ORIGINAL REPORT

Usefulness of cognitive targeting in multiparametric MRI-guided biopsy to diagnose the dominant lesion in prostate cancer[☆]

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Abstract

Objective: To evaluate the safety and efficacy of cognitive targeting in multiparametric MRI-guided biopsy to obtain samples of the dominant nodule in prostate cancer.

Material and methods: We performed cognitive-targeted biopsy after multiparametric MRI in 53 patients with progressive elevation of PSA. All patients provided written informed consent. Biopsies were done via a transperineal route under ultrasound guidance. The first three samples were obtained by cognitive targeting, with the target lesion determined by multiparametric MRI according to the PI-RADS (prostate imaging, reporting, and data system) criteria. Then nine cylinders were obtained from the remaining segments of the prostate (systematic biopsies). The pathologist evaluated the 12 cylinders without knowing which ones were obtained by cognitive targeting. In patients with multifocal lesions, we defined the dominant lesion as the one with the highest Gleason score and tumor volume; in patients with unifocal lesions, we defined the dominant lesion as the lesion identified.

Results: We diagnosed 29 prostate tumors. In 89.7% (26/29), the dominant nodule was diagnosed by the cognitive-targeted biopsy. If only cognitive-targeted biopsy had been done, the dominant nodule would not have been diagnosed in two (3.8%, 2/53) patients and only one (1.8%, 1/53)

patient, in whom no sample was obtained from the lesion with the highest Gleason score, would have been understaged. The rate of positivity of cognitive-targeted biopsy was 50.9% (27/53) in the entire group of patients and 46.3% (19/41) in the group of patients with previous negative biopsies. No significant immediate or late complications were observed.

Conclusion: Cognitive targeting is safe and efficacious for detecting the dominant lesion in prostate cancer.

Utilidad de la biopsia guiada cognitivamente por resonancia magnética multiparamétrica para diagnosticar la lesión dominante del cáncer de próstata

Resumen

Objetivo: Evaluar la seguridad y eficacia de la biopsia guiada cognitivamente (BGC) con la resonancia magnética multiparamétrica (RMmp) para obtener muestras del nódulo dominante del cáncer de próstata.

Material y métodos: Realizamos una BGC en 53 pacientes por elevación progresiva del PSA tras hacer una RMmp. Todos los pacientes firmaron el consentimiento informado. Las biopsias se realizaron por vía transperineal con control ecográfico. Las 3 primeras muestras se obtuvieron de la lesión diana determinada por la RMmp, utilizando criterios PIRADS (corresponden a las BGC). Posteriormente se obtuvieron 9 cilindros del resto de los segmentos de la próstata (biopsias sistemáticas). El anatomopatólogo valoró los 12 cilindros sin saber cuáles correspondían a las BGC y cuáles a las biopsias sistemáticas. Definimos como lesión dominante la de mayor valor Gleason y volumen tumoral en lesiones multifocales y a la única lesión detectada en tumores unifocales.

Resultados: Diagnosticamos 29 tumores de próstata. En el 89,7% (26/29), el nódulo dominante fue diagnosticado por las BGC. De haber realizado únicamente las BGC no se hubieran diagnosticado 2 pacientes (3,8%, 2/53) y se hubiera infraestadificado solo uno (1,8%, 1/53) en el que no se obtuvo muestra de la lesión con mayor valor Gleason. La tasa de positividad de la BGC fue del 50,9% (27/53), y en los pacientes con biopsias previas negativas del 46,3% (19/41). No observamos complicaciones significativas inmediatas ni tardías.

Conclusión: La BGC es una técnica segura y eficaz para detectar la lesión dominante del cáncer de próstata.

Introduction

Prostate cancer (PC) is the most frequent tumor in men.[1] Most of them are diagnosed through an ultrasound-guided transrectal biopsy (UGTB). The percentage of positivity in the first UGTB ranges from 40 to 50%[2] and from 18 to 32%[3,4] in the second one. Managing a patient with progressive increase of prostate specific antigen (PSA) and repeatedly negative UGTB poses a challenge for both urologists and radiologists.

Although PC is a multifocal tumor, there are studies that show that up to 90% of the tumor volume can be attributed to a dominant lesion[5] that becomes progressively aggressive. This lesion is hard to detect through ultrasound and the UGTB does not guarantee that the sample comes from it, especially if it is located in the apical or anterior area. The result can be the understadification of the PC whose percentage published is 38%.[6,7]

Multiparametric magnetic resonance (mpMRI) is more accurate than other diagnostic modalities to detect and characterize PC.[8,9] It is the most reliable modality to guide prostate biopsy toward the dominant lesion. During the last few years, several modalities have been developed to guide biopsy through mpMRI (cognitive, fusion software, biopsy in magnetic resonance).[10,11] The biopsies within magnetic resonance require compatible robotic equipment, are expensive and increase the time of the study.[11] Both the fusion computer software between the mpMRI and the ultrasound images require additional expenses in ultrasound equipment and they do not improve the results of cognitive-guided biopsy (CGB).[12] In the CGB the operator makes a ''mental'' correlation between the mpMRI images and those of the ultrasound while performing the biopsy. To this end he can be assisted by printed images or by images from an additional screen.

The goal of this study is to assess the safety and effectiveness of the CGB through findings in the multiparametric