



Single-Center Experience of Surgical Treatment of Primary Retroperitoneal Tumors

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Abstract

This study is an evaluation of surgical treatment results of primary retroperitoneal tumors. In Samara Regional Clinical Oncology Dispensary, from 2008 to 2015, the treatment of 187 patients (53 men and 134 women) was conducted. One hundred fifteen patients got tumor removal within the healthy tissue (R0), and 61 patients went through complete resection of tumor with wide margins (R0). Complete resection of tumor with wide margins (R0) with preoperative tumor vessel embolization was performed in 11 patients. According to the histological examination, malignant retroperitoneal tumor was detected in 85 patients (48.4%); in most cases it was presented by various forms of sarcoma. A benign tumor was diagnosed in 71 patients (40.3%), fibrolipomas (17.1%), and neurofibromas (12.5%). The diagnosis of 20 patients needs subsequent clarification, as mesenchymal tumor (6.2%) and histiocytoma (5.1%) were diagnosed. Short-term results of surgical treatment for the group, where complete resection of tumor with wide margins was performed: intraoperative blood loss 410.91 ± 113.31 (ml), operation time 185.15 ± 32.49 (min); postoperative complications 10 (16.4%); mortality 3 (4.9%); LOS 23.14 ± 6.31 ; for removal of the tumor within healthy tissues: intraoperative blood loss 281.33 ± 110.94 (ml), operation time 58.33 ± 27.14 (min) postoperative complications 7 (6.08%); mortality 2 (1.74%); LOS 6.98 ± 4.83 ; ($t = 279$, $p = 0.015$). For patients who went through preoperative tumor feeding vessel embolization, intraoperative blood loss was 121.33 ± 27.94 (ml), time of operation 43.13 ± 16.11 (min), postoperative complication 1 (4.5%), mortality 0 (0%), and length of stay 12.72 ± 1.49 . After the complete resection of tumor with wide margins, intraoperative blood loss, operation time, the number of postoperative complications, and postoperative LOS were significantly greater in comparison with the group of patients where the tumor was removed within healthy tissues. The method of preoperative embolization of the tumor feeding vessels can reduce intraoperative blood loss, the time of operation, and the number of postoperative complications.

Keywords Retroperitoneal tumors · Embolization · Surgical treatment · Complete resection of tumor with wide margins · Treatment results

Introduction

Despite the development and improvement of the prevention measures—up-to-date diagnosis and new treatment

techniques—the death rate from cancer remains very high. Rare tumor localizations are badly studied and presented; that means that they are of great interest for many researchers.

According to various authors, primary retroperitoneal tumors are up 0.5–1% from all oncology diseases, and 15% of them were presented by soft tissue sarcomas, most of the patients are middle-age women [1–3]. There are no specific clinical pictures or pathognomonic symptoms; until the tumor achieved significant sizes, the clinic of nearby organ compression (including vascular and nerve) develops, and usually it is the only reason patients make an appointment. Thus, the clinical picture depends on secondary involvement of retroperitoneal organs in the process; primary diagnostics of retroperitoneal treatment is quite difficult [4, 5]. CT with intravenous contrast enhancement

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is the most informative method. Abdominal CT is used to estimate the local prevalence of tumor; chest CT is recommended for searching possible metastases. MRI has more benefits over CT in the cases when the tumor is located in the pelvis [5, 6].

Surgical treatment today is considered to be the only radical way of treatment. According to recent reports, the resectability of primary retroperitoneal tumors varies from 25 to 73% [6, 7]. The most important part of the surgery is the stage of tumor revision and immobilization; it is believed that only “acute” revision allows to get the true picture of operability [8]. The necessary radicalism of surgery is only achieved by the excision of tumor within the healthy tissues in one block with regional lymphatic collectors. Often with the involvement of neighbor organs in tumor process, it is necessary to perform a complete resection of tumor with wide margins including excision of other organs, which is, in most cases, associated with a high risk of bleeding.

