Recent Advances in Endourology, 6
H. Kumon, M. Murai, S. Baba (Eds.)

**Endourooncology**
New Horizons in Endourology
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The trend in all surgical disciplines has been toward nonoperative or minimally invasive treatment. Endourology, which began with the development of cystoscopy, now encompasses all minimally invasive techniques including urologic laparoscopy, creating new horizons in endourology. Endourooncology, the merging of endourology and oncology, is one of the most challenging and rapidly evolving areas in urology practice and will revolutionize our approach to urologic malignancies with continuing refinements in technique.

Recent Advances in Endourology, volume 6, one of a series of publications organized by the Japanese Society of Endourology and ESWL, focuses on endourooncology and related topics. For the treatment of urologic malignancies, advanced and sophisticated reconstructive procedures increasingly have been performed purely laparoscopically. In the near future, standardized procedures will be conducted by robotic systems with advanced surgical eyes and hands. A more important role of robotic systems will be to open new vistas for telementoring and telerobotic cancer surgery, providing a novel educational system in order to overcome the steep learning curve faced by inexperienced surgeons. In addition, a variety of energy-based, targeted technologies, including radiofrequency ablation, high-intensity focused ultrasound (HIFU), and cryoablation are being investigated intensively for the treatment of localized urologic cancers. These image-guided targeted therapies will become preferred options as early detection methods for localized cancers develop, as in the case of transperineal brachytherapy for prostate cancer. Similarly, image-guided in situ gene therapy will have a great impact on future endourooncology.

We editors are most grateful to the authors for contributing excellent, informative review articles. We believe that these thirteen articles will enable the reader to envision future horizons in endourooncology. In the future, we will be able to offer each patient the most beneficial, tailor-made procedure that will provide lower morbidity, less pain, shorter hospital stay, and excellent cosmesis as well as a favorable long-term oncological and functional outcome.

Hiromi Kumon, M.D., Ph.D.
Chief Editor
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Merging of Endourology and Oncology: Endourooncology

ASSAAD EL-HAKIM, BENJAMIN R. LEE, and ARTHUR D. SMITH

Summary. There is a growing need to bring together endourological approaches and sound oncological principles to achieve minimally invasive cancer control in urologic malignancies. Reduced treatment morbidity and quality-of-life issues are becoming more valued by both patients and physicians. In this chapter, we present an overview of the most recent advances in endoscopic, laparoscopic, and energy-based ablation techniques for the treatment of upper-tract transitional-cell carcinoma, renal-cell carcinoma, prostate cancer, adrenal tumors, and germ-cell testicular tumors. The merge between endourology and urologic oncology will undeniably revolutionize our approach to urologic malignancies.

Keywords. Renal cell carcinoma, Transitional cell carcinoma, Prostate cancer, Testicular cancer, Laparoscopy

Introduction

Endourologists have always strived to decrease the morbidity of surgical procedures and improve patients’ quality of life. Endourology, initially defined as “the closed and controlled manipulation within the urinary tract,” has favorably encompassed all minimally invasive techniques, including laparoscopy, for the betterment of patients’ care. The field of urologic oncology is not an exception to this leading force of least invasiveness. Based on the principles of the oldest oncologic endoscopic surgery, namely, transurethral resection of bladder tumors, the endoscopic approach to superficial upper-tract transitional cell carcinoma has evolved for the past two decades. More recently, laparoscopic approaches to all urologic cancers have been developed and validated, and have achieved cancer control comparable to that with traditional open surgeries. Laparoscopic radical nephrectomy has replaced open radical nephrectomy for low-stage

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renal neoplasia in many institutions around the world. Other energy-based technologies, including cryosurgery, radiofrequency ablation, and high-intensity focused ultrasound (HIFU), are being investigated intensively for the treatment of localized renal and prostate cancers. Hence, the field of endouro-oncology has become a reality. In this chapter we give a general overview of recent developments in minimally invasive urologic oncology.

