Managing Discordant Findings Between Multiparametric Magnetic Resonance Imaging and Transrectal Magnetic Resonance Imaging–directed Prostate Biopsy—The Key Role of Magnetic Resonance Imaging–directed Transperineal Biopsy

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Abstract

Background: Discordant findings between multiparametric magnetic resonance imaging (mpMRI) and transrectal image-guided biopsies of the prostate (TRUS-P) may result in inadequate risk stratification of localized prostate cancer.

Objective: To assess transperineal image-guided biopsies of the index target (TPER-IT) in terms of disease reclassification and treatment recommendations.

Design, setting, and participants: Cases referred for suspicion or treatment of localized prostate cancer were reviewed in a multidisciplinary setting, and discordance was characterized into three scenarios: type I—negative biopsies or International Society of Urological Pathology (ISUP) grade 1 cancer in Prostate Imaging Reporting and Data System (PI-RADS) ≥4 index target (IT); type II—negative biopsies or ISUP grade 1 cancer in anterior IT; and type III—<3 mm stretch of cancer in PI-RADS ≥3 IT. Discordant findings were characterized in 132/558 (23.7%) patients after TRUS-P. Of these patients, 102 received reassessment TPER-IT.

Outcome measurements and statistical analysis: The primary objective was to report changes in treatment recommendations after TPER-IT. Therefore, cores obtained by primary TRUS-P and TPER-IT were analyzed in terms of cancer detection, ISUP grade, and Cambridge Prognostic Group classification using descriptive statistics.

Results and limitations: TPER-IT biopsies that consisted of fewer cores than the initial TRUS-P (seven vs 14, p < 0.0001) resulted in more cancer tissue materials for analysis (56 vs 42.5 mm, p = 0.0003). As a result, 40% of patients initially considered for follow-up (12/30) and 49% for active surveillance (30/61) were reassigned after TPER-IT to surgery or intensity-modulated radiotherapy.

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Conclusions: Nonconcordance between pathology and imaging was observed in a significant proportion of patients receiving TRUS-P. TPER-IT better informed the presence and grade of cancer, resulting in a significant impact on treatment recommendations. A multidisciplinary review of mpMRI and TRUS-P findings and reassessment TPER-IT in type I–II discordances is recommended.

Patient summary: In this report, patients with suspicious imaging of the prostate, but no or well-differentiated cancer on transrectal image-guided -biopsies, were offered transperineal image-guided biopsies for reassessment. We found that a large share of these had a more aggressive cancer than initially suspected. We conclude that discordant results warrant reassessment transperineal image-guided biopsies as these may impact disease risk classification and treatment recommendations.

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1. Introduction

Prostate multiparametric magnetic resonance imaging (MRI) is a cornerstone of international guidelines on prostate cancer detection and risk stratification [1,2]. Upfront MRI focuses attention on a region of interest (ROI) that image-guided biopsies (IGBs) characterize with precision [3]. Furthermore, cognitive or software-assisted IGBs address the risks of overdetection of nonsignificant cancers and demonstrate aggressive prostate cancer more often than standard sextant biopsies [4]. Moreover, increments in the Prostate Imaging Reporting and Data System (PI-RADS) values [5] correlate consistently with the aggressiveness of the cancer evaluated by either the Gleason score [6–8] or the International Society of Urological Pathology (ISUP) groups [9], and refine the risk stratification of localized prostate cancer.

However, the delicate chain that runs from clinical suspicion to diagnosis is prone to successive pitfalls such as false-positive MRI findings, PI-RADS inter-reader variability, influence of tumor location, and technical errors in image registration or needle placement [10–12]. Thus, discordance between MRI and fusion biopsies may result in inadequate risk stratification that may be redressed by software-registration IGBs.

Here, we assessed the consequences of transperineal fusion biopsies on disease reclassification and treatment recommendations.

2. Patients and methods

As previously reported [13], cases referred for suspicion or treatment of localized prostate cancer were reviewed collaboratively during the institutional Prostate Cancer Multidisciplinary Meeting (PCMM) by a group of senior radiologists (O.M., R.A., and D.P.), urologists (M.R., G.P., and B.M.), a radiation oncologist (P.G.C.), and a genitourinary pathologist (S.P.).

2.1. MRI review and transperineal IGBs

MRI review followed the PI-RADS version 2 guidelines [5]; the index target (IT) was defined as the largest ROI of the highest category. This information was compared with the pathology of the cores from the IT or obtained in a systematic pattern by transrectal elastic-fusion biopsies of the prostate (TRUS-P). Findings were classed as possibly nonconcordant in any of the three following scenarios:

1. Type I: no cancer or ISUP 1 cancer in PI-RADS ≥4 IT
2. Type II: no cancer or ISUP 1 cancer in PI-RADS ≥3 IT located anteriorly on the 39-segmentation model [5]
3. Type III: any ISUP group assigned on a short segment of cancer tissue (maximum cancer core length <3 mm) obtained by IGBs of PI-RADS ≥3 IT.

Nonconcordant cases were offered transperineal elastic-registration IGBs with a CE-marked, Food and Drug Administration–approved MRI/three-dimensional (3D) TRUS image-guided system (TRINITY; Koelis, Grenoble, France). Additional cores were obtained at the discretion of the operator from secondary targets or in a random systematic pattern. Following the current guidelines that recommend IGBs and systematic sextant biopsies in biopsy-naïve patients but allow IGBs alone in repeat-biopsy patients, the results of all the cores taken within the prostate by primary TRUS-P were compared only with those targeted at the IT by repeat transperineal biopsy (TPER-IT).

