

Diagnosis of anterior prostate cancer using MRI/TRUS real time soft image fusion

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BACKGROUND

Anterior prostate cancers (APC) are rarely palpable and difficult to sample when using traditional transrectal ultrasound (TRUS) biopsies. Accurate targeted biopsies can be performed when using magnetic resonance imaging (MRI) and 3D TRUS real time soft image fusion. The aim of the study was to evaluate the accuracy of MRI/TRUS guided biopsies in the detection of APC.

MRI: 1.5T Avanto (Siemens, Erlangen) and body array coil. Sequences: ax3D T2w, and DWI b2000 and b50/1000 were used for apparent diffusion coefficient (ADC).

Ultrasound: 3D Accuvix V10 (Medison®, Korea), navigation system: Urostation (Koelis®, Grenoble, France).

Minimum one biopsy was obtained from each MRI target using 18G Tru Core®II (Angiothech, USA). One sample T- test was used for statistics.

METHOD

Between 2010 and 2012, 358 patients with elevated prostatespecificantigen (PSA) underwent MRI/TRUS guided biopsies. 90/358 (25%) pts with MRI suspicious anterior cancer were included in the study. Biopsy patients groups were: initial biopsy 5 pts, 1st-10th re-biopsy 63 pts (mean previous negative biopsy procedures 2,6), re-biopsy due to active surveillance 19 pts, and PSA recurrence after radiotherapy 3 pts. Mean age, PSA and prostate volume were 65 years, 17.0 ng/ml and 42 ml.

RESULTS

T74/90 (82%) pts had positive targeted biopsies with Gleason score 6 (n=25), 7 (n=34), 8 (n=14) and 9 (n=1), and mean tumour volume 3.2 ml (95% CI 1.6-4.8).

ADC values for positive targeted biopsies were $78 \times 10^{-5} \text{ mm}^2/\text{s}$ (95% CI 74-82) and for negative targeted biopsies $97 \times 10^{-5} \text{ mm}^2/\text{s}$ (95% CI 90-104), $p < 0.001$. The mean number of positive targeted biopsies pr. patient was 2.7, and the mean length of cancer pr. biopsy was 5.5 mm.

CONCLUSION

Biopsies using MRI/TRUS soft image fusion technique is an accurate method for diagnosing anterior prostate cancer.

