

# Is Modified Retroperitoneal Lymph Node Dissection Alive for Clinical Stage I Non-Seminomatous Germ Cell Testicular Tumor?

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**Purpose:** To evaluate efficacy of modified retroperitoneal lymph node dissection (RPLND) in the management of patients with pathological stage (PS) I non-seminomatous germ cell testicular tumor (NSGCT) in a retrospective study.

**Materials and Methods:** Between April 2002 and April 2012, 55 patients with clinical stage (CS) I NSGCT had undergone modified RPLND according to Sloan-Kettering modified RPLND template. Clinicopathological parameters, retroperitoneal relapse, and antegrade ejaculation rate were evaluated in patients with PS I.

**Results:** Of 55 patients, 41 (74.5%) and 14 (25.5%) subjects were in PS I and II, respectively. In PS I group, the mean patients' age was 32.8 years (range, 19 to 51 years) at the end of the follow-up period. Three patients missed the follow-up; hence, were excluded from the study. Mean follow-up duration was 56 months (range, 6 to 120 months). Tumor recurrence was identified in no subjects at the end of the follow-up period. Overall peri and postoperative complication rate was 18% (7 patients). Out of 38 patients, 23 (61%) had post RPLND antegrade ejaculation at the end of the study.

**Conclusion:** Modified template RPLND is a safe, effective, and sufficient treatment for patients with no retroperitoneal micrometastasis after the procedure. Furthermore, this strategy may obviate the need for close, expensive, and potentially harmful follow-up protocol in patients with PS I NSGCT.

**Keywords:** lymph node excision, testicular neoplasms, neoplasm metastasis

## INTRODUCTION

**R**etroperitoneal lymph node dissection (RPLND) has been accepted as a diagnostic and therapeutic management for patients with non-seminomatous germ cell testicular tumor (NSGCT).<sup>(1,2)</sup> Conventional bilateral RPLND is defined as lymph node dissection between both the kidneys and the ureters down to the bifurcation of the common iliac arteries. This radical surgery may result in delayed restoration of the bowel function, prolonged hospital stay, and loss of antegrade ejaculation.<sup>(3)</sup> However, very low recurrence rate (less than 2%) after this bilateral procedure confirms its efficacy for control of the retroperitoneum.<sup>(4)</sup>

Nerve-sparing RPLND involves preservation of sympathetic fibers. By saving sympathetic nerve function, minimal ejaculatory morbidity is achieved and more than 95% of patients may have antegrade ejaculation. However, dissection along the aorta and inferior vena cava may result in vessel disruption.<sup>(3,5)</sup>

Several modified RPLND techniques have been introduced to limit contralateral dissection and accompany with faster patients' recovery and preservation of antegrade ejaculation.<sup>(5)</sup> The potential risk of recurrence, due to unresected retroperitoneal lymph nodes, is the major oncological concern with modified RPLND.<sup>(4)</sup> Recently, modified RPLND is reported as an unacceptable procedure for clinical stage (CS) I NSGCT.<sup>(4,6)</sup> In this retrospective study, we evaluated efficacy of Sloan-Kettering modified RPLND template in the management of CS I NSGCT.

## MATERIALS AND METHODS

From April 2002 to April 2012, a total of 55 patients with CS I NSGCT had undergone modified RPLND in our referral center, Shahid Labbafinejad Medical Center, Tehran, Iran. Clinical stage I was defined as normal serum tumor markers and no evidence of malignancy in the abdominopelvic computed tomography (CT) scan and chest X-ray (CXR) after initial orchiectomy.

Modified RPLND was performed with diagnostic and therapeutic purpose. All the lymph nodes above the contralateral inferior mesenteric artery as well as ipsilateral lymph nodes between the kidneys, ureters, and common iliac bifurcation were resected.

Post RPLND evaluation in patients with pathological stage (PS) I included blood tests (liver function test and serum levels of calcium, phosphorus, and alkaline phosphatase) and serum tumor markers (alpha-fetoprotein [AFP], beta-human chorionic gonadotropin [ $\beta$ -hCG], and lactate dehydrogenase [LDH]) every 3 months, and CXR and abdominopelvic CT 4 to 6 months after RPLND and at the end of the follow-up period.

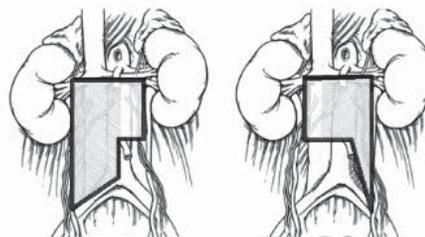
Patients with PS II underwent post RPLND chemotherapy.<sup>(4,5)</sup> In or extra template recurrence of cancer after modified RPLND was assessed. Descriptive statistics for clinical and demographic characteristics of the patients are mentioned in other articles.

