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SURGICAL TECHNIQUE

Compartmental resection of a retroperitoneal sarcoma

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Introduction

Retroperitoneal sarcomas are rare tumors that affect approximately 600 people every year in metropolitan France. This rare surgery, although it has been the subject of an international consensus since 2012, is often poorly understood. The principles of resection are derived from extremity sarcoma surgery, where a real ''compartment'' consisting of defined aponeuroses exists; the entire contents of the compartment are resected *en bloc* ''without even seeing the tumor''. Since the retroperitoneum does not form a real ''compartment'', it is, in effect, recreated by an *en bloc* resection that includes the ipsilateral colon anteriorly, the psoas aponeurosis posteriorly, the kidney and all of the retro-peritoneal fat.

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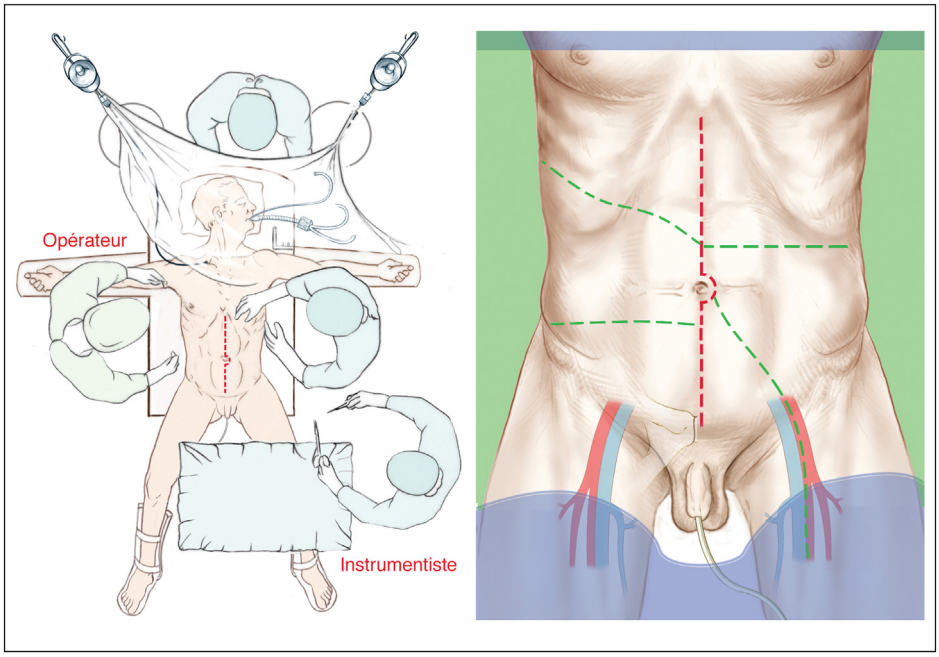


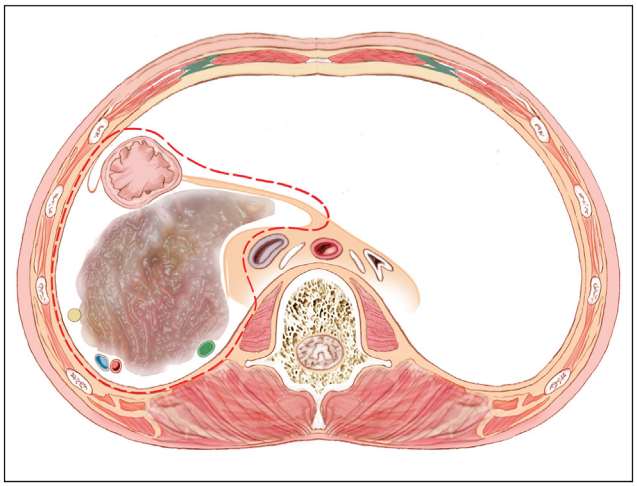
1 Technique: patient positioning and incision

The patient is positioned supine with legs apart and arms in abduction. For large tumors, the groins and the lower thorax are draped into the operative field.

The usual approach is a midline xypho-pubic incision. Depending on the volume or location of the tumor, this can be complemented by one or two transverse extensions or by an incision centered over the iliac vessels. The tumor is often large and in close proximity to the great vessels, which results in a potentially life-threatening intra-operative risk and justifies not skimping on the size of the incision.

