

Laparoscopic Management of Retroperitoneal Masses: Our Experience and Literature Review

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Abstract

Background: Retroperitoneal growths often require surgical exploration for diagnostic and/or therapeutic purposes. Here in, we present our experience in laparoscopic management of retroperitoneal masses and review the literature to assess the feasibility of a minimally invasive approach in this setting.

Method: In the last 4 years 8 consecutive patients, aged 46 to 73 years, underwent laparoscopic surgery for isolated retroperitoneal masses at our institution. Medical records were reviewed collecting data regarding clinical presentation, dimensions of the finding, pathology, whether a preoperative biopsy was performed and its results, procedure performed (excision versus incisional biopsy), operative times, estimated blood loss, complications, hospital stay and follow-up.

Results: All procedures were successfully completed laparoscopically with no conversions. Mean operative time was 131 minutes. Blood loss was 0-200 mL and blood transfusions were not required. One bowel injury was repaired intraoperatively; postoperative course was uneventful in all cases. Hospital stay ranged from 2 to 7 days. Final pathology was local recurrence of Renal cell carcinoma in 3 cases, 1 lymphoma, 1 sarcoma, 1 schwannoma and 2 retroperitoneal cysts. With an average follow-up of over 2 years there are no recurrences.

Conclusion: Laparoscopic approach is a feasible approach in selected patients with retroperitoneal masses. In our experience, laparoscopy offers a viable and oncologically radical option with excellent results and low morbidity. This minimally invasive approach is likely to become more common practice as the experience grows and new technologies become available.

Keywords: Retroperitoneal, laparoscopy, tumor.

INTRODUCTION

Laparoscopy is now widely used in urological surgery. As surgical experience grows and more urologists acquire expertise in laparoscopic approach, possible indications for this procedure expand. This is the case of retroperitoneal masses and their management with a minimally invasive surgical technique. Retroperitoneal growths often require surgical exploration for diagnostic and/or therapeutic purposes since in many cases imaging is inconclusive and biopsy, when feasible, can be

inadequate. The advantages of laparoscopic surgery over open approach may be exploited in this setting with no compromise of the outcomes.

Herein we present our experience in laparoscopic management of retroperitoneal masses and review the literature.

MATERIAL AND METHODS

In the last 4 years 8 consecutive patients, aged 46 to 73 years, underwent laparoscopic surgery for isolated retroperitoneal masses by a single surgeon (AT) in our institution. Medical records of these patients were reviewed. We collected data regarding clinical presentation, dimensions of the finding, pathology, whether a preoperative biopsy was performed and its results, procedure performed (excision versus incisional biopsy), operative times, estimated blood loss, concomitant procedures, complications, hospital stay and follow-up.

Lesion dimensions were registered using the largest dimension from imaging studies. Operative times were recorded as *skin-to-skin* times; in 2 out of 8 cases additional surgical procedures were performed simultaneously and their operative times were subtracted from total.

Standard surgical technique was used for laparoscopic approach. In a full flank position, lesion side upwards, pneumoperitoneum was established by open technique. Additional 3 trocars were placed in the upper abdomen. The retroperitoneal space was accessed by colon mobilization along the line of Toldt and the mass was identified. The finding was then dissected from adjacent structures with accurate hemostasis. The mass was then detached with adequately wide margins and extracted in an Endobag through an additional incision in the lower abdomen (3 cases) or through an extension of a port incision.

The literature was reviewed using PubMed/Medline database and keywords 'laparoscopy' or 'laparoscopic', 'retroperitoneal' or 'retroperitoneum'; lymph node dissections and adrenal surgery were excluded. Relevant abstracts and

articles in English were reviewed and summarized collecting available data as reported for our series.

RESULTS

Table 1 summarizes clinical presentation, imaging findings and demographics of the patients in our series.

Of note, in our series 3 cases (37.5%) were found on follow-up imaging due to history of RCC. It is important to note that only 3 of 8 patients were symptomatic at presentation. Average lesion size (largest diameter on imaging) was 6.88 cm ranging from 2 to 16 cm.

Surgery and postoperative course are reported in Table 2. In 2 (25%) cases preoperative biopsy was performed and only in one case its result correlated with final pathology diagnosis. Only in one case incisional biopsy was performed whether all other findings were radically excised. All procedures were successfully completed laparoscopically with no conversions. Mean operative time was 131 min (range 60-270 minutes), in two cases concomitant surgery was performed (laparoscopic ventral hernia repair and contralateral open partial nephrectomy in one case, and laparoscopic cholecystectomy in another) and its time was subtracted from total. Blood loss ranged from 0 to 200 mL and blood transfusions were not required. One bowel

injury was identified and repaired intraoperatively; postoperative course was uneventful in all cases.

Final pathology was local recurrence of Renal cell carcinoma (RCC) in 3 cases, 1 lymphoma, 1 sarcoma, 1 schwannoma and 2 retroperitoneal cysts (one of adrenal origin). It is of note that in our series malignant pathology accounted for 5 out of 8 cases (62.5%).

