

Retroperitoneal Laparoscopic Radical Nephroureterectomy for High Urothelial Tumours

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Abstract

Introduction and Objectives. The gold standard for the treatment of non-metastatic high urothelial tumours is nephroureterectomy with lymph node dissection involving complete resection of the kidney along with the ureter and perimeatic cystectomy. The purpose of the paper is to evaluate the intraoperative, postoperative and oncologic results of retroperitoneal laparoscopic nephroureterectomy with inguinal incision compared to open classical nephroureterectomy.

Materials and Methods. 28 patients were diagnosed with high urothelial tumours in the Sibiu Urology Clinic, between 2014 and 2017. In 15 patients, open classical nephroureterectomy was performed and 13 patients received retroperitoneal laparoscopic nephroureterectomy.

Results. The mean operative time in the laparoscopic group was 100 ± 20 min (between 90-190 minutes) without major haemodynamic disorders during the intervention and without intraoperative complications (vascular or intestinal). Intraoperative blood loss was about 70 ± 30 ml (between 50-120 ml). Average length of stay was 4 ± 1 (3-8 days).

Conclusions. The association of classical perimeatic cystectomy with vesicular suture has the advantage of shortening the maintenance time of the urethrovesicle probe. The retroperitoneal laparoscopic approach is a minimally invasive option of this pathology, with oncologic results at least equal to open surgery.

Key-words: laparoscopic retroperitoneal nephroureterectomy, urothelial carcinoma, ilio-inguinal incision

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Introduction and Objectives

Urothelial tumours are the fourth malignancy after prostate cancer, with a higher incidence of tumours in the pyelocaliceal system than those in the ureter. The occurrence frequency is higher in males with the highest incidence after the age of 70^[1,2].

The gold standard for the treatment of non-metastatic high urothelial tumours is nephroureterectomy with lymph node dissection involving en-bloc resection of the kidney along with the ureter and perimeatic cystectomy^[3].

Since Clayman et al. have described the first laparoscopic nephroureterectomy. It has been oncologically confirmed to be as effective as the classical nephroureterectomy, and can benefit from all the advantages of microinvasiveness compared to classical surgery^[4].

The therapeutic management of high urothelial tumours can be: classic surgery, laparoscopic transperitoneal or retroperitoneal and robotic.

The purpose of the paper is to evaluate the intra-operative, postoperative and oncologic results of retroperitoneal laparoscopic nephroureterectomy with inguinal incision compared to open classical nephroureterectomy.

Materials and Methods

Twenty-eight patients (p) were diagnosed with high urothelial tumours in the Department of Urology Sibiu, between 2014 and 2017. In 15 patients, open classical nephroureterectomy was performed and 13 patients received retroperitoneal laparoscopic nephroureterectomy.

The diagnosis was based on clinical and paraclinical investigations: cystoscopy, computed tomography urography (CTU) (photo 1) and/or ureteroscopy. Demographic data of patients are shown in Table 1.

Results

	Laparoscopy retroperitoneal group I	Open surgery group II
Patients	13	15
Age	62 ± 6.7 (53-87)	63 ± 6.8(52-84)
Men	7 (53.85 %)	8 (53.3 %)
Women	6 (46.15 %)	7 (46.7 %)
Right	8 (61.5 %)	8 (53.3 %)
Left	5 (38.5 %)	7 (46.7 %)
Tumour location		
Pielocalyceal	9 p (69.2 %)	9 (60 %)
Proximal ureter	2 p (15.4 %)	2 (13.3 %)
Distal ureter	2 p (15.4 %)	4 (26.7 %)
Tumour stage		
T1 TCC	1 p (7.7 %)	2 (13.3 %)
T2 TCC	3 p (23 %)	4 (26.7 %)
T3 TCC	7 p (53.9 %)	6 (40 %)
T4 TCC	2 p (15.4 %)	3 (20 %)
N0	11 p (84.6 %)	10 (66.7 %)
N1	2 p (15.4 %)	5 p (33.3 %)
M+	3 p (23 %)	4 p (26.7 %)
TCC: transitional cell carcinoma		

