Inverse Correlation between Age and Risk of Lymph Node Metastasis in Bladder Cancer

Wenchao Ma  
Shanghai Tenth People's Hospital

Tiantian Wang  
Shanghai University of Traditional Chinese Medicine

Yadong Guo  
Shanghai Tenth People's Hospital

Ruiliang Wang  
Shanghai Tenth People's Hospital

Ji Liu  
Shanghai Tenth People's Hospital

Cheng Li  
Shanghai Tenth People's Hospital

Niraj Maskey  
Shanghai Tenth People's Hospital

Wentao Zhang  
Shanghai Tenth People's Hospital

Xudong Yao  
Shanghai Tenth People's Hospital  
https://orcid.org/0000-0001-7234-3940

Research

Keywords: Bladder cancer, lymph node metastasis, age

DOI: https://doi.org/10.21203/rs.3.rs-46937/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.  
Read Full License
Abstract

Background

Bladder cancer (BCa) is the most common malignant tumor in humans and brings about a huge burden on the international community and on the families of those it affects. Lymph node metastasis (LNM) is an important factor affecting the prognosis of BCa. This study aimed to investigate the risk factors affecting LNM.

Patients and Methods

This study involved 5517 patients who underwent BCa-related surgery between 2006 and 2015. The multivariate logistic regression analysis was used to evaluate the association between age and LNM. The overall survival (OS) and cancer-specific survival (CSS) were analyzed using the Kaplan–Meier method. The multivariable Cox regression model was used to evaluate independent risk factors affecting OS and CSS.

Results

We retrieved 5517 cases from SEER database, including 148 patients aged 40-49 years, 726 aged 50-59 years, 1541 aged 60-69 years, 1538 aged 70-79 years and 1564 aged 80+ years. The rates of LNM were 20.27%, 16.94%, 11.94%, 9.95% and 6.46% for patients aged 40-49, 50-59, 60-69, 70-79 and 80+ years. We found an inverse correlation between age at diagnosis and risk of LNM from the logistic regression analysis in three modules(Module 1: P-value for trend, crude, no adjustment < 0.001; Module 2: P-value for trend adjusted for sex, race, insurance status, and marital status < 0.001; Module 3: P-value for trend adjusted for sex, race, insurance, marital status, size, grade, and metastasis < 0.001). Compared with patients aged 40–49 years, patients aged 50–59 years (OR = 0.752; 95% CI, 0.470–1.204; P = 0.236), 60–69 years (OR = 0.517; 95% CI, 0.329–0.815; P = 0.004), 70–79 years (OR = 0.375; 95% CI, 0.237–0.595; P < 0.001), and 80+ years (OR = 0.248; 95% CI, 0.154–0.398; P < 0.001) had a lower risk of LNM.

Conclusions

Younger age at diagnosis was associated with a higher risk of LNM in patients with BCa. Excepting this, grade and metastasis were also risk factors for LNM.

Introduction

Bladder cancer (BCa) is one of the most common cancers in the world. It ranks ninth among all cancers (1). The American Cancer Society predicts that there will be about 81,400 new cases of BCa and approximately 17,980 deaths from BCa in the United States in 2020 (2). Some studies showed that the incidence of BCa increased from 1997 to 2016 (3, 4), posing a huge burden on society.
Many factors, including age, tumor grade, stage, and lymph node metastasis (LNM), affected the prognosis of BCa (5, 6). This study found that tumor size, insurance status, and marital status were also important factors affecting the prognosis of BCa. Meanwhile, lymph node metastasis (LNM) is an important factor affecting the prognosis of BCa (7). To our knowledge, however, factors affecting LNM have not been studied. Thus, this study aimed to investigate the factors affecting LNM in patients with BCa. T2 stage BCa is a muscular invasive bladder cancer (MIBC). The tumor usually invades the muscular layer of the bladder. For MIBC, surgery is still the first choice in most countries (8). Bilateral pelvic lymphadenectomy is the standard approach for radical cystectomy (RC) (9), and extended lymph node dissection is effective for patients with BCa having LNM or micrometastasis (10, 11). The increased risk of recurrence and disease-specific death of BCa is related to regional LNM, and lymphadenectomy is beneficial to accurate staging (12). However, a sufficiently accurate method of evaluating preoperative lymph node invasion has not yet been developed.

