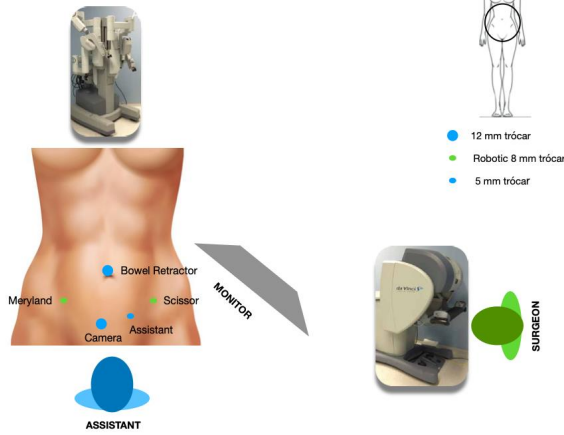


Figure 4. Robotics-assisted laparoscopic trocar placement for **S or SI** model in **transperitoneal** approach.

Robotic Transperitoneal Xi Option A

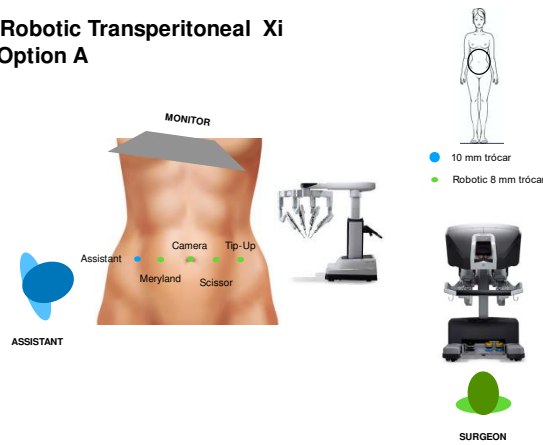


Figure 5. Robotics **option A** trocar placement for **Xi** model in **transperitoneal** approach.

Robotic Transperitoneal Xi Option B

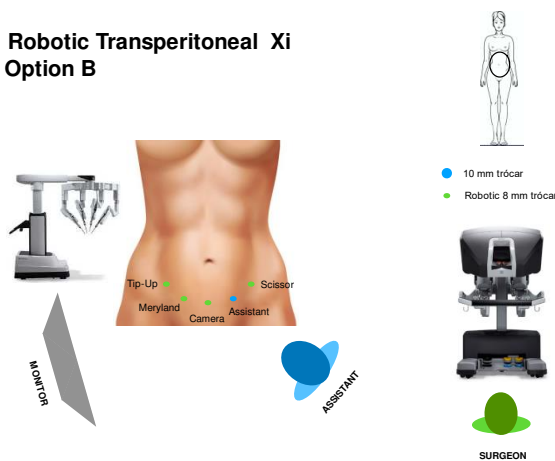


Figure 6. Robotics **option B** trocar placement for **Xi** model in **transperitoneal** approach.

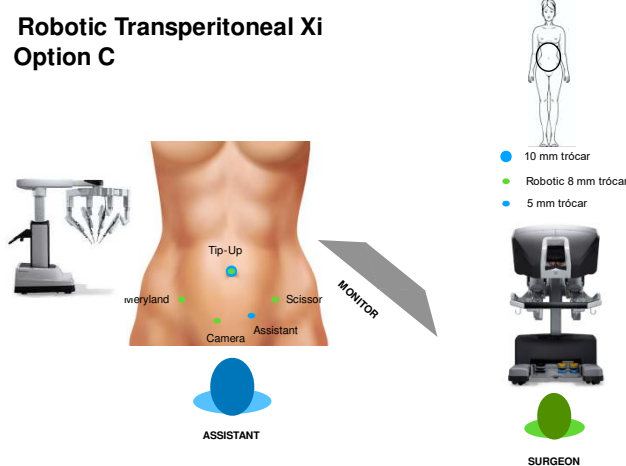


Figure 7. Robotics **option C** trocar placement for **Xi** model in **transperitoneal** approach.

