Application of Laparoscopy in Upper Urinary Tract Surgery

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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>99mTc-DMSA</td>
<td>99m Technetium-Dimercaptosuccinic Acid</td>
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<tr>
<td>AKI</td>
<td>Acute kidney injury</td>
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<tr>
<td>AMP</td>
<td>Adenosine Monophosphate</td>
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<td>ANOVA</td>
<td>Analysis of Variance</td>
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<td>ATN</td>
<td>Acute Tubular Necrosis</td>
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<td>ATP</td>
<td>Adenosine Triphosphate</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index (kg/m²)</td>
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<tr>
<td>CKD-EPI</td>
<td>Chronic Kidney Disease Epidemiology Collaboration</td>
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<td>CT</td>
<td>Computerized Tomography</td>
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<tr>
<td>EAU</td>
<td>European Association of Urology</td>
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<tr>
<td>eGFR</td>
<td>Estimated Glomerular Filtration Rate</td>
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<td>GFR</td>
<td>Glomerular Filtration Rate</td>
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<tr>
<td>IR</td>
<td>Ischemia-Reperfusion</td>
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<tr>
<td>LN</td>
<td>Laparoscopic Nephrectomy</td>
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<td>LPN</td>
<td>Laparoscopic Partial Nephrectomy</td>
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<td>LRN</td>
<td>Laparoscopic Radical Nephrectomy</td>
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<td>MAG 3</td>
<td>Mercapto-Acetyltriglycine</td>
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<td>NSS</td>
<td>Nephron-Sparing Surgery</td>
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<td>OPN</td>
<td>Open Partial Nephrectomy</td>
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<td>P-DRF</td>
<td>Partial Differential Renal Function</td>
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<td>PN</td>
<td>Partial Nephrectomy</td>
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<td>RCC</td>
<td>Renal Cell Carcinoma</td>
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<td>RF</td>
<td>Renal Function</td>
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<td>RN</td>
<td>Radical Nephrectomy</td>
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<td>ROI</td>
<td>Region Of Interest</td>
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<td>sCr</td>
<td>Serum Creatinine</td>
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<td>T-DRF</td>
<td>Total Differential Renal Function</td>
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<td>US</td>
<td>Ultrasound</td>
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<td>WI</td>
<td>Warm Ischemia</td>
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<td>WIT</td>
<td>Warm Ischemia Time</td>
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1. PARTIAL NEPHRECTOMY IN KIDNEY TUMOR

1.1 INTRODUCTION

Surgery remains the only curative treatment for renal cell cancer (RCC). The objective of surgical therapy is to excise the entire tumour with an adequate surgical margin. In 1969, Robson and colleagues established radical nephrectomy (RN) as the “gold standard” curative operation for localized RCC. In the past three decades, the increased use of imaging modalities such as ultrasound (US) and computerized tomography (CT) has led to increase the number of incidentally detected renal masses. Tumours detected by imaging techniques tend to be smaller, lower stage lesions that are typically amenable to partial nephrectomy (PN). The main aim of this surgical procedure is maximal preservation of unaffected renal parenchyma without sacrificing cancer control. During the last several years, refinements in the surgical technique of PN have made this procedure technically safe with acceptable complication rates. Long-term outcome data indicate that open partial nephrectomy (OPN) has cancer-free survival rates comparable to those of radical surgery with better preservation of renal function (RF), reduced frequency of cardiovascular events, and decreased overall mortality rate.

According to European Association of Urology (EAU) guidelines 2017, with grade of recommendation “A”, for T1a tumours, nephron sparing surgery (NSS) is recommended and for T1b tumours, NSS should be favoured over RN whenever feasible. RN is no longer the gold standard treatment in these cases. Recently, cases of elective indications for NSS of RCC have vastly increased. It has been proved that, in these cases, NSS for tumours limited in diameter to 4 cm (pT1a) provides recurrence-free and long-term survival rates similar to those observed after radical surgery. For larger tumours (pT1b), PN has demonstrated feasibility and oncological safety in carefully selected patients.