The results of treatment of retroperitoneal tumors still accompany with high risk of intraoperative and postoperative complications and the tendency to relapse, which appears in 13–82% of cases [6]. It can be explained with the pathophysiology features of retroperitoneal tumor growth: abdomen anatomy infringement, impossibility of proper identification of the presence of the invasion in organs and magistral vessels, and difficulties in visualization of tumor feeding vessels [3, 8]. Therefore, the problem of development of existing principles of diagnosis and treatment of retroperitoneal tumors is still in a high point of interest for numerous researchers around the globe.

Patients and Methods

In the Samara Regional Clinical Oncology Dispensary, from 2008 to 2015, treatment of 187 patients (53 men and 134 women) was conducted. The ratio was 1:2; average age was 50 ± 8 years. All the patients got surgical treatment (Table 1).

Tumor resection within healthy tissues was performed in 115 cases; complete resection of tumor with wide margins, including excision of other organs, was performed in 61 cases; to analyze if the preoperative tumor vessel embolization has significant effect on short-term results, it was performed in 11

patients (Table 2). For all patients included in this study, the microscopically margin-negative resection (R0) was performed.

Results

According to the histological evaluation, malignant retroperitoneal tumor was detected in 85 patients (48.4%), and they were presented by various forms of sarcoma in 100% of cases. While benign tumor was diagnosed in 71 patients (40.3%), fibrolipomas (17.1%) and neurofibromas (12.5%) were predominated. Twenty patients got the histological diagnosis—mesenchymal tumor (6.2%) and histiocytoma (5.1%) Table 3.

We performed a comparative analysis of short-term results in two groups to compare: patients who went through tumor removal within healthy tissues and patients who got a complete resection of tumor with wide margins including excision of other organs (Table 4).

Rates of intraoperative blood loss, time of surgery, postoperative complications, mortality, and LOS were significantly lower in the group where surgery within healthy tissues was performed.

Group of patients where complete resection of tumor with wide margins with embolization of tumor blood vessels was performed had statistically significantly lower parameters of intraoperative blood loss, time of surgery, number of postoperative complications, and LOS (Table 5).

Long-term results in groups—where the tumor was removed within healthy tissues, through complete resection of tumor with wide margins including excision of other organs, and through complete resection of tumor with wide margins including excision of other organs with preoperative embolization—were analyzed. Recurrences after surgical treatment in cases with malignant forms of retroperitoneal tumor were 15 (41%), 13 (29%), and 3 (29%), respectively; 1-year survival rate was 74%, 91%, and 93%; 3 years 60%, 75%, and 74%; and 5 years 45%, 43%, and 43%; the median of overall survival reached 65 months, 75 months, and 75 months, respectively.

Table 1 The type and number of operations carried out in patients with the diagnosis of retroperitoneal tumor

Type of surgery	Number of operations	
	Absolute number	%
Removal of the tumor within healthy tissues	115	65.3
Complete resection of tumor with wide margins including excision of other organs	61	34.7
Total	176	100

Table 2 Age and gender distribution

	Removal of the tumor within healthy tissues (<i>n</i> = 115)	Complete resection of tumor with wide margins including excision of other organs without embolization (<i>n</i> = 61)	Complete resection of tumor with wide margins including excision of other organs with embolization (<i>n</i> = 11)	Statistics
Age	50.14 ± 8.63	51.57 ± 7.79	50.97 ± 8.55	<i>t</i> = - 1.07; <i>p</i> = 0.34
Gender	M 35 (18.73%)	14 (7.48%)	4 (2.13%)	Chi ² criteria = 1.13; <i>p</i> = 0.29
	F 80 (42.78%)	47 (25.14%)	7 (3.74%)	

Clinical Case

The patient—65 years old woman (1953)—was admitted to the clinic with a diagnosis of left primary retroperitoneal tumor. She complained about periodical low-intense non-reason pain in the lower regions of the abdomen without clear localization. In the preoperative period, abdominal CT was performed (Fig. 1).

