Prediction of prostate cancer in patients with benign prostatic hyperplasia

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INTRODUCTION & OBJECTIVES: To develop formula for prediction of prostate cancer in patients with benign prostate hyperplasia (BPH), undergoing surgical treatment.

MATERIAL & METODS: 359 patients, undergoing surgical treatment of BPH were included in our study (mean age 66.7 y± 0.6 (range 41-88)). Diagnostic studies were prostate-specific antigen (PSA) assay (5.6±0.3(0.2-24) ng/ml), digital rectal investigation (DRI) (palpable induration was in 5.6%), transrectal ultrasound (TRUS) (mean prostate volume was 82.4. SD=2.6 (range 39-213) ml; hypoechogenic lesion was determined in 6.4% cases), morphological examination of bioptates and resected prostate tissue (prostate cancer was found in 23 patients (5.8%)). Discriminant analysis was performed, which allows to determine statistically significant diagnostic criteria for prostate cancer and standardized coefficients, and to develop formula on its basis to predict prostate cancer.

RESULTS: In patients with a suspicion of prostate cancer after performing standard diagnostic studies, who has already have biopsy negative results, diagnostic coefficient (C_d) should be calculated as follows: $C_d = 9.01 – (9.62 \cdot x_1) – (0.015 \cdot x_2) – (0.27 \cdot x_3) – (9.51 \cdot (x_4 : x_2))$, where x_1 is 0, when induration within prostate is present, while in cases with no induration, x_1 is 1; x_2 is prostate volume, ml; x_3 is prostatic intraepithelial neoplasia (PIN) (in cases with high PIN x_3 is 1, in cases without high PIN, x_3 is 0); x_4 is total PSA level, ng/ml.

In patients with no indications to prostate biopsy, it should be used the next formula: $C_d = 6.14 – (0.18 \cdot x_1) – (3.19 \cdot x_2) + (7.66 \cdot x_3) + (140 \cdot (x_2 : x_4)) + (0.09 \cdot x_4)$, where x_1 is patient age; x_2 is total PSA level, ng/ml; x_3 is free PSA level, ng/ml; x_4 is prostate volume, ml.

In those cases, when $C_d > 0$, we confirm our diagnosis of BPH, while in cases, when $C_d < 0$ we can suspect prostate cancer. Diagnostic sensitivity of this method is 77.7% and 78.6%, specificity is 93.4% and 96.3% for 1 and 2 formula, respectively ($p<0.001$).

CONCLUSIONS: Proposed formulas can predict prostate cancer prior to surgical treatment of BPH and optimize indications for prostate biopsy.