The impact of laparoscopy has increased rapidly within the last two decades, and as a result, laparoscopic radical nephrectomy has become a recognized standard surgical approach by the 2006 EAU guidelines. Many laparoscopic surgeons were confronted with the situation that they could offer radical nephrectomy by means of laparoscopy but they had difficulties to perform laparoscopic NSS for the small tumors. Thus, in the past few years, great efforts have been directed towards the
development of reliable and reproducible techniques for laparoscopic partial nephrectomy (LPN).

1.2. AIM OF THE STUDY

To learn the upper urinary tract laparoscopy from international leading urologists in the field, to overcome the learning phase and develop modifications of standard laparoscopic techniques.

To design a study to answer some challenging questions in relation to the impairment of renal function after partial nephrectomy:

a. What is the minimal renal ischemia time which can lead to kidney damage?

b. What is the maximum ischemia time which can be tolerated by the majority of kidneys?

c. Are there other factors which may worsen the damage?

d. Are there renoprotective substances which can prolong ischemia time?

e. What is the impact of volume reduction on renal function outcome after partial nephrectomy?

In line with these questions, in patients with small renal mass (pT1a) operated with laparoscopic partial nephrectomy under warm ischemia, for determination of functional outcome, we designed a prospective randomized study to identify the role of renal parenchymal volume reduction distinguished from the ischemia-reperfusion injury.

1.3. ISCHEMIA IN PARTIAL NEPHRECTOMY

In PN operations, ischemia time is critical for renal function which is traditionally restricted to a maximum of 30 minutes. Ischemia time can be increased substantially by cooling of the renal parenchyma, which is easily induced during open surgery. When comparing laparoscopy with open surgery, ischemia time is longer even in the most experienced hands and hypothermia for protection of the renal function is difficult to achieve. Several attempts have been made to overcome the aforementioned problems in laparoscopic approaches.
Bloodless surgical field for optimal tumor excision can only be achieved by establishing renal ischemia, which can be applied by either cold ischemia or warm ischemia (WI). Cold ischemia is applied in cases where longer ischemic time is expected. The interest in laparoscopic partial nephrectomy resulted in an urgent need for clear data describing techniques to minimize the ischemic renal damage and also to understand the impact of other factors on renal functional outcome.

1.3.1. LAPAROSCOPIC PARTIAL NephRECTOMY IN COLD ISCHEMIA

Background

Günter Janetschek was one of the pioneers in performing and developing the techniques of PN for RCC by means of laparoscopy about two decades ago. The time available to complete the resection and repair of collecting system and parenchyma during warm ischemia is limited and the surgeon has to race against the clock. Renal cooling during ischemia protects the kidney and offers the surgeon extra time. The problem of renal cooling during ischemia when performing laparoscopic PN has not been solved yet. In 2003, we presented our first experience with renal cooling during laparoscopic surgery for small RCC by means of cold arterial perfusion.

Patients and methods

Between November 2001 and March 2003, we performed laparoscopic PN in cold ischemia in 17 patients. The indication was suspected RCC in 15 patients with a mean tumor size of 2.71 cm (range: 1.5 - 4 cm), and a pyelonephretic lower pole due to recurrent stone disease in 2 patients. In all patients, preoperative angio-MRI was performed to visualize the renal artery(s). Preoperative renal scintigraphy (DMSA) was done to have a baseline data about the renal function for follow-up.

Placement of an open tip ureteric catheter was done under fluoroscopy to be used later to check the integrity of the collecting system. Next, an angiocatheter was passed into the main renal artery through a femoral puncture on the ipsilateral side. This procedure was carried out by one of our interventional radiologists. Then the patient was brought to 45-degree lateral decubitus position. In this final position for laparoscopic surgery, the angiocatheter was checked again and advanced in the renal artery close to the origin of the segmental arteries if needed. Port placement varied
according to the tumor location. The renal artery was secured and later on occluded using a tourniquet.

