10. Riffenburgh R.H. Statistics in Medicine. 3rd. ed. *Elsevier*. 2012. 738 p

11. Seroprevalence and vaccination coverage of vaccine-preventable diseases in perinatally HIV-1-infected patients / L. Sticchi et al. *Hum Vaccin Immunother.* 2015. Vol. 11, No. 1. P. 263-269. DOI: https://doi.org/10.4161/hv.36162

12. Standard vaccines increase HIV-1 transcription during antiretroviral therapy / C. Yek et al. *AIDS*. 2016. Vol. 30, No. 15. P. 2289-2298. DOI: https://doi.org/10.1097/QAD.0000000000001201

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WHEN THE LIMITED PELVIC LYMPH NODE DISSECTION IN PROSTATE CANCER PATIENTS CAN BE JUSTIFIED?

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Ключевые слова: *рак предстательной железы, тазовая лимфаденэктомия*

Abstract. When the limited pelvic lymph node dissection in prostate cancer patients can be justified? Molchanov R.M., Stakhovskyi E.O., Kriachkova L.V., Pilin Ye.V., Malinovskyi S.L. *Extended pelvic lymph node dissection (PLND) is an important diagnostic step in the surgical treatment of moderate and high risk prostate cancer (PCa) according to D'Amico criteria. However, it has a number of complications and prolonged time of surgery. Limited PLND has a more favorable complication profile, but is not used because of its low diagnostic efficacy in low-risk RP patients, while in higher-risk groups its relevance remains controversial. The goal – to determine the diagnostic efficacy of limited PLND in radical prostatectomy in patients of moderate and high risk. A retrospective analysis included 377 PCa patients in whom the radical prostatectomy with PLND was performed in the period between 2013 and 2016. Patients' age was 63.4±6.2 y.o. 40 (10.6%) patients had low, 126 (33.4%) – moderate and 211 (56.0%) – high risk PCa. No statistically significant differences in the number of complications of PLND in open and laparoscopic*

surgery (p=0.16) were found. The overall frequency of complications was 22.8% (95% CI 18.6 - 27.1). When comparing clinical and histological parameters in groups with and without metastases, statistically significant differences were found between the levels of total prostate specific antigen before surgery (p=0.010); the Gleason score (corresponding median values of 8.0 (8.0; 9.0) and 7.0 (6.0; 7.0); p<0.001) and local tumor status (T) – the patients with stage >T2 53.1% and 19.4%, respectively (p<0.001). In 32 (8.5%) patients metastatic lesions of lymphatic nodes were found. Of these, 28 (87.5%) were related to high- risk, 4 (12.5%) – to moderate- risk. The main prognostic criteria for lymph node metastasis are preoperative PSA level, the Gleason Score, and T-status of the tumor. According to ROC analysis, the diagnostic efficacy of limited PLND increases in patients at high and moderate risk at a total PSA level greater than 18.4 ng/ml. This can be used to justify the indications for limited PLND in patients in these groups to reduce the number of postoperative complications associated with extended procedure.