Upper-Tract Transitional Cell Carcinoma

Endoscopic Treatment

The traditional treatment of upper-tract transitional cell carcinoma (TCC) has been nephroureterectomy with bladder cuff excision. Endoscopic (percutaneous or ureteroscopic) treatment of upper-tract TCC emerged initially from the need for renal preservation in a subset of patients with anatomical or functional solitary kidneys. Lessons learned from this early experience paved the way for elective endoscopic treatment of superficial low-risk upper-tract TCC in patients with normal contralateral renal units [1, 2]. Strict indications include solitary, small (less than 2 cm), low-grade, completely visible, and resectable lesions. In the Mayo Clinic series, 21 patients meeting these inclusion criteria underwent endourologic management of upper-tract TCC, resulting in an overall renal salvage rate of 81%. The 5-year disease-specific survival was 100%; however, the overall 5-year survival curve was lower than expected (66% vs 78%) for a similar disease-free age group in the United States [2].

Contraindications to endourologic treatment of upper-tract TCC include high-grade (grade 3 or 4) lesions and tumors that appear to be invasive on radiographic imaging or direct endoscopic inspection. If a tumor is found to be unresectable on either anatomic or technical grounds, laparoscopic nephroureterectomy should follow. Recurrence at a higher grade of a previously resected tumor or a tumor that recurs rapidly after resection and bacille Calmette-Guérin (BCG) instillation portends aggressive disease, and further attempts at conservative therapy are ill-advised.

The percutaneous approach provides improved visibility and the ability to use larger instruments. On the other hand, the ureteroscopic approach is less invasive. It has been our practice to initially proceed with ureteroscopy. If the tumor is not completely resectable ureteroscopically, a percutaneous resection is undertaken under the same anesthesia.

The preoperative metastatic work-up includes, at a minimum, a computerized tomographic (CT) scan of the abdomen and pelvis and chest radiography.

Patients with grade 1 disease have an excellent prognosis, whereas the prognosis of those with grade 3 disease is guarded. Grade 1 disease has a reported recurrence rate of 16% on average (range, 5% to 33%) [3–6]. However, despite recurrences, death from low-grade urothelial carcinoma is rare. The prognosis of grade 2 disease is also good. The average recurrence rate is 22% (range, 6% to
However, no matter how grade 3 urothelial carcinoma of the upper urinary tract is managed, the prognosis is poor. We recently updated our series of endoscopically treated upper-tract TCC. Ninety patients with upper-tract TCC were treated with primary endoscopic intent (ureteroscopic and/or percutaneous approach) at our institution between April 1985 and May 2003. Seventy-two patients (75 renal units) were closely followed thereafter, and 18 patients underwent definitive surgical extirpative treatment shortly after initial endoscopic resection. According to multivariate analysis, tumor grade and focality were predictive of survival ($p < 0.05$). Patient age, gender, tumor stage, tumor side, and year of resection were not predictive of survival (unpublished data). In the authors’ opinion, endoscopic resection should not be offered for high-grade multifocal upper-tract TCC, except as an alternative in elderly patients with a solitary kidney who would fare quite poorly on hemodialysis. In fact, the 5-year survival rate of patients with end-stage renal failure in the age group from 75 to 84 years is only 10% [60].

A rigorous, lifelong follow-up regimen should be tailored to the recurrence pattern of upper-tract tumors. Although long-term (over 5 years) recurrences have been reported, most recurrences occur in the first 3 years following initial therapy [8]. These patients should undergo routine bladder surveillance as well. Ureteroscopy is the best modality to survey the ipsilateral upper tract [9]. The authors recommend that ureteroscopy be performed every 6 months, that the contralateral kidney be imaged at least annually with either retrograde or excretory pyelography, and that an abdominal CT scan be performed yearly.