Hospital stay ranged from 2 to 7 days (median 3). With an average follow-up of over 2 years there are no recurrences. Patient no. 1 was lost on follow-up after 24 months.

DISCUSSION

Literature review yielded 21 papers of laparoscopic treatment of retroperitoneal masses for a total of 27 cases. Most papers are case reports¹⁻¹⁸ and there are 3 small series.¹⁹⁻²¹ Table 3 summarizes the data of those cases; unfortunately some papers are incomplete with regards to several data elements. As for today, to the best of our knowledge, this is the largest series of laparoscopic treatment of retroperitoneal masses.

Within the available literature, in roughly one half of the cases (13 out of 27, 48%) the finding of a retroperitoneal process was incidental and patients were asymptomatic. Abdominal or flank pain at presentation accounted for 11 cases, abdominal

Table 1: Demographics, clinical presentation and imaging findings in our series

Patient no.	Gender (M/F)	Age (Years)	Presentation	Symptomatic (Yes/No)	Side (L/R)	Size (cm)
1	M	60	Work-up for systemic disease	Yes	L	2
2	M	56	Follow-up imaging (RCC)	No	L	2
3	M	68	Follow-up imaging (RCC)	No	R	5
4	M	56	Incidental	No	L	10
5	F	52	Incidental	No	R	4
6	M	73	Follow-up imaging (RCC)	No	R	4
7	F	53	Flank and abdominal pain	Yes	L	16
8	F	46	Flank and abdominal pain	Yes	L	12

Table 2: Surgery characteristics and postoperative course in our series

Patient no.	Preoperative biopsy	Final pathology	Malignant (Yes/No)	Procedure	Operative time (Min)	Complications	Hospital stay (days)	Follow-up (months)
1	No	Lymphoma	Yes	Incisional biopsy	60	No	2	24*
2	No	RCC (local recurrence)	Yes	Excision	270**	colon injury	7	50
3	No	RCC (local recurrence)	Yes	Excision	120	No	6	38
4	No	Schwannoma	No	Excision	150	No	3	35
5	Mesenchymal tumor	Sarcoma	Yes	Excision	120	No	3	18
6	RCC	RCC (local recurrence)	Yes	Excision	110	No	2	13
7	No	Adrenal cyst	No	Excision	140	No	2	13
8	No	Retroperitoneal cyst	No	Excision	80***	No	6	5
Average					131.25		3.88	24.5

RCC – Renal cell carcinoma

* Lost on follow-up

** Concomitant laparoscopic postoperative ventral hernia (POVH) repair and contralateral open partial nephrectomy (operative time detracted from total)

*** Concomitant laparoscopic cholecystectomy (operative time detracted from total)

Table 3: Demographics, clinical presentation and imaging findings in literature

Author	Gender (M/F)	Age (years)	Presentation	Symptomatic (Yes/No)	Side (L/R/Median)	Size (cm)
Viani	F	49	Abdominal and flank pain	Yes	R	6
Melvin	F	36	Abdominal pain	Yes	R	2.5
Kawabata	F	43	Incidental	No	L	NA
	M	68	Incidental	No	NA	NA
Nishio	F	41	Abdominal mass	Yes	R	5
Ohigashi	F	28	Incidental	No	R	3
Shalhav	F	58	Incidental	No	L	3
	NA	50	Incidental	No	L	2
	NA	62	Loin pain	Yes	L	6
	NA	62	Back pain	Yes	R	NA
Cadeddu	F	32	Abdominal pain	Yes	R	12
	F	45	Incidental	No	L	20
	F	35	Painful flank mass	Yes	R	12
Descazeaud	F	62	Incidental	No	R	8
Funamizu	M	55	Epigastric discomfort	Yes	M	6
Ishizuka	M	36	Incidental	No	L	5
Johna	F	37	Flank pain, lower limb sensory impairment	Yes	L	12
Morrison	M	62	Incidental	No	NA	7
Akos	F	18	Incidental	No	L	8
Chung	M	46	Incidental	No	L	3
Dalpiaz	F	61	Incidental	No	L	10
Minei	M	39	Fever, suspect adrenal tumor	Yes	L	3.5
Cho	F	27	Incidental	No	M	10
Tsukamoto	F	36	Abdominal and back pain	Yes	R	11
Targarona	F	45	Abdominal pain	Yes	L	12
Celia	F	65	Abdominal pain	Yes	R	7
Trindade	M	28	Painful flank mass	Yes	R	5
Average (range)		(18-68)				(2-20)

mass, fever, and epigastric discomfort were the presenting symptoms in 1 case each. In our series only one case presented incidentally, and the most common cause of diagnosis was follow-up imaging for RCC (37.5% of cases). In found publications, average lesion size is reported to be 7.5 cm in its largest diameter, ranging from 2 to 20 cm; malignant masses in those reports are generally smaller (2-10 cm). On our experience malignant masses treated laparoscopically measured 2-5 cm indicating a cautious approach to laparoscopic indications.