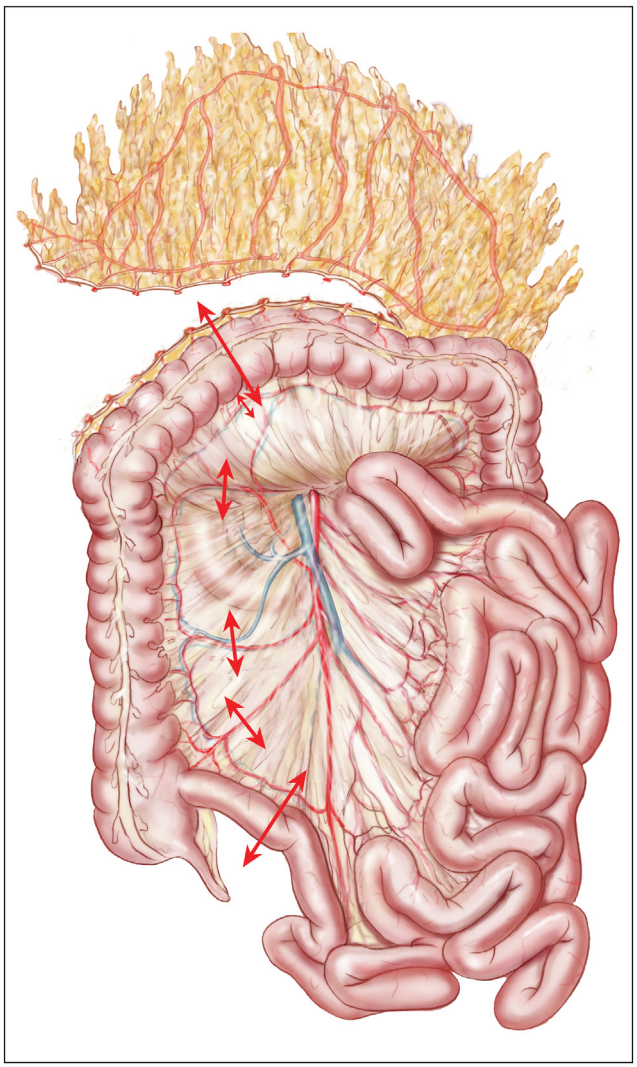
2 Abdominal exploration and colo-epiploic detachment

The initial surgical exploration confirms the findings from the pre-operative CT scan and the absence of peritoneal sarcomatosis. The omentum is completely detached from the transverse colon because an omentoplasty will be needed at the end of intervention to cover the excisional bed.



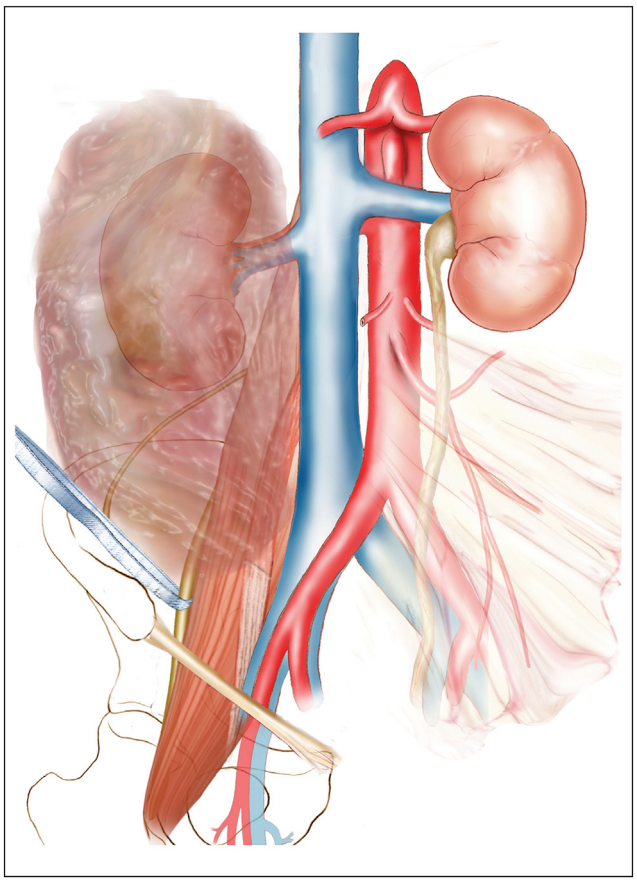
3 Intestinal transections

The colon and its mesentery constitute the anterior margin of the compartment. They are therefore resected *en bloc* with the specimen. The transverse colon is divided preserving the middle colic artery. For tumors located on the right side, the last ileal loop is divided. For left-sided tumors, the upper rectum is divided at the level of the pelvic brim. The mesocolon is then divided in line with the great vessels after ligation of the vascular pedicles.



