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# Laparoscopic Exploration in the Management of Retroperitoneal Masses

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## ABSTRACT

**Background and Objectives:** The isolated finding of a retroperitoneal mass (RM) often represents a diagnostic challenge. Image-guided biopsy is frequently inadequate for diagnosis. With increasing experience, the use of laparoscopy for exploration of an indeterminate RM may provide a minimally invasive alternative to open exploration. Herein, we present a retrospective review of our initial four laparoscopic explorations, comparing our experience to four contemporary open explorations for an RM.

**Patients and Methods:** From July 1995 to January 1998, four patients, aged 50 to 62 years old, with an RM of undetermined etiology underwent laparoscopic exploration. Another four patients underwent open exploration at the same hospital. The medical records of these patients were reviewed.

**Results:** The tumors were smaller in the laparoscopic group, averaging 3.7 cm (range 2-6 cm) vs 6.5 cm (range 1-10 cm) in the open group. A definitive diagnosis was obtained for all eight patients. Postoperative complications were observed in one of the laparoscopic explorations, and in three of the open explorations; there was no operative mortality. The blood loss (90 vs 440 ml), fall in hematocrit (5.1 vs 7.8%), time to resumption of a regular diet (3 vs 5 days), amount of morphine sulfate equivalents required for analgesia (128 mg vs 161 mg), time to ambulation (2.3 vs 6 days) and hospital stay (4.8 vs 6 days) were all less among the laparoscopy patients. However, the operative time was longer for the laparoscopic procedure; this time included stent placement and patient repositioning in addition to the time for laparoscopic excision of the mass (7.8 vs 4.3 hours).

**Conclusion:** Laparoscopic exploration appears to be a viable alternative to open exploration in patients presenting with a retroperitoneal mass. It is as effective as an open procedure and provides benefits with regard to patient morbidity and convalescence. However, operative time for this laparoscopic procedure is lengthy.

**Key Words:** Surgical procedures, Laparoscopic, Retroperitoneal neoplasms.

## INTRODUCTION

The isolated finding of a retroperitoneal mass (RM) often represents a diagnostic challenge. Even when possible, an image-guided biopsy frequently provides an inadequate specimen for diagnostic purposes. Open retroperitoneal exploration is often the only option capable of obtaining sufficient tissue for diagnosis; however, this necessitates a major operation.

With increasing experience in laparoscopic retroperitoneal surgery,[1,2] the use of laparoscopy for exploration of an indeterminate retroperitoneal mass may provide a minimally invasive alternative to open exploration. Herein, we report our experience with four laparoscopic explorations for RM and compare our results with four contemporary open explorations for RM.

## PATIENTS AND METHODS

From July 1995 to January 1998, four consecutive patients, aged 50 to 62 years old, with computed tomographic findings of a retroperitoneal mass underwent laparoscopic exploration by one surgeon (RVC). Another four consecutive patients underwent open exploration by other surgeons at the same hospital. The medical records of these patients were reviewed.

Preoperative evaluation included computed tomography of the abdomen and chest radiography. In each case, the only finding was a retroperitoneal mass **(Figure 1)**. In the laparoscopic group, all patients had either preoperative biopsy of the mass or a biopsy of an enlarged peripheral lymph node.

For laparoscopic exploration, all patients underwent placement of a ureteral stent and Foley catheter. The

