Surgery for Left Upper Abdominal Retroperitoneal Tumors

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1 Clinical Characteristics of Left Upper Abdominal Retroperitoneal Tumors (RPTs)

The author has summarized the clinical characteristics of 71 cases of left upper RPTs (age range, 0.5–76 years; median, 39.1 years). The incidence is about equal between men and women. The most common pathological types include liposarcoma, nerve sheath tumor, teratomas, leiomyoma, ganglioneuromatosis, and neuroblastoma. Other reported types include paraganglioma, malignant lymphoma, malignant stromal tumors, metastatic tumors, primitive neuroectodermal tumors, malignant fibrous histiocytoma, malignant hemangiopericytoma, synovial sarcoma, malignant Brenner tumor, and choriocarcinoma (Felix et al. 1981).

The most common clinical symptoms are upper abdominal or left upper abdominal pain or discomfort, accompanied by the left lumbar back soreness and abdominal distension. The upper abdominal pain with distension may be mitigated by the right lateral supine position, and the back pain may radiate to the left lower abdomen, occasionally accompanied by discomfort in the left shoulder, left upper limb numbness, or left thigh pain and numbness. Patients have obvious postprandial bloating in left upper abdomen and oppression feeling. Symptoms such as fever, anorexia, vomiting, fatigue, weight loss, chest tightness, shortness of breath, and trouble breathing in supine position are also seen in patients with the left upper abdominal RPTs, which are mostly associated with the compression of the surrounding organs, involvement of the nerves, or growth into the left side of the chest.

When growing to a certain extent, the left upper RPTs may involve surrounding organs. Tumors may result in reactive left pleural effusion when they reach upwardly the top of the left diaphragm. Tumors may adhere to and invade left diaphragm or metastasize to the dorsal portion of inferior mediastinum through the diaphragmatic hiatus. The left hepatic lobe can be invaded, and the left kidney and suprarenal gland are often squeezed, wrapped, and invaded by tumors located in this area. If it is neurogenic tumor, vertebrae and vertebral foramen are often involved. The stomach, spleen, pancreas body, and tail are usually pushed up by left upper abdominal RPTs, thereby resulting in eating disorders, enlarged spleen, and other symptoms.

About 20% of patients with left upper RPTs have palpable masses. Sometimes, these patients visit clinic when they found left abdominal mass by chance. Preoperative imaging such as B ultrasound, CT, and MRI may reveal lesions and

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display the location, size, shape, nature of the tumor, and changes in surrounding organs, with almost 100% of accuracy in diagnostic localization. It is reported that the qualitative diagnosis is challenging in 11% of patients with left upper RPTs (Karakousis and Pourshahmir 1999). The majority of those are tumors with specific features such as liposarcoma and teratoma (Furukawa et al. 1997).

2 Treatment and Prognosis of Left Upper Abdominal RPTs

The operative incision is essential to successful and complete resection of the left upper RPTs. Thoracoabdominal incision is the most common incision, which may be inverted "L" shaped, "L" shaped, arc shaped, and "┤" shaped. The vertical incision may pass through midline of the abdomen or rectus abdominis, while the thoracic incision may pass through the sixth or the seventh intercostal space. Alternative incisions include large roof-shaped incision under the bilateral costal margin, oblique incision from spinous process of the 11th thoracic vertebra to the anterior superior iliac spine, and a large "cross"-shaped incision in the left upper quadrant. During the surgery, elevate the left lumber region with pad, or secure the patient in the right lateral recumbent position as required.

A complete resection of the left upper abdominal RPTs depends on the surgeon's familiarity with the anatomy and professional skills in combined organ resection. Due to invasion of the tumor, combined left kidney resection is common in patients with RPTs, especially in those with liposarcoma derived from perirenal adipose capsule. The resection of the left kidney can be performed only when the preoperative kidney function is normal. If the tumor involves the renal cortex, partial nephrectomy is another option. If the tumor involves simply the renal vasculature, surgeons can remove this specific segment. Vascular graft is suitable for arteries, while ovarian vascular anastomosis or left renal collateral vein reflux is suitable for veins. Simple vascular rupture can be repaired. If diaphragm is invaded by the tumor, partial resection is feasible, or the diaphragm is opened for removal of thoracic tumor. After surgery, the closed thoracic drainage must be placed. Other common combined resected organs are partial or whole stomach, pancreatic body and tail, left lobe of spleen and liver, splenic flexure, left psoas major, partial vertebral body, and left suprarenal gland.

