Histoscanning in diagnosis of prostate cancer

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Aims and objectives

Differential diagnosis between malignant lesions and non-tumor diseases of the prostate is still a difficult task for radiology. MRI is considered as a best non-invasive method for detection of prostate cancer. [1] At the same time, MRI is a relatively expensive procedure, obtaining of high-quality images of the prostate largely depends on the knowledge and experience of radiologist. [2] The role and place of CT and PET, is still not determined. As for B-mode ultrasound, it`s specificity is not high, besides of that standard ultrasound research is not sufficiently reliable to determine the presence of prostate cancer. [3] In this regard, innovative techniques of differential diagnosis of prostate diseases, such as histoscanning method, are of particular interest.

The aim of current study was to assess the usefulness of histoscanning in diagnosis of prostate cancer as a sole method.

Methods and materials

We have retrospectively observed 110 pts at the age of 44-87 years (mean age 65.5). All pts underwent complex clinical examination, DRE and PSA level measurement, and histoscanning. Focal changes by DRE were determined in 34(30.9%) patients, mean PSA level was 10.61 (from 0.19 to 154.0). Suspicious lesions were estimated by histoscanning as a positive volume bigger than 0.5cc. To explore possibilities of histoscanning in diagnosis of prostate cancer we have formed 4 groups of patients depending on PSA level: 1-st group - 54 pts (49,1%) with PSA level before 10 ng/#l; 2-d group - with PSA from 10 to 20 ng/#l (n=16 (14,5%)), 3-d group - patients with PSA more than 20 ng/#l (n=13 (11,8%)). 4-th group was consisted of 27 patients (24.5%) with normal PSA with suspicion on prostate cancer by DRE or clinical data; only 8 patients of 4-th group underwent biopsies, so separate statistical analysis for this group was not included in the study. 69 of 110 pts were subsequently referred for targeted biopsy under US control, in 15 cases pts had MRI. Biopsy samples were taken not only from standart points: about 2-3 columns of tissue were taken additionally under US navigation, according to localization of pathological areas, obtained by histoscanning. Spatial localization of pathological areas was determined by comparing ultrasound and pathology cards by computer overlay segments of prostate. The area of prostate gland was divided into 6 zones - center, right and left apical, middle left and right, left and right at the bottom. Histoscanning data were assessed by comparing findings with biopsy and surgery results.

Results
Pathomorphological study of biopsy results showed, that among 69 biopsies in 38 (34.5%) cases was detected adenocarcinoma; in 25 (22.7%) cases - PIN of high and low degree; histoscanning results were confirmed by further pathomorphology data in 52 of 69 cases. Radical prostatectomy was performed in 14 (12.7%) pts, 24 (21.8%) pts underwent hormonal and radiation therapy. 68 pts (61.8%) were scheduled for dynamic control.

Statistical analysis was performed separately for 3 first groups, than for overall number of pts.

In the first group of patients we have received 20 truepositive and 7 truenegative results. Falsepositive results were obtained in 6 cases, falsenegative - in 3 cases. Se was 86.9%, sp - 53.8%, ac - 75.0%, PPV - 76.9%, NPV - 70.0%.

In the second group the number of truepositive results was 7 (50.0% from all 69 performed biopsy studies), also we had 2 falsepositive and 1 falsenegative results. Se, sp, and PPV and NPV were 87.5%, 66.6%, 78.5%, 77.7% and 80.0% respectively.

As for the third group of patients, in 9 cases (81.8% from all 69 performed biopsy studies) were identified truepositive results, 1 truenegative and 1 falsepositive; falsenegative results were not received in 3 group. Se for the third group of patients was 100%, sp - 50.0%, ac - 90.9%, PPV - 90.0%, NPV - 100%.

As we mentioned previously, separate statistics were not calculated for the fourth group due to a small number of biopsies performed. Among 8 biopsies there were 2 truepositive, 2 falsenegative and 4 falsepositive results. It is important to point out, that in 2 cases of 4-th group of pts, even with normal PSA level, histoscanning has revealed prostate cancer, which was subsequently confirmed by histology.

Summarizing results of separate statistical analysis, the sensitivity of histoscanning in the 3-d group of patients was rather high than in 1-st and 2-nd groups; at the same time, sensitivity in the 1-st and a 2-nd groups was practically similar.

For overall number of patients, in 38 cases we received truepositive results, in 14 - truenegative, 13 - falsepositive and 4 - falsenegatives. Paying attention to the large number of mistaken conclusions, which caused formation of incorrect diagnosis, we have separately analyzed data of patients, who had received false positive and negative findings. Totally were obtained 17 such conclusions. Thus, we concluded, that in 4 cases three-dimentional scans were not correctly performed for further interpretation, because of the presence of shadow artifacts on received histoscanning pictures. In 5 cases histoscanning showed big volume intensity areas in entire peripheral part of a prostate, in patients with acute inflamatory changes of prostate tissues (acording to clinical data).

As a result of our study, histoscanning has showed high overall sensitivity - 90,5%, specificity was 51,8%, accuracy 75,3%, PPV 74,5% and NPV 77,7%.
Fig. 1: I group (clinical example). Histoscanning in case of prostatic hyperplasia, PSA level 5.13. MRI and B-mode revealed a volume formation in the central zone left lobe, suspicious for cancer. Histoscanning identified only an area of pathological intensity in the projection of cyst, which was correctly interpreted by us regarding B-mode changes. In the central part of the prostate there were no pathological intensity signals. This patient underwent biopsy, only hyperplasia cells were found.
Fig. 2: II group (clinical example). PSA 11.18, 2 negative biopsies in anamnesis. Abnormal signal intensity area 1.17 cc in projection of median groove with transition to the right lobe, which was interpreted by us as an evidence of cancer. Histology results: adenocarcinoma cells at the right lateral lobe of a prostate.
Fig. 3: III group (clinical example). PSA 35.1, previous negative biopsy. Abnormal signal intensity of 6.45 cc in both lobes of prostate, occupying the entire peripheral part. Histology results: adenocarcinoma in both lobes of prostate, Gleason score 4.
Fig. 4: IV group (clinical example). PSA 1.77. Histoscanning identified pathological intensity signal 2.51 cc in projection of median groove with transition to both lobes. Histology identified adenocarcinoma cells in the left lobe, also in both lobes were signs of tuberculosis. Probably, histoscanning pathological signals, revealed in the right lobe, may be considered to tuberculous nature of tissue changes.
Conclusion

Histoscanning is independent, high sensitive method, that can be used for screening of prostate cancer.

Personal information

References


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