

# Treatment of Primary Retroperitoneal Tumors: Single Center Experience

 Umut Ünal<sup>1</sup>,  Kadir Karkin<sup>1</sup>,  Ediz Vuruşkan<sup>1</sup>,  Mubariz Aydamirov<sup>1</sup>

<sup>1</sup> Department of Urology, Health Sciences University, Adana City T&R Hospital, Adana, Türkiye

<sup>2</sup> Department of Urology, Baskent University, Alanya A&R center, Antalya, Türkiye

## Abstract

**Aim:** The aim of our study is to evaluate the results of patients who underwent surgery due to primary retroperitoneal tumors in order to contribute to the knowledge pool in the literature.

**Methods:** The data of patients who underwent surgery due to retroperitoneal tumor at Health Sciences University, Adana City Training and Research Hospital between January 2015 and January 2023 were retrospectively scanned. Approximately 54 patients with a clinical diagnosis of PRT were included in the study. Preoperative demographic characteristics of the patients, such as age at diagnosis, gender, number of surgeries for PRT, preoperative biopsy pathology and symptom status, if any, were recorded. All patients underwent computed tomography (CT) imaging with intravenous contrast. The location, size, density and presence of contrast enhancement of PRT in preoperative imaging methods were recorded. Peroperative incision type and duration, need for erythrocyte suspension transfusion, need for organ resection, complications and length of stay in the postoperative period were evaluated.

**Results:** The average age of a total of 54 patients who underwent surgery due to a retroperitoneal mass was 53.8±10.0 years. While 15 (27.8%) of 54 patients with a retroperitoneal mass were diagnosed incidentally, 39 (72.2%) patients were diagnosed symptomatically. The final pathological outcome of all relapsed patients was liposarcoma. The average operation time was 178.7±85.4 minutes. In 12 (22.2%) patients, adjacent organ resection was performed in addition to the mass. The average length of stay of the patients was 6.2±3.1 days. In the postoperative period, one patient required re-operation due to ileus and one patient due to bleeding. Adjuvant therapy was given to 6 (11.1%) patients after surgery. In the final pathology results of the patients, positive surgical margins were detected in 8 (14.3%) patients. Additionally, all of these patients had organ resection. In the Kaplan-Meier survival analysis, it was found that surgical margin had a statistically significant effect on average survival ( $p<0.001$ ).

**Conclusions:** According to the results of our study, microscopic surgical margin positivity is the main factor affecting survival in PRT treatment and that total organ resection positively affects survival.

**Keywords:** Primary retroperitoneal tumors, surgical resection, effective treatment

## 1. Introduction

Retroperitoneal tumors account for less than 1% of all tumors but approximately 20% of all soft tissue tumors. It is malignant at a high rate (65-86%)<sup>1</sup>. They are large lesions that can be primary or secondary. Differentiating primary retroperitoneal tumors (PRT) from secondary retroperitoneal tumors is important for treatment management. The first-line treatment for lymphoma or metastatic disease is chemotherapy, while surgery is the only curative treatment


option for PRT. Percutaneous biopsies may be needed from time to time to make this distinction. However, it must be differentiated from retroperitoneal non-neoplastic pathologies such as Castleman disease, extramedullary erythropoiesis, Erdheim-Chester disease and amyloidosis. Distinguishing these by characteristic imaging findings prevents unnecessary biopsies and surgeries<sup>2</sup>. PRT originates from soft tissues, lymphatics and neural tissue rather than the organs in the region. Symptoms are atypical and have a long growing period until symptomatic. For this reason, the diagnosis can be made either by imaging performed for other purposes or when it reaches very large sizes. Masses that reach large sizes cause symptoms to occur in the late period due to displacement of retroperitoneal structures or pressure on neighboring organs. The primary treatment is surgical resection, and the importance of removing the entire tumor has been emphasized many times in the literature<sup>1,3,4</sup>.