Реферат. Коли обмежена тазова лімфаденектомія у хворих на рак передміхурової залози може бути виправданою? Молчанов Р.М., Стаховський Е.О., Крячкова Л.В., Пілін Є.В., Маліновський С.Л. *Розширена тазова лімфаденектомія (ТЛАЕ) є важливим лікувально-діагностичним етапом при хірургічному лікуванні раку передміхурової залози (РПЗ) помірного і високого ризику за критеріями D'Amico. Проте вона має низку ускладнень і подовження часу оперативного втручання. Обмежена ТЛАЕ має більш сприятливий профіль ускладнень, проте не використовується внаслідок її низької діагностичної ефективності у хворих на РПЗ низького ризику, у той час як у групах більшого ризику її доцільність залишається дискутабельною. Мета – визначити діагностичну ефективність обмеженої ТЛАЕ при радикальній простатектомії в пацієнтів помірного і високого ризиків. Ретроспективному аналізу підлягли 377 хворих, які прооперовані в період з 2013 по 2016 рік в обсязі радикальної простатектомії з обмеженою ТЛАЕ. Вік пацієнтів становив 63,4±6,2 року. У 40 (10,6 %) хворих встановлено рак передміхурової залози низького, 126 (33,4%) – помірного і 211(56,0%) – високого ризику. Не виявлено статистично значущих розбіжностей у кількості ускладнень лімфаденектомії при відкритих і лапароскопічних операціях (p>0,05), загальна частота яких становила 22,8% (95% ДІ 18,6 – 27,1). При порівнянні клініко-гістологічних показників у групах з і без метастазів установлено статистично значущі розбіжності за такими показниками, як рівень загального простатоспецифічного антигену (ПСА) до оперативного втручання (p=0,010); суми Глісона (відповідні медіанні значення 8,0 (8,0; 9,0) та 7,0 (6,0; 7,0) балів; p<0,001) і локального статусу пухлини (Т) – частка пацієнтів зі стадією більше Т2 становить відповідно 53,1 % та 19,4% (p<0,001). У 32 (8,5%) пацієнтів виявлено метастатичне ураження лімфатичних вузлів. З них 28 (87,5%) відносились до групи високого, 4 (12,5%) – помірного ризику. Основними прогностичними критеріями метастазування в лімфатичні вузли були передопераційний рівень ПСА, сума Глісона і Т-статус пухлини. За даними ROC-аналізу, діагностична ефективність обмеженої лімфаденектомії зростає у хворих груп високого і помірного ризику при рівні загального ПСА більше 18,4 нг/мл. Це може бути використано для обґрунтування показань щодо обмеженої ТЛАЕ у пацієнтів цих груп для зменшення кількості післяопераційних ускладнень, пов'язаних із розширеною процедурою.*

Prostate cancer (PCa) is one of the most common cancer diseases. In the US and European countries PCa ranks first among oncological diseases in men. Mortality from PCa among men ranks 2nd after lung cancer [5].

The main treatment for localized PCa is radical prostatectomy, which provides high rates of overall and relapse-free survival with relatively low complications [10].

Pelvic lymph node dissection (PLND) is an important diagnostic step in the surgical treatment of PCa. The main goal of PLND is to assess the condition of the pelvic lymph nodes (PLN), which allows determining the prognosis of the progress of disease and developing the most rational treatment approach [8]. Nevertheless latest systematic reviews show that there is currently no evidence base for the curative efficacy of PLND in radical prostatectomy, including overall survival [14].

Currently, the decision of the necessity of PLND application is based on clinical and histopathological characteristics included in the Briganti, Partin and Memorial Sloan Kettering Cancer Center (MSKCC) nomograms as well as Roach formulas and their modifications [3, 11].

According to current recommendations of the European Association of Urology (EAU) and the American Urological Association (AUA) and several other organizations dealing with such patients, an extended PLND is conducted simultaneously with radical prostatectomy of patients with moderate- and high-risk localized PCa. In low-risk patients, advanced PLND is not recommended because of a number of complications and prolonged surgery, while limited PLND is not used due to its low diagnostic efficacy [2].

According to the recommendations of the EAU, an extended PLND involves the removal of nodes lying anterior to the external iliac arteries and veins in the obturator fossa, medially and laterally of the internal iliac artery [7]. However there is an inconsistency in defining the boundaries of extended PLND, which significantly influences the understanding of surgery. In this case, patients suffering from

moderate risk are performed with partial PLND, expediency of performing which remains controversial.

The goal is to determine the diagnostic efficacy of limited PLND in radical prostatectomy in patients of moderate and high risk.

MATERIALS AND METHODS OF RESEARCH

A retrospective analysis included 377 PCa patients in whom the radical prostatectomy with PLND was performed in period between 2013 and 2016. The volume of lymph node dissection in the studied patients was not in compliance with current definition of extended PLND, and was considered limited. Patients' age was 63.4±6.2 (M±m) y.o.

According to D'Amico criteria [1], 40 (10.6%) patients had low, 126 (33.4%) – moderate and 211 (56.0%) – high risk PCa. In 132 (35.0%) cases, the surgery was performed laparoscopically, in 245 (65.0%) – in open way. All patients had PLND in accordance with current guidelines.

