Abstract
Preoperative diagnostic methods in prostate cancer

Introduction: At present, the most attention in prostate cancer is focused on tumor markers and imagining methods, especially magnetic resonance and fusion methods in order to accurately identify carcinoma deposits and predict the biological behavior of the tumor. Accurate diagnosis allows choosing optimal therapeutic procedure.

Aim: The aim of the study is to evaluate how preoperative diagnostic methods can help in designing an optimal treatment in a patient with prostate cancer. The main objective is to evaluate the use of the Prostate Health Index (PHI) in differentiating low-risk carcinoma from aggressive cancer. Another goal of the thesis is the use of imaging methods. I focused on the 3T magnetic resonance imaging in assessing invasion beyond the prostate and in high risk patiens on a new method of fusion magnetic resonance imaging and positron emission tomography for prediction of nodal involvement.

Methodology: A total of 320 patients who underwent preoperative diagnosis using our investigated methods (PHI, MRI, choline PET / MRI) and subsequently radical prostatectomy were enrolled in the study. It allowed us to retrospectively assess these diagnostic tests. The PSA, % fPSA, -2proPSA, and PHI results overall were evaluated by statistical methods and in relation to the differentiation of GS6 and GS> 6 in biopsy and definite histology. The mpMRI results were evaluated and, in a small part of the set, the results of PET / MRI fusion examination were evaluated in the prediction of nodal involement.

Results: Category T2 (73.75 %) acording to TNM classification, was the most frequently presented. Exactly the same bioptic and definitive GS was found in 145 patients (45.3 %). The distribution in the bioptic GS subgroup GS6 / GS> 6 was 198/122 and 95/225 in final histology. In the group divided by definitive histology, the statistically significant markers were PHI, -2proPSA, %fPSA and PSA ($p < 0.0001$, $p < 0.0001$m, $p = 0.0003$ and $p = 0.0043$) were statistically significant. MRI examination

was perfomed in 266 (83.1 %), and in 34 (12.8 %) cases MRI did not identify carcinoma. In differentiation between T3 and T2 category sensitivity was 21%, specificity 91.2 %, PPV 42 % and NPV 79.3 %. In the detection of seminal vesicle infiltration by carcinoma, sensitivity was 31%, specificity 97%, PPV 56.2 % and NPV62 %. 14 patients were examined by PET / MRI, histologically metastases were verified at 3 (micrometastases smaller than 5mm). PET / MRI did not identify these micrometastases.

Conclusion: In the study we pointed out a large biopsy inaccuracy in determining GS. We demonstrated a statistically significant ability of new tumor markers -2proPSA and PHI in distinguish the low-risk and aggressive carcinoma. The mpMRI is beneficial for local staging but we noted a high specificity but low sensitivity of mpMRI in the detection pT3 staging and seminal vesicle invasion. In a subset of high-risk patients who underwent fusion PET / MRI with 18F fluorocholine, we did not recognize the benefit of this examination for the detection of lymf node micrometastases. We used the results to specify the diagnostic and therapeutic prostate cancer algorithm currently used in our department and we will further modify it, especially in relation to an ongoing clinical study with PET / MRI (PET / CT) fusion with Ga PSMA.