Corresponding Author: Kadir Karkin

e-mail: kadir\_karkin@msn.com

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Factors such as late detection of large sizes and critical neighborhoods make treatment management difficult. Due to the limited effect of chemotherapy and radiotherapy, PRT treatment continues to be surgical even if there is a recurrence<sup>3,4</sup>. PRTs are a heterogeneous group of tumors. Tumors originating from different tissues have many variations even within their own subgroups. This heterogeneity is present in many studies in the literature and the number of patients generally appears to be insufficient. For this purpose, we aimed to evaluate the results of patients who underwent surgery due to RPT in order to contribute to the knowledge pool in the literature.

## 2. Materials and methods

After obtaining approval from the local ethics committee, the data of patients who underwent surgery due to retroperitoneal tumor at Health Sciences University, Adana City Training and Research Hospital between January 2015 and January 2023 were retrospectively scanned. Approximately 54 patients with a clinical diagnosis of PRT were included in the study. Preoperative demographic characteristics of the patients, such as age at diagnosis, gender, number of surgeries for PRT, preoperative biopsy pathology and symptom status, if any, were recorded. All patients underwent computed tomography (CT) imaging with intravenous contrast. The location, size, density and presence of contrast enhancement of PRT in preoperative imaging methods were recorded. Peroperative incision type and duration, need for erythrocyte suspension transfusion, need for organ resection, complications and length of stay in the postoperative period were evaluated. Histopathologically, tumor type, tumor grade and surgical margin status, number of recurrences and locations in the postoperative period were recorded. During their follow-up, the patients' additional treatment needs and surveys were recorded. Survey was calculated from the date of surgery to the date of death or last follow-up.

### 2.1. Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows version 22.0 (IBM Corp., Armonk, NY). Continuous variables are presented as mean  $\pm$  standard deviation and categorical variables as n (%). Kaplan Meier method and log-rank test were used to evaluate the relationship between surgical class positivity and survival rate.  $P < 0.05$  was considered statistically significant.

## 3. Results

The average age of a total of 54 patients who underwent surgery due to a retroperitoneal mass was  $53.8 \pm 10.0$  years. 30 (55.6%) of the patients were male and 24 (44.4%) were female. Needle biopsies were taken from 9 patients during preoperative evaluation. While 15 (27.8%) of 54 patients with a retroperitoneal mass were diagnosed incidentally, 39 (72.2%) patients were diagnosed symptomatically. 49 of the cases were operated once, 4 twice, and 1 three times due to recurrence. The final pathological outcome of all relapsed patients was liposarcoma. Preoperative demographic and clinical characteristics of the patients included in the study are summarized in table 1.

When intraoperative results were evaluated, median incision below and above the umbilicus was found to be the most frequently preferred approach in 21 (38.9%) patients. The average operation time was  $178.7 \pm 85.4$  minutes. In 12 (22.2%) patients, adjacent organ resection was performed in addition to the mass. Intraoperatively, main vessel injury occurred in 3 (5.6%) patients and pleural injury occurred in 3 (5.6%) patients and was repaired intraoperatively.

**Table 1**

Demographic and preoperative characteristics of the patients

Variables	Total patient, n=54
Age, year, mean $\pm$ s.d.	53.8 $\pm$ 10.0
Gender, female/male	30/24
Tumor size, cm, mean $\pm$ s.d.	8.5 $\pm$ 4.7
Preoperative biopsy, n (%)	
None	45 (83.3)
Paraganlionroma	3 (5.5)
Ganglionroma	3 (5.5)
Malign mesenchymal tumor	3 (5.5)
Incidental diagnosis, n (%)	15 (27.8)
Presence of contrast enhancement, n (%)	48 (88.9)
Density of mass in CT, n (%)	
Hyperdense	12 (22.2)
Hypodense	33 (61.1)
Heterogen	9 (16.7)
Anatomical location of the mass, n (%)	
Psoas anterior	36 (66.6)
Para-aortic	9 (16.6)
Renal hilum	3 (5.5)
Suprarenal	6 (11.1)