The author has found that the visually complete resection rate was 96% in 71 cases of left upper abdominal RPTs, with bleeding up to 6000 ml and blood transfusion up to 5400 ml and the longest operation time up to 12 h. The postoperative follow-up demonstrated that 59 cases survived more than 1 year, and 15 cases underwent reoperation due to recurrence, with a 3-year survival rate of 83%.

3 Surgical Procedure of Left Upper Abdominal RPTs

3.1 Preoperative Preparation

Preoperative preparation as per the principles described in relevant sections hereof and preoperative imaging reveal that the tumor is located in the left upper abdominal retroperitoneum (Fig. 9.1).

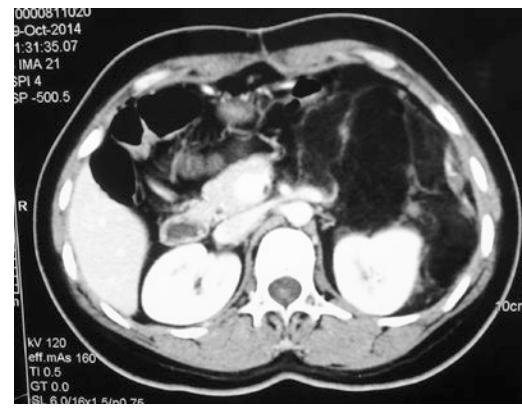

Fig. 9.1 Image (CT) of the retroperitoneal tumor in the left upper quadrant

3.2 Anesthesia

Endotracheal intubation under general anesthesia.

3.3 Position

Lie in supine position, and elevate the left side if necessary.

3.4 Incision

The midline incision in the upper abdomen is the most common choice. For those who have undergone surgery previously, the original surgical incision should be selected in principle (Fig. 9.2).

3.5 Surgical Procedures

1. Resect each layer of abdominal wall to gain access into the abdomen; pay attention to potential bowel adhesions under the incision, and carefully separate the tumor to guarantee no damage to the bowel and other structures (Fig. 9.3).
2. Abdominal adhesions are common in patients with RPTs, especially in those who underwent previous surgical treatment. Lift up one side of abdominal wall with multiple Alice forceps to separate the adhesion on the identical side. Prefer to remove part of the peritoneum rather than damaging intraperitoneal intestinal tract and other vital structures. Separate the adhesion on the opposite side (Fig. 9.4).
3. Explore the location and size of left upper abdominal RPT and its relationship with the surrounding organs, which is important to determine the next surgical approach (Fig. 9.5).
4. Protect the incision, retract the abdominal wall with large frame retractor to expose splenic flexure of the colon, and block off small intestine with gauze pad (Fig. 9.6).

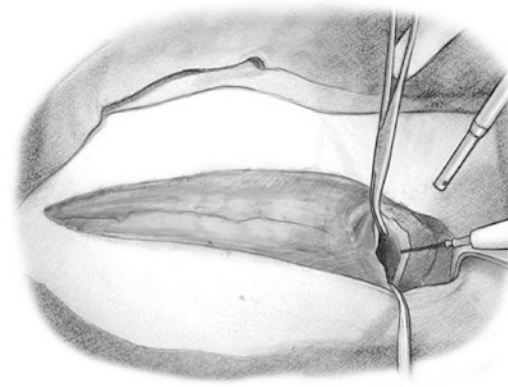

Fig. 9.3 Cut layers of abdominal wall and pay attention to inferior adhesions

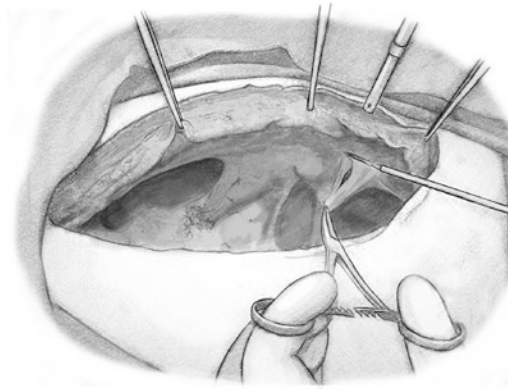

Fig. 9.4 Separate the adhesion between the abdominal wall and the intra-abdominal structure during the surgery of recurrent tumors

