Clipless Laparoscopic Retroperitoneal Lymph Node Dissection Using Bipolar Electrocoagulation for Sealing Lymphatic Vessels

Initial Series

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Purpose: To evaluate the outcome of laparoscopic retroperitoneal lymph node dissection (LRPLND) using bipolar electrocoagulation instead of clipping the lymphatic vessels.

Materials and Methods: Between August 2002 and April 2008, a total of 13 patients underwent transperitoneal LPRLND for nonseminomatous germ cell tumor of the testis. In this experience, in contrast to other techniques, we did not use clips for ligation of the lymphatic vessels; instead, we used bipolar cautery for coagulation of the lymphatic vessels. We followed up the patients for lymphocele formation or lymphatic leakage using abdominal computed tomography scan.

Results: Mean age of the patients was 24.2 years (range, 19 to 39 years). Six tumors were on the left side and 7 on the right. Pathological stage was I in 12 patients and ΠA in one. The mean follow-up period was 29.9 months (range, 3 to 70 months). No re-operation was required. There was no prolonged lymphatic leakage or lymphocele formation during the follow-up period.

Conclusion: Our study demonstrates that using bipolar electrocoagulation instead of clips, for sealing of the lymphatic vessels during LRPLND, does not hamper the outcome of the procedure. This should be further evaluated in randomized clinical trials with more subjects.

Keywords: lymphatic vessels, electrocoagulation, laparoscopy, lymph node excision, postoperative complications

INTRODUCTION

After the introduction of laparoscopic retroperitoneal lymph node dissection (LRPLND) in several case reports as a feasible method,[1,2] many studies were performed to investigate its safety, reproducibility, and long-term results. Today, several institutions have published and updated their experience with LRPLND.[3-7]

Complications associated with LRPLND are reported to occur in 6% to 17% of patients, the majority of which are minor. Chylous ascites and lymphocele are among minor complications, which are reported in up to 6.6% of patients following LRPLND.[8] It is proposed that prevention of chylous ascites and lymphocele can be achieved by meticulous ligation of the lymphatic vessels with clips.[9] However, using electrocoagulation instead of ligation could be time-saving and cost-effective without increase of lymphocele incidence.[10]

We evaluated the outcome of LRPLND eliminating clips and using bipolar cautery to seal the lymphatic vessels. We did not focus on oncologic outcomes, but on technical aspects of using bipolar cautery and its efficacy to prevent lymphocele formation.

MATERIALS AND METHODS

We reviewed our experience with transperitoneal LRPLND for nonseminomatous germ cell tumor of the testis, between August 2002 and April 2008. First, we placed the patient in the flank position under general anesthesia. Thereafter, we introduced four trocars, including three ports in the midline and one pararectally. In a transperitoneal approach, a wide dissection of the ascending colon and the duodenum (right side) or the descending colon with transection of the splenocolic ligament (left side) was performed. For left-side tumors, all of the lymphatic vessels between the aorta and the left ureter (laterally) with extension to the left renal vein (cranially) and crossing site of the left iliac artery and the ureter (caudally) were dissected. The left sympathetic trunk, however, was preserved. Furthermore, the pre-aortic and inter-aortocaval and precaval lymphatic vessels cephalic to the inferior mesenteric artery insertion were removed (left modified technique). The template for the right side included all the tissue around the vena cava from the ureter (laterally) to the right renal vein (cranially) and the iliac artery crossing by the ureter (caudally), the inter-aortocaval nodes, and the pre-aortic tissue cephalic to the inferior mesenteric artery insertion.

Only in one patient with positive lymph nodes (stage ΠA), bilateral classic RPLND (from the ipsilateral to the contralateral ureter, including both paracaval and para-aortic regions) was performed.

We dissected the lymphatic vessels as much as possible en block with split and roll technique and removed the gonadal vein together with the surrounding lymphatic tissue from the ipsilateral orchiectomy ligature to insertion end point (the inferior vena cava or the left renal vein) in all of the cases. In this experience, in contrast to other techniques, we did not use clips for ligation of the lymphatic vessels. Instead, we used bipolar cautery for coagulation of the lymphatic vessels (Figures 1 and 2). We followed up the patients, especially for lymph leakage or lymphocele formation using abdominal computed tomography scan.

