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.

Elevated levels of prostate-specific antigen (PSA), abnormalities observed during digital rectal examination, and distinct findings from imaging studies can potentially indicate the presence of prostate cancer. Nevertheless, definitive confirmation of the malignant tumor within the prostate gland necessitates histopathological examination during biopsy. This procedure not only establishes the presence of cancerous tissue but also determines the degree of malignancy and stage of disease progression, providing essential information for initiating appropriate treatment for PCa.

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 results of the analysis demonstrated that fusion biopsy achieved a detection rate of malignant tumor tissue of 61%, while systematic biopsy confirmed the presence of cancer in 45% of cases. The effectiveness of combined fusion biopsy and targeted biopsy in detecting PCa was significantly superior to that of systematic biopsy. Furthermore, a significantly higher frequency of PCa grade group ≥ 2 was observed in the ComBx group (40%) compared to the TRUS-Bx group (30%). Additionally, a comparison was made between the histopathological results of biopsy specimens and tissue materials obtained from radical prostatectomy, with a particular focus on discrepancies in tumor grade (Grade Group/ISUP). Histopathological results obtained through fusion biopsy demonstrate greater histopathological concordance with material obtained during radical prostatectomy. Upgrading of tumor grade was identified in 11 cases (16%) in the ComBx group and 31 cases (35%) in the TRUS-Bx group. Notably, the fusion biopsy exhibited a significantly lower incidence of underestimation in PCa grade when compared to systematic 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 clinically significant prostate cancer lesions when compared to systematic biopsy. Targeted biopsy techniques offer an improved approach to accurately guide needle placement towards suspicious regions revealed in mpMRI study, thereby increasing the likelihood of precisely

determining tumor grade. This allows for a more comprehensive evaluation of the patient's oncological status and facilitates the development of optimal treatment strategies.