Fig. 9.2 Common surgical incisions for the surgery of retroperitoneal tumors in the left upper quadrant

Fig. 9.5 Left upper abdominal exploration

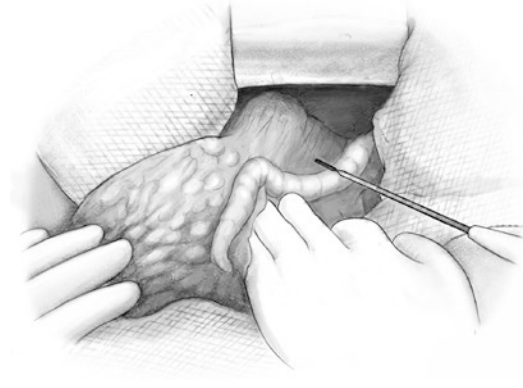

Fig. 9.7 Separate the splenic flexure

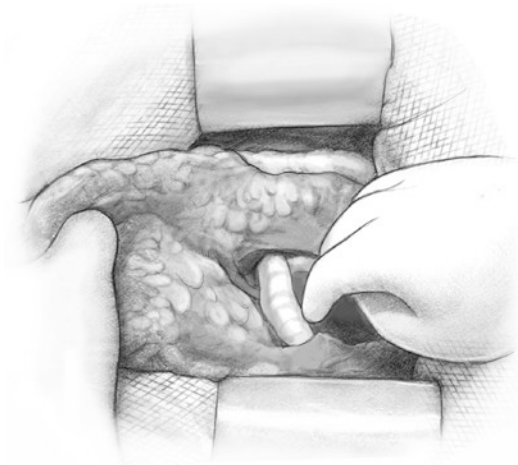

Fig. 9.6 Expose the tumor in the surgical field

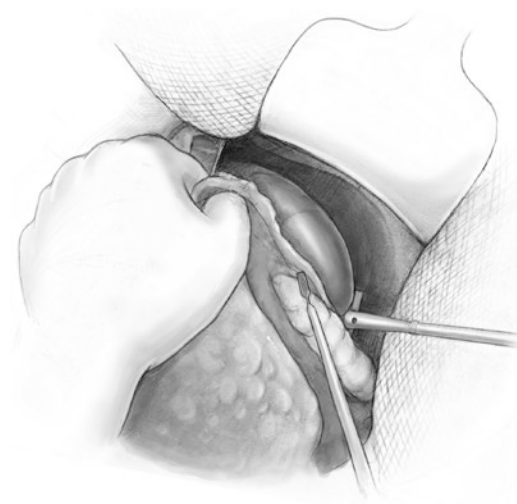

Fig. 9.8 Cut the colon and splenic ligament to obtain an access into the tumor area

5. Initiate sharp separation of the paracolic gutter of the descending colon, and then dissociate and separate splenic flexure (Fig. 9.7). How to gain access to RPTs through the gastrocolic space and splenocolic space approaches is the key to tumor resection, which requires cutting off gastrocolic ligament and splenocolic ligament (Fig. 9.8).
6. Now, expose the anterior portion of the tumor, which is medially close to inferior mesenteric vein, inferiorly to body and tail of pancreas and lower margin of spleen, whereas anteriorly and superiorly to the left kidney and renal blood vessels (Fig. 9.9).
7. Next, separate the adhesion between the left kidney and the tumor. For liposarcoma, remove perirenal fat capsule which may be the primary site of the tumor (Fig. 9.10).
8. Separate the lateral side of the tumor from the lateral abdominal wall due to relatively simple operation, and resect together with the adipose tissue around the tumor as much as possible, which is the key to reduce relapse of retroperitoneal liposarcoma (Fig. 9.11).
9. The medial side of the tumor is closely adjacent to descending mesocolon and transverse mesocolon, anterior to duodenojejunal flexure and abdominal aorta, and thus it is difficult to separate the tumor from these

