Minimally Invasive Retroperitoneal Lymphadenectomy: Current Status

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KEYWORDS

• Laparoscopy • Testicular cancer • Retroperitoneal • Lymph node • Dissection • RPLND

KEY POINTS

- In patients with nonseminomatous germ cell tumor (NSGCT), clinical stage I retroperitoneal lymphadenectomy (RLA) is considered the only method that can immediately and reliably identify lymph nodes suspected of metastatic involvement.
- In well-defined residual masses smaller than 5 cm, strictly unilateral before chemotherapy, a modified unilateral template does not interfere with oncologic outcome.
- Recommendation for minimally invasive RLA and postchemotherapy RLA (PC) can only be given to tertiary centers with experience in laparoscopy and managing testicular cancer. No recommendation can be given for laparoscopic bilateral PC-RLA because of the lack of available data.

INTRODUCTION

Testicular cancer typically occurs in men between 15 and 35 years of age. The incidence is low, with 3 to 10 new cases per 100,000 men per year in the Western world. In total, testicular cancer represents 5% of urologic tumors[1] and only 2% of all human malignancies.[2] On the other hand, the incidence of germ cell tumors (GCTs) has been rising over the last 30 years in industrialized countries.[3] GCTs are divided in 2 major groups, seminomatous germ cell tumors (SGCTs) and nonseminomatous germ cell tumors (NSGCTs), consisting of teratoma, embryonal carcinoma, yolk sac tumor, and choriocarcinoma.[4]

Testicular cancer is eminently treatable with radiotherapy and chemotherapy, with excellent cure rates even in advanced cases provided that correct staging, early adequate treatment, and strict follow-up is carried out. If indicated, RCA in clinical stage I (CS I) or postchemotherapy (PC) is done as an open procedure at most centers. Nowadays, with the increased routine use of laparoscopy, the minimally invasive approach is gaining more interest. The first laparoscopic RLA was described for clinical stage I cancer in 1995 by Janetschek and colleagues,[5] who reported a case of laparoscopic PC-RLA in a patient with a left-sided stage IIb tumor. The operation was successful without major complications.

INDICATIONS FOR RETROPERITONEAL LYMPHADENECTOMY

Clinical Stage I Nonseminomatous Germ Cell Tumor

CS I NSGCT is defined as tumor involvement that is limited to the testis, normal serum tumor markers after inguinal orchiectomy, and no retroperitoneal lymph node metastasis.[6] However, up to 30% of these patients have occult metastases and will relapse if only surveillance is chosen after orchiectomy.[7] In large studies with high patient numbers, 80% of relapses occur during the first year of follow-up.[8,9]

Conflict of Interest: The authors have nothing to declare.

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Urol Clin N Am 42 (2015) 321–329
http://dx.doi.org/10.1016/j.ucl.2015.04.006
0094-0143/15/$ – see front matter

Several studies have shown that vascular invasion of the tumor is a reproducible risk factor for relapse in CS I.[10,11] For this reason, the European Association of Urology (EAU) and the European Germ Cell Cancer Consensus Group (EGCCCG) recommend risk-adapted treatment in their guidelines. For patients with vascular invasion, PEB (cisplatin/etoposide/bleomycin) chemotherapy is the treatment of choice, and for those without vascular invasion surveillance should be chosen.[4,12]

RLA in CS I patients is preserved for those who are not suitable for chemotherapy or surveillance in the risk-adapted treatment according to EAU guidelines.[4] Also, the EGCCCG suggest RLA only for patients who do not agree to or qualify for the aforementioned options.[13] These recommendations are in contrast to those in the United States. The National Cancer Institute suggests postorchiectomy surveillance as the standard treatment option for CS I with no vascular invasion. On the other hand, RLA is considered the only method that can immediately and reliably identify lymph nodes suspected of metastatic involvement without the potential for false-positive results. If no retroperitoneal metastases are found, only 10% of these patients will relapse, and therefore no further treatment is needed.

In the guidelines of the National Comprehensive Cancer Network (NCCN), RLA-CS I has to be done within 4 weeks after imaging, with normal tumor markers not older than 7 days. This strict regime is chosen to ensure correct clinical staging.[2] RLA in NSGCT CS I has proved to be the most sensitive and specific method for testicular cancer staging in helping to choose the best treatment option for the patient. In 30% of patients testicular metastases are found, which leads to an upgrading to stage II disease.[14]

Clinical Stage IIa Nonseminomatous Germ Cell Tumor Without Elevated Tumor Marker: S0

In all advanced stages of NSGCT, initial cisplatin-based chemotherapy is the standard of care; this is one of the few treatment recommendations to reach general consensus in all guidelines.[2,4,15] Only in patients with very small lymph nodes (<2 cm) and negative tumor markers does the EAU suggest surveillance for 6 weeks, at which point a computed tomography (CT) scan should be repeated to clarify whether the lesion is stable, shrinking, or growing.[4] A shrinking lesion is due to a nonmalignant origin, so no further treatment is needed. A stable or progressive lymph node without marker evaluation indicates teratoma or tumor. In this case, nonseminomatous RLA should be performed.[15] On the other hand, in patients with simultaneous increase of tumor markers surgery is obsolete. These patients require PEB chemotherapy according to the International Germ Cell Cancer Cooperative Group (IGCCCG) treatment algorithm.[16]

INDICATIONS FOR POSTCHEMOTHERAPY RETROPERITONEAL LYMPHADENECTOMY

Postchemotherapy Retroperitoneal Lymphadenectomy in Advanced Seminomas

A residual tumor after cisplatin-based chemotherapy in advanced stages of seminoma should not be primarily resected, irrespective of the size. A residual tumor smaller than 3 cm almost never contains viable cancer. Therefore, PC-RLA is not indicated in these cases.[17] After cisplatin-based chemotherapy in advanced seminoma, viable cancer was observed histologically only in 12% to 30% of patients after PC-RLA, even though the residual tumor was larger than 3 cm.[18–20] Hence PC-RLA is an overtreatment in about 80% of patients, harming them with needless morbidity.

To solve this problem, ^{18}F-labeled fluorodeoxyglucose PET (FDG-PET) scanning was included in the EAU guidelines in 2005, based on the SEMPET trial.[21,22] FDG-PET was affiliated into the EAU guidelines for patients with residual tumors larger than 3 cm to clarify viability. However, the scan must not be performed before 6 weeks after the last course of chemotherapy to reduce false-positive rates.[21,22] After this period, false positives are rare on FDG-PET. In patients with a positive FDG-PET scan, PC-RLA is indicated.

FDG-PET is an option in patients with residual tumors smaller than 3 cm according to EAU guidelines.[4] No further treatment besides observation is necessary in patients with a negative FDG-PET scan.[23]

Postchemotherapy Retroperitoneal Lymphadenectomy in Advanced Nonseminomatous Germ Cell Tumor

Overall, only 10% of residual masses contain viable cancer following PEB induction chemotherapy in NSGCT; 50% contain mature teratoma, and 40% contain necrotic-fibrotic tissue.[18,24,25] Even today no imaging investigation, including PET, or prognosis model can predict histologic differentiation of NSGCT residual tumor. Therefore in the case of any visible residual mass and marker normalization, surgical resection is indicated in accordance with EAU guidelines.[4,18]

However, there is still an increased risk of viable cancer or teratoma in patients with residual tumor smaller than 1 cm.[26] Mature teratoma was found in up to 22% and viable cancer in 9.4%.[27] In cases