Statistical data processing was performed using STATISTICA 6.1 software (StatSoftInc., SN AGAR909E415822FA). ROC analysis and construction of ROC curves were performed in the software package of MedCalc Statistical Software trial version 19.1. (MedCalc Software, Ostend, Belgium; https://www.medcalc.org; 2019).

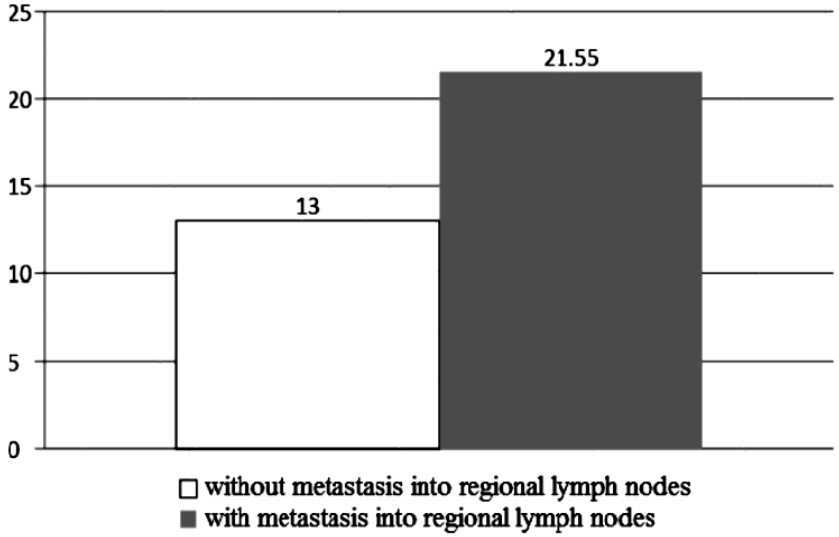
To describe the central tendency of quantitative traits, taking into consideration their mainly non-normal distribution, the median and interquartile range – Me (25%; 75%) were used. The probability of differences in categorical data was estimated by Pearson's Chi-square test ($\chi 2$), quantitative and rank by Mann-Whitney criterion (U). A simple logistic regression analysis was performed with calculation of relative chances (OR – odds ratio) with 95% confidence interval (95% CI) and ROC analysis. The level of statistical significance (p) for all types of analysis was accepted <5% ($p<0.05$) [6].

RESULTS AND DISCUSSION

In 32 (8.5%) patients metastatic lesions of lymphatic nodes were found. Of these, 28 (87.5%) were related to high-risk, 4 (12.5%) – to moderate-risk. In the group of low-risk patients metastatic lesion of lymphatic nodes was not found. We found no statistically significant differences in the number of complications of PLND in open and laparoscopic surgery ($p=0.16$), the overall frequency of which was 22.8% (95% CI 18.6 - 27.1).

When comparing clinical and histological parameters in groups with and without metastases, statistically significant differences were found in such indicators as the level of total prostate specific antigen (PSA) before surgery ($p=0.010$); the Gleason Score (corresponding median values of 8.0 (8.0; 9.0) and 7.0 (6.0; 7.0) points; $p<0.001$) and local tumor status (T) – part of patients with stage greater than T2 is 53.1% and 19.4%, respectively ($p<0.001$).

The average PSA in patients with regional lymph node metastases was 21.55 (10.8; 42.9) ng/ml – Me (25%; 75%), which is statistically significantly lower compared to patients without regional lymph node metastases – 13.0 (8.0; 22.5) ng/ml, $p=0.010$ (Fig. 1).



Note. Mann-Whitney criteria differences

Fig. 1. The average PSA level (ng / ml) in patients with PCa, depending on regional lymph nodes metastasis (median and interquartile range)

The difference of median PSA values in the comparison groups was 6.99 (95% CI 1.6 - 13.76) ng/ml, which clearly means that the PSA level in the group without metastasis is less by 39.68% (p=0.01) compared with patients with metastasis.

To evaluate prognosis of probability of patient's pertaining to one of two groups – with or without regional lymph nodes metastasis, using a base PSA level, a simple logistic regression analysis was performed, the results of which are presented in table 1 and in Fig. 2.