**Results and Discussion**

Laparoscopic PN with our technique could be performed successfully in all patients with no conversion. The mean intraoperative blood loss was 145 ml (30 – 650). Only one patient required intraoperative blood transfusion. Mean total ischemia time was 41 minutes (27 - 101 min). Entry to the collecting system happened in 7 patients and was repaired intraoperatively. Mean amount of perfusate was 1,600 ml (1,150-2,800). Mean decrease of body temperature during cold perfusion was 0.66°C (0.5-1.1). Mean operative time was 176 minutes (135-220). Urethral and ureteric catheters were removed on the second postoperative day. Mean hospital stay was 9.4 days (7- 14 days). Bleeding occurred in one case in the first postoperative day due to parenchymal tear from the sutures. This was managed laparoscopically by bipolar coagulation and application of a strip of Tachocomb. No urinary fistula or urinoma were encountered. The histopathological examination revealed RCC in 13 patients, angiomyolipoma in 2, and pyelonephretic renal tissue in another 2. The resection margins were negative in 14 patients. In one patient, negative margin was not described where the tumor was in direct contact with the renal vein. During resection the vein was entered and repaired. Postoperative renal function was evaluated in 8 patients. In 5 patients the reduction in renal function was 1%, 1%, 2%, 3%, and 8%, respectively by renal scintigraphy (DMSA). In the other 3 patients, CT scan showed undisturbed perfusion of the renal parenchyma. We concluded that the reduction in renal function was most probably attributed to reduction in the total renal volume after wedge resection.

In our series, we didn’t encounter any problem regarding the renal function or the amount of perfusate used. This is probably because all the patients were with a normal contralateral kidney and diuresis was induced prior, during and after ischemia. However in a solitary kidney, one should be aware of the risk of volume overload resulting from the non-excretion of the perfusate during temporary renal ischemia. In this case excretion of the perfusate will depend on the fast recovery of the kidney after ischemia.
1.3.2. LAPAROSCOPIC PARTIAL NEPHRECTOMY IN WARM ISCHEMIA AND IMPACT OF RENAL PARENCHYMAL MASS REDUCTION IN KIDNEY FUNCTION

Partial nephrectomy (PN) has become a standard of care for treatment of small renal masses. Hilar occlusion is commonly performed for a precise tumour resection and renal reconstruction. The above surgical manoeuvre results in warm ischemia (WI) of the remaining renal tissue and has been associated with ischemia-reperfusion injury (RI) to the organ. Current evidence showed that the length of the warm ischemia time (WIT) and the subsequent reperfusion injury may result in permanent renal damage (Becker et al 2009; Simmons et al 2008). Moreover, the resection of the renal tumour and the suturing of the parenchyma resulted in additional reduction of the functional renal tissue (Simmons et al 2012; Song et al 2011). Thus, two mechanisms of renal function damage during PN could be proposed. Nevertheless, the importance of the mechanisms for the decline of the postoperative renal function has not been investigated. The current prospective study evaluated the split renal function and elucidated the role of renal parenchymal loss in patients with small renal mass who were treated by LPN with WI.

Patients and methods

Thirty five patients were enrolled in a prospective study. The procedures were performed by two experienced laparoscopists. The exact location and dimensions of the tumour was identified by three-dimensional CT scan prior to the operation. Only patients with a single exophytic mass of \( \leq 4 \) cm in diameter located in either lower or upper pole of the kidney with normal contralateral kidney were enrolled.

The recorded parameters included the time for tumour resection, calyceal closure, haemostatic sutures and the total WIT. Serum creatinine (sCr) was recorded and estimated glomerular filtration rate (eGFR) was calculated. The above measurements were performed preoperatively (baseline), 5-6 hours after the surgery, on the 1\(^{st}\), 3\(^{rd}\) and 7\(^{th}\) postoperative days and at the end of 1\(^{st}\), 3\(^{rd}\), 6\(^{th}\), and 12\(^{th}\) postoperative months.

In order to distinguish the impact of parenchymal loss from WI effect on the operated kidney, we planned a novel method of investigation with renal scan as follow. All patients in LPN group underwent 99m Technetium-Dimercaptosuccinic
Acid (99mTc-DMSA) renal scintigraphy for the determination of split renal function preoperatively and at the end of 1st, 3rd, 6th, and 12th postoperative months. Since 99mTc-DMSA scan provides relative functional percentage of the two kidneys and the contralateral kidney served as a control for comparison after LPN, we selected patients with solitary small polar mass (T1a), otherwise normal ipsilateral kidney, and normal contralateral kidney.