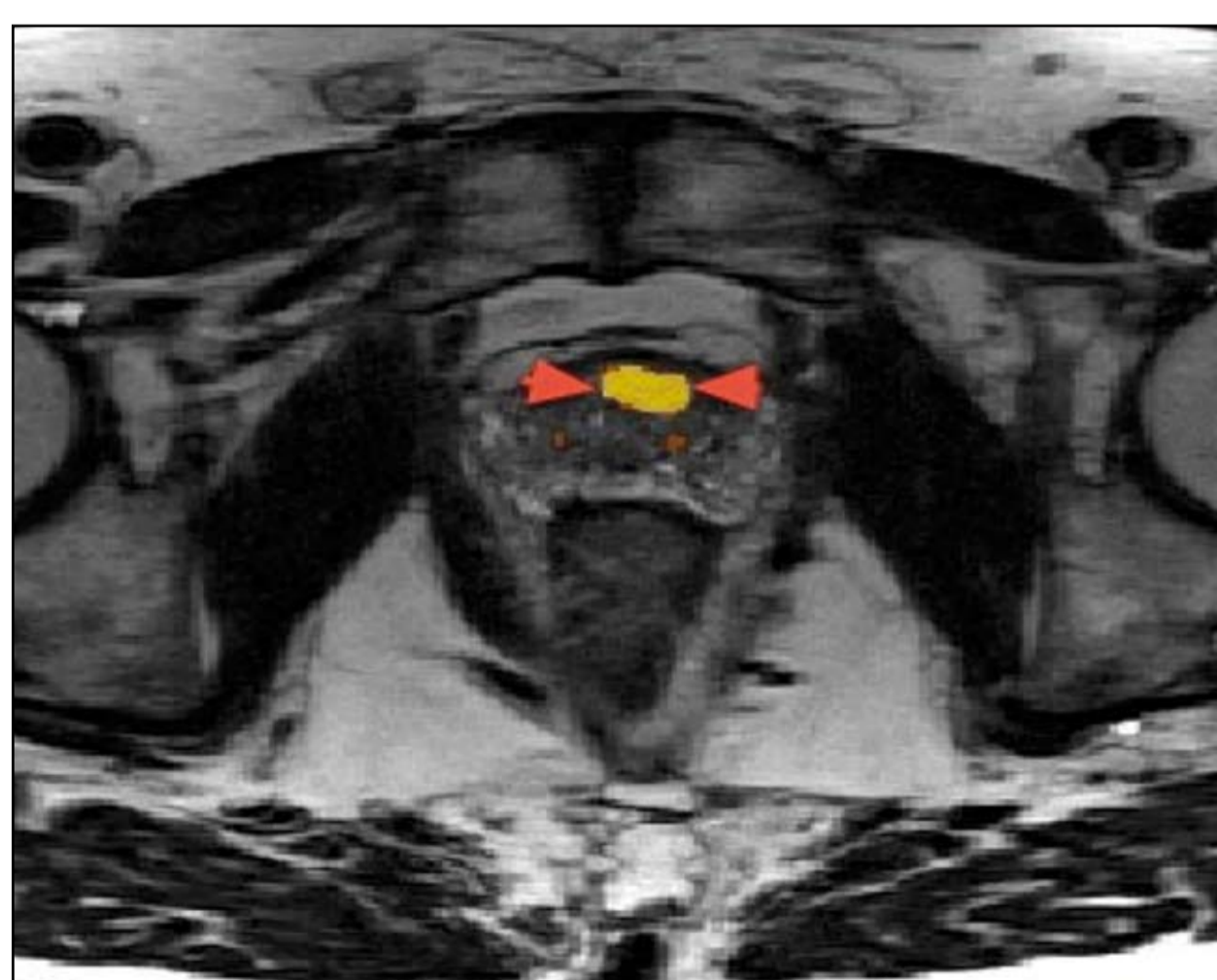


Fig 1. T2w MRI with superimposed b2000 in a 64-year old man who underwent two previous negative biopsy series both by TRUS and transperineal approach. The tumor appears yellow.