Carried out a simple logistic regression analysis showed that among the examined patients PSA level is a significant independent variable for predicting regional lymph nodes metastasis in Pca patients (regression coefficient β= -2.768; its error 0.006; $\chi 2$=7.009; OR=1.015; 95% CI 31.004 - 1.027).

Table 1

Results of a simple logistic regression analysis of the prognosis of regional lymph nodes metastasis in patients suffering from PCa with the level of prostate specific antigen

Variables	Regression coefficient β	standard error β	Wald test statistics χ^2	p value	OR	95% CI
absolute term in expression	-2.768	-	-	-	-	-
PSA level	0.015	0.006	7.009	0.008	1.015	1.004 – 1.027

The chance of regional lymph nodes metastasis increases by 1.5% (OR=1.015; 95% CI (1.004 - 1.027)) per each unit of prostate specific antigen increment. Such an insignificant chance benefit is statistically significant (p=0.008), but OR less than 1.2 is not recommended for clinically relevant results [6].

According to the results of the statistical analysis, a logistic regression equation was built [7], where each PSA (X) value, which served as a predictor, was matched by a dependent variable – the presence or absence of regional lymph nodes metastasis (Y).

$$y=\exp(-2.768+(0.015) \times x)/(1+\exp(-2.768+(0.015) \times x)),$$

where: y is the result: theoretical probability of metastasis into regional lymph nodes;
-2.768 is absolute term in equation of regression;
0.015 is regressive coefficient;
X is specific value of PSA expression.

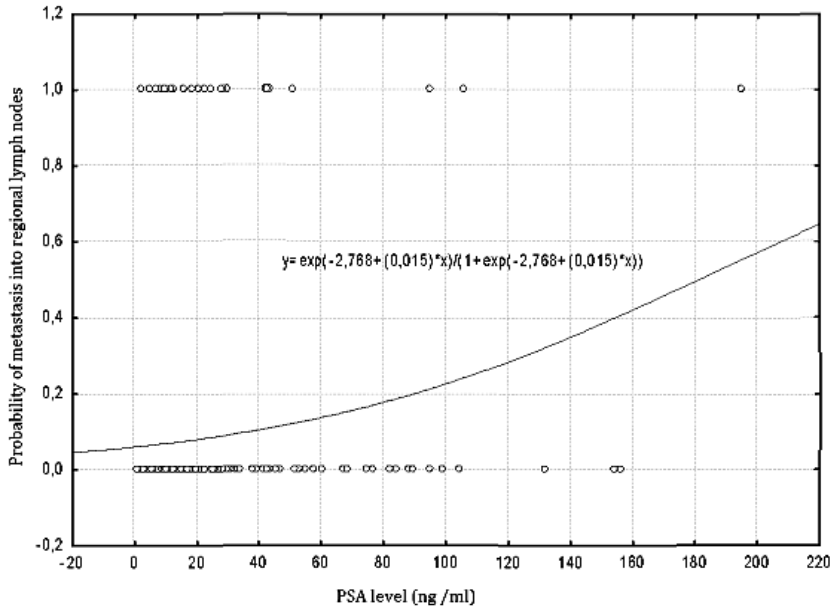


Fig. 2. Probability of regional lymph nodes metastasis depending on PSA level of examined patients

The valuation of the predictive accuracy of logistic regression was performed using the Wald's Chi-square ($\chi 2$) value; the percentage of concordance; Hosmer-Lemeshov consent test.

The valuation of the logistic regression equation for the Chi-square value ($\chi 2$) showed its adequacy: $\chi 2$=7,009 (p=0.008). The percentage of correct prediction (percentage of concordance) for the obtained equation was 91.8%, which indicates a high degree of concordance of the real distribution of observations of regional lymph nodes metastasis and the distribution based on logistic regression equation. Thus, in 91.8% of cases, the obtained logistic regression equation correctly predicts the presence of regional lymph nodes metastasis in a particular patient.

The overall valuation of agreement between the real and calculated data based on the Hosmer-Lemeshov test showed a significant coincidence, since the indicator was 4.86 (p=0.773), and at p>0.05 the null hypothesis regarding the consistency of theoretical and real results is accepted.

