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ORIGINAL ARTICLE

Transperineal prostate biopsy with ECHO-MRI fusion. Biopsee system. Initial experience☆

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Abstract
Objective: The aim of this study is to present our initial experience with the stereotactic echo-MRI fusion system for diagnosing prostate cancer.
Material and methods: Between September 2014 and January 2015, we performed 50 prostate biopsies using the stereotactic echo-MRI fusion system. The 3-Tesla multiparameter MR images were superimposed using this image fusion system on 3D echo images obtained with the Biopsee system for the exact locating of areas suspected of prostate cancer. The lesions were classified using the Prostate Imaging Report and Date System.
Results: We assessed a total of 50 patients, with a mean age of 63 years (range, 45–79), a mean prostate-specific antigen level of 8 ng/ml (range, 1.9–20) and a mean prostate volume of 52 ml (range, 12–118). Prostate cancer was diagnosed in 69% of the patients and intraepithelial neoplasia in 6%. The results of the biopsy were negative for 24% of the patients. The results of the biopsy and MRI were in agreement for 62% of the patients; however, 46% also had a tumor outside of the suspicious lesion. We diagnosed 46% anterior tumors and 33% apical tumors. One patient had a hematuria, another had a hematoma and a third had acute urine retention.
Conclusions: Multiparametric prostatic MRI helps identify prostate lesions suggestive of cancer. The Biopsee echo-MRI fusion system provides for guided biopsy and increases the diagnostic performance, reducing the false negatives of classical biopsies and increasing the diagnosis of anterior tumors. Transperineal access minimizes the risk of prostatic infection and sepsis.

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Biopsia prostática transperineal con fusión de imagen ecografía-resonancia magnética. Sistema Biopsee. Experiencia inicial

Resumen
Objetivo: El objetivo del estudio es presentar nuestra experiencia inicial con el sistema estereotáctico de fusión de imagen ECO-RM para el diagnóstico de cáncer de próstata.
Material y métodos: Entre septiembre de 2014 y enero de 2015 se realizaron 50 biopsias de próstata mediante el sistema estereotáctico de fusión de imagen ECO-RM. Las imágenes de RM multiparaméticas 3 Tesla (RM3T) se superpusieron mediante este sistema de fusión de imagen sobre las imágenes de ECO3D obtenidas con el sistema Biopsee para la localización exacta de las zonas de sospecha de cáncer de próstata. Las lesiones se clasificaron mediante el sistema *Prostate Imaging Report and Data System*.
Resultados: Se valoraron un total de 50 pacientes, edad media de 63 años (rango 45–79), PSA medio 8 ng/ml (rango 1,9–20) y un volumen prostático medio de 52 ml (rango 12–118). Se diagnosticó cáncer de próstata en el 69% de los pacientes, neoplasia intraepitelial (PIN) en el 6% y la biopsia resultó negativa en el 24%. Un 62% de los pacientes tenía coincidencia entre la biopsia y la RM, pero un 46% presentó tumor también fuera de la lesión sospechosa. Se diagnosticaron un 46% de tumores anteriores y un 33% de tumores apicales. Un paciente presentó hematuria, otro un hematoma y un tercero retención aguda de orina.
Conclusiones: La RM prostática multiparamétrica permite identificar lesiones de próstata sugestivas de cáncer. El sistema Biopsee de fusión de imagen ECO-RM permite su biopsia dirigida y aumenta el rendimiento diagnóstico, reduce los falsos negativos de las biopsias tradicionales y aumenta el diagnóstico de tumores anteriores. El acceso transperineal minimiza el riesgo de infección prostática o sepsis.

Introduction

Prostate cancer is the most common solid tumor in men.[1] In Spain, an incidence of prostate cancer of 21.7% is estimated, and an annual mortality of about 5000–6000 men.[2] One of the greatest challenges in the therapy of prostate cancer is the identification and accurate diagnosis of tumor lesions. Faced with an increased prostate specific antigen (PSA) in blood or suspicious digital rectal examination, performing a transrectal ultrasound-guided prostate biopsy is indicated, which is currently the standard technique for the diagnosis of prostate cancer. However, its high rate of false negatives, the need for repeating the biopsies, and the risk of post-biopsy infection (3–5%) are favoring the emergence of new diagnostic techniques.[3–5]

The most recent advances in imaging techniques have made it possible to superimpose real-time magnetic resonance imaging (MRI) with ultrasound images. The Biopsee stereotactic system allows for a ECO3D study of the prostate, merging it with the image of MRI, and planning biopsies aimed at suspicious lesions transperineally.[6] The prostate multiparameter RM3T provides high sensitivity and specificity in detecting lesions suspicious of cancer. The radiological classification system PIRADS[7] allows for stratification of patients into risk categories. Although there are some international studies, there are still no studies published in Spain for evaluating the applicability of this technique in clinical practice.

The aim of this study is to describe our initial experience with the technique and to show the effectiveness in the diagnosis and the safety of it.

Material and methods

Between September 2014 and January 2015, prostate biopsies were performed with the stereotactic image fusion system ECO-RM to all patients, with elevated PSA or abnormal digital rectal examination, and that also showed, at least, one suspicion injury in the multiparameter MRI (mpMRI).

Biopsee prostate mapping the system: contour of images of prostate MRI and injuries

Firstly, a prostate mpMRI was performed. In cases where at least one lesion suspicious of malignancy was detected, a prostatic mapping was indicated. The images of the mpMRI were loaded in the Biopsee system and the contour of each of the prostate images obtained from T2 was marked. The contour of all suspicious lesions was also marked and they were classified according to the PIRADS system, having the images in dissemination and their value of Apparent Diffusion Coefficient (ADC) as a guide for their classification (Fig. 1).

Prostate ultrasound scanning and fusion of ultrasound-magnetic resonance images

The procedure was performed in the operating room and the patient was placed in lithotomy position under spinal anesthesia or sedation. Then, the sterile perineum was exposed and the ultrasound transducer was inserted transrectally