

# LAPAROSCOPIC NEPHRECTOMY AND RESECTION IN THE THERAPY OF RENAL TUMORS

UDC 616.61–006–089.81/.87

Received 22.06.2012



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**The aim of the investigation** is to study the immediate results of laparoscopic surgeries in patients with localized renal cell carcinoma.

**Materials and Methods.** There were analyzed the results of treatment of 76 patients with renal cell carcinoma operated from 2009 till 2012 using laparoscopic techniques. There were 35 (46%) males and 41 (54%) females, average age — 55.30±1.36 (min 24 y/o and max 76 y/o).

**Results.** The duration of laparoscopic surgery directly depended on a surgeon's experience. The operation time decreased with the improvement of surgeon experience in performing laparoscopic procedures. Moreover, particular features of vascular anatomy of kidneys, adhesive process (11.8%) also influenced the operation duration. When mastering the technique of laparoscopic operation on kidney the timing of surgery as on the average 240.0±19.7 min (min 180, and max 335 min), subsequently, the average operation time decreased on the average up to 110.00±4.57 min (min — 88, and max — 180 min). On gaining experience in performing laparoscopic operations, there was introduced the laparoscopic nephrectomy technique without total ischemia with selective segmental aortic cross-clamping.

**Conclusion.** The analysis of immediate results of laparoscopic operations in patients with renal cell carcinoma demonstrated its high efficiency and safety. The results of laparoscopic nephrectomies and resections of kidney are reliably improved when technologies are advanced and surgeons' experience is gained.

**Key words:** laparoscopic radical nephrectomy; laparoscopic nephrectomy; renal cell carcinoma.

Renal-cell cancer (RCC) amounts to 2–3 % of all malignant tumors and comes second in incidence following prostate cancer [1, 2]. The distinctive feature of RCC is that it may progress asymptotically for a long time. Surgery is the only effective treatment for renal cancer.

Currently, laparoscopic radical nephrectomy (LRN) is the standard of treatment of patients with localized renal cancer (T<sub>1-2</sub>N<sub>0</sub>M<sub>0</sub>). All oncologic principles are observed when LRN is performed. However, in comparison with the open operation, it is less traumatic. Laparoscopic nephrectomy

(LN) is the alternative to open operation in localized RCC. Small tumors located mostly extraparenchymatously are considered the optimal condition for LN.

Exact estimation of indications and careful patient selection for laparoscopic operation on renal cancer enable to use all the advantages of minimally invasive laparoscopic approach, observe ablative principles and decrease the complication and conversion rate. Moreover, laparoscopic approach results in good cosmetic effect that is an irresistible argument for a patient to choose between

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surgical treatment methods, and has a positive effect on the quality of a patient's life [4, 5, 6].

**The aim of the investigation** was to study the immediate results of laparoscopic surgeries in patients with localized renal cell carcinoma.

**Materials and Methods.** We performed post-hoc analysis of the results of treatment of 76 patients operated on RCC in 2009–2012 in urological clinic of Privolzhsky District Medical Centre of FMBA of Russia. There were 35 (46%) males and 41 (54%) females, aged 24–76 years (average age:  $55.3 \pm 1.36$ ). All patients underwent preoperative ultrasonic Doppler examination (USDG) of renal vessels to visualize anatomic features of kidney blood supply, computer tomography (CT) and/or magnetic resonance tomography (MRT).

The following types of surgery were used when performing laparoscopy: LRN (the sample is taken through Pfannenstiel incision or through the existing postoperative cicatrix) — 57 (75%), among them hand-assisted LRN (the initial formation of port, 6–7 cm in length, for hand-assistance along the existing postoperative cicatrix (after previous operations), or in another zone without muscular fiber transaction, with the following extraction of specimen through this incision) — 46 (60.5%); LN — 19 (25%), among them hand-assisted laparoscopic nephrectomy (performed at the stage of mastering the technique, if there is a postoperative cicatrix on the anterior abdominal wall and the tumor is localized in the upper pole of kidney).

Simultaneous operations with the use of laparoscopic approach were performed in 7 patients (9.5%) with concomitant pathology — cholelithiasis. 5 patients (6.6%) underwent simultaneously performed LRN and cholecystectomy, and 2 (2.6%) patients — cholecystectomy upon LN completion.

**Results.** The duration of an operation directly depended on surgeon experience. The operative time decreased with gradual improvement of surgery performance with the use of laparoscopic technique. Moreover, vascular anatomic features of kidney, and the presence of adhesive process (11.8%) influenced the operation duration. At the initial stage, the period of mastering the technique of performing laparoscopic interventions on kidney, the surgery lasted in

average  $240.0 \pm 19.7$  min (min — 180, and max — 335 min). Subsequently, at the period of gaining experience the average operative time was  $110.00 \pm 4.57$  min (min — 88, and max — 180 min). The obtained experience and mastering the technique on renal blood vessels enabled to apply LN technology with selective cross-clamping of segmental arteries without total ischemia in 3 cases (See the Table).

