



# Open Radical Nephrectomy

# 18

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Open radical nephrectomy (ORN), first described by Frederic Foley in 1952 [1], includes the early ligation of the renal artery and vein, removal of the ipsilateral adrenal gland and the Gerota's fascia surrounding the kidney, and removal of the paraaortic/paracaval lymph nodes extending from the diaphragm crus to the inferior mesenteric artery [2]. Adrenalectomy is recommended in patients with large tumors and adrenal involvement on preoperative imaging [3]. Although initially

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identified as a component of RN, the routine application of ipsilateral adrenalectomy in local or locally advanced disease is not recommended [4]. This is because patients who undergo ipsilateral adrenalectomy have lower adrenal involvement rates [5] and do not have a survival benefit compared with those who do not [6–8]. Regional lymphadenectomy is not necessary in every radical nephrectomy case, considering the overall incidence of lymph node disease is about 5% [9, 10]. Guidelines continue to recommend lymph node dissection for patients with visible lymphadenopathy on preoperative imaging, although there is no evidence of benefit [11].

Indications for ORN include locally advanced kidney tumors with invasion of the perirenal fat and adrenal gland (T3a), tumors with invasion of the renal vein or vena cava (T3b and c), tumors that extend to adjacent organs (T4), and tumors that will likely undergo a wide lymph node dissection [12, 13].

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## 18.1 Surgical Technique

The surgical site can be reached retroperitoneally by flank incision and transperitoneally by midline or subcostal incision (Fig. 18.1). The thoracoabdominal approach may be preferred for large upper-pole tumors. Briefly, the kidney is released from the surrounding organs and tissues along with its fascia, then the artery and vein are cut after the ligation. The lengths of the renal vein on the right (shorter) and left (longer) sides should be considered. The gonadal, adrenal,

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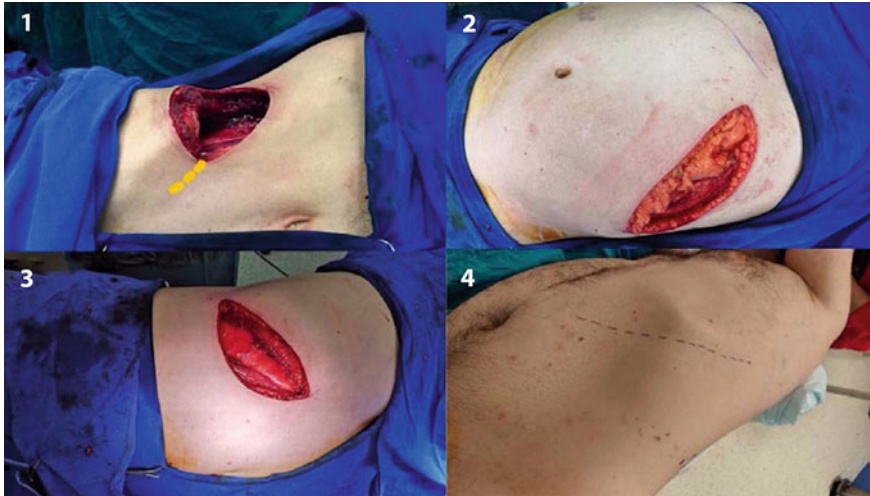
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**Fig. 18.1** Graphical overview of possible skin incisions for open partial nephrectomy. 1: Right flank incision; 2: Left anterior subcostal incision; 3: Right modified flank incision (Incision started from the posterior edge of 12th rib); 4: Left thoracoabdominal incision line (9th intercostal space)

and lumbar veins should also be ligated and the ureter should be ligated and cut distally to the extent possible and removed along with the Gerota's fascia of the kidney. Performing RN involving perirenal tissues as described [2] is important in preventing local recurrence because perinephric fat invasion is observed in about 25% of RN specimens [14].

## 18.2 Flank Approach

This approach provides easy access to the kidney and renal hilum prevents peritoneal cavity involvement, and reduces the risk of bowel injury, especially in patients with a previous history of abdominal surgery. Nevertheless, approaching the renal artery and vein is more difficult. The retroperitoneal flank approach may not provide sufficient surgical space in large tumors, upper-pole tumors, or in patients with thrombus in the inferior vena cava (IVC). It may also not be appropriate in cases where lymphadenectomy is planned. With this approach, although subcostal access may be sufficient in most cases, the subsequent division and removal of the 11th and 12th ribs may be required in tumors located in the upper pole and when the adrenal glands need to be evaluated. In this case, the rib to be removed is selected, the incision is started over that rib, and if necessary, the incision can be extended to end at the lateral edge of the rectus abdominis.

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## 18.3 Anterior Subcostal Approach

The anterior subcostal approach provides good exposure to the renal hilum. The incision is started in front of the 12th rib and, at approximately 2 cm below the costal arch, is extended in the cranial direction along the costal arch and terminated at the level of the xiphoid bone. In tumors that are medially located and require meticulous pedicle dissection or aorta and IVC dissection, the incision can be passed to the opposite side in a “Chevron” fashion without ending at the xiphoid level. When necessary, lymphadenectomy can be performed easily, and even the opposite side can be evaluated and improved if needed by entering the retroperitoneum. In the modified approach we implement at our clinic, we perform the incision in the 45-degree lateral decubitus position, a little more forward than the classical flank approach, starting from the front of the 12th rib and extending slightly longer medially. This way, not only can we continue operating retroperitoneally but also reduce the likelihood of incisional hernia by preventing subcostal nerve injury in most patients.

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## 18.4 Thoracoabdominal Approach

The thoracoabdominal approach reveals the upper abdomen, retroperitoneal structures, and thoracic cavity. It is used in large kidney tumors or when a mass or metastasis in the ipsilateral lung needs to be removed. The patient is placed in a semi-oblique position, and an incision is made between the 8th and 10th ribs. The incision can be made between the ribs or over the ribs, allowing them to be removed. The incision starts from the posterior axillary line, continues from the costal cartilage edge, and is advanced from the midline to the umbilicus. Performing intercostal nerve blockage while closing the surgical incision may reduce postoperative pain.

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