With the help of the developed equation, theoretical values of the probability of regional lymph nodes metastasis for each patient were calculated. The final result of the equation was always in the range from 0 to 1 (1 is present regional lymph nodes metastasis and 0 is absent).

The overall valuation is based on the approach [15] which assumes that if the calculated probability is less than 0.5, then it can be assumed that the event will not occur (no metastasis to regional lymph nodes will occur); otherwise, metastasis to regional lymph nodes is assumed (probability greater than 0.5).

For a more detailed valuation with the help of the logistic equation, theoretical values of the probability of regional lymph nodes metastasis at different values of prostate specific antigen were calculated, which allowed us to propose the following scale of predictive valuation (Fig. 3):

PSA level up to 18 ng/ml is very low probability of regional lymph nodes metastasis (P<7.63%);

• from 18 to 111 ng/ml – low probability of regional lymph nodes metastasis (7.63%≤P<25.48%);

• from 111 to 182 ng/ml – the average probability of regional lymph nodes metastasis (25.48%≤P<50.27%);

• from 182 to 254 ng/ml – above average probability of regional lymph nodes metastasis (50.27%≤P<75.22%);

• from 254 to 326 ng/ml – high probability of regional lymph nodes metastasis (50.27%≤P<75.22%);

• from 254 to 326 ng/ml – high probability of regional lymph nodes metastasis (75.22%≤P<90.11%);

• from 326 ng/ml – very high probability of regional lymph nodes metastasis (P>90.11%).

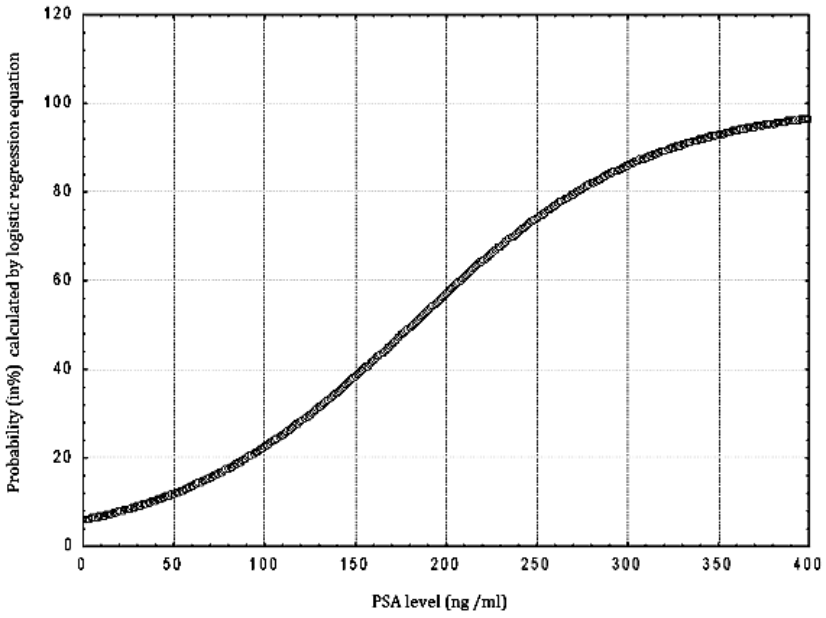


Fig. 3. Estimated probability (in%) of regional lymph nodes metastasis depending on PSA level (ng / ml) in patients suffering from PCa, calculated by logistic regression equation (1)

To determine the critical prognostic level of PSA, a ROC analysis was performed, the results of which are presented in table 2 and Fig. 4.

The construction of a ROC curve using the level of prostate specific antigen to predict the probability of regional lymph nodes metastasis in PCa patients showed its statistically significant, sufficient predictive ability [13], since the obtained area under ROC (area under ROC curve) AUC=0.653; 95% CI AUC 0.596-0.706; the achieved level of statistical significance p=0.010.