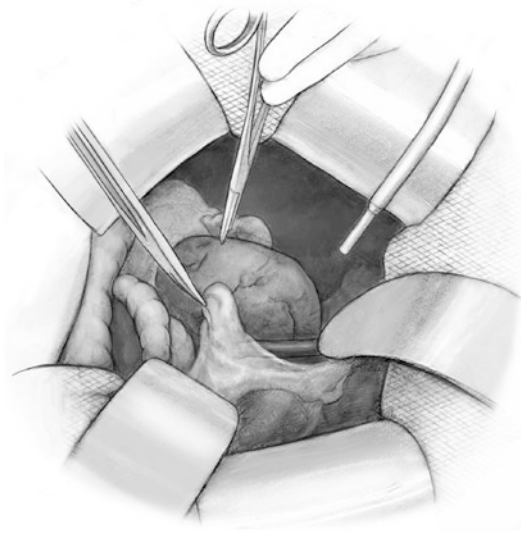

Fig. 9.9 The relation between the left retroperitoneal tumor and adjacent structure is clearly visible

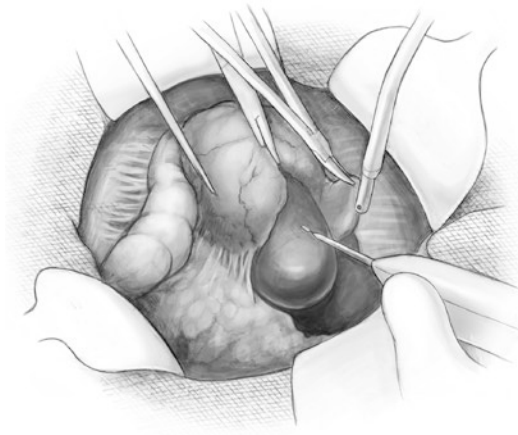

Fig. 9.10 Remove the pararenal adipose capsule to dissociate the kidney

structures. Close attention should be paid to protecting them from being damaged (Fig. 9.12).

10. Continuously separate the superior portion of the tumor to expose the lower margin of the pancreas and mesocolon structure (Fig. 9.13).
11. Continuously separate the tumor from pancreas laterally along the superior portion of the tumor, and cut off left splenorenal ligament (Fig. 9.14).

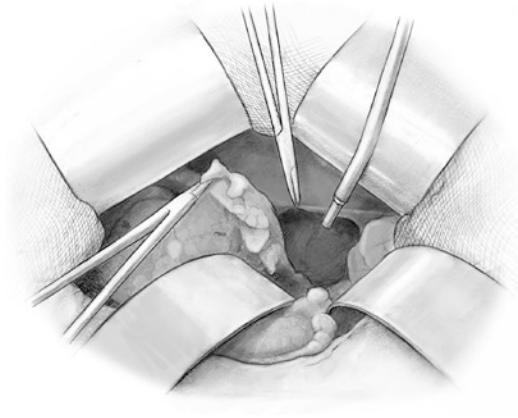

Fig. 9.11 Flush and separate the lateral area that is relatively easily accessible during the surgery of a retroperitoneal tumor