RESULTS

A total of 13 patients with the mean age of 24.2 years (range, 19 to 39 years) underwent transperitoneal LRPLND for nonseminomatous germ cell tumor of the testis. Testis tumors were on the left side in 7 patients and on the right side in 6. Twelve patients had stage I and one had stage IIa tumor.

One conversion occurred during our early experience with LRPLND, due to bleeding of the lumbar vessels. No re-operation was needed in any of the patients. Blood transfusion was needed only in one patient. On average, 14 nodes were removed. Tumor pathology and peri-operative results are

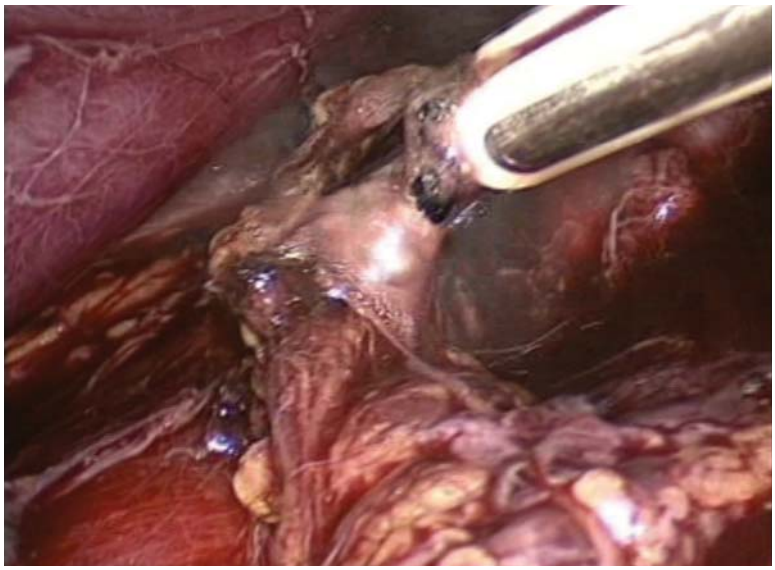

Figure 1. Removing lymphatic tissue using bipolar cautery cautery during retroperitoneal lymph node dissection.

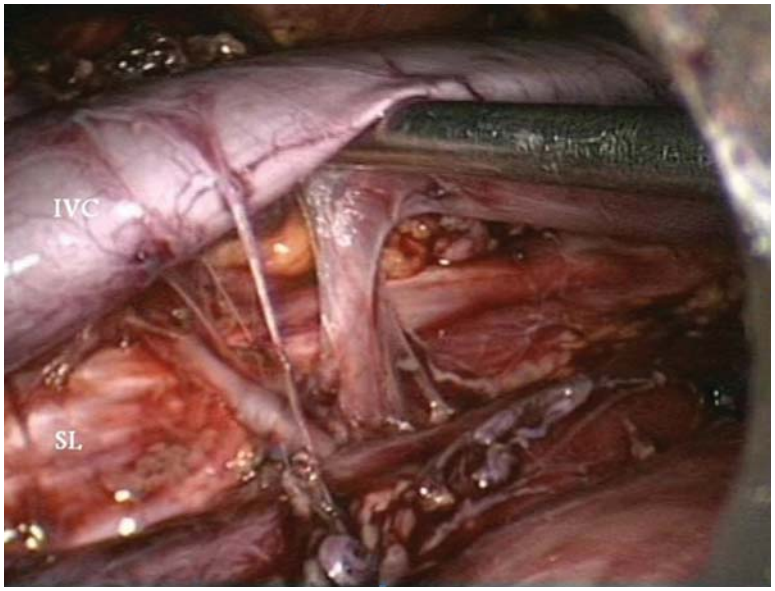

Figure 2. Paracaval and inter-aortocaval lymphatic tissue are removed. SL indicates spinous ligament; and IVC, inferior vena cava.

shown in Table. Because of success in performing lymph node dissection and low-stage disease, chemotherapy was not needed postoperatively in any of the patients. No case of chylous ascites or prolonged lymphatic leakage from the drains was encountered during the postoperative period. Patients were followed up for an average of 29 months (range, 3 to 70 months). In the long-term follow-up, lymphocele was not observed in the patients (Table).

DISCUSSION

Laparoscopic RPLND is a technically demanding procedure that should be undertaken only by

Table . Outcome of transperitoneal lymph node dissection without using clips for ligation of the lymphatic vessels.

