



Case Series of the Month

Single-Portal Access Laparoscopic Radical Nephrectomy for Renal Cell Carcinoma in Transplant Patients: The First Experience

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Abstract

We present the details of the first three single-portal access laparoscopic radical nephrectomies (S-Portal-RN) performed in patients with a malignant renal tumour that developed after a renal transplant.

The mean operative time was 171.6 ± 37.5 min, with a mean blood loss of 126.6 ± 25.1 ml. A single small skin incision (5 cm) was performed to remove the kidney. No significant difference in glomerular filtration rate was observed postoperatively. The postoperative recovery was uneventful with favourable short-term outcomes and high patient satisfaction at the 2-mo follow-up.

We believe that S-Portal-RN for renal cancer after a renal transplant can be performed without increased risks for the patients or for the transplanted kidney. © 2010 European Association of Urology. Published by Elsevier B.V. All rights reserved.

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1. Case report

The advent of laparoscopic surgery has greatly influenced urologic surgery. Immune function after surgery is believed to be preserved as a result of smaller incisions, reduced tissue injury, and less blood loss [1]. Decreased perioperative stress is particularly important when performing oncologic surgery because exaggerated activation or reactive suppression of the immune system may affect tumour growth and dissemination [1,2].

Single-incision laparoscopic surgery uses bent and articulating instrumentation introduced through either adjacent conventional trocars or a specialised multilumen port. This surgical innovation obviates the need to space trocars externally for triangulation, thus allowing for the creation of a small solitary portal of entry into the abdomen. Case selection during initial experiences and precise

definition of indications and contraindications for single-portal access laparoscopic surgery will contribute to a successful outcome [3].

We report the first three single-portal access laparoscopic radical nephrectomies (S-Portal-RN) performed in patients with a malignant renal tumour that developed after a renal transplant.

1.1. Patients and methods

As of February 2010, S-Portal-RN was performed in 26 patients; of these 3 patients had previously undergone a renal transplant for chronic renal insufficiency associated with vascular hypertensive nephropathy, immunoglobulin A nephropathy, or diabetic nephropathy (Table 1). Six years after the first renal transplant, one patient began to reject the transplanted kidney, which was subsequently removed

Table 1 – Preoperative data

Patients	Age, yr	Gender	Body mass index, kg/m ²	Localisation of the graft kidney (iliac fossa)	Tumour side	Preoperative tumour size, cm	Pathologic features for renal insufficiency	American Society of Anaesthesiologists score
Patient 1	51	Male	26.6	Right	Right	4.5	Vascular hypertensive nephropathy (two renal transplantations)	2
Patient 2	61	Male	24.1	Right	Right	5.7	Immunoglobulin A nephropathy	1
Patient 3	57	Female	23.2	Left	Left	4.3	Diabetic nephropathy	1

by open surgery. The patient underwent a second renal transplant in the right iliac fossa.

Preoperatively the patients underwent a Doppler ultrasonography revealing a normal perfusion of the transplanted kidney in all cases and bilateral multicystic native kidneys in one patient. Magnetic resonance imaging provided detailed information about tumour size, location, and evidence of lymphadenopathy or renal vein involvement.

The indications to perform S-Portal-RN for renal cancers were T2 or lower renal tumours without evidence of lymphadenopathy or renal vein involvement and the absence of health conditions precluding a laparoscopic procedure.

S-Portal laparoscopic surgery was proposed, and a radical nephrectomy (RN) was performed by an experienced laparoscopic surgeon (FG). Demographic data and perioperative and postoperative variables, including operative time, estimated blood loss, complications, postoperative pain, incision length, hospital stay, pathologic results, and tumour size, were recorded and analysed.

1.2. Surgery

The sequence of steps of the S-Portal-RN was comparable with a standard laparoscopic RN. The patient was placed in the semilateral decubitus position, with the side of the lesion elevated at 60°. Using an open Hasson technique, a 4-cm semicircular incision was made at the inner edge of the umbilicus and dissected deep to the rectus fascia. Then the S-Portal X-Cone (Karl Storz, Tuttlingen, Germany) was placed (Fig. 1), and a 30° lens high-definition laparoscopic camera (Karl Storz, Germany) with 5-mm diameter was used. A 5-mm bent instrument and a conventional laparoscopic (straight) instrument were inserted through the X-Cone (Fig. 2). The nephrectomy was started with a peritoneal incision and the dissection of the line of Toldt, followed by retraction of the colon and division of all lateral ligaments. Gerota's fascia and the psoas muscle were identified. On the right side, additional retraction of the liver was attained using 3-mm grasping forceps inserted directly through the skin.