This study was performed to investigate the risk factors affecting LNM so as to better evaluate the status of preoperative LNM. Based on LNM status and other disease information, more individualized treatment strategies can be developed for patients.

**Materials And Methods**

**Patients**

This study included patients with BCa from the Surveillance, Epidemiology, and End Results (SEER) database between 2004 and 2015. The US SEER database, a population-based cancer registration system, provides different datasets on cancer incidence and survival by covering 34.6% of US populations. The inclusion criteria were as follows: (1) patients diagnosed with BCa; (2) BCa as the first diagnosed primary tumor; (3) all patients aged more than 39 years at diagnosis; (4) data related to LNM available; (5) patients who received no preoperative radiotherapy; (6) all patients who underwent BCa-related surgery; and (7) all patients stage T2. After filtering, 5517 patients were ultimately included in the study. In this retrospective study, a signed SEER research data agreement form was provided to the SEER program, and approval was obtained to access and analyze the SEER data. Informed consent was not required to analyze the SEER data.

**Statistical analysis**

For descriptive statistics, classified variables were represented as absolute numbers and percentages. Continuous variables that conformed to normal distribution were represented as mean and standard deviation, whereas continuous variables that did not conform to normal distribution were represented as the median of the quartile interval.

The TNM staging of all patients was performed according to the Seventh American Joint Committee on Cancer. Age was classified as a categorical variable using 10-year ranges starting from 40 years, except for the age more than 80 years. The univariate and multivariate logistic regression analyses were used to
analyze the relationship between age and lymph node metastasis. Model 1 was a univariate logistic regression analysis model. Model 2 was a multivariate logistic regression model with demographic variables such as age, sex, race, insurance status, and marital status. Model 3 was a multivariate logistic regression model including age, race, sex, tumor size, grade, depth of invasion, insurance status, and marital status.

The correlations with overall survival (OS) and cancer-specific survival (CSS) were assessed using Kaplan–Meier curves with log-rank statistics. The Multivariate Cox regression model was used to evaluate the risk factors for OS and CSS in patients with BCa. A \( P \)-value less than 0.05 was considered to be statistically significant. IBM SPSS Statistics 22.0 software was used for statistical analysis.

**Results**

**Demographic characteristics of patients**

After screening, 5517 patients with BCa (1507 female and 4010 male) were included in this study, of which 591 cases (10.71%) were lymph node positive. Table 1 shows the clinical and pathological features of patients with BCa classified by age at the time of diagnosis. The average age of patients was 71.60 (40–103) years, and the average follow-up time was 26.75 months. The youngest age group, ranging from 40–49 years, comprised 148 patients (2.68%), followed by 726 (13.16%) patients in the age group ranging from 50–59 years, 1541 (27.93%) patients in the age group ranging from 60–69 years, 1538 (27.88%) patients in the age group ranging from 70–79 years, and 1564 (28.35%) patients in the age group of 80 + years.
Table 1
Baseline characters of T2 bladder cancers by age at diagnosis