According to CT findings in the retroperitoneal area on the left with distribution to the abdomen cavity, there is a mass lesion size of up to 79×60×112 mm with indistinct rough contours and signs of contrast enlargement, with non-

homogeneous structure and calcifications. The tumour mass is closely located to the musculus iliopsoas up to 70 mm; to the small intestines and lower part of the left kidney up to 16 mm, without any signs of invasion; and to the ureter up to 53 mm.

To perform embolization of tumor feeding vessels, patients went through angiography with puncture and catheterization of femoral artery on the left. The angiograms from celiac trunk, superior mesenteric artery, and left renal artery showed typical anatomy without pathology. Afterward, searching angiography from lumbar arteries on the left was performed. The source of tumor blood

Table 3 Histological forms of retroperitoneal tumors

Histological form	Removal of the tumor within healthy tissues (<i>n</i> = 115)		Complete resection of tumor with wide margins including excision of other organs without embolization (<i>n</i> = 61)		Complete resection of tumor with wide margins including excision of other organs with embolization (<i>n</i> = 11)	
	Abs. number	%	Abs. number	%	Abs. number	%
Malignant tumor						
Liposarcoma	9	7.83	13	21.31	9	81.8
Fibrosarcoma	12	10.43	8	13.11	0	0
Neurofibrosarcoma	6	5.22	11	18.03	0	0
Leiomyosarcoma	3	2.61	6	9.84	0	0
Spindle cell sarcoma	5	4.35	4	6.56	1	9.1
Chondrosarcoma	3	2.61	5	8.19	0	0
Total	38	33.0	47	77.04	10	90.9
Benign tumor						
Fibrolipoma	27	23.48	3	4.92	0	0
Neurofibrolipoma	20	17.39	2	3.28	0	0
Ganglioneuroma	8	6.96	1	1.64	0	0
Dermoid cyst	3	2.61	0	0.00	0	0
Epithelioid tumor	3	2.61	1	1.64	0	0
Teratoma	2	1.74	1	1.64	0	0
Total	63	54.78	8	13.11	0	0
Tumor which needs additional clarification						
Mesenchymal tumor	7	6.09	4	6.56	1	9.1
Histiocytoma	7	6.09	2	3.28	0	0
Total	14	12.18	6	9.84	1	9.1
Patients in total	115	100	61	100	11	100

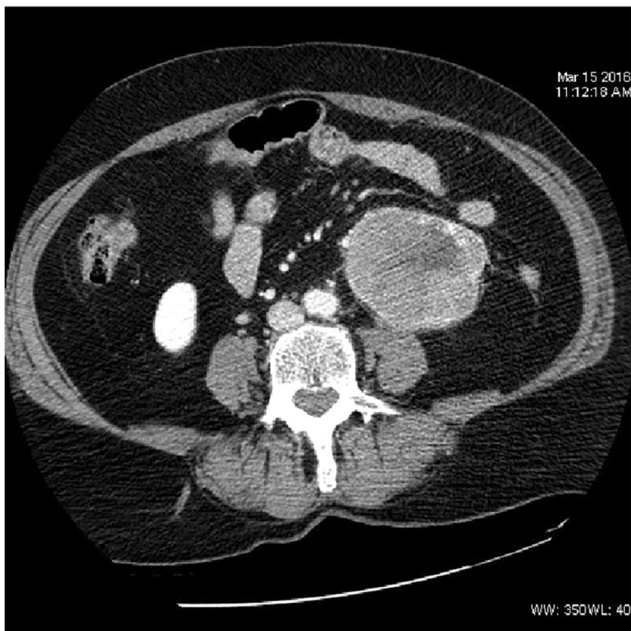
Table 4 Short-term results of surgical treatment