The middle portion of the ureter was identified medially to the psoas muscle. The bent instrument was used to grasp the ureter, and the straight instrument was used for dissection.

Gerota's fascia was opened using a laparoscopic LigaSure System (Covidien GmbH, Neustadt/Donau, Germany) to reduce blood loss from the renal fat, and the lower pole of the kidney was mobilised.

The lower pole was lifted laterally, and the hilum was placed under gentle tension to prepare the vessels. The

renal artery and the renal vein were identified and dissected with vascular Endo-GIA staplers (US Surgical Corp, Norwalk, CT, USA). After control of the renal vessels, the lower pole was dissected using bent monopolar scissors; the upper pole was mobilised using the same technique. The kidney was released and retrieved in a prepackaged 1500-ml extraction bag (MTP, Neuhausen, Germany) wrapped in a 12-mm tube that was introduced through the 12-mm



Fig. 1 – X-Cone trocar (Karl Storz, Tuttlingen, Germany).



Fig. 2 – Intraoperative photograph demonstrating the laparoscopic instrument configuration through the S-Portal X-Cone and a 3-mm trocar for additional retraction of the liver.

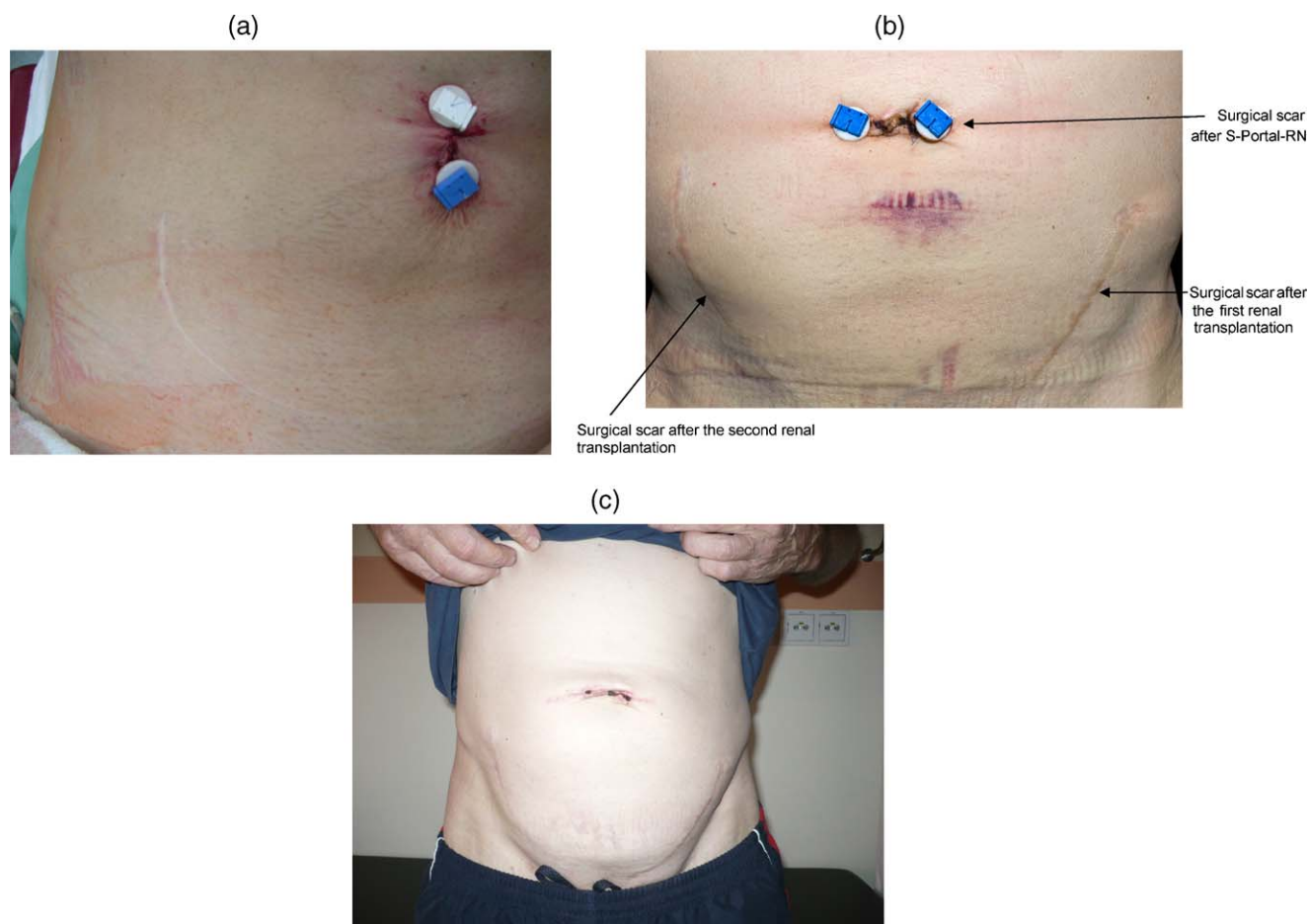


Fig. 3 – Appearance of surgical incision in a transplant patient: (a) intraoperative, (b) postoperative, and (c) at 1-mo follow-up.

