

# Operative Strategy in Laparoscopic Nephrectomy

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## Key Words

Laparoscopic nephrectomy  
Renal cancer  
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Transabdominal laparoscopic nephrectomy

## Abstract

Nephrectomy is a debilitating procedure because of the trauma to the abdominal wall. Laparoscopy could be a solution in this matter. Four patients underwent laparoscopic nephrectomy. In 3 patients with renal cancer, the transperitoneal route was used in order to obtain quicker access to the hilus. In the fourth patient with benign disease, a retroperitoneal route was chosen. There was no morbidity or mortality. Mean hospital stay was 5 days. Laparoscopic nephrectomy is safe and effective. Larger series are needed for evaluation of the long-term results in the treatment of renal cancer.

## Introduction

Laparoscopic cholecystectomy has been widely accepted as the technique of choice for the surgical treatment of gallbladder disease [1]. The absence of trauma to the abdominal wall results in a markedly decreased perioperative morbidity and recovery time for the patients. Similar advantages have been shown for other procedures [2]. Laparoscopic nephrectomy should prove no different as far as immediate benefit for the patient is concerned [3]. This seems acceptable in benign disease. Many cases of nephrectomy, however, are performed for malignant disease and criticisms in this matter could include the possibility of peroperative seeding of tumor cells [4] and the allegedly less than optimal radicality of the procedure. Laparoscopic nephrectomy can now, we believe, be performed in a way that comes very close to the open procedure. To document this, we report 4 cases of laparoscopic nephrectomy performed between November 1992 and July 1993.

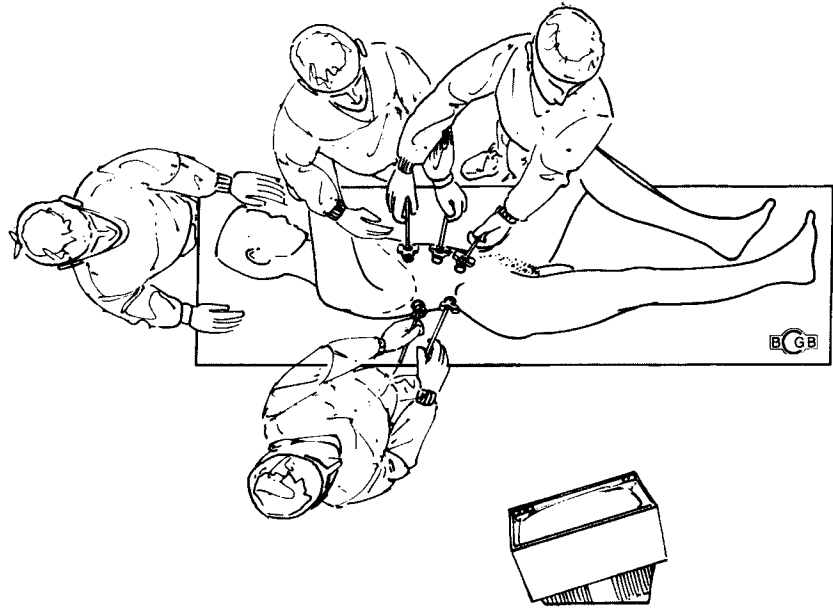
## Materials and Methods

Four patients were candidates for nephrectomy. Three had malignant disease and 1 had an infected terminal hydronephrosis without residual renal function.

In the 3 male patients with renal cell carcinoma, a transabdominal approach was selected (two right kidneys and one left kidney). The patients weighed an average of 93 kg (range 78-102 kg). The patients were placed in the same position as to undergo thoracophrenolaparotomy.

Pneumoperitoneum was performed according to Veres' technique. The first 10-mm trocar was put at the level of the umbilicus, approximately 4 cm lateral to it, on the same side as the lesion. This trocar was used for the laparoscope. The 4 other trocars were inserted on the anterior and posterior axillary line, 2 immediately under the costal rim and 2 just proximal to the iliac crest (fig. 1). All the trocars were 10 mm in diameter, except for the distal one on the anterior axillary line, which was 12 mm to permit the insertion of a linear stapling instrument (Endo GIA<sup>®</sup>, USSC, Norwalk, Conn., USA) in order to control the hilar vessels if necessary.

The overlying colon was mobilised by severance of the lateral peritoneal adhesions and the ureter was dissected free at the level of the iliac bifurcation.