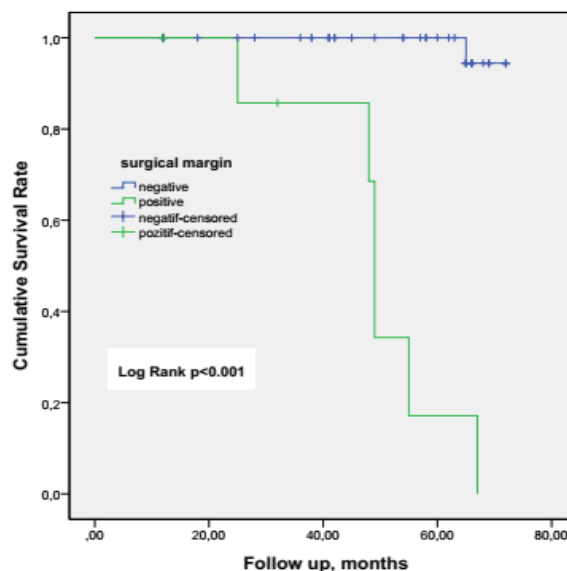
**Table 2**

Histological types of retroperitoneal tumor

	Frequency	Percent
Liposarcoma	22	40.7
Well differentiated		
Myxoid		
Mixed type		
Malign fibrous histiocytoma	11	20.4
Paraganglioma	6	11.2
Leiomyosarcoma	3	5.6
Atypical lipomatosis tumor	3	5.6
Mature cystic teratoma	3	5.6
Ganglionroma	3	5.6
Schwannoma	3	5.6
Total	54	100.0

**Figure 1**

In Kaplan-Meier survival analysis



The average length of stay of the patients was  $6.2 \pm 3.1$  days. In the postoperative period, one patient required re-operation due to ileus and one patient due to bleeding. Erythrocyte suspension was given to 6 (11.1%) of the patients due to decrease in hematocrit. According to the surgical specimen results, the most frequently detected pathology was reported as liposarcoma (40.7%). 50 (92.5%) patients underwent complete resection. Total excision could be performed in 12 (100%) patients with benign pathology results and 38 (90.4%) patients with malignant pathology results. Final pathology results are presented in table 2. Adjuvant therapy was given to 6 (11.1%) patients after surgery. In the final pathology results of the patients, positive surgical margins were detected in 8 (14.3%) patients. During an average follow-up of the patients of  $49.1 \pm 19.2$  months, cancer-specific deaths occurred in 7 (12.5%) patients. When the pathology results of 7 patients were examined, it was observed that 4 (57.1%) patients had liposarcoma and 3 (42.9%) patients had leiomyosarcoma pathology. Additionally, all of these patients had organ resection. In the Kaplan-Meier survival analysis, it was found that surgical margin had a statistically significant effect on average survival ( $p < 0.001$ ) (Figure 1).

**Table 3**  
Patients underwent adjacent organs resection (n = 12)

Surgery	Frequency	Percent
Nephrectomy	5	41.6
Adrenalectomy	4	33.3
Partial intestine resection	2	16.6
Splenectomy	1	8.3
Total	12	100.0

#### 4. Discussions

PRTs are challenging cases in terms of location, slow progression, and lack of an effective treatment method other than surgery. Its treatment involves complete resection of the tumor, including the pseudomembrane, which can be seen with the naked eye and radiologically. Surgery is often performed without taking a preoperative biopsy of these masses. When we look at the literature, it is seen that 30% of cases are benign as a result of pathology, and in our study, we found this rate to be 22.2%<sup>4</sup>. Benign tumors generally have a well-circumscribed and distinct capsule on imaging methods. Malignant tumors tend to invade neighboring organs or have unclear borders. [one]. Both contrast-enhanced computed tomography and magnetic resonance imaging are used to evaluate the source of the mass, its relationships with neighboring organs, and its malignant potential. Both imaging provides very accurate assessment of the characteristics of these tumors<sup>5</sup>. Sometimes computed tomography or magnetic resonance angiography may be needed to determine adjacent vessel relationships and oral contrast-enhanced computerized tomography to determine the gastrointestinal system relationship. Preoperative detection of these relationships can help take precautions for bowel cleansing or vascular resection and reconstruction<sup>6</sup>. Such preoperative preparations reduce both morbidity and mortality.

