RETROPERITONEAL RADICAL NEPHRECTOMY WITH FAST ACCESS TO THE RENAL ARTERY

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ABSTRACT
Laparoscopic radical nephrectomy has been introduced as an alternative to open surgery and accepted as gold standard in the current literature. Trans peritoneal and retroperitoneal techniques have been described in the literature. Herein, we described our retroperitoneal laparoscopic radical nephrectomy technique with the fast access to the renal pedicle. In this video-pictured article we reported one of our retroperitoneal radical nephrectomy experience explaining the technique with it's video.

Key Words: Robotics, Radical nephrectomy, Fast access, Robotic radical nephrectomy

INTRODUCTION
Wittmoser has first reported retroperitoneal access in 1973 for lumbar sympathectomy and he described the blunt dissection with the telescope and the CO2 pneumatic pressure (1). Clayman et al. have introduced laparoscopic nephrectomy as an alternative to open surgery with an initial report (2) and following this report both trans peritoneal and retroperitoneal approaches have been reported (3). It has been concluded on the "Guidelines on Renal Cell Carcinoma of European Association of Urology" that laparoscopic radical nephrectomy has lower morbidity than open surgery with the 1b level of evidence (4). In this video-pictured article we described our retroperitoneal laparoscopic radical nephrectomy technique with fast access to the renal pedicle.

SURGICAL TECHNIQUE
Trocar Placement
Three ports configuration was used for the laparoscopic radical nephrectomy. Nearly 18 mm incision was made between the 12th rib and iliac crest on the midaxillary line to produce a tunnel down to the retroperitoneal space (Figure 1).

This field of the body where the first incision was made is known as the inferior lumbar (Petit’s) triangle. This anatomical area is bordered by iliac crest inferiorly, lassimus dorsi muscle posterior-laterally and external oblique muscle anterior-laterally. The tunnel reaching retroperitoneal space through this incision on the Petit’s area was created by blunt dissection using a Kocher forceps. Following the creation of retroperitoneal tunnel using Kocher forceps, the tunnel was...
First incision for the tunnel, which was widened with the index finger of the surgeon to the retroperitoneal space, was used for the 12 mm camera trocar. Before placing the camera trocar second and third trocars were inserted into the cavity under the guidance of the index finger, which was introduced through the primary incision. A 12 mm trocar for the surgeon’s dominant hand and a 5 mm trocar for the non-dominant hand were inserted. Following the second and third trocars placement the camera trocar was placed and the initial incision was closed around the trocar with a mattress suture to prevent gas leakage (Figure 3).

If necessary, an additional 5-mm trocar can be inserted under endoscopic view to retract the kidney during the dissection, especially for the new starters. Appropriate port placement provides a safe and convenient working area.

**Technique of the Procedure**

Pneumoretroperitoneum was established by carbon dioxide insufflation (12 mm Hg). Pressure inside the retroperitoneal cavity, dissects the minimal adherences and provides a widened cavity. Under the direct vision residual minor adherence can be dissected. Psoas muscle is a major anatomical landmark for the retroperitoneal procedures (Figure 4).

Gerato’s fascia was opened longitudinally and completely to expose the psoas muscle. Complete longitudinal incision opens the retroperitoneal space where renal pedicle can be reached easily (Figure 5).

Bipolar forceps and Thunder-Beat (Olympus, Tokyo, Japan) were used for this operation, which was published with its video.

Careful dissection with dominant hand of the surgeon on the both side of the renal pedicle allows surgeon to find renal artery and vein while surgeon’s non-dominant hand retracts the kidney around as in the video. This dissection can be performed by both dominant and non-dominant hands of the surgeon while the extra instrument retracting the kidney through 4th trocar for the new starters as mentioned above. Also vena cava inferior can be detected by careful dissection on the right side retro peritoneum as in our case (Figure 6).