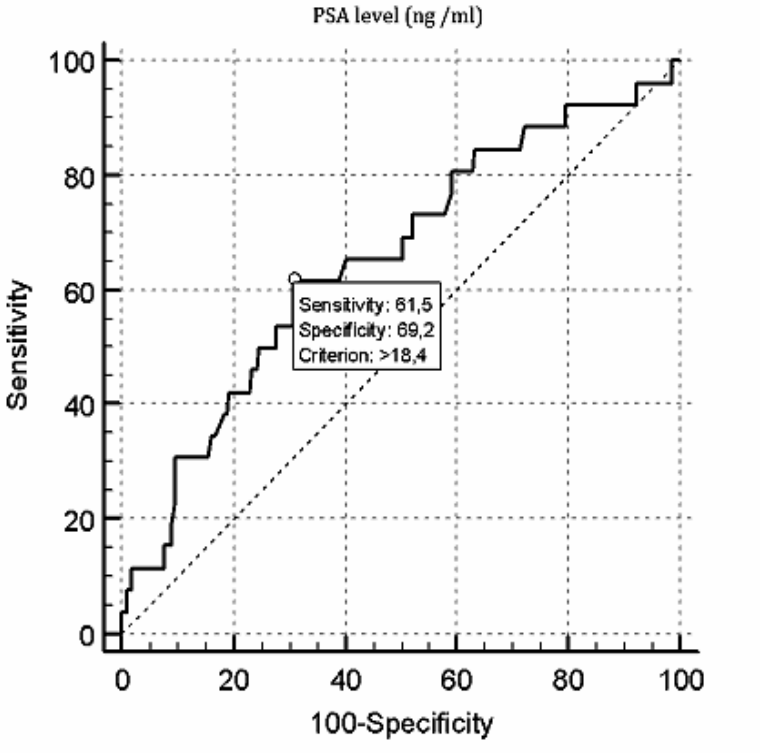


Fig. 4. ROC curve of the prostate specific antigen level to predict the probability of regional lymph nodes metastasis in PCa patients

The optimal cut-off value, determined by the Youden's index, is a PSA result of >18.4 ng/ml at a sensitivity of 61.54% and a specificity of 69.18%. This indicator, which corresponds with the results of logistic regression analysis, can be used as a classifier in deciding whether a patient is at risk of metastasis into regional lymph nodes.

The determined cut-off points (Table 2) and the results of the developed scale for prognosis value (Fig. 3) were subsequently used to identify individual groups with higher and lower PSA values to and calculate odds ratios with 95% confidence intervals (Table 2).

Table 2

Evaluation of different values of PSA level as a prognostic factor of predicting regional lymph nodes metastasis

PSA level (ng / ml)	OR	95% CI	p
>18,4	3.59	1.57-8.23	0.003
>111	3.46	0.35-34.398	0.290
>182	30.93	1.23-777.56	0.037

The OR calculation showed (Table 3) that the chances of regional lymph nodes metastasis are 3.59 times higher with PSA >18.4 ng/ml compared to patients with an antigen level lower than this indicator (OR=3.59; 95% CI 1.57 - 8.23; p=0.003) and 30.93 times higher with PSA >182 ng/ml (OR=30.93; 95% CI 1.23 - 777.56; p=0.037).

Limitations of indications for the use of extended PLND in patients suffering from moderate- and high-risk prostate cancer are associated with a higher complexity profile, compared to limited PLND, which, according to Briganti A. et al. (2006), are 19.8% and 8.2% respectively, and as a consequence, prolong the hospitalization [4].

Current research has shown a tendency to find ways to minimize the volume of PLND. Among them there is the study of the diagnostic efficiency of sentinel node biopsy (SNB) [9]. Given the anatomical features of the lymphatic drainage of the prostate, the volume of limited PLND may not include sentinel lymph nodes [12]. Thus, its diagnostic efficacy cannot be equated with the removal of SNB.

However, a total PSA level above 18.4 ng/ml, according to the results obtained, increases the diagnostic efficiency of limited PLND.

The presented study has several limitations. The study is retrospective, conducted on a relatively small cohort of patients, with an increase in which some sample bias may be reduced. Moreover, it concerns only the diagnostic aspect of PLND in PCa. Despite the limitations, the obtained data confirm the prognostic efficacy of the indicators used in the nomograms – the Gleason Score and T-status of the tumor [3]. The use of a PSA cut-off level of 18.4 ng/ml can be used to justify limited PLND for diagnostic purposes in moderate- and high-risk patients with radical prostatectomy.