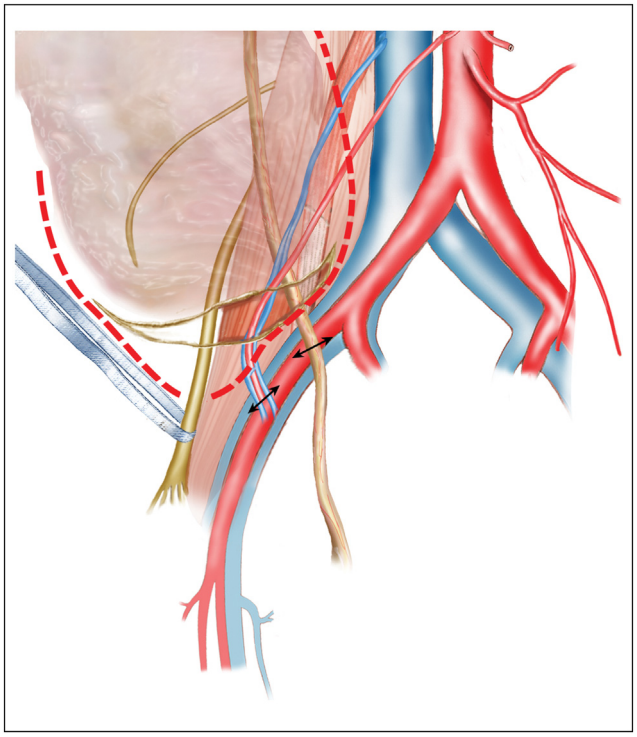
4 Opening of the retroperitoneum and identification of the femoral nerve

The posterior parietal peritoneum is incised at a distance from the lower edge of the tumor. The fascia of the psoas muscle is incised at the level of the iliac bifurcation to identify the femoral (crural) nerve that will be encircled with a tape and spared.



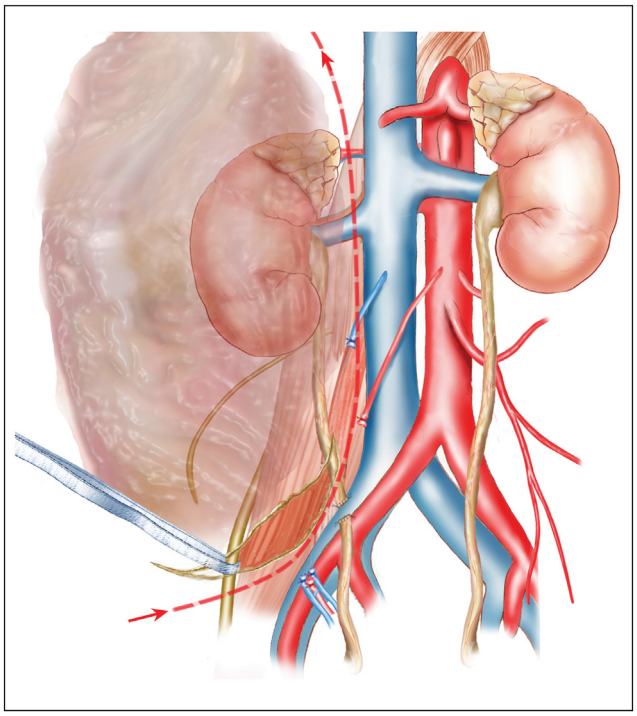
5 Dissection of the iliac axis and ureteral division

The psoas muscle fascia, which constitutes the posterior limit of the compartment and must be removed, is incised and dissection is continued medially to the aortic bifurcation along the upper edge of the external and common iliac vessels, which is the distal limit of the compartment. The ipsilateral ureter and gonadal vessels are divided as they cross the iliac vessels.