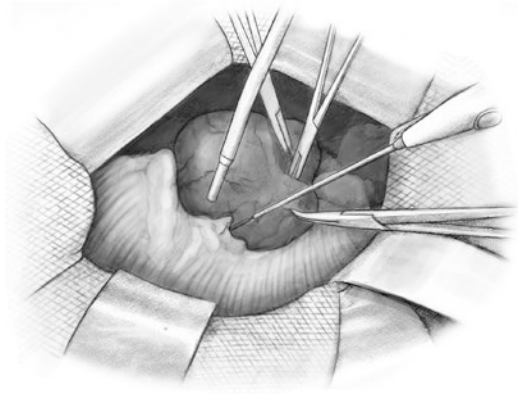

Fig. 9.12 Separate the duodenum from the mesocolon

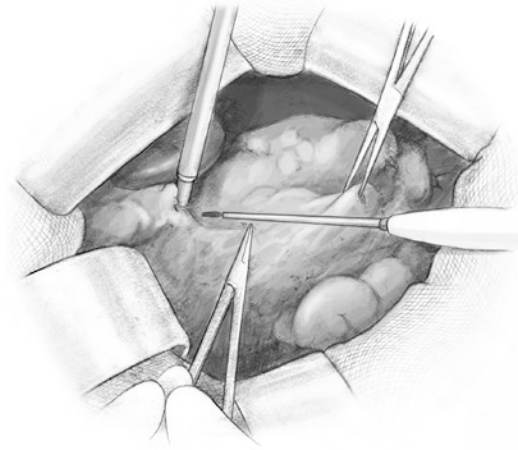

Fig. 9.13 Separate the pancreas

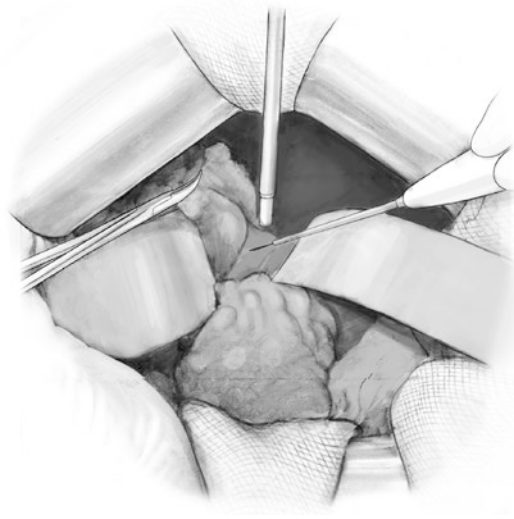

Fig. 9.14 Separate the tumor from the spleen

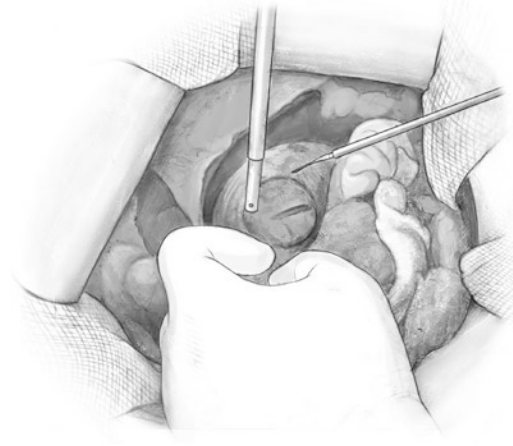

Fig. 9.16 Hemostasis at the bleeding points on the surface of the pararenal adipose capsule during its removal

