Prostate cancer detection rate in patients with a negative multiparametric MRI or a negative biopsy after 2 years of follow-up

Giannetto G., Appendino E., Pusceddu L., Doronzo V., Russo F., Regge D.

INTRODUCTION

Current EAU guidelines recommend to perform multiparametric MRI (mp-MRI) of the prostate after a first negative biopsy in patients with a persistent suspicion of Prostate Cancer (PCa). Recently, the PROMIS study suggests to use mp-MRI before biopsy, also in biopsy-naive patients as a triage test.

Although MRI has a higher negative predictive value (NPV) than TRUS-guided biopsy to identify clinically significant tumors, about 10% of PCa are missed at MRI and identified at template prostate mapping (TPM).

Since there are not approved guidelines or indications in literature for patients with negative MRI, it is necessary to plan an adequate follow-up for these subjects.

PURPOSE

The primary aim of this study is to assess PCa detection rate among patients in follow-up after a negative mp-MRI or biopsy; the secondary aim is to evaluate the negative predictive value of mp-MRI in the detection of PCa.

MATERIALS and METHODS

STUDY POPULATION

Follow-up was conducted on subjects from a randomized prospective clinical trial (PROCURE study), performed in Candilocia Cancer Institute - FPO IRCCS, between November 2014 and December 2016. All subjects underwent mp-MRI (1st-MRI), after a clinical or laboratory suspicion of PCa. The subjects who were positive at mp-MRI were randomized in two different groups: Group 1 (in-bore MRI-guided biopsy) and Group 2 (saturation TRUS-guided biopsy).

The subjects with a negative 1st-MRI or a negative biopsy entered the following study (FU), and they were monitored periodically with PSA values and urological visit every 6 months. Subjects who completed at least 2-year clinical-radiological follow-up were included in the analysis. In cases of PSA doubling time less than 3 years or positive digital rectal examination (DRE), subjects underwent a second mp-MRI (2nd-MRI). If suspicious lesions have been identified at 2nd-MRI, they underwent prostate biopsy. In case of histological confirmation of PCa, subjects underwent radical prostatectomy or alternative therapies and they were considered as true positive cases.

Subjects who presented the following characteristics were considered as true negative cases:

- Subjects with no clinical suspicion of PCa
- Subjects with a negative 2nd-MRI
- Subjects with a negative biopsy after the 2nd-MRI

IMAGING, MRI INTERPRETATION and REFERENCE STANDARD

2nd-MRI of patients in FU was performed using a 1.5 T magnet, and a phased-array coil combined with an endorectal coil. The imaging protocol included T1- and T2-weighted, diffusion-weighted, and dynamic contrast-enhanced imaging, according to PI-RADS v.2 recommendations.

Subjects with lesions with the following characteristics were considered positive at 2nd-MRI and underwent biopsy:

- PI-RADS score = 3 and largest diameter ≥ 7 mm
- PI-RADS score = 4 or 5 and clinically significant size (diameter ≥ 5 mm)

Otherwise, subjects with the following characteristics were considered negative at 2nd-MRI and continued the FU:

- No suspicious areas found at mp-MRI
- Mp-MRI with PI-RADS score = 1, 2 or 3 with lesion’s diameter < 7 mm
- Mp-MRI with PI-RADS score = 4 or 5 but no clinically significant size (≤ 4 mm)

The reference standard was biopsy Gleason score (bGS). All PCa with bGS ≥ 7 were considered clinically significant.

Histological data were compared with mp-MRI images to identify the correspondence between the location of a positive biopsy and MRI findings.

RESULTS

A total of 169 subjects participated in the FU: 158 subjects with 1st-MRI negative (arm A) and 11 subjects with 1st-MRI positive but negative biopsy (arm B).

Considering both groups, during the FU, 47/169 subjects (87% coming from arm A and 13% from arm B) underwent a 2nd-MRI. The average time elapsed from the 1st-MRI was 14 months. In 10/47 (21%) patients a prostate lesion was found, triggering a biopsy.

Presence of PCa was biopsy-confirmed in 7/10 (70%) patients (5 men with GS=3+4, 1 with GS=4+3 and 1 with GS=3+3). Among these subjects two presented PI-RADS score = 3 at 2nd-MRI (they were PI-RADS 2 at 1st-MRI) and five presented PI-RADS 4 at 2nd-MRI (three were PI-RADS 3 and two were PI-RADS 4 at 1st-MRI).

Among the 7 biopsy-proven PCa after the 2nd-MRI, 2 were already reported on the 1st MRI, although not confirmed by 1st MRI.

The detection rate of PCa among subjects in FU was 4.2% (7/169). Considering only clinically significant (GS ≥ 7) PCa, the detection rate was 3.5% (6/169).

No clinical or laboratory suspicion of PCa were observed during the 2-year follow-up period in 122/169 (72.2%) patients (517 men from arm A and 5 men from arm B). Overall 162/169 patients were negative for PCa presence (NPV of 95.8%).

CONCLUSIONS

This study showed that mp-MRI has a NPV of 95.8% for all PCa and 96.5% for clinically significant PCa, considering a follow-up of two years. Biopsy can be safely avoided in subjects with a negative mp-MRI, if follow-up is performed with clinical examination and PSA assessment.