In one case of LRN there were found the signs of thrombus in renal vein, undetected earlier using instrumental techniques. Laparoscopic nephrectomy with mural resection of inferior vena cava and thrombectomy was performed. Postoperative period was uneventful, and the patient was discharged in 8 days to get outpatient treatment.

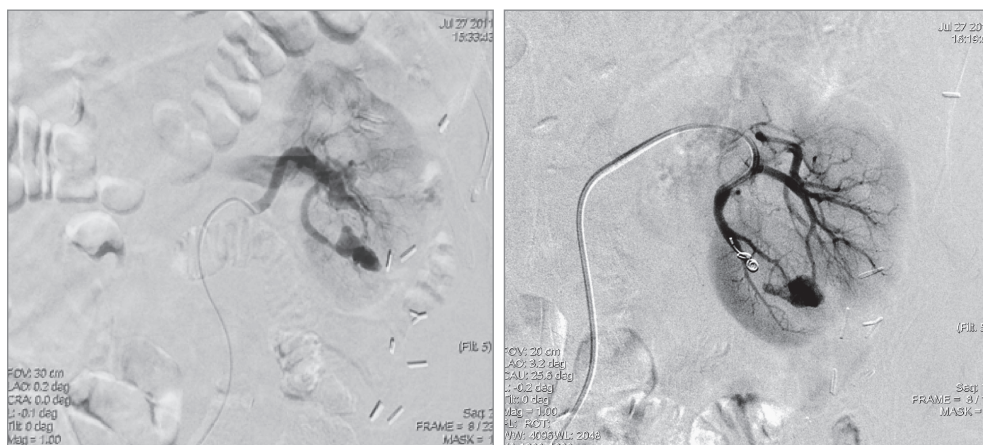
Conversion was performed in three patients (3.9%), including 2 cases (2.6%) due to the bleeding from lumbar veins. In one case (a 64-year-old patient) we had to pass on an open surgery due to intraoperatively revealed indirect signs of undetected by USDG thrombus in the right renal vein going into the inferior vena cava. Radical nephrectomy with inferior vena cava resection was performed because of the lack of necessary instrument and impossibility of laparoscopic fixation of the thrombus. The postoperative period was uneventful. The patient was discharged on the 8<sup>th</sup> day after operation in satisfactory condition.

As a rule, pain syndrome was arrested by the first day after the operation. All the patients underwent rehabilitation treatment that enabled to vitalize the patients on the first postoperative day. An average hospitalization stay after laparoscopic operations in patients with RCC in the period of mastering the technique was  $8.16 \pm 0.29$  bed days (min — 6, and max — 14 days). Later on, postoperative hospitalization time was  $7.10 \pm 0.52$  bed days (min — 4, and max — 11 days).

In one case the female patient was readmitted 3 weeks after discharge due to hematuria. We failed to control the bleeding using conservative measures. USDG diagnosed the arteriovenous shunt with reflux into pelvicalyceal system. Angiography confirmed the diagnosis, and superselective embolization of segmental renal artery was performed (See Fig.). Hematuria was stopped. Postoperative period was uneventful.

**The results of laparoscopic surgeries in renal-cell cancer (n=76)**

Parameters	Periods		p
	Mastering the technique (2009–2010)	Gaining experience (2011–2012)	
Number of LRN performed	9	48	—
Number of LN performed	2	17	—
including segmental LN	—	3	—
The average duration of LRN (min)	$240,0 \pm 19,7$	$110,00 \pm 4,57$	0,038
The average duration of LN (min)	$180,00 \pm 2,50$	$120,00 \pm 4,15$	0,001
The average blood loss (mL)	$170,0 \pm 41,8$	$105,0 \pm 8,6$	0,03
The duration of thermal ischemia in LN (min)	$25,0 \pm 5,0$	$15,0 \pm 1,63$	0,001
Postoperative hospitalization stay	$8,16 \pm 0,85$	$7,10 \pm 0,38$	0,001



Superselective embolization of segmental artery

In comparison with an open surgery, LRN is characterized by less blood loss, the use of smaller analgetic doses in postoperative period and short postoperative hospital stay.

**Conclusion.** The analysis of immediate results of laparoscopic operations in patients with renal cell carcinoma demonstrated its high efficiency and safety. The results of laparoscopic nephrectomies and resections of kidney are reliably improved when technologies are advanced and surgeons' experience is gained.

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