### *Surgical Technique*

All of the 55 patients were operated on according to the Sloan-Kettering modified RPLND template. All of the lymph nodes between the kidneys, ureters, and common iliac bifurcations were resected except the contralateral lymph nodes below the inferior mesenteric artery. Therefore, in patients with right-sided tumor, pre-aortic, para-aortic, paracaval, precaval, interaortocaval, and right common iliac lymph nodes were resected. In patients with left-sided tumor, pre-aortic, para-aortic, precaval, interaortocaval, and left common iliac lymph nodes were resected (Figure).

## RESULTS

Of 55 patients, 41 (74.5%) and 14 (25.5%) subjects were categorized in PS I and II, respectively. Pathological stage I was defined as normal pathological report of retroperitoneal lymph nodes after RPLND. The clinico-oncological outcomes were reviewed in patients with PS I. Three patients



Left and right modified retroperitoneal lymph node dissection template.

Clinicopathological characteristics of 38 patients with stage I non-seminomatous germ cell testicular tumor at orchiectomy and modified RPLND.

#### Variables

Increased serum tumor marker before orchiectomy, n (%)	
Alpha fetoprotein	28 (73)
Beta-human chorionic gonadotropin	21 (55)
Lactate dehydrogenase	9 (23)
Primary testicular tumor side, n (%)	
Right	18 (47)
Left	20 (53)
Maximum testicular tumor size (range), mm	44 (15 to 98)
Orchiectomy pathology, n (%)	
Pure teratoma	2 (5)
Pure yolk sac	2 (5)
Pure choriocarcinoma	0 (0)
Pure embryonalcarcinoma	5 (13)
Mixed germ cell (containing embryonalcarcinoma)	25 (66)
Mixed germ cell (without embryonalcarcinoma)	4 (11)
RPLND type, n (%)	
Open	3 (8)
Laparoscopy	33 (87)
Laparoscopy converted to open	2 (5)
Mean operative time (range), min	237 (80 to 470)
Peri and postoperative complications, n (%)	
Great vessel injury	2 (5)
Visceral injury	0 (0)
Peri-operative bleeding	1 (3)
Myocardial infarction	0 (0)
Cerebrovascular accident	0 (0)
Deep venous thrombosis	0 (0)
Incision site infection	2 (5)
Retroperitoneal hematoma	2 (5)
Cheiloascitis	0 (0)
Acute renal failure	0 (0)
Pulmonary thromboemboli	0 (0)
Total	7 (18)
Mean serum hemoglobin before RPLND (range), mg/dL	14.9 (9.5 to 7.5)
Mean serum hemoglobin one day after RPLND (range), mg/dL	13.4 (10 to 16)
Blood transfusion, n (%)	3 (8)
Mean hospitalization (range), day	3.6 (2 to 7)
Mean total number of dissected lymph nodes (range)	15.2 (1 to 38)
Mean follow-up duration (range), month	56 (6 to 120)
Postoperative antegrade ejaculation, n (%)	23 (61)

RPLND indicates retroperitoneal lymph node dissection; and PS, pathological stage.

missed the follow-up, and were excluded from the study. The mean age of the patients was 32.8 years (range, 19 to 51 years) at the end of the follow-up period. Only one patient had a known risk factor for testicular tumor (undescending testis in the same side of the tumor). Table demonstrates clinicopathological characteristics of 38 patients with PS I.

Two laparoscopic surgeries needed conversion to open approach due to great vessels injury in one subject and severe peri-operative bleeding in another. Overall peri and postoperative complication rate was 18% (7 patients). Complications included great vessels injury, peri-operative bleeding, incision site infection, and retroperitoneal hematoma that all were managed conservatively. Blood transfusion was needed in 3 patients due to postoperative hemoglobin drop.

Mean follow-up duration was 56 months (range, 6 to 120 months). Tumor recurrence was identified in no subjects at the end of the follow-up period. All the patients had normal serum tumor markers (LDH, AFP, and  $\beta$ -hCG) and post RPLND abdominal CT and CXR at the end of the follow-up period. Out of 38 patients, 23 (61%) had post RPLND antegrade ejaculation at the end of the study.