5. Inspection of the abdominal cavity

5.1. Optimal pelvic and abdominal exposure:

- Trendelenburg position is continued until the small bowel can be completely moved out of the pelvis.
- Optimal Trendelenburg position will allow visualization of the promontory and right ureter crossing external iliac artery (except for obese patients).
- The small bowel loops are displaced into the right upper quadrant of the abdomen.
- Table must be placed as low as possible, allowing for an ergonomic position. In case this is not achieved, a platform should be used.

5.2. Exploration of the peritoneal cavity to exclude presence of metastatic disease. When peritoneal fluid is present, it should be sent for cytology.

II. Surgical steps:

The following steps of systematic aortic lymphadenectomy should be performed by laparoscopy¹⁵⁻²⁰ and robotics²¹⁻²⁴.

During lymph node dissection care should be taken during tissue manipulation. Lymph nodes should not be disrupted or crushed, as the rupture of the capsule may cause tumor dissemination.

6	Initial dissection and exposure of retroperitoneum	
6.1		Opening retroperitoneum
6.2		Dissection of the anterior surface of aorta
6.3		Peritoneum is elevated
7	Identification of anatomic landmarks	
7.1		Right infundibulopelvic ligament and ureter
7.2		Right common iliac artery and inferior vena cava
7.3		Aorta and the origin of the inferior mesenteric artery
7.4		Left renal vein and left gonadal veins
7.5		Left infundibulopelvic ligament and ureter
8	Initial iliac and precaval/paracaval dissection	
8.1		Dissection of precaval nodes from aortic tissue
8.2		Dissection of paracaval nodes
9	Aortocaval and preaortic dissection	
9.1		Dissection of aortocaval nodes
9.2		Dissection of preaortic nodes
9.3		Autonomic nerves and superior hypogastric plexus
10	Inframesenteric paraaortic dissection	
10.1		Lateralization of left mesocolon
10.2		Left psoas muscle and left sympathetic chain
10.3		Left inframesenteric paraaortic nodes
11	Supramesenteric paraaortic dissection	
11.1		Dissection of left renal and ovarian veins
11.2		Left supramesenteric paraaortic nodes. Clipping cysterna chyli (optional)
12	Lymph nodes extraction	Extraction by endobag or similar

6. Initial dissection and exposure of retroperitoneum:

- 6.1. Placement of the bowel loops in the right upper quadrant. Posterior peritoneum is opened just above the point where the right ureter crosses iliac vessels at the origin of the *Right Iliac bifurcation*.
- 6.2. Dissection follows anterior surface of the aorta over the right side of the descending aorta (the origin of the inferior mesenteric artery is located on the left side of the aorta) till the third portion of the duodenum and the *inferior mesenteric vein*.
- 6.3. Peritoneum is elevated upward bilaterally with the help of forceps, retractor, peritoneal traction by sutures or anchors. This position may keep small bowel loops outside the operative field.

7. Identification of anatomic landmarks:

The various anatomic landmarks should be identified first. From right to the left, they are:

- 7.1. Right infundibulopelvic ligament and ureter should be dissected and retracted laterally. Right Psoas Muscle should be identified as a landmark.
- 7.2. Right common iliac artery and inferior vena cava should be identified.

- 7.3. Aorta and the origin of the inferior mesenteric artery on its left antero-lateral aspect, 4-5 cm. cephalad of the aortic bifurcation. Gonadal arteries should be identified cranially to the inferior mesenteric artery.
- 7.4. Left renal vein and gonadal veins should be identified. Be careful about the posterior tributaries of the left renal vein.
- 7.5. Left infundibulopelvic ligament and ureter, should be dissected and retracted laterally (in the inframesenteric, underneath the mesosigmoid).