CONCLUSIONS

1. The main prognostic criteria for lymph node metastasis are preoperative PSA level, the Gleason Score, and T-status of the tumor.
2. The diagnostic efficacy of limited PLND increases in patients at high and moderate risk at a total PSA level greater than 18.4 ng/ml.
3. Confirmation of the obtained data in a prospective study of a larger representative sampling of patients will allow justification of the indications for limited PLND in patients in these groups to reduce the number of postoperative complications associated with extended procedure.

Conflict of interests. The authors declare no conflict of interest.

REFERENCES

1. Leyh-Bannurah SR, et al. Adherence to pelvic lymph node dissection recommendations according to the National Comprehensive Cancer Network pelvic lymph node dissection guideline and the D'Amico lymph node invasion risk stratification. Urol Oncol. 2018;36(2):81.e17-81.e24. doi: http://dx.doi.org/10.1016/j.urolonc. 2017.10.022
2. Chalouhy C, Gurram S, and Ghavamian R. Current controversies on the role of lymphadenectomy for prostate cancer. Urol Oncol. 2019;37(3):219-26. doi: http://dx.doi.org/10.1016/j.urolonc.2018.11.020
3. Cimino S, et al. Comparison between Briganti, Partin and MSKCC tools in predicting positive lymph nodes in prostate cancer: a systematic review and meta-analysis. Scand J Urol. 2017;51(5):345-50. doi: http://dx.doi.org/10.1080/21681805.2017.1332680
4. Briganti A, et al. Complications and other surgical outcomes associated with extended pelvic lymphadenectomy in men with localized prostate cancer. Eur Urol. 2006;50(5):1006-13. doi: http://dx.doi.org/10.1016/j.eururo.2006.08.015
5. Bray F, et al. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin, 2018;68(6):394-424. doi: http://dx.doi.org/10.3322/caac.21492
6. Lang TA, Secic M. How to report statistics in medicine : annotated guidelines for authors, editors, and reviewers. 2nd ed. ed. 2006, New York: American College of Physicians. doi: https://doi.org/10.2307/2669655
7. Mottet N, et al. EAU - EANM - ESTRO - ESUR - SIOG Guidelines on Prostate Cancer; 2019. doi: https://doi.org/10.1016/j.eururo.2019.07.014
8. Ploussard G, et al. Pelvic lymph node dissection during robot-assisted radical prostatectomy: efficacy, limitations, and complications-a systematic review of the literature. Eur Urol. 2014;65(1):7-16. doi: http://dx.doi.org/10.1016/j.eururo.2013.03.057
9. Batra V, et al. Predictive factors for lymph node positivity in patients undergoing extended pelvic lymphadenectomy during robot assisted radical prostatectomy. Indian J Urol, 2015;31(3): 217-22. doi: https://doi.org/10.4103/0970-1591.156918
10. Banapour P, et al. Radical Prostatectomy and Pelvic Lymph Node Dissection in Kaiser Permanente Southern California: 15-Year Experience. Perm J, 2019;23. doi: http://dx.doi.org/10.7812/TPP/17-233
11. Sierra PS, et al. Robot-assisted extended pelvic lymph node dissection in prostate cancer. When and how? Arch Esp Urol. 2019;72(3):257-65. doi: https://doi.org/10.1016/s1569-9056(19)32519-9

12. Van der Poel HG, et al. Sentinel node biopsy and lymphatic mapping in penile and prostate cancer. Urologe A. 2017;56(1):13-17.
doi: http://dx.doi.org/10.1007/s00120-016-0270-7

13. Šimundić AM. Measures of Diagnostic Accuracy: Basic Definitions. EJIFCC. 2009;19(4):203-11.
doi: https://doi.org/10.1002/9780470317082.ch2

14. Fossati N, et al. The Benefits and Harms of Different Extents of Lymph Node Dissection During Radical Prostatectomy for Prostate Cancer: A Systematic Review. Eur Urol. 2017;72(1):84-109.
doi: http://dx.doi.org/10.1016/j.eururo.2016.12.003

15. Vittinghoff E. Regression methods in biostatistics: linear, logistic, survival, and repeated measures models. New York: Springer; 2005.