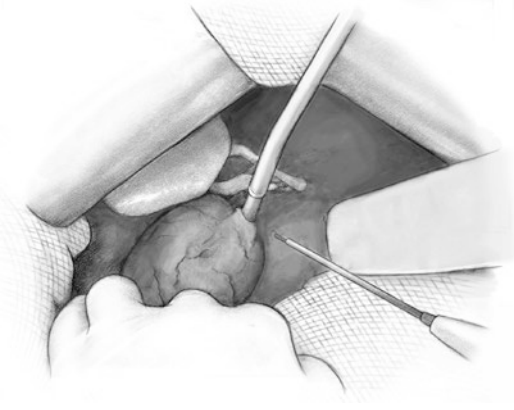

Fig. 9.15 Separate the tumor from the left kidney

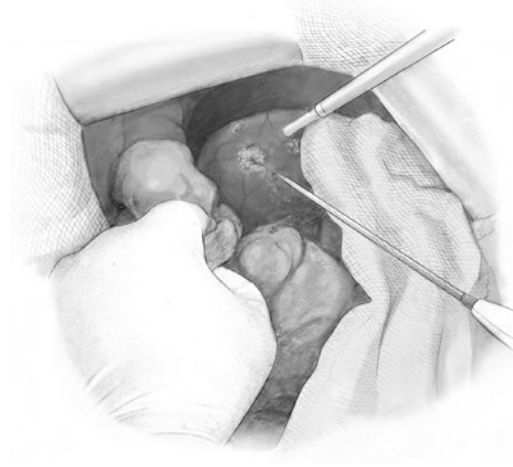

Fig. 9.17 A complete hemostasis of the bleeding points on the renal surface

12. After complete dissociation of the tumor from surrounding tissue, continuously dissociate along the space between the posterior portion of the tumor and the surface of the left kidney to separate the tumor from entire anterior portion of the kidney (Fig. 9.15).
13. When separating perirenal adipose capsule anterior to the kidney, spotlike bleeding may occur on renal surface; successive cauterization may be applied for hemostasis (Fig. 9.16).
14. After the adipose capsule is separated from the entire surface of the kidney, the renal hilum remains unseparated from the tumor. Check the bleeding points on the surface of the naked kidney again, and completely stop bleeding (Fig. 9.17).
15. When separating the tumor anterior to the renal hilum, pay attention to protecting renal artery and vein, suprarenal artery, left gonadal vein, and left ureter. During the surgery, prepare vascular devices, and make endovascular repair if necessary (Fig. 9.18).
16. After full dissociation between the structure of renal hilum and the tumor, only the tumor located anterior to inferior mesenteric vein

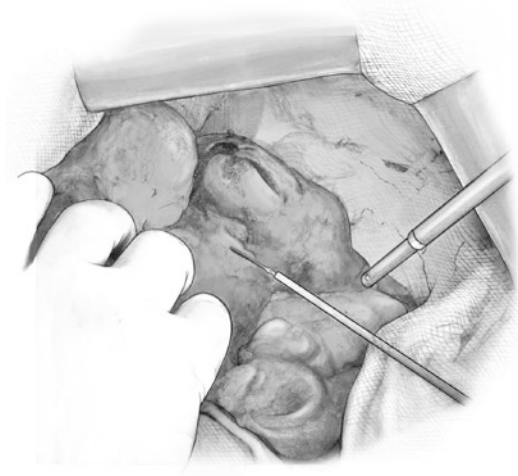

Fig. 9.18 Separate the tumor from blood vessels in the renal hilum and protect the structure of the renal hilum

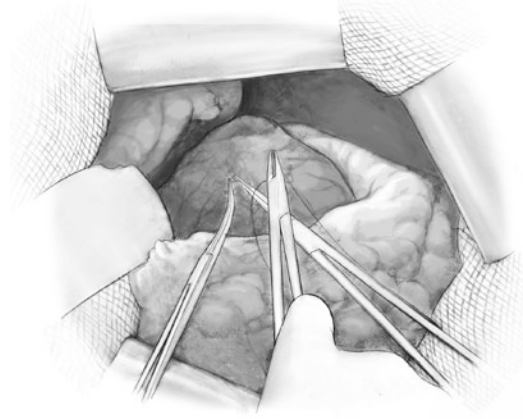

Fig. 9.20 Suture the wound and stop bleeding after tumor resection

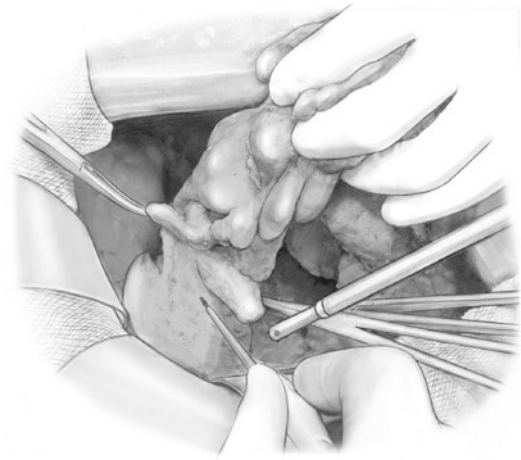

Fig. 9.19 Separate the inferior mesenteric vein medial to the tumor from the splenic flexure

Fig. 9.21 Restore the splenic flexure to normal anatomic position

and splenic flexure mesangium is not separated. Lift up the tumor to expose the residual pedicle-shaped connection, carefully separate, and completely resect the tumor (Fig. 9.19).

17. After resection of RPTs in the left upper abdomen and prerenal zone (Fig. 9.20), if bleeding occurs due to vascular injury in the separation of the tumor anterior to the renal hilum, firstly stop bleeding with clamps, and then suture bleeding points after the tumor is completely removed.
18. Wash the wound, restore the separated and retracted splenic flexure of the colon (Fig. 9.21), place abdominal drainage catheter, accurately count the number of gauzes used for the surgery, and then suture abdominal incision layer by layer (Fig. 9.22).

3.6 Postoperative Treatment

For details, please refer to perioperative treatment of RPTs hereof.

Fig. 9.22 Suture the wound and stop bleeding after surgery

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