8. Iliac and precaval/paracaval dissection:

The most common and recommended nodal dissection begins from Right Common Iliac Artery up to the renal vein. Dissection follows precaval and paracaval tissue to the right and latero-aortic tissues to the left.

- 8.1. Dissection of **precaval** nodes has to be performed with cautious dissection of the *ventral tributaries (fellow veins)*^{8,9} of the inferior vena cava, especially in the caudal 1/3.
- 8.2. For the **paracaval** dissection, right ureter is dissected laterally and right ovarian pedicle is retracted. Ligation of right ovarian vein via clip or sealing device can prevent a possible tear and bleeding from inferior vena cava.

9. Aortocaval and preaortic dissection:

- 9.1. During the dissection of **aortocaval** nodes, the lumbar arteries and veins should be preserved as much as possible²⁵. Right sympathetic chain is localized between aorta and vena cava, and can be damaged during this dissection. The visualization of these structures could be recommendable, mostly to avoid harm them.
- 9.2. During the dissection of **preaortic** nodes, the origin of the inferior mesenteric artery is identified on the anterior surface of the aorta at its left side. Care should be taken to preserve it, as its injury may cause necrosis of the sigmoid colon but extremely uncommon²⁶.
- 9.3. Preservation of the autonomic nerves²⁷ as well as superior hypogastric plexus should be considered.

10. Inframesenteric paraaortic dissection:

- 10.1. Lateralization of left mesocolon allows recognition of left ureter and left gonadal vessels by the medial peritoneal leaf. These two structures cross each other at the level of the inferior mesenteric artery.
- 10.2. Left psoas muscle and left sympathetic chain are identified and respected.
- 10.3. Left paraaortic nodes are dissected from the level of the left ureter crossing left common iliac artery up to inferior mesenteric artery.

11. Supramesenteric paraaortic dissection :

- 11.1. Before nodal dissection, it is strongly recommended to identify the left renal vein and the left ovarian vein, which is continued dorsally by azygo-lumbar vein.
- 11.2. Dissection starts from the inferior mesenteric artery up to the left renal vein. Identify the origin of ovarian arteries. Preventive hemostasis and division (but must be preserved in case of fertility purposes). Consider clipping cisterna chyli and big lymphatic channels close to left renal vein to prevent lymphorrhea.

12. Lymph node extraction :

- Lymph node extraction should be safely done by using endobag or similar to prevent tumor dissemination. Bags can be placed at the beginning of the dissection and used throughout the procedure.
- It is advisable to separate the lymph node dissection by different area of dissection for further analysis.

Paraaortic Lymphadenectomy - Extraperitoneal technique:

Robotic extraperitoneal approach is not considered because it is not widely distributed.

I. Operative room set-up and operative access

1	Operative room organization	
1.1		Patient
1.2		Laparoscopic screen and surgical instruments
1.3		Surgical team
2	Abdominal access. Pneumoperitoneum creation	
2.1		Before pneumoperitoneum creation
2.2		Achieve intraperitoneal access using a recognized method
3	Initial inspection of the abdominal cavity	Perform diagnostic laparoscopy
4	Access to retroperitoneal space	
4.1		Access to retroperitoneal space
4.2		Trocars placement

1. Operative room organization:

1.1 Patient:

- Patients must be placed in lithotomy with legs spread apart in minor ventral flexion (especially in case of possible conversion to intraperitoneal approach) or they can be placed flat along the body .
- Both arms should be placed along the patient body. Left arm lower than the truncus, for allowing maximum space for the two surgeons.
- Buttocks must be placed slightly over the edge of the operating table. Patient should be positioned close to the left edge of the operation table.
- Nasogastric/orogastric tube should be checked (if used).
- Foley catheter should be checked in place.

1.2 Laparoscopic screen and surgical instruments:

- Laparoscopic screen should be placed on the right of the patient, opposite the surgeon.
- Same rules should be followed, as described for transperitoneal approach.