Type of surgery Evaluation criteria	Removal of the tumor within healthy tissues (<i>n</i> = 115)	Complete resection of tumor with wide margins including excision of other organs without embolization (<i>n</i> = 61)	<i>p</i>
Intraoperative blood loss (ml)	281.33 ± 110.94	410.91 ± 113.31	0.3
Time of surgery (min)	58.33 ± 27.14	185.15 ± 32.49	0.02
Postoperative complications (absol/%)	7/(4.5%)	10/(16.4%)	0.05
Mortality (absol/%)	2/(1.3%)	3/(4.9%)	0.08
Length of stay (days)	6.87 ± 4.37	22.13 ± 4.06	0.04

Table 5 Short-term results in groups where combine surgery with and without embolization of tumor blood vessels was performed

		Complete resection of tumor with wide margins including excision of other organs without embolization (<i>n</i> = 61)	Complete resection of tumor with wide margins including excision of other organs with embolization (<i>n</i> = 11)	Stat. parameters
Age		51.57 ± 7.79	47.36 ± 8.57	<i>t</i> = - 1.62; <i>p</i> = 0.11
Gender	Male	14 (19.44%)	5 (6.94%)	Chi ² criteria = 2.49; <i>p</i> = 0.12
	Female	47 (65.28%)	6 (8.33%)	
Blood loss (ml)		402.29 ± 86.61	121.82 ± 28.92	<i>U</i> = 0; <i>Z</i> = - 5.24; <i>p</i> = 0.000
Time of surgery (min)		180.73 ± 36.82	47.27 ± 10.33	<i>U</i> = 3; <i>Z</i> = - 5.19; <i>p</i> = 0.000
Postoperative complications (abs/%)		10/(16.4%)	1/(4.5%)	<i>p</i> = 0.86
Mortality (abs/%)		3/(4.9%)	0/(0%)	<i>p</i> = 0.94
LOS (days)		23.14 ± 6.31	12.72 ± 1.49	<i>U</i> = 19; <i>Z</i> = - 4.94; <i>p</i> = 0.000

supply was on the left second lumbar artery. Once the tumor supply vessel was identified, the patient went

**Fig. 1** Abdominal CT

through selective catheterization and PVA embolization (*d* = 100 μm).

After embolization the tumor was not contrasting, and in the projection of the tumor, an avascular area was presented (Fig. 2).

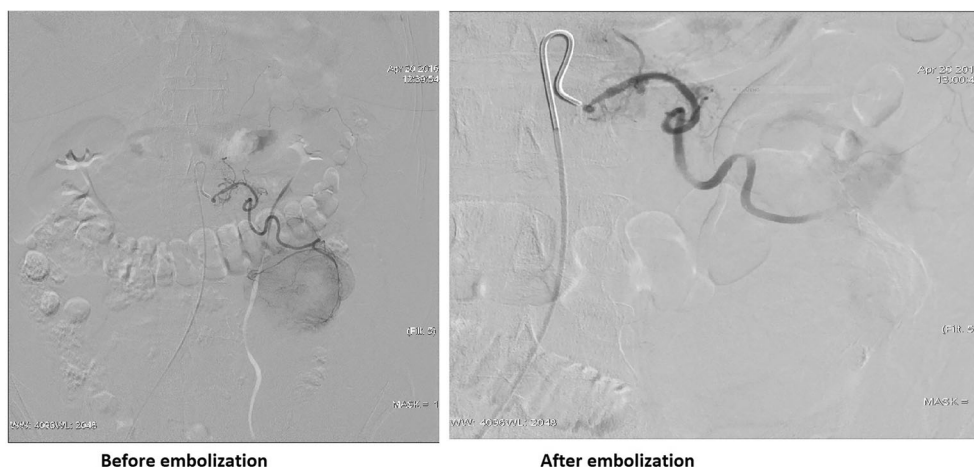
On the next day after embolization, the patient went through the resection of retroperitoneal tumor within healthy tissues. According to the evaluation of planned histological examination, the extracted neoplasm was spindle cell tumor, immunohistochemical analysis – schwannoma.

