STRESZCZENIE W JĘZYKU ANGIELSKIM

Prostate cancer (PCa) is one of the most common cancers among men worldwide and the most frequently diagnosed malignant tumor in men in Poland. PCa is a disease that can be completely cured if diagnosed at an early stage. Therefore, it is extremely important to improve early detection methods, which is the subject of analysis in this study.

An increase in prostate-specific antigen (PSA) levels, abnormalities in prostate gland revealed in digital rectal examination, and characteristic findings in imaging tests may raise suspicion of cancer. However, confirmation of the presence of malignant tumor tissue in the prostate gland, obtained through histopathological examination during biopsy, as well as determining the degree of malignancy and stage of advancement, are necessary to initiate PCa treatment.

The most commonly used biopsy method is systematic transrectal ultrasound-guided biopsy (TRUSBx). In recent years, the integration of multiparametric magnetic resonance imaging (mpMRI) into routine prostate cancer diagnostics has demonstrated high sensitivity and specificity in detecting tumor foci. Suspicious lesions are identified in mpMRI and classified by radiologists using the Prostate Imaging Reporting and Data System (PI-RADS). Patients with PI-RADS scores of 3, 4, or 5 are subsequently referred for fusion biopsy. During this procedure, core samples are taken from areas suspected of tumor growth, visible on the mpMRI image. Additional mapping samples are recommended to more accurately assess the degree of tumor malignancy and exclude potential foci not visible on MRI imaging.

The objective of this study is to assess the efficacy of fusion biopsy in detecting PCa, to compare the effectiveness of fusion biopsy and systematic biopsy, and to evaluate the concordance between histopathological results derived from biopsy specimens and those obtained from radical prostatectomy specimens, with consideration of the biopsy method.

The study included a group of 500 men who underwent prostate biopsy at the Department of Oncological and General Urology of the Wojewódzki Szpital Zespolony im. J. Śniadeckiego w Białymstoku between 2017 and 2022. Among them, 250 underwent transrectal systematic biopsy (TRUS-Bx), and the remaining 250 underwent transperineal combined fusion biopsy (ComBx). Subsequently, men with positive biopsy results from both groups were selected and qualified for radical prostatectomy. The histopathological results of biopsy cores and whole-mount specimens obtained from radical prostatectomy were subjected to analysis.

The analysis findings revealed that fusion biopsy exhibited a 61% detection rate of malignant tumor tissue, whereas systematic biopsy confirmed the presence of cancer in 45% of cases. The effectiveness of the fusion biopsy method in detecting PCa was significantly higher than that of systematic biopsy ($p<0.001$). Additionally, PCa grade group ≥ 2 was more frequently identified in the ComBx group (40%) than in the TRUS-Bx group (30%; $p=0.019$). Furthermore, a comparison was made between the histopathological results of biopsy specimens and tissue materials from radical prostatectomy, focusing on discrepancies in tumor grade (Grade Group/ISUP). Upgrading was observed in 31 cases (35%) in the TRUS-Bx group and in 11 cases (16%) in the ComBx group. Notably, the underestimation of PCa grade was significantly more common in systematic biopsy compared to fusion biopsy.

The analysis unequivocally verified the efficacy of fusion biopsy as a method for prostate cancer detection, exhibiting superior performance in identifying a greater quantity of prostate cancers with grade group ≥ 2 when compared to systematic biopsy. Targeted biopsy techniques augment the prospect of precise needle navigation toward suspicious tumor regions, consequently enhancing the probability of accurately determining tumor grade, facilitating a more comprehensive evaluation of the patient's oncological status, and enabling the formulation of optimal treatment strategies.