The indications for adjuvant therapy (BCG, mitomycin C) in upper-tract urothelial cancer have evolved over the years. Grade 2 tumors, multifocal disease, T1 tumors, carcinoma in situ, and bilateral disease used to constitute the main indications for adjuvant percutaneous BCG at the authors’ institution. In our recent update of the LIJ series, we identified 44 patients who received adjuvant BCG after endoscopic resection of upper-tract TCC and 29 who did not (controls). In this retrospective cohort, BCG increased overall survival of patients with low-grade tumors, unifocal tumors, and elective surgical indications. Furthermore, the recurrence rate was decreased in unifocal tumors receiving BCG compared with controls ($P < 0.05$) [61]. In light of these findings, the indications for adjuvant BCG need to be reconsidered, and a prospective multicenter trial is warranted.

In conclusion, endourologic techniques are ideal for managing noninvasive, resectable tumors that are well or moderately differentiated. These modalities are particularly suited to patients with renal compromise, as well as to patients with normally functioning kidneys and favorable tumor characteristics.

**Laparoscopic Nephroureterectomy**

Although laparoscopic radical nephrectomy has been widely accepted and adopted as a treatment option for renal cell carcinoma (RCC), the use of laparoscopic nephroureterectomy (LNU) for upper-tract TCC has lagged because of
the lower incidence of the disease and management of the distal ureter and bladder cuff. LNU can be performed through a transperitoneal or retroperitoneal approach. There are several alternatives for dealing with the distal ureter and ensuring a bladder cuff [10]. The Pluck technique is a transvesical ureteral dissection whereby the ureteral orifice and intramural ureter are resected transurethrally using a Collins knife. In order to prevent tumor spillage from the upper tract, we recommend performing the laparoscopic nephrectomy first and applying a clip on the distal ureter early during dissection. Alternatively, an Endoloop (Ethicon Endosurgery, Cincinnati, OH, USA) can be used transvesically to occlude the distal ureter. A novel approach without the need for intraoperative patient repositioning (in lithotomy) has been recently reported [11]. A rigid offset nephroscope is introduced through a 10-mm working port into the bladder, and an incision is made around the ureteral orifice using the Collins knife, through the working channel of the nephroscope. Open bladder cuff resection, laparoscopic stapled bladder cuff, and ureteral intussusception [12] are all described alternatives. The specimen should be removed intact without morcellation through the hand port incision if hand-assisted LNU is performed, or through a lower midline or Pfannenstiel incision.

Four recent clinical series compared LNU with open nephroureterectomy (ONU) [13–16]. There were a total of 108 LNU procedures and 105 ONU procedures in these four series. The mean follow-up period was 11.1 to 35 months for LNU and 14 to 46 months for ONU. All four reports demonstrated a shorter hospital stay for LNU, by a mean of 1 to 6 days. The mean blood loss decreased on average from 440–696 ml for ONU to 199–288 ml for LNU. None of the LNU patients had their specimens morcellated. There were two extravesical local recurrences with LNU and three with ONU, as well as five distant metastatic diseases with LNU and seven with ONU. There were 8 disease-related deaths with LNU and 14 with ONU. There were no reported port site recurrences in these four series, despite earlier reports of tumor seeding into the port sites [17, 18].

LNU has obvious benefits over ONU, including decreased pulmonary complications, decreased postoperative discomfort, shorter hospital stay, and shorter convalescence. At medium-term follow-up of patients with upper tract TCC, the disease-free survival rate of those treated with LNU seems to be similar to that of patients treated with ONU. Although concerns over port site and intraperitoneal seeding have been voiced, these problems have not been reported in recent series. The overall disease-specific survival is comparable to that for ONU. However, long-term results are required.

Renal-Cell Carcinoma

The concept of elective nephron-sparing surgery has become well established in the past decade. Currently, 60% of all renal tumors are detected incidentally and are often small (4 cm or less), with up to 22% of these tumors not being malignant [19, 20]. Among patients with small renal tumors (4 cm or less), the 5- and
10-year survival rates are comparable for patients undergoing partial nephrectomy and those undergoing radical nephrectomy. Disease-specific survival following nephron-sparing surgery for small tumors is in excess of 90% [21]. In addition, preservation of nephrons is protective against hyperfiltration injury. A negative parenchymal margin is the primary oncologic goal, regardless of the thickness of that margin.