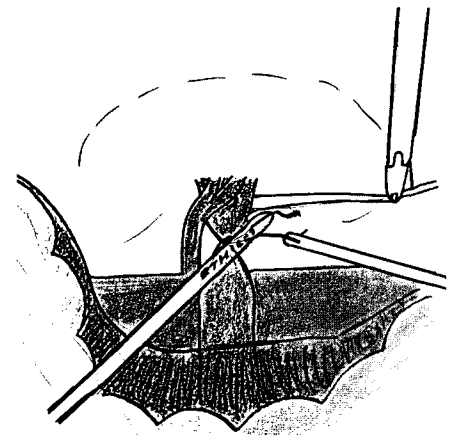
**Fig. 1.** Positioning of patient and trocar placement in transabdominal laparoscopic nephrectomy.

The spermatic vessels were clipped and transected at that level. The colon was retracted medially. In a right nephrectomy, the vena cava was completely exposed. On the left, the retroperitoneal dissection revealed the aorta. The ureter was then dissected free from distal to proximal and the hilar vessels were encountered. These latter vessels were then isolated and the renal artery ligated with 2/0 silk, tied intracorporally, flush with the aorta on the left or with the vena cava on the right. The distal part of the artery was secured with clips and the artery transected. Subsequently, the main trunk of the renal vein was ligated (fig. 2) (in 2 patients) or stapled (in 1 patient). The distal branches were either clipped or ligated and the vein transected.

Dissection was then oriented cranially, just lateral to the vena cava or the aorta, and small vascular branches were serially clipped. Care was taken to include Gerota's fascia with the specimen as much as possible.

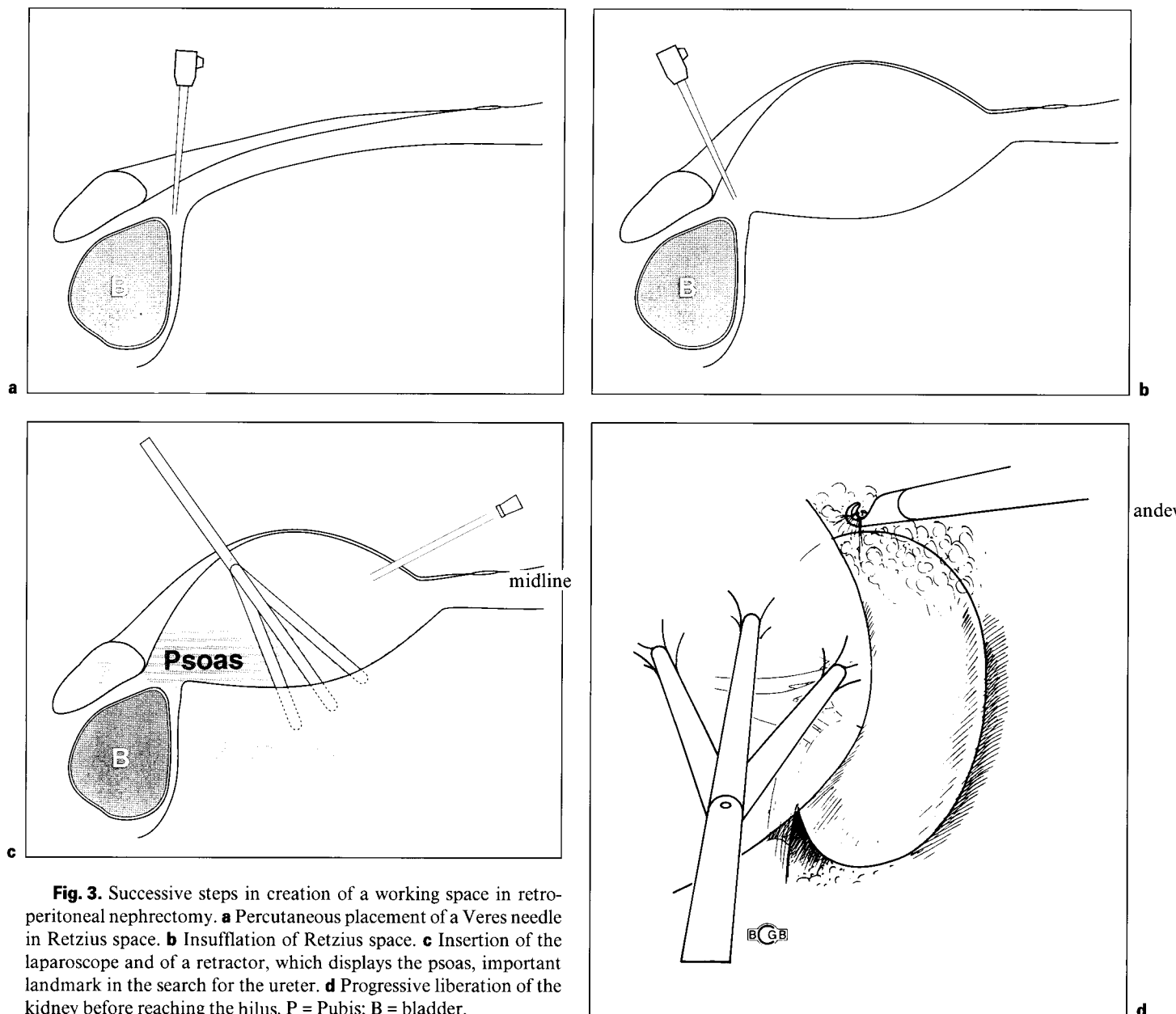
Once the medial side of the kidney had been liberated, medial traction being maintained on the now clipped and transected ureter, the lateral and posterior sides of the kidney were dissected, again leaving the perirenal fat with the specimen. Once the kidney was completely free, a large endoscopic bag (Lapsac<sup>®</sup>, Cook Urological, Neuhausen, Switzerland) was introduced in the abdomen and shoved over the specimen. The pursestring on top of the bag was then tied and the bag containing the kidney was exteriorised by enlarging the trocar site in the iliac fossa. The specimen was thus extracted in toto through a 7-cm incision. The trocar openings were then closed in layers and a drain was left behind in the area of dissection, through a preexisting lateral trocar hole.