| Characteristics | 40–49 | 50–59 | 60–69 | 70–79 | 80+   |
|-----------------|-------|-------|-------|-------|-------|
| Total           | 148(2.68%) | 726(13.16%) | 1541(27.93%) | 1538(27.88%) | 1564(28.35%) |
| Sex             |       |       |       |       |       |
| Male            | 111(75%) | 570(78.51%) | 1185(76.90%) | 1136(73.86%) | 1008(64.45%) |
| Female          | 37(0.25%) | 156(21.49%) | 356(23.10%) | 402(26.14%) | 556(35.55%) |
| Race            |       |       |       |       |       |
| White           | 126(85.14%) | 626(86.23%) | 1354(87.87%) | 1357(88.23%) | 1416(90.54%) |
| Black           | 15(10.14%) | 66(9.09%) | 121(7.85%) | 90(5.85%) | 79(5.05%) |
| Other           | 7(4.72%) | 34(4.68%) | 66(4.28%) | 91(5.92%) | 69(4.41%) |
| Grade           |       |       |       |       |       |
| Low             | 17(11.49%) | 40(5.51%) | 88(5.71%) | 68(4.42%) | 75(4.80%) |
| High            | 131(88.51%) | 686(94.49%) | 1453(94.29%) | 1470(95.58%) | 1489(95.20%) |
| LNM             |       |       |       |       |       |
| N0              | 118(79.73%) | 603(83.06%) | 1357(88.06%) | 1385(90.05%) | 1463(93.54%) |
| N1-3            | 30(20.27%) | 123(16.94%) | 184(11.94%) | 153(9.95%) | 101(6.46%) |
| Metastasis      |       |       |       |       |       |
| Non-metastasis  | 134(90.54%) | 658(90.63%) | 1425(92.47%) | 1375(89.40%) | 1454(92.97%) |
| Metastasis      | 14(9.46%) | 68(9.37%) | 116(7.53%) | 163(10.60%) | 110(7.03%) |
| Size            |       |       |       |       |       |
| Size<3          | 35(23.65%) | 196(27.00%) | 415(26.93%) | 408(26.53%) | 310(19.82%) |
| Size $\geq$3    | 113(76.35%) | 530(73.00%) | 1126(73.07%) | 1130(73.47%) | 1254(80.18%) |
| Insurance       |       |       |       |       |       |
| Insured         | 132(89.19%) | 664(91.46%) | 1474(95.65%) | 1505(97.85%) | 1549(99.04%) |
| Uninsured       | 12(8.11%) | 48(6.61%) | 45(2.92%) | 9(0.59%) | 2(0.13%) |
| Unknown         | 4(2.70%) | 14(1.93%) | 22(1.43%) | 24(1.56%) | 13(0.83%) |
| Marital status  |       |       |       |       |       |
| Abbreviation:   |       |       |       |       |       |
| LNM, lymph node metastasis.
Correlation between the LNM rate and the increase in age in BCa

The LNM rate in different age groups was compared to evaluate the relationship between age and LNM. As shown in Fig. 1, the LNM rate was the highest in patients aged 40–49 years. However, the LNM rate in patients aged 80+ years decreased to 6.46%.

A negative correlation was observed between the lower LNM rate and increasing age in patients with BCa (Supplementary Table 1: Module 1: P-value for trend, crude, no adjustment < 0.001). In Model 2 (P-value for trend adjusting for sex, race, insurance status, and marital status < 0.001) and Model 3 (P-value for trend adjusting for sex, race, insurance, marital status, size, grade, and metastasis < 0.001), the LNM rate still negatively correlated with the increasing age. The score test for trend shown in the Fig. 2 shows that a higher age at diagnosis was significantly associated with decreased odds of LNM (p < 0.001).

In other subgroup analyses, the patients aged 40–49 years had the highest LNM rate and the patients aged 80+ years had the lowest LNM rate in nearly all subgroups except female patients with BCa (Fig. 1). In addition, the LNM rate in patients with metastasis was half of the original value.

The multivariate logistic regression analysis also demonstrated a significant association between age and LNM. The covariates in the adjusted model included sex, race, size, grade, LNM, metastasis, insurance status, and marital status. As shown in Fig. 3, compared with patients aged 40–49 years, patients aged 50–59 years (OR = 0.752; 95% CI, 0.470–1.204; P = 0.236), 60–69 years (OR = 0.517; 95% CI, 0.329–0.815; P = 0.004), 70–79 years (OR = 0.375; 95% CI, 0.237–0.595; P < 0.001), and 80+ years (OR = 0.248; 95% CI, 0.154–0.398; P < 0.001) had a lower risk of LNM. Except this, high grade (OR = 3.689; 95% CI, 1.925–7.909; P < 0.001) and metastasis (OR = 6.339; 95% CI, 5.081–6.760; P < 0.001) were also important factors affecting LNM.

Survival of BCa according to age at diagnosis

As shown in Figure 4A, the 5-year OS for patients aged 40–49, 50–59, 60–69, 70–79, and 80+ years was 59.2%, 55.8%, 53.3%, 41.5%, and 17.3%, respectively. Similarly, as shown in Figure 4B, the 5-year CSS for patients aged 40–49, 50–59, 60–69, 70-89, and 80+ years was 63.0%, 61.6%, 61.1%, 53.5%, and 32.0%, respectively. Aging affected the prognosis of patients with BCa; the prognosis of elderly patients was worse than that of younger patients. The multivariate Cox regression analysis showed that age, LNM,
metastasis, tumor size, insurance, and marital status were the risk factors for OS and CSS in patients with BCa (Supplementary Table 2).