## DISCUSSION

Approximately, one-third of patients with NSGCT present with CS I, and optimal treatment for these patients is controversial. Various treatment modalities have been described, including surveillance, chemotherapy, and RPLND,<sup>(7-10)</sup> with the cancer-specific survival rate of 99%.<sup>(11)</sup>

Retroperitoneal lymph node dissection results in excellent oncological outcomes in CS I; however, patients may suffer from surgical complications and loss of antegrade ejaculation.<sup>(12)</sup> Due to nearly similar cancer-specific survival with RPLND and surveillance, it seems that surveillance should be performed in low-risk patients. Long-term follow-up in patients who undergo surveillance strategy requires more patients' compliance, greater expenses, and more X-ray exposure.<sup>(6)</sup> Surgical management of retroperitoneal lymph nodes has some benefits. This procedure provides important staging information and also therapeutic advantages.<sup>(5)</sup>

In the present study, incidence of retroperitoneal micrometastasis in patients with CS I NSGCT was 25.5% (14 patients) that was consistent with other studies.<sup>(13)</sup> This relatively high

micrometastasis rate justifies using RPLND in the management of CS I NSGCT. In order to reduce potential complications of RPLND, a modified template has been used with comparable oncological outcomes and acceptable complications. In this study, we performed modified template RPLND resecting all retroperitoneal lymph nodes noted in bilateral infrahilar regions except below the inferior mesenteric artery of contralateral side.

In the management of CS I NSGCT with modified RPLND, urologists face with two questions. One, does this technique have similar oncological efficacy to complete bilateral template? Second, may modified template RPLND reduce possible surgical complications and improve antegrade ejaculation?

Several investigators have reported various recurrence rates of 6% to 15% after modified RPLND template in patients with CS I NSGCT.<sup>(7,14)</sup> Katz and Eggener believe that higher cancer recurrence rate and more additional therapy are potential modified template RPLND pitfalls.<sup>(2)</sup>

In a cohort study, five different modified RPLND templates were evaluated in 500 patients with CS I and II NSGCT (364 and 136 patients, respectively), including testicular tumor study group template (TTSG), Indiana template, memorial Sloan-Kettering cancer center template (MSKCC), Innsbruck template, and Johns Hopkins University template (JHU).<sup>(5)</sup> 0% (MSKCC and Indiana) to 5% (JHU and Innsbruck) extra template relapse rates were reported in CS I. Post RPLND lymph node positive rates of 58% and 42% were reported in CS I and II, respectively. It was concluded that retroperitoneal metastasis should be noted outside the limits of modified template, and this metastasis may contain chemoresistant teratoma. This study reported different extra template retroperitoneal relapse rates between MSKCC and JHU modified RPLND techniques (3% versus 23%, respectively). Furthermore, extra template retroperitoneal relapse was nearly similar to modified RPLND in terms of pathology report. An acceptable follow-up was performed with sufficient period for such patients (mean of 54 months). This study demonstrated that absence of positive lymph nodes in MSKCC and JHU modified RPLND can predict extra template retroperitoneal relapse rates of 0% and 5%, respectively. The authors concluded that maximum oncological outcomes (less

relapse rate) of modified RPLND may be achieved by more regional lymph node dissection. Despite no extra template recurrence in patients with negative malignant intra template lymph nodes in Eggener and associates' study,<sup>(5)</sup> it seems that they mistakenly recommended no more usage of modified RPLND in such cases.

In another study, Richie performed modified RPLND for the management of 85 patients with CS I NSGCT. According to his study, no intra template recurrence was noted and only one extra template retroperitoneal recurrence was detected.<sup>(14)</sup> These results confirm the efficacy of modified RPLND for CS I NSGCT. However, mean follow-up of 3 years does not seem enough for cancer control.

Pizzocaro and colleagues performed modified RPLND for 61 patients with CS I NSGCT and noted relapse rate of 15% and post RPLND antegrade ejaculation rate of 85% at the end of the 5-year follow-up period. Although disease recurred in 14.5% of patients with PS I, no patient had intra or extra template retroperitoneal recurrence (all recurrences occurred in the liver or lung).<sup>(15)</sup> The unilateral retroperitoneal template in this study was limited and smaller than our Sloan-Kettering template.

In our study, no subjects needed re-operation due to severe complications, and no mortality occurred as a result of operation. We suggest that PS I after modified template RPLND is a favorable factor that may prevent expensive and long-term possible harmful follow-up. One of the limitations of this study is the small sample size (41 patients), which decreases the power of study. Therefore, further studies with greater sample size are recommended.

## CONCLUSION

Modified RPLND template is a safe and effective modality in the management of CS I NSGCT, and may be considered as a sufficient treatment for patients with no retroperitoneal micrometastasis after modified RPLND template. Furthermore, this strategy may obviate the need for close, expensive, and potentially harmful follow-up protocol in patients with PS I NSGCT.

## CONFLICT OF INTEREST

None declared.

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