1.3 Surgical team:

- Surgeon stands at the left side of the patient. Assistant stands beside the operator's left, or between patient's legs.
- Instrument nurse is placed on the left of the operator.

2. Abdominal access. Pneumoperitoneum creation:

- Same rules should be followed, as described for transperitoneal approach.

3. Initial inspection of abdominal cavity. A diagnostic laparoscopy is performed:

- Same rules should be followed, as described for transperitoneal approach.

- Exploration of the peritoneal cavity to exclude presence of metastatic disease. When peritoneal fluid is present, it should be sent for cytology.
- Accessory 5mm. trocar can be placed on the on the right iliac fossa to perform a complete evaluation of the abdominal cavity.

4. Access to retroperitoneal space:

Trocar placement in extraperitoneal space is usually done by open technique by finger dissection and guidance, although a dissection directly with the trocar is described. Preparation of the extraperitoneal space can be done via intraabdominal optical vision, and deflate intraabdominal pneumoperitoneum till pressure between 8-10 mm Hg once they start to insufflate extraperitoneal space.

4.1. Access to retroperitoneal space:

- A 2 cm iliac incision is made at lateral 1/3 between iliac spine and umbilicus.
- Abdominal muscles must be dissected taking into account their order (from superficial to deep, major oblique, minor oblique and transversus).
- With the left index finger peritoneum must be dissected against the deep layer of transversus muscle. It is not recommended to pass the lateral border of the rectus sheath, where the peritoneum is more fixed.
- Left index finger has to identify the left psoas muscle and Left Common Iliac Artery.

4.2. Trocars placement:

- Under left index finger guidance, a trocar of 10-12mm should be placed in the left flank in the mid-axillary line, half-way between the Iliac crest and the costal margin, making sure that the peritoneum is not breached, by the help of the finger placed in the left iliac incision.
- Insufflation pressure is set at 12mmHg (previous intraperitoneal desufflation).
- The optic is introduced in this trocar, the left index finger continues dissection to identify the left ureter and left gonadal vessels.
- The index finger is replaced by a 10 mm balloon-armed trocar and then the laparoscope is reinserted through this trocar.
- A 5mm left subcostal trocar is placed cranially at the anterior axillary line under direct vision after further retroperitoneal dissection from the 10mm operative trocar.

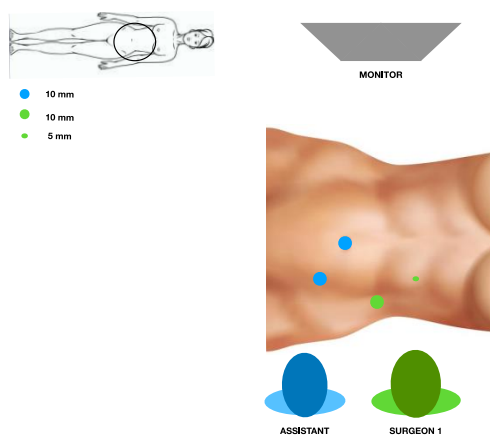


Figure 8. Laparoscopic trocar placement in **extraperitoneal** approach.

II. Surgical steps.

5	Identification of anatomic landmarks	
5.1		Inframesenteric anatomical landmarks
5.2		Supramesenteric anatomical landmarks
6	Left Common Iliac Artery and latero-aortal dissection	
6.1		Dissecting left paraaortic space
6.2		Dissection of preaortic nodes
6.3		Dissection of the cranial limit
7	Aortocaval and laterocaval dissection	Dissecting right ureter, and precaval and laterocaval nodes
8	Lymph node extraction and peritoneal fenestration	
8.1		Extraction by endobag
8.2		Peritoneal fenestration

5. Identification of the anatomical landmarks:

5.1. Identification of *inframesenteric* anatomical landmarks:

- Retroperitoneal space is created by dissecting posterior peritoneum from the anterior face of psoas muscle up to left renal vessels.
- Left ureter and gonadal vessels are identified. Left ureter is allowed to remain adherent to the peritoneum anteriorly and it will be in the roof of the dissection.
- The antero-lateral aspect of the left common iliac artery and the aorta are identified.