**Discussion**

With aging, the incidence and prevalence of BCa gradually increase, especially after the age of 60 years, when it reaches its peak (13, 14). Approximately 25% of patients had muscle-invasive or metastatic BCa, while the remaining patients had nonmuscle-invasive BCa (15). However, the prognosis of patients with MIBC was worse than that of patients with NMIBC (16). Not only the depth of tumor invasion but also sex, age, LNM, and other factors affect the prognosis of BCa (17). Over the years, studies showed that patients with BCa having LNM had a worse prognosis compared with patients with negative lymph nodes (18, 19). Also, radical cystectomy combined with extended lymph node dissection could significantly improve the survival rate of patients with BCa (20, 21). To our knowledge, however, no study has explored the factors influencing LNM in patients with T2 BCa. The purpose of this study was to explore the factors affecting LNM so as to individualize the plan of lymph node dissection.

Two previous studies showed that the LNM rate of T2 BCa was 10.5% and 18.3%, respectively (22, 23). However, neither of these studies examined the relationship between LNM and age. The present study, involving 5517 patients with T2 BCa, was novel in investigating the relationship between age and LNM risk. In this study, the LNM rate of T2 BCa was 10.71% and had a correlation with age. The LNM rate was the highest in young patients (20.27%) and the lowest in patients aged 80+ years (6.46%). The results of binary logistic regression models adjusted for different risk factors showed that the correlation between age at diagnosis and LNM was negative. These results suggested that the age at diagnosis should be considered when evaluating the risk of LNM in patients with T2 BCa before radical cystectomy to determine whether the patient needs expanded lymph node dissection. Previous studies have shown that patients with BCa undergoing enlarged lymph node dissection at all ages have a better prognosis (10, 24, 25). Also, a negative correlation exists between age and LNM in other cancers, such as colorectal cancer (26, 27), breast cancer (28), and early gastric cancer (29). Compared with preoperative lymph node evaluation, postoperative lymph node examination is more accurate (30). Hence, it is meaningful to look for risk factors influencing LNM.

In this study, patients with BCa in the age group of 40–49 years classified by other characteristics, including male sex, white ethnicity, tumor size, high grade, metastasis, insurance, and separated, had the highest LNM rates. Previous studies have shown that young patients with BCa have a better prognosis than their old counterparts (31, 32). This may be related to physiological changes. For example, aging can lead to changes in the immune system, which weakens the immune function in the elderly (33-35). In addition, some studies supported age-dependent changes in immunity, including degenerative changes in lymph nodes, lymphatic reduction to lymph nodes, and nodular involution (35-38). However, the association between age and LNM needs to be discussed in the future.
The binary logistic regression results showed that, excepting age, grade and metastasis were statistically significant risk factors ($P < 0.001$). These results suggest that grade and distant metastasis are also risk factors for LNM. Therefore, it was speculated that age combined with grade and metastasis might better predict LNM. Tumor grade and metastasis were important factors affecting tumor prognosis. The five-year survival rate of patients with a low tumor grade was higher than that of patients with a high tumor grade in BCa (39). The relationship between tumor grade and LNM needs further clarification.

This study had some limitations. First, it was a retrospective study and all the data were retrieved from the SEER database. Therefore, prospective verification of the findings is required. Second, the incidence of BCa is low in young people. Hence, patients younger than 39 years were excluded from our study. Nevertheless, the inclusion of such patients might have been informative. Third, the data on tumors are limited in the SEER database. The risk factors for LNM include lymphatic vessel involvement and tumor budding, but these were not included in this study. Fourth, nonmuscular invasive BCa does not metastasize easily. Only patients with T2 BCa were included in this study. In addition, genetic research could not be conducted. Hence, the potential genetic susceptibility to familial BCa remains largely unknown.

**Conclusions**

Younger age at diagnosis was associated with a higher risk of LNM in patients with BCa. Except this, grade and metastasis were also risk factors for LNM.

**Declarations**

**Acknowledgement**

We are grateful to doctors contributed to this paper.

**Disclosure**

There are no conflicts of interest.

**Authorship contribution**

(I) Conception and design: Wenchao Ma; Yadong Guo

(II) Administrative support: Xudong Yao

(III) Provision of study materials or patients: Niraj Maskey; Wentao Zhang

(IV) Collection and assembly of data: Ji Liu; Yuan Wu; Cheng Li

(V) Data analysis and interpretation: Yadong Guo; Ruiliang Wang; Wenchao Ma; Tiantian, Wang
(VI) Manuscript writing: All authors

(VII) Final approval of manuscript: All authors

Funding

None

Availability of data and materials

The raw data are from Surveillance, Epidemiology, and End Results (SEER) database.

