

Extent of Lymphadenectomy at Time of Prostatectomy An Evidence-Based Approach

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KEYWORDS

- Lymphadenectomy • Extended pelvic lymphadenectomy • Prostate cancer
- Radical prostatectomy

KEY POINTS

- Extended pelvic lymph node dissection (PLND) with radical prostatectomy is the most accurate method of prostate cancer staging and includes removing the of external iliac, obturator, and internal iliac lymph nodes.
- Limited or standard PLND templates provide low-yield and inadequate staging.
- Superextended templates include presacral nodes and common iliac nodes to the ureteric crossing, and may detect additional positive lymph nodes; however, these are not routinely performed.
- There is indirect evidence, through retrospective studies, of an oncologic benefit to extended PLND.
- Sentinel lymph node dissection has not been shown to reliably identify at-risk nodes in the surgical management of prostate cancer, and full extended PLND is still required.

INTRODUCTION

Pelvic lymph node dissection (PLND) is a critical staging procedure for men with higher risk prostate cancer, who have nonnegligible risk of lymph node metastasis. Radiographic imaging examinations, including cross-sectional imaging (computed tomography [CT]/MRI) and novel forms of PET/CT (eg, 11C-choline PET), have shown inadequate sensitivity to supplant surgical staging.^{1,2} At many centers, PLND has historically been performed with limited templates based on lack of appreciation for anatomic drainage patterns and

distribution of nodal disease. Varied anatomic, pathologic and clinical studies have shown that an extended template, including the obturator, external iliac, and internal iliac lymph nodes, is needed for adequate staging. Several studies have shown that removal of presacral and common iliac nodes to the ureteric crossing may find additional positive lymph nodes; however, the clinical impact of these super-extended dissections is unclear. Improved staging is useful for prognostication, but may also valuably inform treatment decisions, given the strong evidence for adjuvant

Disclosures: Neither author has any commercial or financial conflict of interest, or any funding source for this article.

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Urol Clin N Am 44 (2017) 587–595

<http://dx.doi.org/10.1016/j.ucl.2017.07.007>

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therapy in the setting of pN + disease.^{3,4} Unfortunately, however, there is no level 1 evidence for an oncologic benefit of extended PLND (ePLND). Despite limited evidence of therapeutic effect, ePLND to at least the level of internal iliac nodes has become the standard of care for patients at higher risk for lymph node disease.⁵⁻⁷

In this article, we review evidence to support an extended template PLND for accurate staging and possible therapeutic benefit in men undergoing radical prostatectomy, and discuss criteria for selecting patients for ePLND.

ANATOMIC LANDMARKS AND NODAL DRAINAGE

Mapping studies have shown that lymphatic drainage from the prostate is variable and complex. Work by Gil-Vernet⁸ showed that prostate lymphatics drain into a periprostatic subcapsular network, leading to 3 groups of ducts—ascending ducts from the cranial gland, leading to the external iliac nodes; lateral ducts leading to the hypogastric nodes; and posterior ducts from the caudal prostate leading to the lateral and subaortic sacral nodes. In vivo drainage patterns in patients undergoing PLND with scintigraphic injections have also been reported. Mattei and colleagues⁹ mapped lymphatic spread in 34 patients with organ-confined prostate cancer (who were pN0) through intraprostatic injections of Tc-99m nanocolloid followed by single-photon emission CT fused with CT/MRI, intraoperative gamma probing, and ePLND. These authors found that patients had significant uptake in internal iliac nodes (25%), common iliac nodes (16%), and presacral and pararectal nodes (8%). Sixty-three percent of at-risk nodes were captured with dissection of nodal tissue medial and lateral to internal iliac vessels, versus 38% with the standard template (external iliac and obturator nodes). Seventy-five percent of at-risk nodes were captured with dissection to the ureteric crossing on the common iliac, demonstrating that even higher dissections can theoretically miss nodal metastasis in one-quarter of patients.⁹ In a similar study of patients undergoing radical prostatectomy and PLND, Inoue and colleagues¹⁰ injected the prostate with indocyanine green and used fluorescence navigation intraoperatively to map lymphatic drainage, and found that the dominant route of spread was to the internal iliac nodes.

These studies, among others, show that prostate lymphatic drainage extends beyond standard nodal templates (external iliac and obturator nodes) to the level of internal iliac nodes and common iliac nodes.¹¹⁻¹³ Although

these mapping studies are useful for understanding drainage patterns, it is important to realize that in the setting of prostate cancer these maps may not be reliable, owing to the lack of congruence between lymphatic drainage and actual cancer dissemination, as well as the fact that lymphatic metastasis itself may alter drainage patterns.^{13,14}

RATIONALE FOR EXTENDED PELVIC LYMPHADENECTOMY: IMPROVED STAGING

Studies of the location of positive nodes during PLND provide additional information on the appropriate extent of dissection. Accurate staging is important for varied reasons, including improved prognostication, patient counseling, and enabling prompt adjuvant therapy. Prompt adjuvant therapy is particularly important, given high-level evidence supporting adjuvant therapy for pN + disease.^{3,4,15} Accurate staging of pelvic nodes may also influence the details of adjuvant or salvage therapy, for example, the use of concomitant androgen deprivation therapy or higher radiation fields.

It is important to clarify that studies of staging PLND for prostate cancer vary in some important details. One challenge of a cursory read of these studies is that definitions vary; for instance, standard and extended templates do not necessarily have the same anatomic boundaries. In general, ePLND pertains to removal of external iliac, obturator, and internal iliac nodes, although in some studies higher dissection is included. Also, definitions of standard versus limited dissection vary in terms of obturator, external iliac, or both sets of nodes being removed, and the precise landmarks that are used for dissection. It is also important to understand that the populations being evaluated may vary in their underlying risk of lymph node metastasis; indeed, some studies are enriched with low-risk patients for whom any PLND is low yield, and findings may not be representative of what is found in higher risk patients.

Overall, studies of PLND have shown that inclusion of internal iliac nodes in an extended template is necessary for adequate staging. Indeed, Heidenreich and colleagues¹⁶ reported that 25% of positive nodes were found exclusively in the internal iliac packet, and Godoy and colleagues¹⁷ found exclusive metastasis in the hypogastric packet in 31%. For comparison, exclusive nodes were found in the external iliac packet in 11% and obturator packets in 26%.¹⁷ Studies comparing dissections including the internal iliac packet to more limited dissections have shown higher lymph node yields and increased detection of lymph node metastasis with the former.^{18,19}

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