channel. To remove the specimen, the rectus fascia incision was extended cranially and caudally, and the intact specimen was removed through the umbilicus without morcellation. The fascia was then closed with interrupted 2-0 Vicryl sutures, and the skin was approximated with an intracutaneous suture (Fig. 3a and b).

1.3. Outcomes

S-Portal-RN was successfully completed with no intraoperative complications in all patients. The mean operative time was 171.6 ± 37.5 min, with a mean blood loss of 126.6 ± 25.1 ml. A single small skin incision (5 cm) was

performed to remove the kidney (Fig. 3a–c). The postoperative recovery was uneventful. The mean haemoglobin decrease was 2.1 ± 0.7 mmol/l, and no transfusion was requested. The mean visual analogue scale (VAS) on the first postoperative day (POD) was 1.3 ± 0.5 , with a mean analgesic requirement of 10.3 ± 4 mg, which was maintained only for the first 24 h after surgery.

The patient began oral intake on POD 1 and was discharged on POD 5 (Table 2). Postoperatively, the transplanted kidney did not experience any alterations in perfusion by Doppler sonography without increases in biochemical markers of glomerular filtration. Moreover, the pre- and postoperative glomerular filtration rate, calculated

Table 2 – Intra- and postoperative data

Patients	Operative time, min	Blood loss, ml	Transfusion	Haemoglobin decrease, mmol/l	No. of additional trocars	POD of oral intake	VAS on POD 1, 1–10	Analgesic requirement, mg	Length of stay, d	Skin incision, cm
Patient 1	170	150	0	1.0	1	1	1	8	5	5
Patient 2	210	100	0	2.9	1	1	2	15	5	5
Patient 3	135	130	0	1.8	0	1	1	8	5	5

POD = postoperative day; VAS = visual analogue scale.

Table 3 – Pre- and postoperative evaluation of renal function

Patients	Preoperative glomerular filtration rate, ml/min per 1.72 m ²	Preoperative creatinine, μ mol/l	Creatinine decrease, μ mol/l	Postoperative glomerular filtration rate, ml/min per 1.72 m ²	Postoperative creatinine, μ mol/l
Patient 1	17.41	345	22	18.78	323
Patient 2	54.2	125	15	58.7	110
Patient 3	51.1	134	14	56.4	120

Table 4 – Postoperative histopathologic results

Patients	Kidney weight, g	Specimen size, cm	Tumour stage	Tumour size, cm	No. of tumours	Surgical margins
Patient 1	340	11	pT1a	4 and 0.5	2	Negative
Patient 2	492	12	pT1b	5.9	1	Negative
Patient 3	415	12	pT1b	4.8	1	Negative