Table 1. Patients characteristics, tumour location and staging

Tumour location was the pyelocaliceal system for 9 p in both groups, the proximal ureter was affected in 2 p in both groups and the distal ureter was involved in 2 p of the laparoscopic group and in 4 patients in group II. Pre-operative tumour stage based on imaging results reveals the tumour stage: T1 - 1 p (7.7 %) / 2 p (13.3 %), T2 - 3 p (23 %) / 4 (26.7 %), T3 - 7 p (53.9 %) / 6 p (40 %), T4 - 2 p (15.4 %) / 3 p (20 %), presence of adenopathys: N1 - 2 p (15.4 %) / 5 p (33.3 %), N0 - 11 p (84.6 %) / 10 p (66.7 %) and secondary metastases: M1 (lung)-3 p (23%) / 4 p (26.7%)

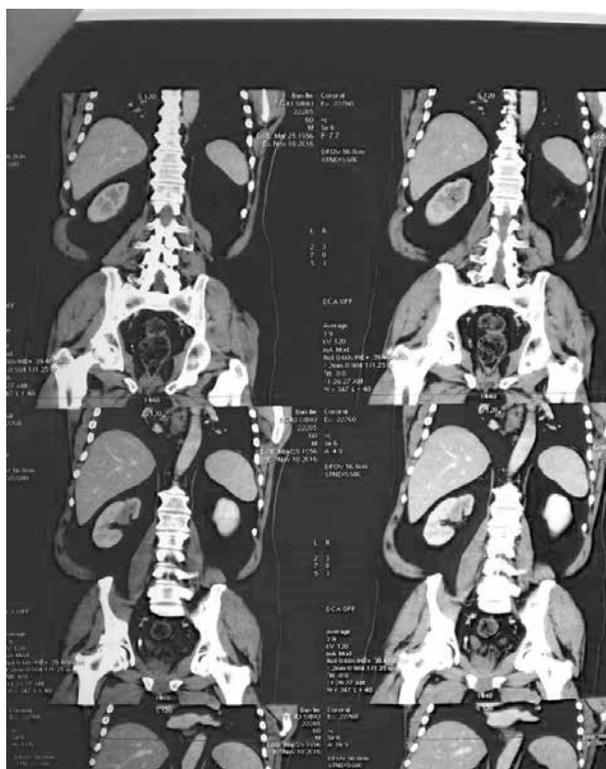


Photo 1. Tumour mass at the right upper caliceal level

Surgical technique

Retroperitoneal open nephroureterectomy can be achieved by one or two incisions. After the anaesthetic induction, the patient is positioned in lateral decubitus with the thorax turned at 35°-40°. The renal approach is practiced by a lumbar incision with the resection of the 12th or 11th rib. The anterior peritoneum with medial dissection is mobilized in the avascular plane between the peritoneum and the Gerota fascia. Dissection of the renal pedicle with double ligation of the renal artery and vein is then practiced. Upon mobilization of the renal superior pole, the inferior dissection continues along the large vessels. Lymphodissection begins at the level of the cisterna chyli located below the right kidney artery and up to the bifurcation of the large vessels. The patient will be repositioned in dorsal decubitus and the Gibson ilio-inguinal incision is practiced. After the medial mobilization of the peritoneum and the ureter and iliac vessels disclosure, the previously dissected nephroureterectomy piece is brought to the operative field. Dissection of the pelvic ureter and ilio-oburatory lymph node dissection are subsequently performed. Intramural ureter dissection is practiced with perimeatic cystectomy and separate suture for bladder mucosa and detrusor, and then the extraction and exteriorization of the surgical piece.

The technique of laparoscopic radical nephroureterectomy through retroperitoneal approach observes the same principle of open surgery and imposes two stages: a laparoscopic one in which the kidney and the ureter are excised throughout the entire tract by lymphodissection, then by an ilio-inguinal incision (Gibson), excision of the urethral meatus is practiced, including the perimeatic cystectomy with bladder suture and en bloc removal of the surgical piece. The patient is repositioned in lateral decubitus after performing general anesthesia with oro-tracheal intubation. The retroperitoneal access is made by a 12 mm incision at the top of the 12th rib (photo 2, 3).