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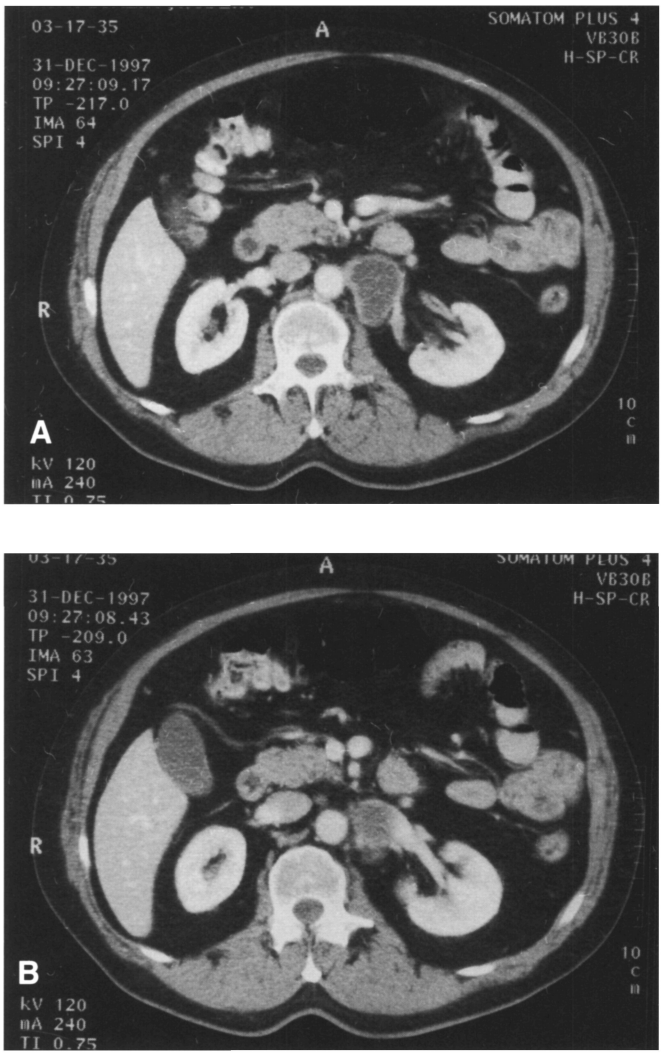


**Figure 1.** A, B. Preoperative CT of patient #3 showing a 4 cm left retroperitoneal mass located posterior to the renal hilum and lateral to the aorta; renal vessels are displaced anterior.


**Figure 2.** A, B. Four-months post-laparoscopic excisional biopsy in patient #3 showing area of resected mass, no recurrences, surgical clips lateral to aorta. Renal vessels resume normal position.

patient was then turned from a supine to a full lateral position. A pneumoperitoneum was created with a Veress needle inserted 3 cm above and medial to the anterior superior iliac spine; a 12 mm port was placed. Additional 12 mm ports were placed in the mid-clavicular line subcostally and just above and lateral to the umbilicus. The colon was mobilized medially by incising the line of Toldt. Another 5 mm port was placed in the posterior axillary line subcostally for placement of a 5 mm retractor. The colonic mesentery was further separated from Gerota's fascia; the mass was identified and either an incisional or excisional biopsy was done.

In patients undergoing open exploration, all lesions were approached transperitoneally by a midline incision. The colon was mobilized medially. The mass was excised in three patients and biopsied in one patient.

Total surgery time included the time for stent placement and the laparoscopic surgery. Blood loss was assessed by the anesthetist's estimation and by comparing preoperative and postoperative hematocrit. Also, we recorded the complications, time to ambulation, time for resump-

**Table 1.**
Preoperative Data.

| Patient # | Age | Presentation | Past medical health | Imaging result | Preoperative biopsy result |
|---|---|---|---|---|---|
| Laparoscopic | | | | | |
| 1 | 58 | Incidental | Carcinoma of ovary (1993) with hysterectomy, oophorectomy and post-operation chemotherapy | CT: 2x3 cm mass left of aorta below left renal artery | CT-guided biopsy: necrotic tissue only |
| 2 | 50 | Incidental | Follicular lymphoma treated by chemotherapy | CT: left hilar and retrocaval lymphadenopathy, largest node 2x2 cm | Attempted CT-guided biopsy: failed |
| 3 | 62 | Loin pain | Renal stones | CT: left periaortic retroperitoneal mass 4x4x6 cm below renal vein | Open axillary lymph node biopsy: negative for malignancy |
| 4 | 62 | Back pain | Squamous cell carcinoma of larynx with total laryngectomy and radiotherapy 5 years ago, epidermoid cell carcinoma of right lung with right lower lobectomy 1 year ago | CT: right hydronephrosis, thickened right upper ureter Retrograde pyelogram: cut off at right upper ureter, need to rule out transitional cell carcinoma and extrinsic compression | Ureteroscopic biopsy: atypical urothelial cells, suspicious for transitional cell carcinoma |
| Open | | | | | |
| 5 | 75 | Incidental | TCC right renal pelvis with nephrectomy and partial ureterectomy 1 year ago | CT: 5 cm soft tissue mass around right distal ureter | None |
| 6 | 35 | Left abdominal pain and mass, weight loss and dysuria | Unremarkable | CT: 10 cm diameter retroperitoneal mass, behind left ureter, mild left hydronephrosis | CT-guided biopsy: probably sarcoma |
| 7 | 75 | Abdominal pain | Hypertension, emphysema and hypothyroidism | CT: 10 cm mass below left kidney | CT-guided biopsy: spindle cells suspicious of leiomyosarcoma |
| 8 | 22 | Incidental | Right testicular teratoma with right orchiectomy and retroperitoneal lymph node dissection 2 years ago, post chemotherapy | CT: 1 cm diameter mass anterior to right psoas | None |

tion of a regular diet, analgesic use, the hospital stay and the hospital charges.