Ethics approval and consent to participate

Since all information from the SEER database has been deidentified and no personal identifying information was used in our analysis, informed consent was not required in our study.

Consent for publication

All authors consent to publish.

Competing interests

The authors declare that they have no conflict of interest.

References

1. S A, J F, I S, A Z, A J, urology BFJE. Bladder Cancer Incidence and Mortality: A Global Overview and Recent Trends. 2017;71(1):96-108.

2. RL S, KD M, clinicians JAJCajf. Cancer statistics, 2020. 2020;70(1):7-30.

3. PU M, T G, A S, V S, A H-A, S J, et al. Incidence, survival and mortality trends of bladder cancer in Sweden 1997-2016. 2019;53(4):193-9.

4. GW D, JL G, MH F, M N, urology FCJE. Global Burden of Urologic Cancers, 1990-2013. 2017;71(3):437-46.

5. SD P, JL B, F M, P C, O V, X L, et al. Impact of age on bladder cancer management practices: a general population study. 2020:1-5.

6. Y Z, YK H, DW Z, XJ H, Medicine LMJ. Bladder cancer survival nomogram: Development and validation of a prediction tool, using the SEER and TCGA databases. 2019;98(44):e17725.

7. W K, PK A, HW H, MF M, PE S, GA B, et al. Lymph node density is superior to TNM nodal status in predicting disease-specific survival after radical cystectomy for bladder cancer: analysis of pooled data from MDACC and MSKCC. 2008;26(1):121-6.

