



ORIGINAL ARTICLE

Multiparametric magnetic resonance imaging predicts the presence of prostate cancer in patients with negative prostate biopsy[☆]



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KEYWORDS

Magnetic resonance imaging;
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Second biopsy

Abstract

Objective: To assess the ability of multiparametric prostate magnetic resonance imaging (mpMRI) to detect prostate cancer in patients with prior negative transrectal prostate biopsy (TPB).

Materials and methods: mpMRI (TSE-T2-w, DWI and DCE sequences) was performed on 1.5 T (Magnetom Avanto; Siemens Healthcare Solutions) in 150 patients suspicious of prostate cancer and with negative TPB. European Society of Urogenital Radiology (ESUR) criteria were used (score 1: clinically significant disease is highly unlikely to be present; score 2: clinically significant cancer is unlikely to be present; score 3: clinically significant cancer is equivocal; score 4: clinically significant cancer is likely to be present; score 5: clinically significant cancer is highly likely to be present). PSA measurement (total and free), digital rectal examination (DRE), transrectal ultrasound (TRU) and a second TPB (at least 14 cylinders) were performed in all patients. Variables were submitted for independent blind analysis. The accuracy of each test was measured. Stepwise selection model for prediction of prostate cancer in second TPB was developed.

Results: Mean age was 66.2 ± 5 years (51–77), mean PSA 11.3 ± 9.6 ng/mL (0.9–75) and mean prostatic volume 82.2 ± 42 (20–250) cc. DRE was suspicious in 11 (7.3%) patients. The mean number of cylinders per patient sampled in second TRB was 17.6 ± 2.7 (14–22). Second TRB was positive in 28 patients (18.7%). mpMRI was positive (score 3–5) in 102 (68%), test

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PALABRAS CLAVE

Imagen por resonancia magnética; Próstata; Estudio multiparamétrico; Cáncer de próstata; Segunda biopsia

sensitivity was 92.9% and the NPV was 95.8%. The risk of prostate cancer diagnosis in second TPB is modified by: PSA velocity >0.75 (OR 1.04 [0.99–1.08]; $p=0.06$), free/total ratio PSA $<15\%$ (OR 0.37 [0.13–1.05]; $p=0.06$), each cc. of prostate volume (OR 0.98 [0.97–1]; $p=0.017$) and mpMRI 3–5 (OR 7.87 [1.78–34.7]; $p=0.006$). Multivariate analysis reveals that mpMRI (OR 7.41 [1.65–33.28]; $p=0.009$) and prostatic volume (OR 0.31 [0.12–0.78]; $p=0.01$) are independent risk predictors of prostate cancer.

Conclusions: According to ESUR guidelines and in patients with prior negative prostate biopsy, mpMRI is a valuable tool for the prediction of prostate cancer in second TPB. Lower the prostate volume, the higher the reliability.

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La resonancia magnética multiparamétrica predice la presencia de cáncer de próstata en pacientes con biopsia prostática negativa

Resumen

Objetivo: Evaluar el papel del estudio multiparamétrico mediante imagen por resonancia magnética (mpMRI) de próstata para detectar cáncer de próstata en pacientes con biopsia prostática transrectal (BPTR) negativa previa.

Material y métodos: Se practicó una mpMRI (secuencias TSE-T2-w, DWI y DCE) de la próstata con equipo de 1.5T (Magnetom Avanto; Siemens Healthcare Solutions) a 150 pacientes con sospecha previa de cáncer de próstata y BPTR negativa. Se aplicaron criterios de European Society of Urogenital Radiology (ESUR) (1: muy posiblemente benigno, 2: posiblemente benigno, 3: dudoso, 4: posiblemente maligno, y 5: muy posiblemente maligno). A todos los pacientes se les realizó PSA (total y libre), tacto rectal (TR), ecografía transrectal (ETR) y segunda BPTR de, al menos, 14 cilindros. Las variables fueron analizadas de forma ciega independiente. Se estudió la exactitud de cada prueba y se evaluó un modelo de selección de variables *stepwise* para predecir cáncer en la segunda BPTR.

Resultados: La edad media \pm desviación estándar fue $66,2 \pm 5$ (51-77) años, el PSA $11,3 \pm 9,6$ (0,9-75) ng/mL y el volumen prostático $82,2 \pm 42$ (20-250) cc. El TR fue sospechoso en 11 (7,3%) pacientes. La segunda BPTR muestreó $17,6 \pm 2,7$ (14-22) cilindros por caso y resultó positiva en 28 (18,7%) pacientes. La mpMRI se consideró positiva (3-5) en 102 (68%), siendo la sensibilidad de la prueba del 92,9% y el VPN del 95,8%. Modifican riesgo de cáncer en segunda BPTR: velocidad de PSA $>0,75$ (OR 1,04 [0,99-1,08]); $p=0,06$, PSA libre/total $<15\%$ (OR 0,37 [0,13-1,05]; $p=0,06$, cada cc de volumen prostático (OR 0,98 [0,97-1]; $p=0,017$) y mpMRI 3-5 (OR 7,87 [1,78-34,7]; $p=0,006$). El análisis multivariante reveló que mpMRI (OR 7,41 [1,65-33,28]; $p=0,009$) y volumen prostático (OR 0,31 [0,12-0,78]; $p=0,01$) definen riesgo de cáncer de forma independiente.

Conclusiones: La mpMRI según criterios ESUR es una herramienta de gran valor para predecir la presencia de cáncer en la segunda BPTR en pacientes con biopsia previa negativa y resulta más fiable en próstatas de menor volumen.

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Introduction

Prostate cancer is the second most frequently diagnosed malignancy in men and the sixth leading cause of cancer death worldwide.^{1,2} The confirmation diagnosis is performed by means of the histopathological study, usually by means of transrectal ultrasound-guided prostate biopsy (TRUS) practiced by elevated PSA or before finding DRE suspicious for malignancy. In any case, both the risks and benefits of performing this biopsy must be taken into account, as well as the age and comorbidity of the patient.³ There is no consensus on the ideal final number of samples to be obtained, but it has been found that obtaining a minimum of 8 prostate

cylinders and a maximum of 12 rises up the detection rate of cancer in up to 20–33% of cases.⁴

We also know that TRUS is not infallible and that due to different factors it may fail in the diagnosis of prostate malignancy. One of these factors is the one that refers to the technique of performing the biopsy, which tends to be carried out on the same prostate areas repeatedly, resulting in a detection rate that does not exceed 25%.^{5,6} Another factor involved considers that, according to studies on radical prostatectomy specimens, 25–33% of prostate cancers are distributed along the anterior prostate.⁷ This figure rises to 57% when transperineal saturation biopsy guided by grid is used.⁸ Moreover, prostate malignancy is often diagnosed

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