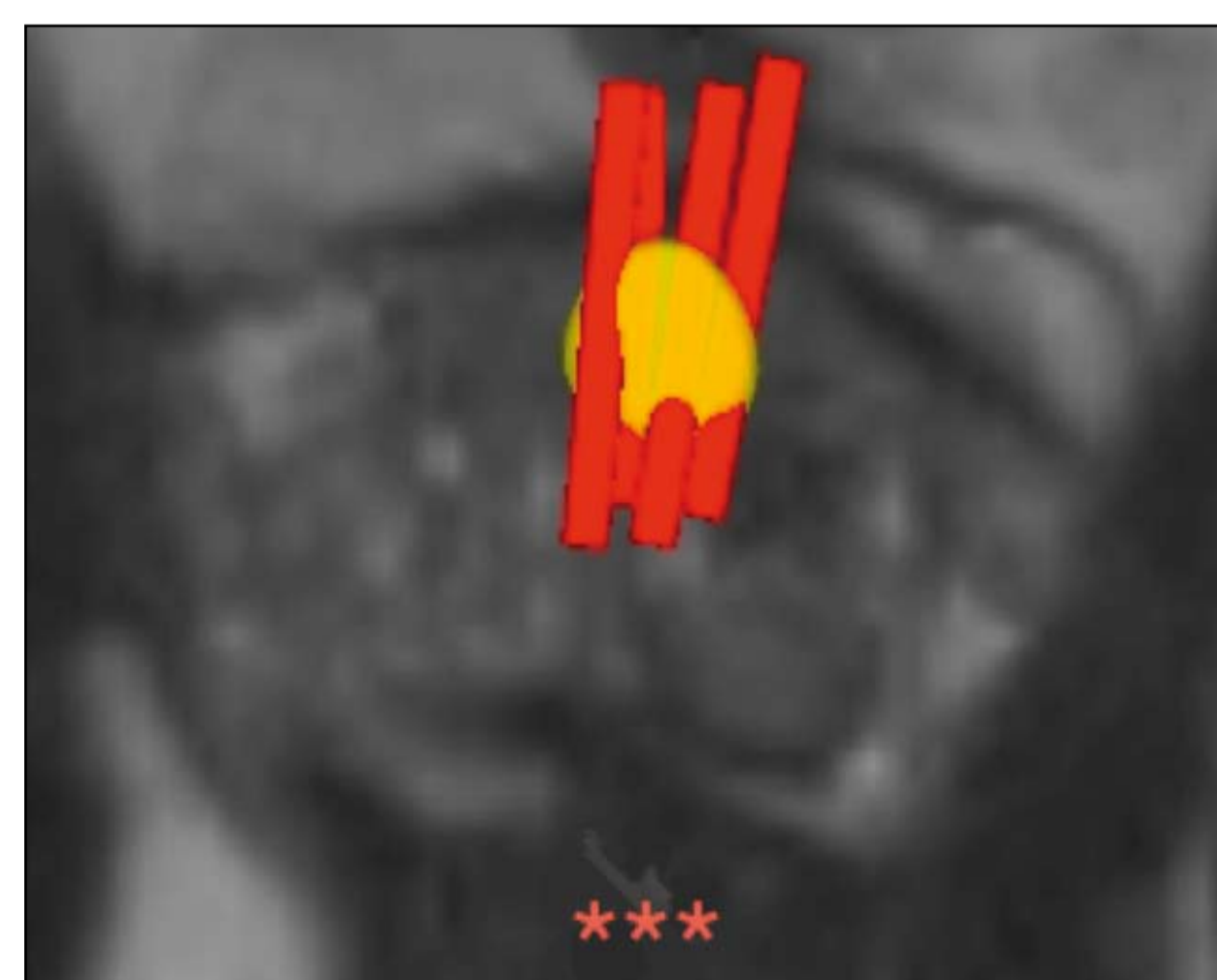


Fig 2, 3. Axial and sagittal images as displayed in the Urostation when performing targeted biopsies. The four red bars represent the biopsy needle tracts, all within the MRI target (yellow circle). All cores were positive for prostate cancer Gleason score 7a.

* urinary bladder ** rectum *** vesicula seminalis

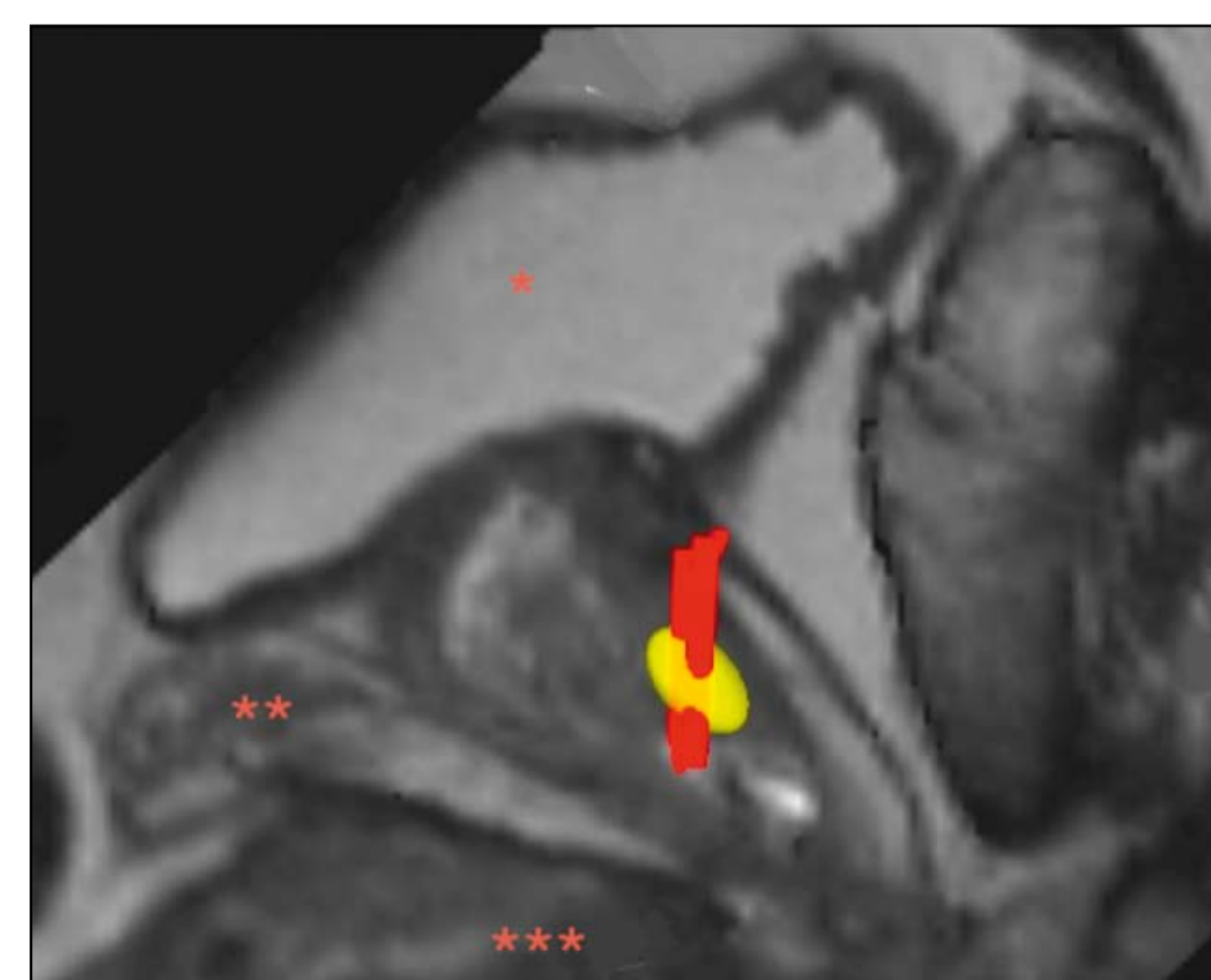


Fig 4. Whole mount sectioned prostate gland after prostatectomy in the same patient. It shows a 22 x 8 mm anterior prostate cancer with Gleason score 7a. Surgical margins were negative.