5.2. Identification of the *supramesenteric* anatomical landmarks:

- The last left sympathetic postganglionic fiber runs close to the inferior mesenteric artery (IMA).
- Dissection up to the left renal vein is made following the antero-lateral surface of the aorta, using the left ovarian vein as a guide could be considered to find the left renal vein.

6. Left common iliac artery and latero-aortal dissection:

The order of the following steps can be modified according to the surgeon's preferences or anatomical variations²⁸⁻³¹.

6.1. Lymphadenectomy starts at the level of the left iliac bifurcation:

- Dissection continues along the anterior surface of the left common iliac artery and aorta.
- Lymphadenectomy is pursued along the aorta. Continuing anterior and left side of the aorta, the surgeon identifies the left sympathetic chain, as well as the vertebral column and the lumbar pedicles that are either preserved or coagulated.

6.2. The dissection of the pre- and latero-aortic lymph nodes is performed up to the left renal vein. Caution is warranted during dissection because of the many possible anatomic variations in this area.

6.3. The upper limit of the lymphadenectomy is the left renal vein. The lymph node lamina is dissected at the left renal vein or artery and clips can be applied in order to limit leakage of lymphatic fluid. The dissection of the renal vein should identify the termination of the ascending lumbar vein, nearly always present, on the inferior aspect of the left renal vein.

7. Aorto-caval and latero-caval dissection³²:

- Right ureter must be dissected to achieve right lateral limit of dissection and to avoid its injury.
- Careful dissection from the anterior surface of the inferior vena cava should be performed. It is recommended a cautious dissection of the ventral tributaries of the inferior vena cava, especially in the lower 1/3.

- The dissection can be performed in a cephalad direction over the inferior mesenteric artery up to the upper limit of the dissection (left renal vein).
- The use of a 30 degrees endoscope should be considered to manage laterocaval dissection.

8. Lymph node extraction and fenestration of peritoneum:

8.1. Specimen extraction:

- Same rules should be followed, as described for transperitoneal extraction.

8.2. Fenestration of peritoneum:

- The peritoneum can be fenestrated transperitoneally or extraperitoneally with the reposition of laparoscope and insufflator to the trans-umbilical trocar in order to secure the left colon.
- The peritoneum is opened widely, to decrease the incidence of lymphocele by creating a communication between the retroperitoneal space and the peritoneum.
- Abdominal drainage is not necessary.

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Appendix 2. Specific OSATS scale of transperitoneal paraaortic lymphadenectomy in MIS.

sTasks	Steps	1	2	3	4	5	Score
1 Operative room organisation	1.1 Patient	Not performed adequately		Performed adequately in some of the points		Performed adequately in all of the points	/5
	1.2 Laparoscopic screen and surgical instruments	Not performed adequately		Performed adequately in some of the points		Performed adequately in all of the points	/5
	1.3 Surgical team	Not performed adequately		Performed adequately in some of the points		Performed adequately in all of the points	/5
2 Abdominal access	2.1 Before pneumoperitoneum creation	Not performed adequately		Performed partially adequate		Performed adequately	/5
	2.2 Achieve intraperitoneal access using a recognized method	Failed to perform		Performed partially adequate		Performed efficiently and skilfully	/5
3 Inspection of the peritoneal cavity	3 Perform diagnostic laparoscopy	Not performed		Moderately detailed inspection, not all 4 quadrants visualized		Careful and complete peritoneal inspection (including liver and diaphragm)	/5
4 Trocar insertion	4.1 Checking anatomy before trocar insertion	Location of the epigastric vessels not checked		Anatomical landmarks partially identified		Anatomical landmarks identified + transillumination performed	/5
	4.2 Trocar insertion	Performed inadequately; without intraperitoneal visualization. Triangulation is not respected. Injuries from port placement not performed		Performed adequately in a safe fashion. Triangulation is partially respected. Injuries from trocar placement cannot be definitively excluded		Performed smoothly and skilfully, optimal trocar orientation and allowing appropriate triangulation and ergonomic operator posture. Injuries from trocar placement is properly excluded	/5
5 Inspection of abdominal cavity	5.1 Optimal pelvic and abdominal exposure	Not performed		Improperly mobilized		Properly mobilized	/5
	5.2 Exploration of abdominal cavity	Not performed		Incomplete detailed inspection and/or cytology not collected		Careful and thorough inspection of the whole cavity and cytology collected	/5
6 Initial dissection and exposure of retroperitoneum	6.1 Opening retroperitoneum	Opening at the wrong level occasioning bleeding and tissue trauma		Performed clumsily but in the right plan and location		Performed smoothly in the right plan and location	/10
	6.2 Dissection of the anterior surface of aorta	Unable to expose and dissect the vascular surface		Performed adequately, with minor bleeding and tissue damage		Adequate direction of the dissection achieving optimal exposure of anterior	/10