## RESULTS

A definitive diagnosis was obtained for all patients after the exploration either by incisional or excisional biopsy **(Figure 1, 2)**. The age, sex, past medical history and preoperative investigation results are summarized in **Table 1**. Preoperative biopsy was performed in six patients; only two findings correlated with the final pathologic report. Of note, the tumors were smaller in the laparoscopic group (3 of 4 < 5 cm) while two of the four lesions in the open group were 10 cm **(Table 1)**.

Postoperative complications were observed in one of the laparoscopic explorations and in three of the open explorations. There was no operative mortality **(Table**

**Table 2.**
Treatment Data.

| Pt # | Operative findings | Procedure | Frozen section | Permanent path. | Further Rx | Complications |
|---|---|---|---|---|---|---|
| Laparoscopic | | | | | | |
| 1 | Tumor adherent to ureter and aorta 2 cm below renal vein | Complete excision | None | Metastatic adeno Ca ovary | Chemotherapy | Incarcerated incisional hernia. Laparoscopic management postop day 4 |
| 2 | Dense fibrosis encasing gonadal and renal vein | Incisional biopsies | Lymphoma? permanent path needed | Sclerosing type lymphoma | Chemotherapy | None |
| 3 | 3-4 cm mass, densely adherent to renal vein | Complete excision | Necrotic tissue only, permanent path needed | Follicular lymphoma | Chemotherapy | None |
| 4 | Tumor infiltrating entire upper pole of kidney and upper ureter, also liver | Incisional biopsies | Poorly diff. malignant cells, origin? | Similar to frozen section | Hospice care | None |
| Open | | | | | | |
| 5 | Dense adhesion and fibrosis around ureteric stump | Excision of ureteral stump with bladder cuff | Atypical cells no malignancy | TCC grade III/IV, T1. 4 cm max. diameter | Follow-up cystoscopies and BCG therapy | None |
| 6 | Fleshy tumor close to ureter and sigmoid colon | Excision with partial ureterectomy, left to right trans U-U | Myxoid spindle cell tumor, muscle phenotype | Grade I/III 13 cm, myxoid leiomyosarc., margins + | Radiotherapy | Urine leakage from ureteral anastomosis from postop day 3, managed by right nephrostomy and internal stenting |
| 7 | 10x5 cm mass below left kidney, encapsulating left ureter | Excision of mass and segment of left ureter with 1° anastomosis | Spindle cell tumor, permanent section needed | High grade, 9 cm leiomyosarc. margins + | Radiotherapy | Urinary tract infection with dysuria, urine culture grew E. coli |
| 8 | 1 cm, firm mass anterior to right psoas | Left testicular biopsy and excision mass | Metastatic seminoma | Mature metastatic teratoma | Follow-up CT and markers | 5x8 cm subcutaneous hematoma, managed by observation and antibiotics |

**2)**. The only complication in the laparoscopic group was a major complication: proximal, small bowel obstruction due to incarceration of bowel into a 12 mm port site. This occurred despite closing the fascia of the 12 mm incisions with a single 1-0 absorbable suture. The patient underwent laparoscopic reduction and repair of the hernia on postoperative day 4. In the open group, there was one major complication (urine extravasation), as well as two minor complications (a urinary tract infection and a subcutaneous hematoma).

The blood loss (90 vs 440 ml), hematocrit drop (5.1 vs 7.8 %), time to resumption of regular diet (3 vs 5 days), amount of morphine sulfate equivalents required (128 mg vs 161 mg), time to ambulation (2.3 vs 6 days) and hospital stay (4.8 vs 6 days) were each less in the