Before the operation, all patients underwent radionuclide isotope examination performed by 99mTc-DMSA. Renal scans were performed in supine position. Individual kidney uptake and differential renal function (DRF) percentage of left-to-right kidneys were determined by the Patlak-Rutland method. The region of interest (ROI) of each kidney was determined with the use of an automated computer program drawing the ROI around the whole kidney. This assessment which is a customary method of evaluating a static renal scan was called a “Total-DRF” (T-DRF) in our study (Figure 1A).

By this means, in the tumorous kidney, the postoperative decline in percentage ratio, reflecting decrease in renal function, was considered as a consequence of both factors: 1). IR injury caused by length of WIT. 2). The kidney parenchymal volume reduction caused by removal of the tumour, and excision and suturing of the surrounding healthy tissues.

In an attempt to distinguish the impact of each of these two factors, we introduced a novel method which is referred as “Partial-DRF” (P-DRF). For this reason, in the preoperative renal scans, the exact location of the tumour was determined and only small polar masses (either upper or lower pole mass) were selected for the study. In the tumorous kidney, a region in the tumour-free pole was selected and manually a ROI was drawn in that pole. Identical ROI was selected in the same pole of the contralateral kidney (Figure 1B). The same ROI drawing was used in all follow-up studies of a given patient. Accordingly, P-DRF which reflects DRF of the intact pole of the operated kidney, which is affected only by the IR injury, was compared with the same pole on the contralateral kidney. The same processing was applied for all patients in all isotope scan examinations. As a result, in the postoperative isotope scans, with the P-DRF, we could compare an intact part of the operated kidney which was impacted by WI but not affected by parenchymal volume reduction with an identical segment of the normal contralateral kidney.
Any postoperative decline in the P-DRF of the operated kidney was considered as the renal functional loss resulted from IR injury only. All renal isotope tests were evaluated and reported by the same specialist doctor in nuclear medicine.

Figure 1: Renal scintigraphy is shown with an imaginary tumour in the lower pole of one kidney (red circle). A: The ROI is selected (purple line) to demonstrate and compare the T-DRF of both kidneys. B: The ROI is selected in the nontumorous pole of the involved kidney and compared with the same ROI in the contralateral kidney.

Results

Twenty-eight patients with small renal mass successfully underwent LPN and completed one year follow up according to our protocol. We didn’t have any significant bleeding, necessitate hilar re-occlusion.

The mean preoperative or baseline eGFR of patients treated with LPN was 97 ± 17 (range: 55-122) which decreased to 81 ± 21 (range: 44-114) in the 1st postoperative day ($p$-value = 0.0069). This shows a 16% decline in average eGFR which was the largest postoperative drop within one year of follow up. Conventionally, we call it “transient-state” of kidney function deterioration. In the 3rd postoperative day, we observed a 7% recovery in the average eGFR comparing to the 1st day. Although, due to the large deviations in the values, this tendency toward recovery was statistically insignificant ($p$-value = 0.3821).

From the 3rd postoperative day to end of the study in 12th month, the average eGFR remained roughly the same. In these time points, comparing the lowest with the highest values, which were in the 7th postoperative day and 3rd month respectively, showed insignificant alteration in the eGFR ($p$-value = 0.4483).
Accordingly, for simplicity, average of all postoperative eGFR mean values after the transient-state (after the 1st day) were calculated and considered as the “steady-state” of renal function deterioration. This was 87 ml/min/1.73 m${^2}$ which demonstrates ~10% decrease in renal function comparing to the baseline ($p$-value = 0.0757).

As seen in Figure 2, the mean preoperative or baseline T-DRF of the operated kidneys was 49% which is decreased to 42% on the 1st postoperative month ($p$-value = 0.001). This value remained almost the same in the following time points. Accordingly, average of all postoperative T-DRF which was 42% was considered as the final postoperative result. On the other hand, the mean preoperative P-DRF of the intact pole of the operated kidney was 50% which decreased to 47% on the 1st postoperative month ($p$-value = 0.0727). Average of all postoperative P-DRF was also 47% without any significant alteration among the time periods ($p$-value = $>0.1$).