In the patient with benign but terminal obstructive nephropathy, a retroperitoneal approach was selected. The patient was a 42-year-old female, weighing 80 kg, with a history of poliomyelitis and a flexion contracture of the left hip. Percutaneous drainage of the hydronephrosis had been performed 6 days preoperatively. The patient was



**Fig. 2.** Selective ligation of renal artery and vein before renal dissection in transabdominal laparoscopic nephrectomy. Traction on the ureter permits slight stretching of the hilar vessels.

put supine because of the hip contracture and the table tilted to the right. The technique is depicted in figure 3. A Veres needle was inserted blindly in the suprapubic area and 1 liter of CO<sub>2</sub> was insufflated deep to the rectus muscle. A small incision was made under the umbilicus, and a 10-mm trocar inserted subcutaneously over 3 cm, aiming for the pubis. The trocar was then oriented dorsally, the fascia of the rectus muscle was perforated and the suprapubic CO<sub>2</sub> pocket reached. Sweeping motions with the 0° laparoscope brushed away the peritoneum from the pelvic fossa wall and a second 10-mm trocar



**Fig. 3.** Successive steps in creation of a working space in retroperitoneal nephrectomy. **a** Percutaneous placement of a Veres needle in Retzius space. **b** Insufflation of Retzius space. **c** Insertion of the laparoscope and of a retractor, which displays the psoas, important landmark in the search for the ureter. **d** Progressive liberation of the kidney before reaching the hilus. P = Pubis; B = bladder.

was inserted on the midline, about 5 cm cephalad to the pubis. A large retracting instrument (Endoretract<sup>®</sup>, USSC) was then inserted and used to push the medial and anterior peritoneum away from the abdominal wall. A third trocar was inserted at the level of the anterior and superior iliac spine, just medial to it. A blunt instrument was used to gain access to the ventral and lateral aspects of the kidney and the percutaneously inserted draining catheter was localised. A fourth 10-mm trocar was then introduced on the posterior axillary line just distal to the rib cage (fig. 4). Bimanual dissection with the coagulating hook and coagulating scissors was then performed and numerous adhesions between the flaccid, bag-like kidney and the peritoneal fat

were taken down, starting at the level of the ureter making the way up cranially. Doing this, the anterior, posterior and lateral surfaces of the kidney were dissected free, lateral traction being kept on the ureter. The hilar vessels could now be dissected free. Several venous and arterial branches were either ligated or clipped depending on the size. Finally, the kidney was entirely freed and removed by slightly enlarging the suprapubic trocar site. A drain was left in the renal space.