Until recently, the only available nephron-sparing option was open partial nephrectomy. However, within the past 5 years, various minimally invasive alternatives have been the subject of intense basic and clinical investigation. Based on established oncologic principles, all minimally invasive nephron-sparing procedures must aim to excise or effectively ablate renal tumors similar to what would have been excised during open partial nephrectomy. Although exciting, these new developments should be tested in well-designed preclinical and clinical trials. Long-term follow-up data are of extreme importance before widespread application.

**Laparoscopic Partial Nephrectomy**

Laparoscopic partial nephrectomy (LPN) has not been widely adopted, mainly because of the technical difficulty in achieving adequate parenchymal hemostasis and renal hypothermia.

Nephron-sparing surgery provides cancer control comparable to radical nephrectomy in select patients with a small (less than 4 cm), localized renal-cell carcinoma [22]. LPN was initially reserved for select patients with small, peripheral, and exophytic tumors [23–26]. With increased experience, the indications have been expanded to include patients with more complex tumors. Absolute contraindications for LPN include renal vein thrombus, and central tumors.

Successful LPN requires strict patient selection and proficiency in intracorporeal suturing. Open partial nephrectomy principles should be duplicated. Intraoperatively, a flexible laparoscopic ultrasound probe can be used to precisely delineate the tumor. The transperitoneal approach is chosen for anterior and lateral tumors, whereas the retroperitoneal approach is preferred for posterior tumors. A ureteral catheter is inserted cystoscopically in patients who require retrograde pyelography. The operative steps include renal hilum preparation for subsequent cross-clamping, followed by mobilization of the kidney and exposure of the tumor. Transperitoneally, a laparoscopic Satinsky clamp is used to occlude the renal hilum en bloc, or laparoscopic bulldog clamps are applied on the renal artery and/or vein separately. The tumor is excised and entrapped within a laparoscopic bag. Retrograde injection of dilute indigo carmine or methylene blue is used to identify any pelvicalyceal entry, which is laparoscopically sutured in a watertight fashion. Parenchymal hemostatic sutures are placed over Surgicel bolsters. A drain is placed, particularly if pelvicalyceal repair was performed.

Various techniques of parenchymal hemostasis have been reported. Cauterization of the cut surface with an argon beam laser and application of fibrin glue
have been explored. For larger vessels, however, the most effective method remains the application of hemostatic parenchymal sutures. Renal parenchymal tourniquets and cable tie devices have been tested in the porcine kidney but are clinically unreliable in the human kidney. Other hemostatic aids include prior microwave thermotherapy [27] or radiofrequency coagulation [28] of the tumor followed by laparoscopic partial nephrectomy. Bioadhesives may become an effective method for obtaining renal parenchymal hemostasis in the future.

Gill et al. reported on the initial 50 patients who underwent LPN without renal hypothermia [29]. The warm ischemia time was 23 min, the mean operative time was 3 h, and the mean hospital stay was 2.2 days. On pathologic examination, renal-cell carcinoma was confirmed in 68% of the patients, all with a negative surgical margin. The intraoperative complication rate was 5%, including parenchymal hemorrhage, a ureteral injury, and a bowel abrasion, but none was converted. There were 9% postoperative and 15% late complications. Janetschek et al. recently reported on 15 patients treated with LPN. Cold ischemia was achieved by continuous perfusion of Ringer’s lactate at 4°C through the clamped renal artery. The mean operative time was 185 min, the mean ischemia time was 40 min, and the mean estimated blood loss was 160 ml. Pathologic examination revealed RCC in 13 patients and angiomyolipoma in 2. The resection margins were negative in 14 patients. There were no significant postoperative complications [30].