						surface of the aorta		
		6.3	Peritoneum is tended	Not performed	Performed adequately but with insufficient traction	Performed adequately allowing optimal exposure	/10	
7	Identification of anatomical landmarks	7.1	Right Infundibulopelvic ligament and ureter	Not dissected or localized	Position not clearly established	Clearly identified	/10	/50
		7.2	Right Common Iliac Artery and Inferior Vena Cava	Not dissected or localized	Position not clearly established	Clearly identified	/10	
		7.3	Aorta and the origin of the Inferior Mesenteric Artery	Not dissected or localized	Position not clearly established	Clearly identified	/10	
		7.4	Left renal and gonadal veins	Not dissected or localized	Position not clearly established	Clearly identified	/10	
		7.5	Left Infundibulopelvic and ureter	Not dissected or localized	Position not clearly established	Clearly achieved	/10	
8	Initial iliac and precaval/paracaval dissection	8.1	Dissection of precaval nodes from aortic tissue	Performed inadequately: in the wrong plane, causing excessive bleeding and traction	Performed clumsily but in the right plan, with minor bleeding	Performed smoothly in the right plan avoiding bleeding	/10	/20
		8.2	Dissection of paracaval nodes	Not performed	Performed adequately (Moderate difficulty to identify correct plan, occasional bleeding)	Performed smoothly in the right plane avoiding bleeding	/10	
9	Aortocaval and preaortic dissection	9.1	Dissection of aortocaval nodes	Not performed, insufficient dissection of tissue	Suboptimal exposure of the field, damage of some structures	Performed adequately allowing optimal exposure and preservation of the structures	/10	/30
		9.2	Dissection of preaortic nodes	Not identified	Suboptimal exposure of the field, damage of some structures	Performed adequately allowing optimal exposure and preservation of the structures	/10	
		9.3	Autonomic nerves and Superior Hypogastric Plexus	Not identified	Correct identification but only partial preservation of the nervous tissue	Correct identification and preservation of the vessel and nervous tissue	/10	
10	Inframesenteric paraortic dissection	10.1	Lateralization of left mesocolon	Not performed	Insufficient exposure of the anatomical structures	Laterally dissected and identified	/10	/30
		10.2	Identification of left psoas muscle and left sympathetic chain	Not performed, insufficient dissection of tissue	Suboptimal exposure of the field, damage of the tissue	Performed adequately allowing optimal exposure and preservation of the structures	/10	