Photo 2, 3.
The patient position after general anesthesia

The subcutaneous tissue is removed with scissors and then, retroperitoneal fascia is penetrated by digital dissection to create the working chamber. The insertion of the trocars is made either digitally or at sight: a 6 mm trocar positioned at the top of the 11th rib, a trocar of 10 mm in the costomuscular angle, and the last 5 mm trocar is positioned on the anterior axillary line at 2-3 cm from the iliac spine. On the initial incision, the 12 mm trocar is inserted onto which, the 10 mm and 30 degrees optical telescope will be mounted (photo 4, 5).



Photo 4, 5 Position of trocars

After creating the working chamber, with a CO₂ insufflation pressure of 14 mm Hg, the posterior dissection starts from the psoas muscle, with the identification of the vascular pedicle. The renal artery and vein is ligated with Hem-o-lok clips, two for the remaining vascular bundle (photo 6,7).

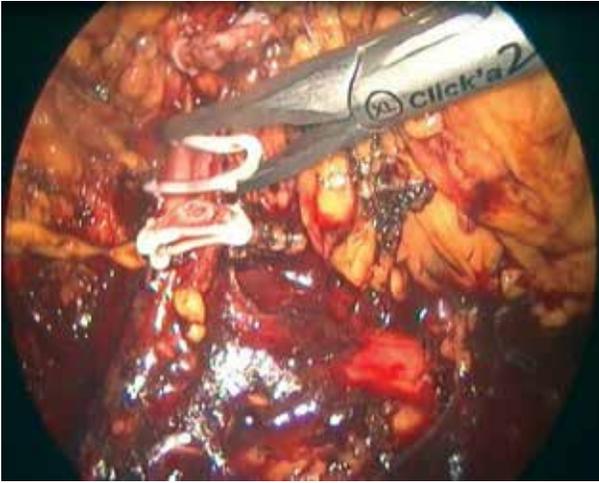


Photo 6, 7. Clamping of arteries and renal veins

The upper renal pole is dissected and the anterior dissection proceeds with the removal of the peritoneum, while the posterior dissection continues with the preparation of the ureter. Regional lymph node dissection is then performed. The patient is repositioned in dorsal decubitus by inclining the surgical table and practicing the Gibson ilio-inguinal incision (photo 8). The peritoneum will be medially mobilized, highlighting the ureter and iliac vessels, followed by the same operative steps described in open nephroureterectomy (photo 9,10).



Photo 8. Gibson incision with en bloc removal of the surgical piece



Photo 9, 10. Final postoperative appearance

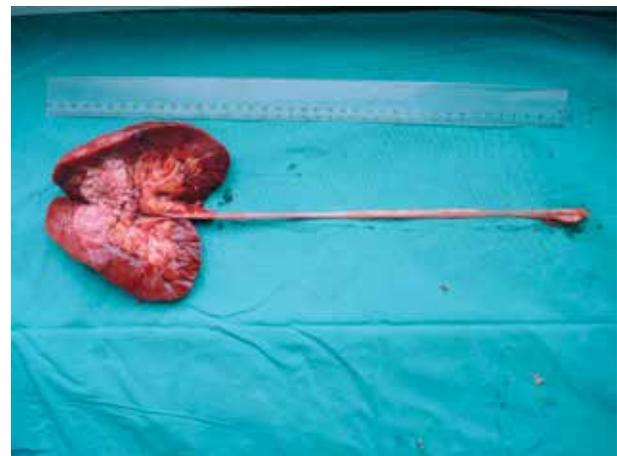


Photo 11. Postoperative specimen

	Laparoscopy retroperitoneal group I	Open surgery group II	p-value
Operating time (min)	100 ± 20 (90-190)	150 ± 30 (130-200)	0.047
Intraoperative blood loss (ml)	70 ± 30 (50-120)	220 ± 50 (170-750)	0.016
Complications	0	2/15 (13.3 %)	0.001
Hospitalisation (days)	4 ± 1 (3-8)	8 ± 2 (9-14)	0.032

Table 2. Intra- and postoperative results

The intraoperative and postoperative results recorded in the two groups are shown in Table 2. The mean operative time in the laparoscopic group was 100 ± 20 min (between 90-190 minutes) without major haemodynamic disorders during the intervention and without intraoperative complications (vascular or intestinal). Intraoperative blood loss was about 70 ± 30 ml (between 50-120 ml). Average length of stay was 4 ± 1 (3-8 days).

