Pathological Nodal Staging Scores for Bladder Cancer: A Decision Tool for Adjuvant Therapy After Radical Cystectomy

Introduction and Objectives: Radical cystectomy (RC) with pelvic lymph node dissection (LND) is the standard of care for high risk non-muscle-invasive and muscle-invasive bladder cancer. We sought to develop a model that allows quantification of the likelihood that a pathologically node-negative patient has, indeed, no positive nodes.
Materials and Methods: We collected data from 4,335 patients treated with RC and LND without neo-adjuvant chemotherapy at 12 academic centers. We estimated the sensitivity of pathologic nodal staging using a beta-binomial model and developed pathologic (post-operative) nodal staging scores (pNSS) which represent the probability that a patient is correctly staged as node-negative as a function of the number of examined nodes.
Results: Overall, the probability of missing a positive node decreases with increasing number of nodes examined (52% if three, 40% if five and 26% if ten nodes were examined). The proportion of having a positive node increased proportionally with advancing pathological T-stage and lymphovascular invasion (LVI). Postoperatively, patients with LVI with 25 examined nodes would have a pNSS of 80% (pT1), 88% (pT2) and 66% (pT3-T4), whereas 10 examined nodes were sufficient for pNSS exceeding 90% in patients with no LVI and pT0-T2 tumors (Table 1).
Conclusions: We developed a tool that estimates the likelihood of tumor metastases to lymph nodes in bladder cancer patients treated with RC by evaluating the number of examined nodes, the pathologic T-stage and LVI. The pNSS indicates the adequacy of nodal staging in lymph node negative patients. This tool could help to refine clinical decision-making regarding adjuvant chemotherapy, follow-up scheduling, and inclusion in clinical trials.

Table 1: Pathological nodal staging score (pNSS) for selected values of number of nodes examined

Patients without LVI								
Nb. of nodes examined	**1**	**3**	**5**	**8**	**10**	**15**	**20**	**25**
Ta-Tis	91.2%	93.8%	95.1%	96.3%	96.8%	97.6%	98.1%	98.4%
T1	87.4%	91.0%	92.9%	94.6%	95.3%	96.5%	97.2%	97.6%
T2	86.9%	88.7%	89.1%	93.2%	94.1%	95.5%	96.4%	97.0%
T3-T4	61.6%	70.0%	75.2%	80.2%	82.5%	86.4%	88.8%	90.4%
Patients with LVI								
Nb. of nodes examined	**2**	**5**	**8**	**10**	**15**	**20**	**25**	**30**
T1	46.4%	54.2%	61.1%	77.5%	83.6%	77.7%	80.1%	82.4%
T2	60.6%	70.3%	76.0%	78.7%	83.2%	86.1%	87.7%	89.3%
T3-T4	27.7%	38.3%	44.4%	49.2%	56.5%	61.8%	65.9%	69.2%