**Energy-Based Ablation Techniques**

Cryoablation and radiofrequency ablation (RFA) are the two most studied minimally invasive alternatives to partial nephrectomy. They can be performed using open, laparoscopic or percutaneous approach. Cryoablation of renal tumors has the longest follow-up among energy based ablation techniques. Studies on animals have shown that tissue destruction is complete, and may be reliably reproduced [31, 32]. Long-term results from clinical trials are soon going to be available. Cryotherapy and RFA both involve a direct cellular injury and an indirect effect from microvascular impairment [33]. Ultrasound can be used to verify extension of the iceball during cryosurgery; however, currently there are no direct means to monitor RFA treatment intraoperatively.

Rukstalis et al. reported on 29 patients with localized renal tumors treated with cryoablation using an open approach [34]. The median preoperative lesion size was 2.2 cm. At a median follow-up of 16 months all patients except one, who had a biopsy-proven local recurrence, demonstrated radiographic regression to only a residual scar or a small nonenhancing cyst. Using the laparoscopic cryoablation approach, Gill et al. [35] treated 32 patients with a mean tumor size of 2.3 cm. Twenty-three patients have undergone a 3 to 6-month follow-up CT-guided biopsy, which was negative in all cases. No evidence of local recurrence was found during a mean follow-up of 16.2 months. Shingleton et al. reported on 65 patients with percutaneous cryotherapy. At an average follow-up of 18 months all 60 surviving patients had no radiographic evidence of disease,
although nine out of 65 (14%) required repeat treatment [36]. The intermediate results look promising, and long-term data will soon be available to assess the durability of renal cryotherapy. (Refer to chapter 5–2, this volume, for further details on cryoablation of RCC).

RFA has recently entered phase II clinical trials for the treatment of small renal tumors. Four recent clinical studies using percutaneous RF reported favorable results with post-procedure CT or MRI enhancement as the primary measure of treatment failure [37–40]. Unfortunately, the absence of contrast enhancement is not an accurate predictor of tumor viability. However, there is as of yet no other reliable postoperative imaging to identify failures. When histology is used as a measure of outcome, several studies have shown incomplete tumor ablation [41–43]. Both hematoxylin and eosin stain (H&E) and nicotinamide adenine dinucleotide (NADH) diaphorase staining should be part of the histological assessment of RF ablated tumors because there are ‘viable-appearing’ cells on H&E in acutely ablated lesions [44].

Complete tumor cell death has not been consistently achieved with RF ablation of RCC. Based on findings of viable tumor cells only at the periphery of treated tumors, it seems reasonable to believe that better intraoperative monitoring would decrease or eliminate positive margins. Until long-term efficacy is well documented, RF treatment should be limited to small (<3 cm) and exophytic renal tumors in the setting of clinical trials. (Refer to chapter 5–1, this volume, for further details on RFA of renal tumors).

Prostate Cancer

Quality of life is a major consideration in the treatment of localized prostate cancer. The issue arises of striking a balance between treating asymptomatic patients and introducing side effects versus deferring treatment until patients become symptomatic, by which time cure may not be possible. The current treatments for early disease have acute and delayed morbidities that affect negatively the quality of life. There would therefore appear to be a need for new treatment options particularly in view of the high incidence of early disease.

Laparoscopic Radical Prostatectomy

In the late 1990s, Guillon et al. described a technique for laparoscopic radical prostatectomy (LRP), an approach that has the potential to offer lower morbidity than open procedures [45]. They have recently reported on 1,000 consecutive patients with clinically localized prostate cancer who underwent LRP. Clinical stage was T1a in 6 patients (0.6%), T1b in 3 (0.3%), T1c in 660 (66.5%), T2a in 304 (30.4%) and T2b in 27 (2.7%). Mean preoperative prostate specific antigen (PSA) was 10 +/−6.1 ng/ml. Positive surgical margin rate was 6.9%, 18.6%, 30% and 34% for pathological stages pT2a, pT2b, pT3a and pT3b, respectively. The overall actuarial biochemical progression-free survival rate was 90.5%
at 3 years. Preservation of the neurovascular bundles did not affect the status of surgical margins or disease progression [46]. Accordingly, LRP is at least equivalent to published series of open radical prostatectomy in terms of local disease control and biochemical progression free survival. Other approaches to LRP have also been described with favorable oncologic results and low morbidity rates [47, 48].