8. CS V, J B, E vW, K H, AN V, T W, et al. Long-term survival and complications following bladder-preserving brachytherapy in patients with cT1-T2 bladder cancer. 2019;141:130-6.
9. TW F, PE S, NA R, B SA B, MK B, et al. NCCN Guidelines Insights: Bladder Cancer, Version 5.2018. 2018;16(9):1041-53.
10. SY C, D Y, B H, JH H, H A, oncology KCJS. Impact of lymph node dissection in radical cystectomy for bladder cancer: How many vs how far? 2019;30:109-16.
11. AK, PR C, JE G, R K, FM, CG S, et al. The impact of lymphadenectomy and lymph node metastasis on the outcomes of radical cystectomy for bladder cancer. 2009;55(4):826-35.
12. IG J, D Y, JW K, CS S, JH H, H A, et al. Outcomes of single lymph node positive urothelial carcinoma after radical cystectomy. 2011;185(6):2085-90.
13. Malats N, Real FX. Epidemiology of bladder cancer. Hematol Oncol Clin North Am. 2015;29(2):177-89, vii.
14. Cumberbatch MGK, Noon AP. Epidemiology, aetiology and screening of bladder cancer. Transl Androl Urol. 2019;8(1):5-11.
15. Kamat AM, Hahn NM, Efsthathiou JA, Lerner SP, Malmström P-U, Choi W, et al. Bladder cancer. The Lancet. 2016;388(10061):2796-810.
16. Liedberg F, Anderson H, Mansson A, Mansson W. Diagnostic delay and prognosis in invasive bladder cancer. Scand J Urol Nephrol. 2003;37(5):396-400.
17. Zhang Y, Hong YK, Zhuang DW, He XJ, Lin ME. Bladder cancer survival nomogram: Development and validation of a prediction tool, using the SEER and TCGA databases. Medicine (Baltimore). 2019;98(44):e17725.
18. <stein2001.pdf>.
19. Jensen JB, Ulhoi BP, Jensen KM. Evaluation of different lymph node (LN) variables as prognostic markers in patients undergoing radical cystectomy and extended LN dissection to the level of the inferior mesenteric artery. BJU Int. 2012;109(3):388-93.
20. Tarin TV, Power NE, Ehdaie B, Sfakianos JP, Silberstein JL, Savage CJ, et al. Lymph node-positive bladder cancer treated with radical cystectomy and lymphadenectomy: effect of the level of node positivity. Eur Urol. 2012;61(5):1025-30.
21. Karl A, Carroll PR, Gschwend JE, Knuchel R, Montorsi F, Stief CG, et al. The impact of lymphadenectomy and lymph node metastasis on the outcomes of radical cystectomy for bladder cancer. Eur Urol. 2009;55(4):826-35.
22. Stein JP, Lieskovsky G, Cote R, Groshen S, Feng AC, Boyd S, et al. Radical cystectomy in the treatment of invasive bladder cancer: long-term results in 1,054 patients. J Clin Oncol. 2001;19(3):666-75.
23. Hao H, Wu X, Zheng W, Yu W, Fan Y, He Q, et al. [Characteristics of lymph node metastasis in patients undergoing radical cystectomy for bladder cancer: a retrospective single-center study of 522 cases]. Beijing Da Xue Xue Bao Yi Xue Ban. 2014;46(4):524-7.
24. TJ H, EE FvdP, S H, BW vR, Association VRJlouojotJU. Extended pelvic lymph node dissection at radical cystectomy for bladder cancer improves survival: Results of a nationwide population-based study. 2016;23(12):1043-4.
25. Tilki D, Brausi M, Colombo R, Evans CP, Fradet Y, Fritsche HM, et al. Lymphadenectomy for bladder cancer at the time of radical cystectomy. Eur Urol. 2013;64(2):266-76.
26. X X, J Y, Z Z, C D, H Z, cancer ZYJB. Young age increases the risk for lymph node metastasis in patients with early Colon Cancer. 2019;19(1):803.
27. QW Z, LC S, CT T, Q L, YY Z, HM C, et al. Inverse Association of Age with Risk of Lymph Node Metastasis in Superficial Colorectal Cancer: A Large Population-Based Study. 2020.
28. J C, RJ G, J H, oncology PBJAos. Older age independently predicts a lower risk of sentinel lymph node metastasis in breast cancer. 2005;12(12):1061-5.
29. ZK W, JX L, P L, JW X, JB W, J L, et al. Higher Risk of Lymph Node Metastasis in Young Patients with Early Gastric Cancer. 2019;10(18):4389-96.
30. JB J, BP U, international JKJB. Lymph node mapping in patients with bladder cancer undergoing radical cystectomy and lymph node dissection to the level of the inferior mesenteric artery. 2010;106(2):199-205.
31. H F, W Z, J L, research LXJAjoc. Different patterns in the prognostic value of age for bladder cancer-specific survival depending on tumor stages. 2015;5(6):2090-7.
32. MS H, andrology CIJAjo. Significance of age and comorbidity as prognostic indicators for patients with bladder cancer. 2010;12(5):766-74.
33. C H, H S, AS D, S G, M T, anatomy PRJJo. Age-dependent histoarchitectural changes in human lymph nodes: an underestimated process with clinical relevance? 2010;216(5):556-62.
34. T F, G D, JM W, clinica LAJRdi, Nutricion odHdEdl. The Role of Immunosenescence in the Development of Age-Related Diseases. 2016;68(2):84-91.
35. Y J, J X, Z H, W L, S X, L H, et al. Immunomarker Support Vector Machine Classifier for Prediction of Gastric Cancer Survival and Adjuvant Chemotherapeutic Benefit. 2018;24(22):5574-84.
36. WR P, H S, research TGJL, biology. Senile changes in human lymph nodes. 2008;6(2):77-83.
37. Y J, T L, X L, Y H, L H, Z L, et al. Association of Adjuvant Chemotherapy With Survival in Patients With Stage II or III Gastric Cancer. 2017;152(7):e171087.
38. Y J, W W, C C, X Z, X Z, W L, et al. Radiomics Signature on Computed Tomography Imaging: Association With Lymph Node Metastasis in Patients With Gastric Cancer. 2019;9:340.
39. pathology HDJJAo, medicine l. The histological grading of neoplasms. 1988;112(11):1091-6.

Figures
Figure 1

Heatmap showing rate of lymph node metastasis (LNM) of T2 bladder cancers among patients aged 40–49, 50–59, 60–69, 70-79 and 80+ years stratified by different characteristics, respectively.
Figure 2

Association between odds of LNM and age at diagnosis in BCa patients. The p value for linear trend of the log odds of lymph node metastasis was tested using score test.
Figure 3

Forest plot showing results of multivariate logistic regression model for identifying potential risk factors for LNM in patients with bladder cancer.
Figure 4

Comparison of overall survival and cause-specific survival among patients with bladder cancer aged 40–49, 50–59, 60–69, 70-79 and 80+ years. Overall survival (A) and Cause-specific survival (B).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementarymaterial.docx