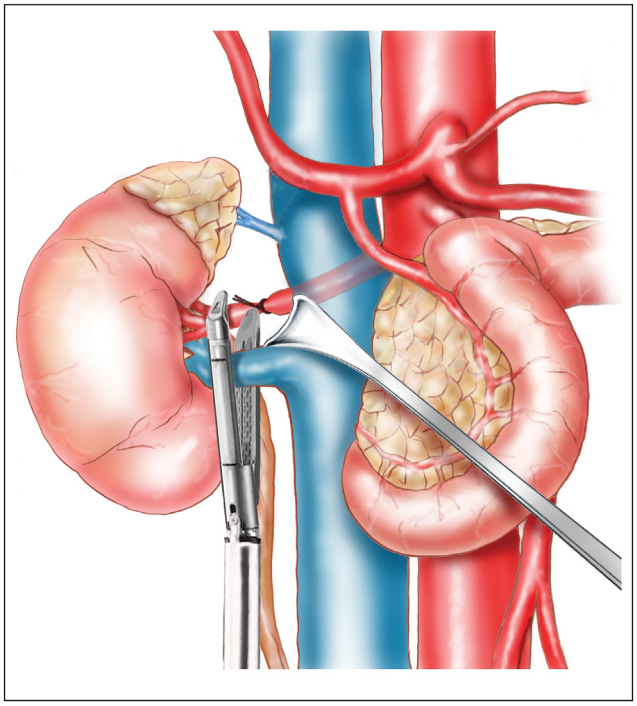
6 Liberation of the inferior vena cava

The inferior vena cava (IVC) for right-sided tumors or the aorta for left-sided tumors, is progressively freed from the tumor, from the bottom upwards, at the same time incising the medial insertion of the psoas fascia. This release is performed prior to any tumor mobilization because the weight and volume of the tumor could result in a vascular tear with massive hemorrhage that is difficult to control. One must take care, during the fascial disinsertion, to avoid injury to the lumbar vessels, which can cause serious hemorrhage.



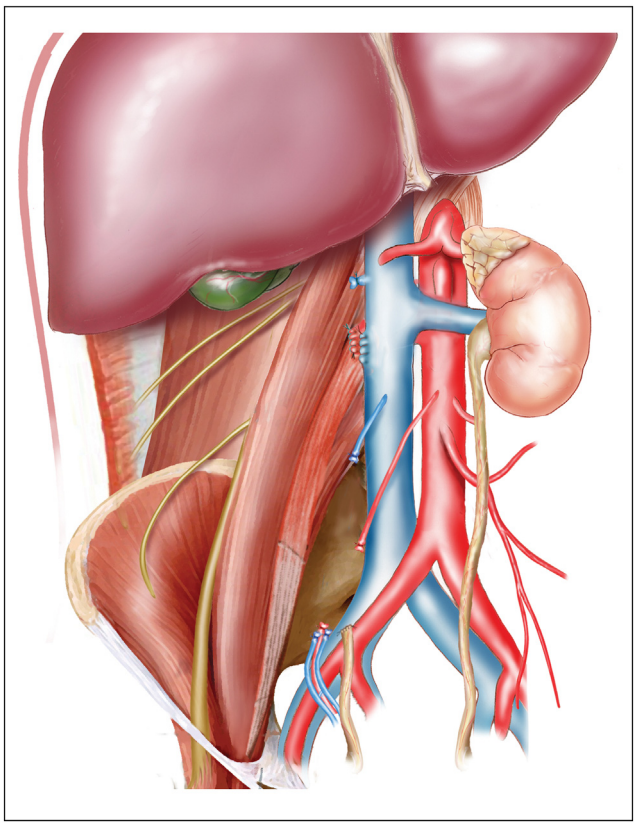
7 Division of the renal pedicle

After division of the gonadal vessels distally over the iliac vessels and proximally at their origin in the renal vein, IVC/aorta, the renal pedicle is controlled. It is best, whenever possible, to ligate the renal artery, which lies very posterior, before ligating the vein. For tumors on the right side, the renal artery can be ligated in the inter-aorto-caval space and then transected at the right edge of the vena cava.