![Figure 2. The graph shows the mean decline of both P-DRF and T-DRF of the operated kidney (LPN) in the studied time intervals.](image)

**Discussion**

We planned a prospective study in order to distinguish the impact of parenchymal loss and effect of warm ischemia on the function of operated kidney. In our study, $^{99m}$Tc-DMSA isotope was used which is a static renal agent and allows accurate calculation of DRF. This was measured preoperatively and completed in
different postoperative intervals in 28 patients with solitary small polar renal mass and no any other abnormality in that kidney. Since $^{99m}$Tc-DMSA scan provides relative functional percentage of the two kidneys and the contralateral kidney served as a control for comparison after LPN, we selected patients with normal contralateral kidney. Such selections have resulted in a young cohort of patients with mean age of $50.5 \pm 11.9$ years old in our study. The T-DRF was measured in all isotope studies. Any postoperative decline in T-DRF in the operated kidney was considered as a result of warm ischemia and ischemia-reperfusion injury combined with parenchymal loss. In nearly all postoperative studies, mean decline of T-DRF in the operated kidney was 7%. In order to distinguish the effect of warm ischemia from the parenchymal loss, we introduced the so-called P-DRF in which a region of interest was selected on nontumorous pole of the involved kidney and it was compared with the same region in the contralateral kidney.

For this reason, we selected only patients with tumor mass of $\leq 4$ cm in diameter which were located on either upper or lower pole of the kidney so that the region selected in the intact nontumorous pole of the operated kidney was not affected by parenchymal loss and suturing. Any postoperative functional decline in this intact pole of the operated kidney was considered to be as a result of warm ischemia and ischemia-reperfusion injury only. In our study, mean postoperative decline in the P-DRF of the operated kidney was only 3% which was found to be statistically insignificant ($p$-value = 0.0727). In agreement with the previous studies, we believe that within certain time limits of warm ischemia, which was $22 \pm 5.3$ minutes in our study, the ischemia-reperfusion insult may be negligible or reversible. On the other hand, deliberate parenchymal loss plays a major role in kidney function deterioration.

Warm ischemia and the IR injury to the kidney have been considered for a long time as the main factor related with postoperative renal function deterioration in patients undergoing PN under WI. Several technically challenging techniques have been introduced for the reduction of WI. Nevertheless, the impact of renal parenchymal mass reduction was not distinguished from the effects of WI and IR in the above literature. Parenchymal loss after PN occurs as a result of intentional tumor excision, some normal parenchyma resection and suturing. Thus, the mass or volume of the parenchymal loss should be considered and differentiated from IR injury when evaluating the renal functional outcome after PN.
The current prospective study aimed at distinguishing the impact of parenchymal loss from the WI effect on the operated kidney. The 99mTc-DMSA isotope was used for this purpose due to the fact that it allows accurate calculation of DRF\textsuperscript{54}. The latter parameter was measured preoperatively and in different postoperative intervals in 28 patients with solitary small polar tumours. Since 99mTc-DMSA scan provided relative functional percentage of the two kidneys, the contralateral kidney served as the control for the comparison after LPN. Consequently, only patients with normal contralateral kidney were selected and a young patient population with mean age of 50.5 ± 11.9 years was eventually included in the study. Any postoperative decline in the T-DRF of the operated kidney was considered as a result of WI and WI combined with parenchymal loss. In nearly all postoperative studies, a mean decline of 7% in the T-DRF was noted. In an attempt to distinguish the effect of WI from the parenchymal loss, the P-DRF was introduced. A ROI was selected on the non-tumorous pole of the involved kidney and was compared with the same ROI on the contralateral kidney. Any interference of the excision area to the ROI was prevented by including only patients with tumour mass of \( \leq 4 \) cm in diameter located on either upper or lower pole of the kidney. Any postoperative functional decline in this intact pole of the operated kidney was considered to be as a result of WI only. The mean postoperative decline in the P-DRF of the operated kidney was only 3% which was found to be statistically insignificant (\( p \)-value = 0.072). In agreement with the previous studies, it could be suggested that WI may result in negligible or reversible renal damage within certain time limits of WIT such as a mean WIT of the current study. In addition, the parenchymal loss seemed to play a more important role in kidney function deterioration than WI. Considering the above, it could be advocated that the LPN surgical technique could probably focus on the precise tumour excision and suturing rather than to the minimization of WIT. Nevertheless, additional studies are necessary for the confirmation of the above hypothesis.