Discussion

Diagnosis and treatment of retroperitoneal tumors are rightfully one of the most complex sections of clinical oncology. In most cases, retroperitoneal tumors are presented by various forms of sarcoma, which is confirmed by foreign and Russian studies [1, 5–8].

Surgical method is the main treatment method for patients with retroperitoneal tumors. Retroperitoneal primary tumors usually grow into the surrounding organs and tissues, as evidenced by our data: tumor removal within the healthy tissues was performed in 115 (61.49%) cases, and complete resection

Fig. 2 Angiography - second lumbar artery



of tumor with wide margins including excision of other organs was performed in 61 (32.62%) cases [1, 7, 8]. According to the materials presented by the Russian and foreign authors, average parameters for blood loss in the surgery with complete resection of tumor with wide margins including excision of other organs reach 500 ml, the duration of the operation was 316 min, the number of postoperative complications was 16%, and the postoperative LOS was 11, while for tumor resection within healthy tissues, blood loss reaches 92.5 ml, the duration of the operation was 35 min., the number of postoperative complications was 5.6%, and the postoperative LOS was 7. That was confirmed by our data are as follows: blood loss, 402.29 ± 86.61 ml and 275.21 ± 45.81 ml; duration of operation, 180.73 ± 36.82 min and 77.97 ± 27.67 min; postoperative complications, 16.4% and 4.5%; and carried out bed-days, 23.14 ± 6.31 and 6.98 ± 4.83 , respectively.

To improve the short-term results of surgical treatment, the new method of preoperative patient preparation—tumor supply vessel embolization—was introduced in clinical practice. The majority of authors agree that most important parts of surgery in addition to tumor revision and mobilization are isolation and ligation of tumor-feeding vessels [6–8]. Considering changes in anatomy in retroperitoneal tumors, this stage of the operation is accompanied by certain difficulties. The aim of the proposed technique was to optimize the search for blood vessels supplying the tumor by a clearer visualization on the background of the surrounding tissues, as well as reducing the blood supply to the tumor.

The use of the new method of preoperative patient preparation allows to considerably reduce the blood loss from 402.29 ± 86.61 to 121.82 ± 28.92 ml, time of operation from 180.73 ± 36.82 to 47.27 ± 10.33 min, the number of postoperative complications from 10/(16.4%) to 1/(4.5%), and the postoperative length of stay from 23.14 ± 6.31 to 12.72 ± 1.49 compared with the patient group without preoperative embolization.

Long-term results of treatment of retroperitoneal tumors require further investigation. Thus, according to the Russian

authors, recurrence after surgical treatment of retroperitoneal tumors appears in 45% of cases with R1 and 30% of R0 [3, 6–9]. According to our data, in the same period, recurrences occurred in 41%, 29%, and 29% of patients respectively. According to the Russian and foreign authors, the 1-year survival rate for malignant retro peritoneal tumors after R1 is 96% and 98% for R0, 3 years 75% and 84%, and 5 years 40% and 45%, respectively [6–9]. According to our data, 1-year survival rate was 74%, 91%, and 93%; 3 years 60%, 75%, and 74%; and 5 years 45%, 43%, and 43%; the median of overall survival reached 65 months, 75 months, and 75 months, respectively.

Summary

In the vast majority of cases, malignant retroperitoneal tumors were represented by sarcomas; benign tumors were more often presented by fibrolipomas and neurofibromas; the main treatment method for these tumors was surgical. Surgical treatment was performed in removal of the tumor within healthy tissues, complete resection of tumor with wide margins including excision of other organs, and complete resection of tumor with wide margins including excision of other organs with preoperative tumor supply vessel embolization. During complete resection of tumor with wide margins including excision of other organs, blood loss, time of surgery, number of postoperative complications, and postoperative LOS were significantly greater in comparison with a group of patients, where tumor resection performed within healthy tissues. The proposed method of preoperative embolization of tumor feeding vessels allows to reduce blood loss, time of operation, the number of postoperative complications, and the number of postoperative LOS.

Compliance with Ethical Standards

Conflict of Interest Not applicable.

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