**Table 3.**
Results.

| | Laparoscopic | | Open | |
|---|---|---|---|---|
| | Average | Range | Average | Range |
| Total operation time* (hr) | 7.8 | 7.3-8.3 | 4.3 | 2.0-7.1 |
| Estimated blood loss (ml) | 90 | 100-200 | 440 | 250-600 |
| Hematocrit change (%) | 5.1 | 1.8-7.1 | 7.8 | 1.9-12.9 |
| Transfusion (ml) | 0 | 0 | 0 | 0 |
| Morphine Sulphate equivalent† (mg) | 128 | 25-219 | 161 | 22-327 |
| Time to regular diet (day) | 3 | 1-5 | 6 | 4-8 |
| Time to ambulation (day) | 2.3 | 1-5 | 6 | 4-8 |
| Hospital stay‡ (day) | 4.8 | 2-10 | 6.8 | 4-13 |
| Operation charge (US$) | 9802 | 7390-11831 | 4755 | 4003-5234 |
| Total hospital charge (US$) | 27732 | 19243-35208 | 22592 | 10796-35768 |

*Total operation time included the time for preliminary procedure, eg, cystoscopy, ureteral stent placement and patient repositioning.
†One patient had controlled epidural anesthesia and was thus excluded from the open data group.
‡The laparoscopic data include one patient with postoperative incarcerated incisional hernia with laparoscopic reduction and repair of hernia with a hospital stay of 10 days.

laparoscopy patients **(Table 3)**. The operation time was longer for the laparoscopic procedure (7.8 vs 4.3 hours); the laparoscopic time included the time to place the ureteral stent and to reposition the patient. Due to the prolonged operation time, the laparoscopic procedure was about $5000 more costly than the open approach **(Table 3)**.

## DISCUSSION

Retroperitoneal tumors may either arise from solid organs (eg, kidney, pancreas and adrenal) or from non-specific tissues that traverse the retroperitoneal space (eg, lymphatic tissue, muscle, nerve, fat and connective tissue). These lesions may be benign, malignant or inflammatory in nature **(Table 4)**. Computed tomography (CT) and magnetic resonance imaging (MRI) can provide information on the location, anatomy and extent of the mass, but are otherwise largely nondiagnostic.[3,4] Indeed, in all instances, the determination of appropriate therapy depends upon obtaining an adequate tissue sample for histologic diagnosis. In this respect, image-guided percutaneous biopsy can be used,[5] but it suffers from a low diagnostic yield due to the small amount of tissue obtained and because an inflammatory infiltrate may have an appearance similar to a malignancy. Indeed, preoperative image-guided biopsies were either incorrect or inadequate in four of our six cases.

Accordingly, surgical exploration with adequate tissue sampling is frequently necessary to establish a definitive diagnosis.[6] For some malignant and benign tumors of the retroperitoneum, an excisional biopsy may be both

**Table 4.**
General Classification of Retroperitoneal Masses.

- Neoplastic masses
  - Benign
    - Cyst
    - Soft-tissue tumor
  - Malignant
    - Sarcoma
    - Lymphoma (primary or metastatic)
    - Germ-cell tumor (primary or metastatic)
    - Metastatic and other undifferentiated tumors
- Non-neoplastic masses
  - Hematoma
  - Abscess

diagnostic and curative.[3,7,8]

Laparoscopic exploration potentially can provide a minimally invasive means to obtain adequate tissue for histologic diagnosis without the need for a major midline abdominal or flank incision. All of our patients who underwent laparoscopic exploration tolerated the procedure well and were able to ambulate and resume a full diet within five days. The postoperative pain was minimal, and the hospital stay was brief (average 4.8 days). In the laparoscopic cases, two patients had an excisional biopsy, and two patients had an incisional biopsy. In all four cases, a definitive diagnosis was made, and no further surgical intervention was necessary.

In comparison with open exploration, the laparoscopic approach was equally as effective, yielding a definitive diagnosis in all four cases. However, due to longer operative time, the laparoscopic procedure was more costly and, hence, less efficient than the open approach. With regard to morbidity, patient recovery and hospital stay, laparoscopic exploration was more favorable.

## CONCLUSIONS

In summary, we believe that laparoscopic exploration for a retroperitoneal mass of undetermined origin is a viable alternative to open exploration. The laparoscopic approach is as effective, albeit less efficient, than an open procedure; however, the laparoscopic approach provided benefits with regard to patient morbidity and convalescence. As urologic surgeons become more experienced with laparoscopic techniques and with the advent of more efficient nondisposable instrumentation, we anticipate that the operative time and cost for more complex laparoscopic procedures, such as retroperitoneal exploration, will decrease. Nonetheless, our initial experience with laparoscopic retroperitoneal exploration is favorable, and we are now offering this approach as first-line therapy in these patients.

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