## Results

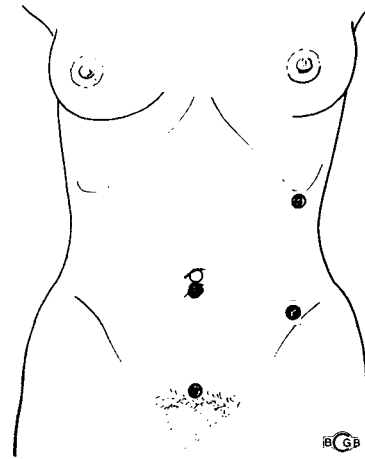
Patient characteristics are shown in table 1. The operating time ranged between 3.5 and 7.5 h (mean 5 h). Blood loss was estimated at 250 cm<sup>3</sup> on average. Oral intake was resumed on the first postoperative day. The urinary indwelling catheter was removed on the third postoperative day. There was no mortality nor morbidity. In-hospital stay was 5 days (range 4–6 days).

One patient with malignant disease (hypernephroma of the lower part of the right kidney) was followed for 14 months so far with no evidence of recurrent disease. For the other 2 cancer patients, follow-up is too short to be significant. For the patient with benign disease, she was seen at the clinic 1 month after the procedure. History and physical examination were entirely unremarkable at that time.

## Discussion

Using relatively simple tools, laparoscopic nephrectomy seems to be well feasible either trans- or retroperitoneally. The choice of which approach to use relies on the disease and hence on the approach that would have been chosen for the 'open' technique. In the case of malignant disease, a 'no touch' and 'vessels first' technique has to be preferred [5]. The transabdominal laparoscopic approach with preliminary exposure of vena cava or aorta before touching the kidney, theoretically permits vascular isolation and ligation before any manipulation, hereby reducing the chance of intravascular tumor seeding [6]. The extent of the procedure is, we believe, entirely comparable with the one performed open, since Gerota's fascia and the adrenals were easily included in the resection. The use of a hermetic endoscopic bag should deal with the concerns about intraperitoneal and parietal seeding [7]. The small muscle splitting incision necessary for removal of the specimen did not cause any significant pain or ileus, which is in accordance with the experience obtained with laparoscopic colectomy [8]. Extirpation of the specimen in toto rather than morcellating it as proposed by others [3] permits an adequate histopathological analysis which is obviously important in cancer staging.

The retroperitoneal approach is the preferred one in benign disease. Retroperitoneoscopy has been used in staging of malignant disease [9] and more recently in the endoscopic treatment of inguinal hernias [10] and in laparoscopic lumbar sympathectomy [Dulucq., pers. commun., 1991]. The retroperitoneal approach, specifically



**Fig. 4.** Trocar placements in retroperitoneal laparoscopic nephrectomy.

**Table 1.** Patient characteristics in our series of laparoscopic nephrectomy

Patient No.	Age years	Sex	Weight kg	OR time h	EBL cm <sup>3</sup>	Drain h	Postoperative stay, days
1	53	M	99	6.5	700	48	4
2	42	F	80	7.5	100	48	6
3	62	M	78	3.5	150	48	5
4	42	M	102	3	100	48	5

EBL = Estimated blood loss.

for kidney surgery, has been studied extensively in the recent past [11–13]. This approach has the advantage of preserving the integrity of the peritoneum. The use of balloons [14–16] to expedite the retroperitoneal dissection is certainly a significant improvement in this approach. We, however, elected the approach described in the text because at that time we felt more comfortable with this technique, through the experience we had gathered in several retroperitoneal procedures (colposuspension, lumbar sympatectomy, inguinal hernia).

The strategy of the procedure is very similar to the traditional lumbotomy access, the traction on the kidney giving exposure to the hilus [17]. Kidney manipulation, however, makes this approach unsuitable for cancer surgery.

Endoscopic staplers facilitate vascular control of the hilar vessels. With growing experience, however, the use of those expensive tools become obsolete and vascular ligation can be performed safely, with very little additional operating time. Transsection of a hilus vessel with a stapling instrument is unsafe in our opinion since technical problems might result in tragic blood loss. Manual ligation has become the technique of choice in other advanced laparoscopic procedures involving large vessels (e.g. the splenic vessels in splenectomy, the inferior mesenteric vein in colectomy, and others [18]). The length of

the procedure has reached acceptable levels. Our last 2 procedures for cancer took 3.5 h, which is comparable with a thoracophrenolaparotomy [19]. This, in combination with the shorter hospital stay and the reduced morbidity and pain for the patient, makes laparoscopic nephrectomy an attractive technique, certainly for benign disease. The question whether it is appropriate in the treatment of renal cancer cannot be solved until longer follow-up times are available. However, the strategy involved in the procedure itself, as well as the width of the resection which includes perirenal fat and fascia and the adrenals, render the procedure very similar to the classical procedure. We therefore dare hope that our results will be granted with equally good long-term results, after a much less debilitating procedure.

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