Small accompanying vessels can be ligate using metal clips or coagulate with bipolar forceps. Renal artery ligation was performed using titanium (Pilling Titanium Clips, Karl Storz GmbH & Co. KG, Tuttingen, Germany) and Hem-o-Lok® clips (Weck® Surgical Instruments, Teleflex Medical, Durham, NC). Three Hem-o-Lok® clips (2 toward the aorta, 1 toward the kidney) and one metal clip were used to secure the artery (Figure 7).
After ligation was completed, renal artery was cut between clips. Following renal artery ligation procedure, longitudinal incision was widened toward both upper and lower poles of the kidney. Upper pole dissection was followed by medial and lower parts of the kidney. Renal vein was ligated with 2 LapraTy® clips (Ethicon Endo-Surgery, Cincinnati, OH) towards to vena cava inferior, 2 Hem-O-Lok® clips one towards to vena cava inferior.

**Figure 3:** Initial incision was closed around the trocar with a mattress suture to prevent gas leakage.

**Figure 4:** Gerato’s fascia and psoas muscle; the major anatomic landmark.

**Figure 5:** Renal pedicle was found following complete longitudinal incision under the Gerato’s fascia.

**Figure 6:** Detecting vena cava inferior.
one of the main steps of the procedure is the early ligature of the renal artery to prevent diffusion of cancer cells [13-16]. Also, early ligation of renal vessels could decrease the bleeding while the dissection of the kidney in further steps. Laparoscopy is a minimal invasive treatment technique that is mimicking open surgery (5,6,12,13). Some of the reports have described early access to the renal artery using trans peritoneal (17-20) and retroperitoneal technique (13).

The study about less intraoperative blood loss, postoperative analgesic requirement and hospital stay have shown the superiority of the laparoscopic surgery (21). Laparoscopic retroperitoneal and trans peritoneal techniques are being used all around the world with many variations but still being developed and modified.

In our retroperitoneal technique, Gerato’s fascia was opened longitudinally and completely over psoas muscle. Renal pedicle was reached and renal vessels were found out easily by dissection. At the beginning of the procedure renal artery was divided. After mobilizing the upper, inferior and medial side of the kidney adequately renal vein was dissected, ligated and divided. Completing all this steps the ureter was cut. The important anatomic landmark is psoas major muscle during the procedure.

The advantages of fast access and early ligature of renal pedicle was described by Yang at al. as follows: less malignant cell spread due to reducing manipulation of the kidney before ligating renal vessels; less blood loss in further steps of dissection; better and easy dissection of the kidney in further steps due to less bleeding and loosen the kidney from renal pedicle; and less mental stress of surgeon in the further operation steps (13). In our technique we have ligated and divided the renal vein at the end of the procedure.

DISCUSSION

For the treatment of renal cell carcinoma, laparoscopic radical nephrectomy has been accepted as the gold standard (5-10) and it has been accepted among the urologists (5-8,11,12). Since traditional open radical nephrectomy has been described, cava inferior and one towards to kidney and 1 titanium clip towards to vena cava inferior. After ligating the renal vein, it was cut by laparoscopic scissors (Figure 8).

Lastly the ureter was found during the lower part dissection and ligated with Hem-o-Lok® clips and cut (Figure 9).

When the procedure was finished, excised material was taken inside the tissue retrieval bag. Following bleeding control, operation was ended. Whole operation took 48 minutes and the time to clamping of the renal artery was 11 minutes. The blood loss was 45 ml.

Figure 7: Ligating and dividing the renal artery.

Figure 8: Renal vein dissection, ligation and division.
CONCLUSION

Early ligature of the renal artery can produce less operation time and intraoperative blood loss during retroperitoneal laparoscopic radical nephrectomy. The foremost advantage of retroperitoneal surgery is the simple exposure of the renal hilum; because, in the retroperitoneal space bowel is not manipulated. Additionally the injury to peritoneal viscera and peritoneal organs is minimized by the retroperitoneal surgery.

TAKE HOME MESSAGES

Laparoscopic radical nephrectomy is the gold standard for the renal cancers. Performing both retroperitoneal and trans peritoneal laparoscopic radical nephrectomy is published in the current literature. Retroperitoneal radical nephrectomy has several advantages;

- Easy and fast exposure of renal pedicle, less injury to the peritoneal viscera and organs.
- Fast ligating of the renal pedicle has several advantages;
  - Reduced manipulation of the kidney before ligating renal vessels, provides less malignant cell spread and less blood loss in further steps of dissection,
  - Less bleeding and loosen the kidney from renal pedicle provides better and easy dissection of the kidney in further steps,
  - Less mental stress of surgeon in the further operation steps.

REFERENCES