**Conclusion**

In LPN, the parenchymal loss caused by the resection of the tumor and the suturing of the surrounding normal tissues resulted in kidney function deterioration which should be distinguished from WI effects. An average WIT of 22 minutes for a
mean tumor diameter of 2.6 cm resulted in a 7% kidney function decline. 4% could be attributed to the parenchymal loss and 3% to WI.

The ultimate renal function after partial nephrectomy is primarily driven by parenchymal preservation with ischemia playing a secondary role as long as it is within a limited time period. One of the major implications of our study is that creating a bloodless filed by clamping the renal pedicle within certain time limits, and consequently precision of excision and renorrhaphy, should be a primary objective during any partial nephrectomy. This may result in more kidney function preservation than putting all efforts to decrease WI time to zero while accepting all potential complications.

2. NEW TOOL FOR LAPAROSCOPIC ANTEGRDAE URETERAL STENTING

We have developed a new method for intraoperative antegrade ureteral stenting. The same instrument can be used in any type of laparoscopic ureteric operations necessitating ureteral stenting. We have applied the new technique for laparoscopic transperitoneal repair with transection and reanastomosis of the ureter anterior to the IVC in patients with circumcaval ureters and in several laparoscopic pyeloplasty and ureterotomy cases.

For stenting, we attempted to avoid any retrograde procedure. We applied antegrade stenting using a ureteral stenting cannula, which was developed by our group and used routinely in laparoscopic pyeloplastic operation in our institute. We developed two sets of ureteric stenting cannula which can be used for intraoperative antegrade ureteric stenting. Each cannula has a length of 28cm to be long enough to pass through the standard laparoscopic trocars and easily reach to the ureteric stump. It is 3mm in diameter so can be easily inserted into any standard trocar or directly into the abdomen by a small percutaneous puncture. The lumen of the cannulas can easily accept stents of up to 7 French.

The cannula in the upper portion of the picture has a mild curvature at the tip. This can be inserted through any standard laparoscopic trocar. The tip of the cannula can be directed to the lower ureteric stump to facilitate insertion of the stent or guidewire into the ureter. The other two parts form a separate kit. The one with a
sharp straight tip works as a trocar. It is inserted into the straight cannula for percutaneous puncture from any site of the abdomen. After insertion into the abdomen, the inner trocar can be removed and the cannula can be used for stenting. At the top of each cannula, appropriate sealing cap can be used for insertion of stent and pusher or a guidewire without any leakage of CO2. After insertion of the stent into the distal ureteric stump, the cannula can be removed. After the first few anastomotic sutures, the upper part of the stent can be pushed into the upper ureteric stump or renal pelvis.

3. LIGATION OF A WIDE RENAL VEIN DURING LAPAROSCOPIC NEPHRECTOMY: AN EFFECTIVE METHOD

The crucial step during laparoscopic nephrectomy is the dissection and control of renal pedicle. Application of the endovascular gastrointestinal anastomosis (GIA) stapler has been a standard procedure to control renal vein during laparoscopic nephrectomy. The complications due to device malfunctioning has led several surgeons to find another secure method for renal vein ligation. Accordingly, the so called Hem-o-lok clips were introduced. However, some renal veins may be so wide that cannot be occluded safely by even the largest available clip. This fact inspired us to find a simple, secure and cost-effective technique to ligate wide renal veins.

After renal pedicle dissection, the renal artery is occluded with Hem-o-lok clips and divided when appropriate. A right angle dissector is passed posterior to the renal vein. A 2-zero 70 cm monofilament suture is fed to the dissector, which is withdrawn and pulled out. The other end of the suture is also grasped and drawn out through the same trocar, so that the suture is placed around the vein. Extracorporally one end of the suture is inserted into the convex side of a specially designed, round eyed knot pusher. It is then grasped by a mosquito and fixed under minimal tension by the assistant in the line of the trocar, while ensuring that there is no kinking or twisting in whole length of the thread. The knot pusher is held by one hand and the free end of the suture is held with the other hand to form a loop around the fixed part, as in open surgery. By maintaining minimal tension on each end of the thread, the loop is gently pushed down by the knot pusher to the level of the renal vein and then slightly tightened. This maneuver can be repeated 3 to 5 times to shrivel the
vein. The whole procedure requires about 2 minutes and it can be easily mastered even by an inexperienced laparoscopist.