СПИСОК ЛІТЕРАТУРИ

1. Adherence to pelvic lymph node dissection recommendations according to the National Comprehensive Cancer Network pelvic lymph node dissection guideline and the D'Amico lymph node invasion risk stratification / S. R. Leyh-Bannurah et al. *Urol Oncol*. 2018. Vol. 36, No. 2. P. 81.e17-81.e24. DOI: http://dx.doi.org/10.1016/j.urolonc. 2017.10.022

2. Chalouhy C., Gurram S., Ghavamian R. Current controversies on the role of lymphadenectomy for prostate cancer. *Urol Oncol*. 2019. Vol. 37, No. 3. P. 219-226. DOI: http://dx.doi.org/10.1016/j.urolonc.2018.11.020

3. Comparison between Briganti, Partin and MSKCC tools in predicting positive lymph nodes in prostate cancer: a systematic review and meta-analysis / S. Cimino et al. *Scand J Urol.* 2017. Vol. 51, No. 5. P. 345-350. DOI: http://dx.doi.org/10.1080/21681805.2017.1332680

4. Complications and other surgical outcomes associated with extended pelvic lymphadenectomy in men with localized prostate cancer / A. Briganti et al. *Eur Urol.* 2006. Vol. 50, No. 5. P. 1006-13. DOI: http://dx.doi.org/10.1016/j.eururo.2006.08.015

5. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries / F. Bray et al. *CA Cancer J Clin*. 2018. Vol. 68, No. 6. P. 394-424.
DOI: http://dx.doi.org/10.3322/caac.21492

6. Lang T. A., Secic M. How to report statistics in medicine : annotated guidelines for authors, editors, and reviewers. 2nd ed. ed. 2006. New York: American College of Physicians.
DOI: https://doi.org/10.2307/2669655

7. Mottet N. EAU - EANM - ESTRO - ESUR - SIOG Guidelines on Prostate Cancer. 2019. DOI: https://doi.org/10.1016/j.eururo.2019.07.014

8. Pelvic lymph node dissection during robot-assisted radical prostatectomy: efficacy, limitations, and complications-a systematic review of the literature / G. Ploussard et al. *Eur Urol*. 2014. Vol. 65, No. 1. P. 7-16. DOI: http://dx.doi.org/10.1016/j.eururo.2013.03.057

9. Predictive factors for lymph node positivity in patients undergoing extended pelvic lymphadenectomy during robot assisted radical prostatectomy / V. Batra et al. *Indian J Urol*. 2015. Vol. 31, No. 3. P. 217-222. DOI: https://doi.org/10.4103/0970-1591.156918

10. Radical Prostatectomy and Pelvic Lymph Node Dissection in Kaiser Permanente Southern California: 15-Year Experience / P. Banapour et al. *Perm J*. 2019. Vol. 23. DOI: http://dx.doi.org/10.7812/TPP/17-233

11. Robot-assisted extended pelvic lymph node dissection in prostate cancer. When and how? / P. S. Sierra et al. *Arch Esp Urol.* 2019. Vol. 72, No. 3. P. 257-265. DOI: https://doi.org/10.1016/s1569-9056(19)32519-9

12. Sentinel node biopsy and lymphatic mapping in penile and prostate cancer / H. G. Van der Poel et al. *Urologe A.* 2017. Vol. 56, No. 1. P. 13-17. DOI: http://dx.doi.org/10.1007/s00120-016-0270-7

13. Šimundić A. M. Measures of Diagnostic Accuracy: Basic Definitions. *EJIFCC*. 2009. Vol. 19, No. 4. P. 203-211.
DOI: https://doi.org/10.1002/9780470317082.ch2

14. The Benefits and Harms of Different Extents of Lymph Node Dissection During Radical Prostatectomy for Prostate Cancer: A Systematic Review / N. Fossati et al. *Eur Urol*. 2017. Vol. 72, No. 1. P. 84-109. DOI: http://dx.doi.org/10.1016/j.eururo.2016.12.003

15. Vittinghoff E. Regression methods in biostatistics: linear, logistic, survival, and repeated measures models. 2005, New York: Springer.

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