Previous studies have proven that removing surrounding organs (e.g. kidney, colon, small intestine) with multivisceral resection, when necessary, contributes to an increase in the resectability rate. Invasions involving major retroperitoneal blood vessels such as the inferior vena cava, aorta, or iliac or visceral vessels require planned

vascular resection<sup>6,7</sup>. In their study by Lee et al., 21% of adjacent organ resections were performed, consistent with our results, while operation times and average hospital stays were longer. It seems to be long (207 minutes and 18 days, respectively). We think that the reason for this difference between the results is due to the retroperitoneal mass sizes of the patients included in both studies (13.7 cm versus 8.5 cm)<sup>8</sup>. When we look at the literature, it is seen that adjacent organ resections are generally performed at similar rates<sup>4,9</sup>. The most commonly resected adjacent organ is the kidney<sup>1,4,8</sup>. While this rate was 44.4% in Lee et al.'s study, it was 41.6% in our study. Our adjacent organ resection rates were consistent with the literature.

According to the results of their study, Xu et al. were able to achieve 85.5% total tumor excision. This rate was 95.6% in benign pathology results and 80.6% in malignant ones. In our study, our overall, benign and malignant pathology results and total excision rates were similar to the results of the study by Xu et al. They also performed adjacent organ resection at a rate similar to the literature and our study (20.2%). When we look at the literature, it is seen that the factor that most affects total excision is major vascular invasion. In the study conducted by Xu et al., 7 patients (4%) required major vascular reconstruction, while the results were similar to our study (5.6%). While there was a 19% recurrence rate in their study, this rate was 9% in our study. In the literature, it is seen that this rate can vary within a wide range of 40-82% between 15-44 months<sup>4,10</sup>. The most recurrent pathologies were liposarcoma, leiomyosarcoma and malignant hemangioendothelioma. In our study, all recurrent masses were liposarcoma<sup>4</sup>. In our study, we detected sarcoma at a rate of 66.6%. In the literature, this rate is seen to be around 90%<sup>11,12</sup>. Our complete resection rate in sarcomas is 86.1%, and in the literature this rate varies within a wide range of 40-95%<sup>1</sup>. Previous studies have shown that local recurrence is associated with poor prognosis. Even if there is recurrence, the primary treatment is surgery<sup>3</sup>. When complete resection can be performed in sarcomas, the average life expectancy is 103 months, but in cases of incomplete resection or inoperability, it can decrease to 18 months<sup>13</sup>. In our study, microscopic surgical margin positivity was detected in 14.3% of the patients. During an average follow-up of the patients of  $49.1 \pm 19.2$  months, cancer-specific deaths occurred in 7 (12.5%) patients. Similar to previous studies, we found that incomplete or positive surgical margins affected median survival<sup>4</sup>. Surgical margin positivity is directly related to recurrence and survival. Primary versus recurrent tumor has a strong association with postoperative survival<sup>14</sup>.

Many factors affect survey in PRT treatment. Many studies in the literature have previously focused on this issue and some results have been reached. Many factors such as the patient's age, gender, tumor size and location, laboratory parameters, and the number of PRT patients treated by the center have been found to be effective<sup>1,4,8,15</sup>. An et al. In their multivariate regression analysis with 49 patients, they reported that tumor size, macroscopic negativity of surgical margins and tumor location were factors affecting average survival<sup>1</sup>. However, the most important limitation in supporting these findings and verifying them with regression analysis was observed to be the limited sample size. In the Kaplan Meier analysis we conducted with 54 patients in our study, we determined that microscopic surgical margin positivity was a factor affecting survival. In addition, although it could not be verified by Cox regression analysis, we observed that 7 patients who died had leiomyosarcoma+liposarcoma pathology and that accompanying organ resection affected survival.

Our study contains some limitations. The first of these is its single center experience and retrospective design. Secondly, our sample number is small. Despite these, we think that it will contribute to the

literature since there are few studies on this subject in the literature and these are the results of the experiences of a tertiary center.

### Conclusions

According to the results of our study, we think that microscopic surgical margin positivity is the main factor affecting survival in PRT treatment and that total organ resection positively affects survival, but studies with large sample sizes are still needed to support our results.

### Statement of ethics

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and was approved by Health Sciences University, Adana City T&R Hospital Ethics Committee. (2023-2962)

### Conflict of interest statement

Author declare that they have no financial conflict of interest with regard to the content of this report.

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