Limitations of available preoperative imaging techniques and suboptimal feasibility of image-guided preoperative biopsy account for the fact that only one group²¹ reported performing guided biopsies and in that setting its accuracy was quite low. In our series preoperative biopsy was carried out in 2 cases and was accurate in diagnosis in one patient. Those findings emphasize the need of novel techniques to establish a more accurate diagnosis in such challenging cases as retroperitoneal masses. An accurate preoperative diagnosis is essential to formulate an appropriate treatment plan.

Published papers report no conversions and this may be due to extreme experience of the surgical team but publication bias must be taken in consideration. It is understandable however, that the growing experience in laparoscopic surgery increases its efficiency even in those delicate cases. Only one

group²¹ and ourselves reported incisional biopsies whether all others report complete excisions of the specimen. Considering that only few papers deal with malignant pathology it is to expect that the rate of incisional biopsies is higher than reported. Combining all reported cases (literature and our experience) with malignant pathology we find 3 incisional biopsies and 8 complete excisions. From another point of view, diagnostic laparoscopy is likely to produce more incisional biopsies than reported considering this surgical intervention as the last diagnostic tool available when non invasive techniques have failed.

In the published papers malignant pathology is observed only in 6 out of 27 cases (22.2%) and in those cases radical resection was performed in 4 cases whether in other 2 cases incisional biopsy was carried out in Table 4. No recurrences are reported in those papers; however this element is to be evaluated against a probable publishing bias. Moreover, in cases with malignant pathology only one group⁵ stated the follow-up period and reported the absence of recurrence at 12 months.

We believe that laparoscopy is a viable and valid alternative not only as a diagnostic tool but also as a treatment option in retroperitoneal masses. Clearly, an accurate patient selection is paramount, especially when one deals with possibly malignant finding. There is little question regarding the feasibility of

Table 4: Surgery characteristics and postoperative course in the literature

Author	Preoperative biopsy	Final pathology	Malignant (Yes/No)	Procedure	Operative time (min)	Complications	Hospital stay (days)	Follow-up (months)
Viani	No	Leiomyosarcoma	Yes	Excision (gasless)	75	None	4	NA
Melvin	No	Schwannoma	No	Excision	NA	NA	1	6
Kawabata	NA	Neurofibroma	No	Excision	NA	NA	NA	NA
	NA	Mature teratoma	No	Excision	NA	NA	NA	NA
Nishio	No	Schwannoma	No	Excision	195	None	14	14
Ohigashi	No	Schwannoma	No	Excision	NA	None	NA	6
Shalhav	Necrotic tissue	Adonocarcinoma of ovary metastasis	Yes	Excision	***	Incarcerated hernia	****	NA
	Failed	Lymphoma	Yes	Incisional biopsy	***	None	****	NA
	Negative*	Lymphoma	Yes	Excision	***	None	****	NA
	TCC suspect**	Poorly differentiated malignant cells	Yes	Incisional biopsy	***	None	****	NA
Cadeddu	No	Mature teratoma	No	Excision	190	None	1	NA
	No	Mesenteric cyst	No	Excision	80	None	1	NA
	No	Retroperitoneal cyst	No	Excision	95	None	1	NA
Descazeaud	No	Schwannoma	No	Biopsy and excision	145	None	3	NA
Funamizu	No	Schwannoma	No	Excision	230	None	10	24
Ishizuka	No	Bronchogenic cyst	No	Excision	NA	None	NA	NA
Johna	No	Neurofibroma	No	Excision (hand-assisted)	180	Urinary and bowel dysfunction	5	NA
		Schwannoma	No					
Akos	No	Bronchogenic cyst	No	Excision	NA	NA	NA	NA
Chung	No	Venous aneurism	No	Excision	NA	None	3	12
Dalpiaz	No	Liposarcoma	Yes	Excision	150	None	4	12
Minei	No	Broncogenic cyst	No	Excision	NA	NA	NA	NA
Cho	No	Mature teratoma	No	Excision	NA	NA	2	NA
Tsukamoto	No	Cystic lymphangioma	No	Excision	NA	None	NA	12
Targarona	No	Cystic lymphangioma	No	Excision	90	None	3	NA
Celia	No	Cystic lymphangioma	No	Excision	NA	None	2	NA
Trindade	No	Cystic lymphangioma	No	Excision	NA	None	NA	12

NA – Not available from manuscript, TCC – Transitional cell carcinoma

* Lymph node biopsy

** Ureteroscopic biopsy

*** Total average operative time 468 minutes (438-498)

**** Average hospital stay 4.8 days (2-10)

laparoscopic surgery for retroperitoneal masses in the hands of an experienced team. It seems that laparoscopy can offer clinical outcomes comparable to open procedures in terms of disease control and better outcomes in terms of hospital stay, analgesic use, cosmesis and return to normal activities.²¹ We feel that the advantages of minimally invasive surgery can be extended to selected patients with retroperitoneal masses.

In conclusion, laparoscopic approach is a valid alternative to open procedures in selected patients with retroperitoneal masses. In our experience, laparoscopy offers a viable and oncologically radical option with excellent results and low morbidity. This minimally invasive approach is likely to become more common practice as the experience grows and new technologies become available.

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