Laparoscopic radical prostatectomy is feasible and reduces perioperative blood loss, but has a steep learning curve. Continence and potency rates compare to open series. However, controversy remains whether LRP offers significant advantages in postoperative analgesic requirements, hospital stay and recovery period. Prospective randomized trials comparing LRP and open retropubic prostatectomy are underway, and results should clarify theses issues.

**Energy-Based Treatment Alternatives**

Cryosurgery and HIFU are some of the minimally invasive alternatives for localized prostate cancer. These modalities offer several advantages over radical surgery. They have low general surgical morbidity, can be performed on an outpatient basis, and blood transfusions are not needed. The results of a retrospective multicenter analysis of cryosurgery for have been published [49]. The 5-year biochemical-free survival rate was 76% for low-risk patients, which was comparable to the results for similar patients undergoing brachytherapy or conformal radiation at the same institutions. Nerve-sparing cryosurgery has recently been described and may increase the popularity of cryosurgery. (See chapter 6–3, this volume, for more details).

The short-term results of a large phase II/III European prospective multicenter trial of HIFU were recently published. 402 patients with localized prostate cancer unfit for radical prostatectomy were treated. The mean serum PSA concentration was 10.9ng/ml. The Gleason scores were 2 to 4 in 13.2% of the patients, 5 to 7 in 77.5%, and 8 to 10 in 9.3%. Patients received a mean of 1.4 HIFU sessions. At a mean follow-up of 407 days 87.2% of clinical stage T1–2 patients achieved a negative biopsy postoperatively [50]. These new minimally invasive techniques are still investigational at present and before their role in localized prostate cancer can be defined it will be necessary to conduct larger studies with longer follow-up as well as comparative studies against traditional therapeutic options. Their role as salvage therapy also warrants investigation. (See chapter 6–2 for more details).

**Adrenal Cortical Carcinoma**

*Laparoscopic Adrenalectomy*

Laparoscopic adrenalectomy has replaced open surgery for the treatment of most surgical adrenal pathologies. Pheochromocytomas once considered a con-
traindication for laparoscopic surgery can now be excised safely and effectively [51].

Primary adrenal carcinoma is a rare tumor occurring in children and adults, and has a poor prognosis despite aggressive multimodality treatment approach [52]. Most malignancies of the adrenal are metastases from other primaries. Melanoma, renal cell carcinoma and adenocarcinoma of the lung, stomach, esophagus and liver metastasize to the adrenal in decreasing order of frequency [53]. Adrenal metastases from any primary malignancy were rarely diagnosed during life. With the increased use of imaging modalities for cancer staging, a higher number of adrenal metastases are being diagnosed. They usually are multiple and bilateral [53]. However if the metastasis is solitary, whether synchronous or metachronous with the primary neoplasm, surgical excision confers a survival benefit with a 5 year survival rate approaching 45% for metastatic non-small cell lung cancer, and 62% disease free survival at 26-month follow-up for metastatic renal cell carcinoma [54]. Prerequisite to adrenalectomy for metastasis is adequate control of the primary, absence of other non-resectable metastases and a patient with good performance status. Preoperative fine needle aspiration (FNA) of the tumor can be helpful in the differential diagnosis. Laparoscopic adrenalectomy for an isolated metastasis is safe effective and efficient. Our technique of laparoscopic adrenalectomy has been previously described [51].

Laparoscopic adrenalectomy for primary adrenal carcinoma is still controversial for the following reasons: the large size of the tumor (90% of adrenal carcinomas are >6 cm) [55], local infiltration, adrenal vein thrombus, and risk of spillage and subsequent recurrence. Size and recurrence do not seem to be the limiting factors and several cases of laparoscopic adrenalectomy for tumors >6 cm have been reported with acceptable operative time and low conversion rate and recurrence [51]. However most experienced surgeons agree that invasive tumors with surrounding tissue infiltration or adrenal vein thrombus are formal contraindications to laparoscopic adrenalectomy.