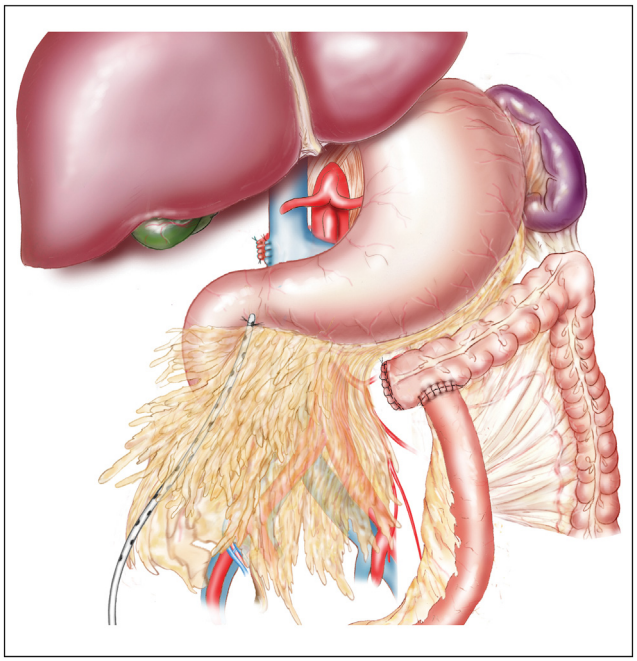
8 Lateral, superior and posterior dissection

Laterally, the parietal peritoneum is incised in the parieto-colonic groove exposing the transversalis muscle that will be followed posteriorly to the quadratus lumborum and iliopsoas muscles. The plane initiated on the underside of the tumor is continued superiorly. Since it is difficult to distinguish between normal and tumorous fat, all the fat structures must be resected *en bloc*, by dissecting in direct contact with the muscles (posterior to the fascia). At the superior pole of the tumor, the peritoneum is incised directly in contact with the diaphragm, and it is often necessary to resect a diaphragmatic pallet or part of the crural pillar.



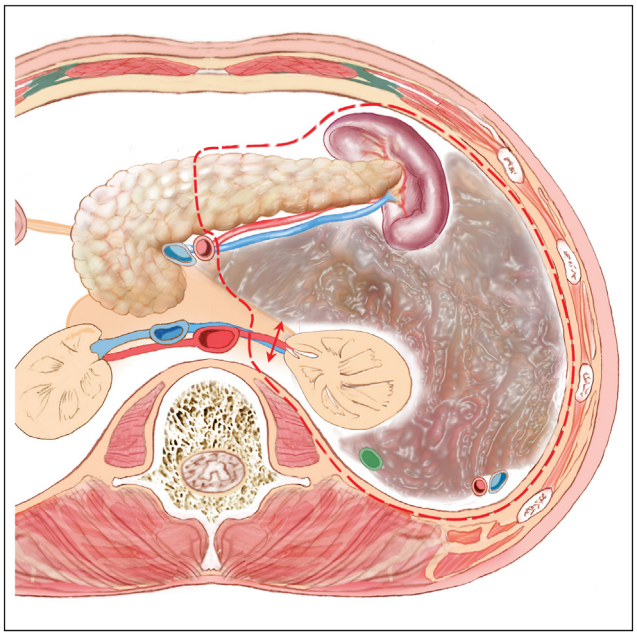
9 Intestinal anastomosis, omentoplasty and drainage

Digestive continuity is then restored by anastomosis according to the habits of the service. We perform primary anastomosis except in patients with multiple risk factors (malnutrition, cirrhosis, intra-operative hemorrhage). An aspiration drain is placed in the resection space and covered with a large omentoplasty to simplify the management of lymphorrhea, which occurs frequently after such retroperitoneal dissections.



10 Special cases

For certain organs that may lie in contact with the tumor, the risk/benefit ratio of systematic resection may be unfavorable. The head of the pancreas, the arterial or major nerve axes (femoral nerves) should only be resected in case of direct tumoral invasion. It is acceptable to perform a planned R1 resection is there is only a small involved area in simple contact between the tumor and these structures. Conversely, the body and tail of the pancreas, the venous axes (excluding vena cava and primary iliac vein) and the digestive tract can usually be sacrificed without a significant increase in morbidity and should be resected if they lie in contact with the tumor.



Disclosure of interest

The authors declare that they have no competing interest.