This approach can be used to ligate the renal vein without any morbidity or significant increase of operative time. The combined use of suture tied extracorporally and clips with locking mechanism allows a safe, rapid secure ligation and transection of a vein of any size and may replace the endovascular GIA stapler, which may lead to complications.

4. THESIS RELATED NEW OBSERVATIONS

In the past two decades, laparoscopic procedures have gained popularity among urologists. However, many of the laparoscopic procedures require standardization so all urologists can perform them safely and relatively easily. In our studies, we have tried to standardize some of the upper urinary tract laparoscopic techniques such as repair of circumcaval ureter, pyeloplasty, application of cold ischemia in partial nephrectomy and concerns related to warm ischemia time in nephron-sparing surgeries.

We have observed that in pyeloplasty and any type of upper urinary tract reconstructive laparoscopic procedures, antegrade ureteral stenting with the ureteral stenting cannula which is developed by our team facilitates the antegrade stenting and its application is safe, easy and quick.

We have proved in a prospective study that in partial nephrectomy operations, loss of renal parenchymal mass has an important impact on renal functional outcome. In nephron-sparing laparoscopic surgeries with an average warm ischemia time of 22 minutes, we observed a 7% kidney function decline of which, 4% contributed to the parenchymal loss and only 3% to the ischemia. This research and findings can be of beneficial in future studies to consider the following points:

1. In any partial nephrectomy surgery, intentional resection and suturing of the renal parenchyma which results in loss of some renal mass, has a significant impact on kidney function. This fact should be taken into consideration and it should be distinguished from effects of warm ischemia time in future studies.

2. Probably, potentially unsafe and challenging techniques which advocate zero ischemia time in partial nephrectomy should not be promoted among urologists.
5. PUBLICATIONS AND PRESENTATIONS

Foreign language publications related to the thesis


IF: 3.297    cit: 37


IF: 3.713    cit: 141


IF: 0.862    cit: 9


IF: 2.247    cit: 19


IF: 2.365    cit: 11


IF: 2.666    cit: 0
Publications in Hungarian related to the thesis
Pusztai Csaba, Bagheri Fariborz, Jávorházy András, Bányai Dániel, Farkas Lászlò.
Korai hilus ellátás bal oldali laparoszkópos radikális nephrectomia során. Magyar urológia, 2008. /XX. Évfolyam / 2. szám

IF: 0

Pusztai Csaba, Bagheri Fariborz, Farkas László: Laparoszkópos retroperitonealis lymphadenectomia, korai tapasztalatok. Magyar urológia, 2008. /XX. Évfolyam / 2. szám

IF: 0

Thesis related IF: 15.150
Thesis related citations: 217

Presentations related to the thesis

Janetschek G, Bagheri F, Abdelmasoud A, Biyani SH, Leeb K, Jeschke S. Ligation of the renal vein during laparoscopic nephrectomy: An effective and reliable method to replace vascular staplers. 21st World Congress on Endourology, September 21-24, 2003, Montreal, Canada


Pusztai C, Bagheri F, Farkas L. Management of clinical stage I NSGCT based on pathological stage: Role of laparoscopic retroperitoneal lymph node dissection (RPLND). SIU World Uro-Oncology Update, November 19-22, 2008, Santiago


Other publications


IF: 2.486    cit: 1


IF: 2.285    cit: 32

  IF: 2.286  cit: 10


  IF: 1.479  cit: 2

Other presentations


Information Booklet: The Prostate and Its Related Diseases. The First Dubai Prostate Disease Awreness Day, Dubai, 21, September 2011

Total number of publications: 12
Cumulative Impact Factor: 23.962
Citation: 263.
6. ACKNOWLEDGEMENTS

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