**Testicular Cancer**

*Laparoscopic Retroperitoneal Lymph Node Dissection*

In the United States, retroperitoneal lymph node dissection (RPLND) is the main diagnostic and therapeutic option for stage I, non-seminomatous germ-cell testicular tumors (NSGCTT). In the early 1990s, the laparoscopic approach to RPLND was introduced as an alternative to open surgery in order to reduce the morbidity of open RPLND, which is too high for a diagnostic procedure. Janetschek et al. reported on the first large series of laparoscopic RPLND with significant follow-up demonstrating similar cancer control in patients with clinical stage I testis cancer compared to traditional open surgery. Seventy-three patients underwent a modified unilateral template dissection. Operative time ranged from 150 to 630 min (mean 297), with a significant drop after the initial 15 cases. The
conversion rate was 2.7%. In the last 44 patients there was no major postoperative complication. The mean hospital stay was 3.3 days. Ejaculation was preserved in all patients. Lymph nodes were positive in 19 cases (26% pathologic stage II). There was one contralateral retroperitoneal recurrence at a mean follow-up of 43.3 months in a patient with initial pathologic stage I [56]. The Johns Hopkins’ group recently reported their long-term data of laparoscopic RPLND in 29 patients with high risk clinical stage I, NSGCTT. A modified template dissection was performed. Lymph nodes were negative in 17 of 29 patients. Of these 17 patients, 15 had no recurrence and were free of disease with 5.8 years of follow-up. Two patients had recurrence, one in the chest, and one biochemical, and both were free of disease after chemotherapy. Notably, ten out of twelve lymph node positive patients underwent adjuvant chemotherapy and were free of disease with 6.3 years of follow-up. One patient had a biochemical recurrence and was salvaged with chemotherapy. The only long-term complication was retrograde ejaculation in 1 patient [57], however there was a high major complication rate of 14%.

Although challenging, laparoscopic RPLND is also feasible after chemotherapy for clinical stage IIA or higher. Palese et al. reported on 7 such patients. The mean tumor diameter was 3.07 cm before chemotherapy and 1.91 cm after chemotherapy. A modified laparoscopic left (n = 3), right (n = 3), and bilateral (n = 1) template was used. Post chemotherapy laparoscopic RPLND was successfully completed in 5 (71.4%) patients. The overall complication rate was 57.1%), with a major complication incidence of 42.8% [58]. Janetschek et al. performed post chemotherapy laparoscopic RPLND in 24 patients. Mean tumor diameter was 2.4 cm. before and 1.1 cm. after chemotherapy. There were no conversions to open surgery. Operative time was 150 to 300 min (mean 240). Blood loss was minimal and no blood transfusions were required. The only postoperative complications were chylous ascites (5 patients) which resolved with conservative management and a small asymptomatic lymphocele. Histological examination revealed necrosis in 71%, mature teratoma in 25% and active tumor in 4% of patients. Antegrade ejaculation was preserved in all patients. Mean postoperative hospital stay was 4 days, return to normal activities between 1 and 3 weeks, and time to complete recovery between 5 and 10 weeks. All patients were well without evidence of disease at a mean follow-up of 24.4 months [59].

Although feasible, laparoscopic RPLND should be viewed as only diagnostic, and considered investigational at the present time. The long and steep learning curve remains the biggest obstacle to laparoscopic RPLND.

It is difficult to draw definite conclusions on the therapeutic effect of primary laparoscopic RPLND because most patients with viable disease received adjuvant chemotherapy.

Conclusion

Minimally invasive approaches should be incorporated in the diagnosis and treatment of urologic malignancies. Unfortunately most centers specializing in the treatment of these diseases are not trained in laparoscopic surgery and vice
versa. There is an urgent need to reconcile both urologic oncology and endourology. Today’s urooncologist must become an endooncologist.

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