In patients with open classical nephroureterectomy, an average operative time of 150 ± 30 minutes was recorded (between 130-200 minutes), blood losses were approximately 220 ± 50 ml (between 170-750 ml). Complications recorded were intraoperative bleeding requiring blood transfusion (2 p, 13.3%). The average length of hospitalization was 8 ± 2 (between 9-14 days).

On the second postoperative day, the drain tubes and the bladder probe were removed. Resumption of intestinal transit occurred on the second postoperative day.

Postoperative follow-up period was of approximately 6.5 months (3-24 months) with cystoscopy every 3 months for the first year and then annually, and computerized tomography every year.

Discussions

The surgical treatment of high urothelial tumours aims at the complete excision of the tumour tissue, providing negative oncologic margins. Radical nephroureterectomy with perimeatic cystectomy is the standard treatment. The intervention can be performed classically by extraperitoneal thoraco-abdominal approach by single incision or by two incisions, transperitoneal or retroperitoneal laparoscopic approach with perimeatic cystectomy performed by extraction, endoscopic resection or by invagination^[5] and transperitoneal or retroperitoneal robotic approach.

Accumulation of results demonstrates that retroperitoneal laparoscopic nephroureterectomy with ilio-inguinal incision is statistically superior to open surgery. Mean operative time, calculated from incision to

closure, was 100 ± 20 minutes compared to 150 ± 30 minutes (p = 0.047). Other remarkable results recorded for the laparoscopic group were the 70 ± 30 ml (50-120 ml) bleeding average compared to 220 ± 50 ml (170-750 ml) in group II (p = 0.016). No severe complication was recorded in the laparoscopic group (p = 0.001).

By reducing parietal trauma and minimizing the incision, the length of stay was lower in the laparoscopic group, 4 ± 1 days (3-8 days) compared to 8 ± 2 days (9-14 days) (p = 0.032).

In 1995, McDougall and colleagues were the first to report sectioning of the terminal ureter with extravesical perimeatic cystectomy^[6]. Then, Yoshino et al. reported their perimeatic cystectomy method by retroperitoneal approach in 2003^[7].

The management of the distal ureter is an important operative time in both laparoscopic and open techniques, and can be an independent predictor of oncologic outcomes. In 2014, Krabbe et al reported a greater recurrence in distal ureter sectioning without perimeatic cystectomy^[8].

Perimeatic cystectomy with suture of the bladder mucosa and the detrusor has the advantage of maintaining the bladder probe for only 2 days, reducing the risk of urinary tract infection and low risk of tumour recurrence.

The retroperitoneal laparoscopic approach is superior to the transperitoneal one because it avoids the inoculation of tumour cells at the peritoneum; port-site metastasis being indeed reported in the literature.

More and more studies suggest that laparoscopic nephroureterectomy has oncologic results comparable to the open one. Moreover, it can reduce blood loss, length of stay and postoperative pains as opposed to the open surgery^[6,9,10].

Conclusions

Laparoscopic radical nephroureterectomy with retroperitoneal approach has the advantage of rapid vascular pedicle exposure, avoids pneumoperitoneum, low risk of lesions of intraperitoneal organs, shorter ile-

us, low risk of intraperitoneal dissemination, decreased postoperative pain, less incision size, reduced length of hospitalization and convalescence, rapid socio-professional integration.

The retroperitoneal laparoscopic approach is a minimally invasive option of this pathology, with oncologic results at least equal to open surgery.

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