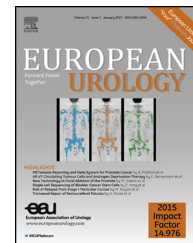


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## Surgery in Motion

# Midline Extraperitoneal Approach to Retroperitoneal Lymph Node Dissection in Testicular Cancer: Minimizing Surgical Morbidity

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### Abstract

**Background:** Retroperitoneal lymph node dissection (RPLND) is an important component of the management of testicular germ cell tumor (GCT) but carries significant surgical morbidity.

**Objective:** To describe our experience with a midline extraperitoneal (EP) approach to RPLND for seminomatous and nonseminomatous GCT.

**Design, setting, and participants:** From 2010 to 2015, 122 consecutive patients underwent RPLND from a prospective database. Patients requiring aortic resection or retrocaval dissection or with intraperitoneal disease were excluded. The remaining 69 patients underwent midline EP-RPLND.

**Surgical procedure:** Open midline EP-RPLND was performed using a standardized technique.

**Outcome measurements and statistical analysis:** Perioperative and long-term outcomes were analyzed. Complications were graded using the Clavien-Dindo classification. A descriptive analysis using SAS software was performed.

**Results and limitations:** A total of 68 patients underwent midline EP-RPLND successfully (98.6%). The median age was 28 yr (range 17–55). On preoperative imaging the size of the retroperitoneal mass or lymphadenopathy was <2 cm in 29 patients, 2–4.9 cm in 15 patients, and >5 cm in 24 patients, of which 19 were >10 cm. The median estimated blood loss was 325 ml (interquartile range [IQR] 200–612.5). The median number of lymph nodes resected was 36 (IQR 24.5–49); the median number of positive nodes was one (IQR 0–4). The median time for return of bowel function was 2 d (IQR 1–2) and hospital stay 3 d (IQR 3–4). There were no cases of ileus. Eleven patients had 12 (17.6%) 90-d complications. Of these, six (55%) were Clavien grade 1, five (45%) were grade 2, and one was grade 3b (1.5%). Antegrade ejaculation rates were 91.6% in the primary group and 96.8% in the post-chemotherapy group.

**Conclusions:** Midline EP-RPLND can be performed safely without compromising the completeness of the resection. This approach is associated with rapid return of bowel function, minimal rates of ileus, and short hospital stay.

**Patient summary:** A midline extraperitoneal approach for retroperitoneal lymph node dissection in testicular cancer is safe and effective and leads to faster return of bowel function and earlier discharge.

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## 1. Introduction

Testicular GCT remains the most common solid organ malignancy in young males, and its incidence has increased over the past 20 yr [1]. With the current multimodal treatment algorithms, overall survival rates exceed 95% [2]. This is largely attributable to the advent of cisplatin-based therapy 40 yr ago, as well as refinement of surgical indications and technique. The challenge in this young and otherwise healthy patient population is minimization of treatment morbidity, which must be viewed cumulatively over many decades.

We previously described our novel approach to retroperitoneal lymph node dissection (RPLND) via a midline incision that is completely extraperitoneal [3]. This approach was initiated as an attempt to minimize the perioperative and long-term complications associated with entering the peritoneal cavity, and we demonstrated in a small initial series that it afforded faster return of bowel function and shorter length of hospital stay (LOS) without compromising exposure or the ability to complete a full node dissection, even in the postchemotherapy (PC) setting. Here we describe our updated series, review the specifics of the technique, and report on our outcomes.

## 2. Patients and methods

### 2.1. Study population

All patients were from an institutional review board–approved testis cancer database with prospectively collected data. From 2004 to 2015, 169 patients underwent RPLND (135 PC, 34 primary). As of 2010, all patients were considered for EP-RPLND except for men undergoing aortic resection, retrocrural dissection, or intraperitoneal resection (exclusion criteria). Of the remaining 122, some 69 consecutive patients underwent EP-RPLND using a midline incision; one patient was converted to transperitoneal (TP) RPLND because of failure to progress (Table 1). Primary cases underwent extended ipsilateral templates; PC cases underwent either full bilateral or extended ipsilateral templates according to validated criteria [4].