		10.3	Left inframesenteric paraortic nodes	Insufficient dissection of the nodes, excessive tissue traction and disordered trajectory	Correct dissection of the nodes and tissue, incomplete achieving of the limits	Optimal dissection of the nodes including the correct areas	/10	
11	Supramesenteric paraortic dissection	11.1	Dissection of the left renal and ovarian veins	Not performed	Partially performed, completed with some difficulty	Performed adequately allowing optimal exposure of the vessels	/10	/20
		11.2	Left supramesenteric paraortic nodes. Clipping cysterna chyli (optional)	Incomplete dissection of nodal tissue of the area	Correct dissection of the nodes and tissue, incomplete achieving of the limits	Optimal dissection of the nodes including the correct areas	/10	
12	Lymph node extraction	12	Extraction by endobag or similar	Not performed	Partially performed, completed with some difficulty	Performed adequately	/10	/10

Appendix 3. Specific OSATS scale of extraperitoneal paraaortic lymphadenectomy in MIS.

sTasks		Steps		1	2	3	4	5	Score	
1	Operative room organization	1.1	Patient	Not performed adequately		Performed adequately in some of the points		Performed adequately in all of the points	/5	/15
		1.2	Laparoscopic screen and surgical instruments	Not performed adequately		Performed adequately in some of the points		Performed adequately in all of the points	/5	
		1.3	Surgical team	Not performed adequately		Performed adequately in some of the points		Performed adequately in all of the points	/5	
2	Abdominal access. Pneumoperitoneum creation	2.1	Before pneumoperitoneum creation	Not performed adequately		Performed partially adequate		Performed adequately	/5	/10
		2.2	Achieve intraperitoneal access using a recognized method	Failed to perform		Performed partially adequate		Performed efficiently and skilfully	/5	
3	Initial inspection of abdominal cavity	3.1	Perform diagnostic laparoscopy	Not performed		Moderately detailed inspection, not all 4 quadrants visualized		Careful and complete peritoneal inspection (including liver and diaphragm)	/5	/5
4	Access to retroperitoneal space	4.1	Access to retroperitoneal space	Performed inadequately, missing identification of anatomic landmarks		Performed satisfactorily, rough dissection of muscles plane		Anatomical landmarks identified, optimal incision and trocar placement	/10	/20
		4.2	Trocars placement	Performed inadequately; without intraperitoneal visualization. Triangulation is not respected. Injuries from port placement not performed		Performed adequately in a safe fashion. Triangulation is partially respected. Injuries from trocar placement cannot be definitively excluded		Performed smoothly and skilfully, optimal trocar orientation and allowing appropriate triangulation and ergonomic operator posture. Injuries from trocar placement is properly excluded	/10	
5	Identification of anatomical landmarks	5.1	Inframesenteric anatomical landmarks	Not dissected or localized		Position not clearly established		Anatomical landmarks clearly identified	/10	/20
		5.2	Supramesenteric anatomical landmarks	Not dissected or localized		Position not clearly established		Anatomical landmarks clearly identified	/10	
6	Left common iliac artery and latero-aortal dissection	6.1	Dissecting left paraortic space	Performed in an inadequate location		Start of the procedure at the correct level, difficulty to access in the correct plane		Start of the procedure at the correct level, respecting the left ureter and with the optimal plane	/10	/30

		6.2	Dissection of preaortic nodes	Performed incompletely: in the wrong plan, causing excessive bleeding and traction	Performed clumsily but in the right plan, adequate nodal identification and resection	Careful dissection, optimal nodal identification and resection of the whole area	/10	
		6.3	Dissection of the cranial limit	Not performed	Acceptably performed	Skilfully performed	/10	
7	Aortocaval and laterocaval dissection	7	Dissecting right ureter, and precaval and laterocaval nodes	Performed inadequately: in the wrong plan, causing excessive bleeding and traction	Performed clumsily but in the right plan. Slow to control bleeding	Performed smoothly in the right plan avoiding bleeding	/10	/10
8	Lymph node extraction and peritoneal fenestration	8.1	Extraction by endobag	Not performed	Partially performed, completed with some difficulty	Performed adequately	/10	/20
		8.2	Peritoneal fenestration	Not performed	Performed correctly, but not widely opened	Optimal opening of the peritoneum, ensuring a correct communication between the two spaces	/10	