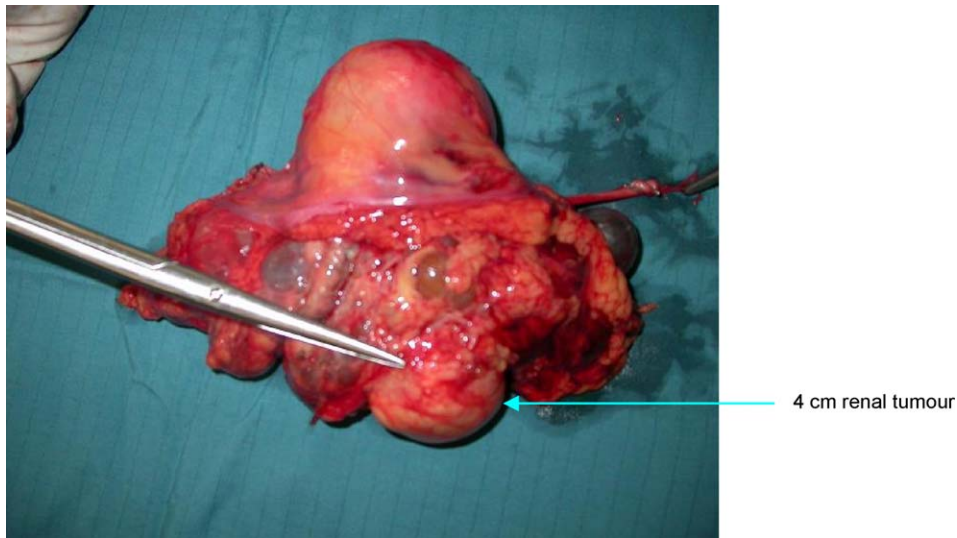


Fig. 4 – Gross photograph of a 340-g multicyst kidney, 11 × 11 × 6 cm. The definitive histologic report revealed two papillary renal cell carcinomas of 4 cm and 0.5 cm with negative surgical margins. The tumour was well encapsulated, without evidence of invasion of surrounding structures.

using the Modification of Diet in Renal Disease study equation, did not differ significantly (Table 3). The definitive histologic report revealed one pT1a and two pT1b tumours. Two tumours were centrally localised, and one was located on the lower renal pole. All tumours were organ confined with negative surgical margins (Table 4; Fig. 4).

After surgery the patients recovered rapidly and did not require any oral pain medication, returning to work quickly (11.2 ± 2.4 d). The patients were very satisfied with the appearance of the scar (Fig. 3c).

2. Discussion

Since the first laparoscopic nephrectomy in 1990, most ablative and reconstructive urologic kidney surgeries have been attempted laparoscopically. The advantages of this method were first demonstrated for benign diseases, with less postoperative pain, shorter hospitalisations, and a

faster convalescence. In the objective evaluation of these findings, there were lower serum levels of interleukins and acute phase proteins without any disadvantages in therapeutic efficiency [1]. Over the last several years, sufficient data have been published to demonstrate the feasibility of laparoscopy in such a delicate medical and surgical endeavour as a renal transplant [4].

Traditionally, at least three or four ports have been required to complete laparoscopic renal surgery, and an additional incision has been needed to remove the specimen. S-Portal surgery is a single-port technique through the umbilicus that has additional benefits, such as a decreased number of trocars, decreased postoperative pain, and the cosmetic advantage of hiding the operative scar in the umbilicus.

S-Portal surgery represents a new surgical method in urology; nevertheless, in the literature few studies have reported first experiences with complex urologic surgeries

such as RN, pyeloplasty, renoureteral procedures, and living donor nephrectomy [5–10]. We report the first three cases of S-Portal-RN for renal carcinoma performed in transplant patients.

The chief technical problems associated with this technique pertained to the triangulation of the instruments (ie, internal and external instrument collision). This technique requires considerable previous experience with traditional multiport laparoscopy. Although the X-Cone port has a metal structure, it did not interfere with the instruments when they were inserted through the two lateral 5-mm channels of the trocar.

S-Portal-RN was feasible and safe with the latter combination, without altering the postoperative function of the transplanted kidney. Analgesic requirement was maintained only for the first 24 h after surgery, whereas it was required for the first 3 d after multitrocar laparoscopy. This is an important point to consider because analgesic medications could decrease the function of the transplant.

As we already know, one drawback of performing surgery in transplant patients under immunosuppression is the risk of wound infection. By performing S-portal laparoscopic procedures in these patient populations with a lesser number of skin incisions (only one 5-cm incision), it might be reasonable to expect lower rates of postoperative wound complications. However, although only a small series, we did not observe any wound healing problems in our patients.

Another aspect to consider was the need for an additional 3-mm trocar to retract the liver. This might actually represent a drawback of S-Portal surgery performed for right-sided diseases.

A limitation of this study was the small group of the patients and its short follow-up, the principal issue that must be investigated: Is single-portal access laparoscopic surgery safe oncologically? Because the first studies on S-Portal surgery have concentrated on reporting surgical outcomes, we expect future studies that include long-term follow-up to evaluate the oncologic feasibility of the procedure. But in our opinion, S-Portal-RN for renal cancer after a renal transplant can be performed without increased risks for the patients and for the transplant kidney.

3. **Conflicts of interest:** The authors have nothing to disclose.

Acknowledgement statement

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EU-ACME question

Please visit www.eu-acme.org/europeanurology to answer the following EU-ACME question online (the EU-ACME credits will be attributed automatically).

Question:

Which are the actual indications to perform an S-Portal radical nephrectomy?

- A. Only benign renal disease
- B. Renal tumours lower than pT2 without evidence of lymphadenopathy or renal vein involvement
- C. Body mass index >35 kg/m²
- D. None of these criteria

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