### 2.2. Surgical technique

#### 2.2.1. Preoperative preparation and positioning

Patients do not undergo bowel preparation. Heparin prophylaxis is administered within 1 h before incision. The patient is positioned supine in a slightly hyperextended position.

#### 2.2.2. Incision and separation of the peritoneum

A midline abdominal incision is made (Fig. 1A) from several centimeters below the xiphoid process (approximating the level of the renal hilum) to 4–5 cm below the umbilicus (approximating the level of the ipsilateral common iliac artery).

Beginning in the infraumbilical portion of the incision, where separation of the peritoneum from the fascia is easier, the anterior and posterior rectus fascias are incised (Fig. 1B), and the extraperitoneal space between the peritoneum and the transversalis fascia is developed with gentle blunt and sharp dissection.

The peritoneal sac is swept medially off the inferolateral abdominal wall on the ipsilateral side of the planned dissection, aiming towards the ipsilateral psoas muscle (Fig. 1D).

**Table 1 – Demographic data and perioperative outcomes**

Parameter (n = 68)	Result
Age (yr)	28 (17–55)
Follow-up (mo)	15.3 (5.7–24.3)
Extraperitoneal retroperitoneal lymph node dissection	68/69 (98.6)
Primary	27 (39.7)
Nonseminomatous germ cell tumor	27 (100)
Stage I	7 (25.9)
Stage IIA	17 (63)
Stage IIB	1 (3.7)
Stage IIC	2 (7.4)
Post-chemotherapy	41 (60.3)
Nonseminomatous germ cell tumor	37 (90.2)
Seminomatous germ cell tumor	4 (9.8)
Retroperitoneal mass or lymphadenopathy on preoperative imaging (cm)	2.2 (1.3–5.5)
0 cm	6 (8.9)
<2 cm	23 (33.8)
2–4.9 cm	15 (22.1)
5–10 cm	5 (7.6)
>10 cm	19 (27.9)
<b>Intraoperative outcomes</b>	
Estimated blood loss (ml)	325 (200–612.5)
Packed red blood cells transfused (units)	0 (0–7) <sup>a</sup>
Lymph node yield (n)	36 (24.5–49)
Positive lymph nodes (n)	1 (0–4)
<b>Postoperative outcomes</b>	
Return of bowel function (d)	2 (1–2) <sup>a</sup>
Length of stay (d)	3 (3–4) <sup>a</sup>
Data are presented as median (interquartile range) for continuous variables and as n (%) for continuous variables.	
<sup>a</sup> Range.	

Care is taken to avoid inadvertent opening of the peritoneum, especially anteriorly where it becomes thin. Fibrous strands between the peritoneum and abdominal wall can be taken down sharply to help prevent tearing of the peritoneum.

#### 2.2.3. Entering the retroperitoneal space

As the peritoneal envelope is peeled off the posterior muscles in the lower quadrant, retroperitoneal fat will be encountered. The edge of the sac is peeled back from this and confirmed by visualization of the psoas muscle (Fig. 1D).

#### 2.2.4. Ureteral identification

The ureter and gonadal vessels are visualized along the psoas (Fig. 2A), and this plane is traced superiorly. The sac is separated from the posterior ribs and then mobilized medially off of Gerota's fascia.

Often some part of the fat of Gerota's fascia will be medialized with the peritoneum, which can be helpful in avoiding entering the sac, and allows exposure to the renal parenchyma, which aids in ruling out vascular compromise of the kidney during the case. Of note, the attachments of the sac just below the liver (right-sided template) and just below the spleen (left-sided template) can be quite fibrous, and great care should be taken to avoid peritoneotomy in these difficult-to-repair areas. Completely freeing the upper pole of the kidney off of the overlying peritoneum is the safest way to accomplish this (Fig. 2B).

#### 2.2.5. Visualization of the great vessels

In the post-chemotherapy setting, ipsilateral residual masses are often readily visible or palpable at this point. The peritoneal sac at this point is typically easy to medialize further, stopping once the contralateral renal hilum is reached. A self-retaining retractor is placed to retract the abdominal wall and the peritoneal sac (Fig. 2C).

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