Parameters	Value
Mean follow-up (range), month	29.9 (3 to 70)
Testicular tumor pathology	
Mixed germ cell tumor	1
Pure embryonal cell carcinoma	1
Lymph node pathology	
Free of tumor	12
Embryonal + teratoma	1
Mean operation time (range), hr	5.28 (3.15 to 7.40)
Conversion to laparotomy	1
Mean hemoglobin drop (range), mg/dL	1.33 (0.2 to 2.7)
Mean drain leakage (range), day	4.2 (3 to 6)
Symptomatic lymphocele	0
Lymphocele on follow-up imaging	0

experienced laparoscopic surgeons, who are also comfortable and adept at advanced vascular techniques in the event of open conversion. The indications for LRPLND in low-stage nonseminomatous germ cell tumors of the testis are the same as those for open primary RPLND, namely clinical stage I or IIA, negative serum tumor markers, and the absence of comorbidities that would preclude safe surgery, such as a bleeding diathesis.[11]

As experience with LRPLND has improved, several modifications to the technique have been made in order to make it more feasible and less complicated.[12] One of the RPLND complications either in open or laparoscopic manner is lymphatic leakage or lymphocele formation.[8] Chylous ascites is the result of surgical transection of the major lymphatic vessels. A symptomatic lymphocele occurring after transperitoneal RPLND is relatively uncommon. The presenting symptom may be a sense of abdominal fullness, but flank pain may allude to ureteral obstruction. Imaging studies, including ultrasonography and computed tomography, may reveal a thin-walled cystic lesion, but one must be aware of the possibility of a thick-walled lesion, which must be distinguished from a cystic teratoma through biopsy.[9]

Prevention of these problems requires marked attention to closing the suspected lymphatic structures. Traditionally, clip-ligation and division of the lymphatic channels is being practiced and specifically recommended by most authors. They believe that care must be taken to clip as many of the main lymphatic channels as possible to decrease the risk of postoperative lymphatic leakage.[13] However, bipolar electrocoagulation and division is an alternative technique. Although this technique is criticized by some for the increased frequency of lymphatic leakage or lymphocele,[8] in our series, we did not find any case of lymphocele formation.

Box and colleagues described an animal study comparing monopolar, bipolar, and ultrasonic energy devices for in-vivo lymphatic sealing in a porcine model. They assessed the capability of the devices for sealing the thoracic duct. They concluded that bipolar electrocautery and ultrasonic devices, not monopolar device, provide a supraphysiological seal of lymphatic vessels, and are appropriate for being utilized in laparoscopic surgery.[14] The efficacy of bipolar electrocoagulation of the lymphatic vessels in comparison with suture ligation has been previously evaluated in the kidney transplantation.[13,15] Farouk and Bano compared electrocoagulation with ligation of lymphatic vessels in the kidney transplant recipients. Their results showed that electrocoagulation is time-saving and cost-effective, with no increase in lymphocele incidence.[10]

To the best of our knowledge, using bipolar electrocoagulation to close lymphatic vessels in LRPLND has not been assessed. We eliminated the use of clips for ligation of the lymphatic and blood vessels; instead, we used bipolar cautery. However, we did not confront chylous ascites or prolonged lymphatic leakage from the drains or lymphocele during long-term follow-up period.

It must be remembered that the most effective approach for the management of symptomatic lymphocele after retroperitoneal lymph node manipulation, such as the kidney transplantation and pelvic lymph node dissection, is surgical intraperitoneal drainage.[16-20] It seems that because our approach was transperitoneal, minor degrees of lymphorrhea could be absorbed by the exposed peritoneum surface; thus, we did not have any case of lymphatic leakage or symptomatic lymphocele formation.

Our study is not without limitations. Although recurrence occurred in none of our patients, longer follow-up period is needed to more precisely evaluate recurrence. Another limitation of our study was lack of a control group; however, this is the first clinical study, which could be a basis for future comparative ones.

CONCLUSION

Our study demonstrates that bipolar electrocoagulation during transperitoneal LRPLND does not adversely affect the outcome of the procedure. Furthermore, the use of bipolar coagulation greatly facilitates a bloodless tissue dissection, shortens the operation time, prevents unnecessary application of intraperitoneal foreign bodies, reduces the costs, and brings more convenience for the surgeon. Further studies are needed to confirm our results.

CONFLICT OF INTEREST

None declared.

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