2.2. Multidimensional risk stratification

Cores were processed by a dedicated pathologist whose grading followed the ISUP consensus conference [14]. Surrogates of cancer volume were reported as the longest stretch of cancer on any positive core (maximum cancer core length) and the cumulated length of cancer available for pathology (total cancer core length) [15]. Risk groups followed the Cambridge Prognostic Group (CPG) classification that was reported to be a better predictor of cancer death, including under active surveillance (AS), than the traditional three-tier classification [16].

The density of tissue harvesting was approximated from the number and the cumulated tissue length (CTL) procured by the cores targeted to the IT or the whole gland.

2.3. Treatment recommendations

Treatment recommendations followed the institution-adapted European Association of Urology guidelines that take into account age as a proxy for life expectancy (Supplementary Table 1). Recommendations based on primary TRUS-P were secondarily complemented by the information obtained from the TPER-IT cores. For clarity, the lesser invasive recommendation was selected whenever two or more could be made, which was AS when low-dose rate brachytherapy, intensity-modulated radiotherapy, or surgery were alternate options.
2.4. Statistical analysis

In this retrospective analysis of prospective data from the PCMM, the primary objective was to report changes in treatment recommendations before and after TPER-IT.

For descriptive analyses, medians and 95% confidence intervals (95% CIs) are presented for continuous variables, whereas absolute values and percentages are provided regarding categorical variables. For comparison of continuous variables of non-Gaussian distribution, nonparametric statistics were used; the Mann-Whitney U test or the Wilcoxon test was used for matched-paired comparisons. All p values were two sided. Statistical significance was set at p < 0.05 (Prism version 5.0; GraphPad Software, Inc., San Diego, CA, USA).

Institutional ethics committee approved the study. Informed consent was obtained from all participants.

3. Results

From January 2018 to March 2020, the PCMM reviewed 2602 prostate cancer cases, including 1161 (44.6%) for suspicion or primary diagnosis of localized prostate cancer. Of 558 patients assessed by transrectal IBGs, nonconcordant findings between MRI and pathology were observed in 132 (23.7%). A total of 102 patients who received complementary TPER-IT composed the study population (Fig. 1). The median interval between biopsies was 7.1 mo (95% CI: 6.1–11.0).

3.1. Cancer detection and disease reclassification

As expected, most cases showed more than one type of discordance (Fig. 2), principally types I (88 patients) and II (63 patients).

Compared with the initial transrectal biopsy, fewer cores and tissue materials were taken by transperineal biopsy (median: seven vs 14 cores; CTL: 98 vs 189 mm, both p < 0.0001), which however provided more cancer tissue materials for characterization from the IT (CTL: 56 vs 42.5 mm, p = 0.0003; Table 1).

Significant differences in cancer detection, risk stratification, and treatment allocation were observed between the methods of biopsy. TRUS-P and TPER-IT resulted in a diagnosis of cancer in 72 and 68 patients, respectively (Table 2). In 18 cases, the two methods concurred in their negative conclusions, with TPER-IT cores demonstrating inflammation in 12 patients, active (six/12, 50%) or chronic or granulomatous (8/12, 75%).

In line with the process of selection for TPER-IT, the cores obtained by TRUS-P rarely demonstrated aggressive tumors (nine/72 ISUP 2–3 cancers, 12.5%). On the contrary, TPER-IT cores that obtained more cancer material from the IT (Fig. 3) demonstrated mainly ISUP 2–3 cancers (46/68 cancers, 67.6%).

Consequently, 19 of 64 patients initially considered to be at a low risk (CPG 1–2; Table 3) were upgraded to CPG 3–4 by TPER-IT, which also revealed cancer in 12 patients.

3.2. Changes in treatment recommendations

Ultimately, TPER-IT reassigned a significant share of patients initially considered for follow-up (12/30, 40%) or AS (30/61, 49%). It informed a 40% reduction in the indications of AS or follow-up (52/91, 57%) and a four- to fivefold increase in recommendations of intensity-modulated radiotherapy (from four to 20) or surgery (from seven to 30; Table 4). While patients reassigned were significantly older (67.6 vs 62.9 yr, p = 0.01) and with smaller prostates (48.5 vs 55.0 mL, p = 0.03) than the others, no meaningful differences were observed in terms of prostate-specific antigen (PSA), PSA density, diameter of the IT, and types of discordant findings between imaging and TRUS-B (Supplementary Table 2). Of the 28 patients who were elected to undergo radical prostatectomy, concordance in ISUP grading with the prostatectomy specimen was demonstrated in three (10.7%) and 18 (64.3%) patients for TRUS-P and TPER-IT, respectively (Supplementary Table 3).

4. Discussion

International guidelines position MRI at the forefront of the detection and risk stratification of prostate cancer [1,2]. A recent Cochrane review concluded that the "MRI pathway";
that is, MRI with or without MRI-targeted biopsy, improved the detection of clinically significant (ISUP grade ≥2) cancers and reduced the detection of insignificant lesions, compared with systematic TRUS-guided biopsy [17]. However, for the proposed cancer prevalence of 30%, the calculated sensitivity (0.72) and specificity (0.96) figures were surprisingly high in view of the many pitfalls reported in such a complex chain of events [18].

Table 1 – Patients’ characteristics in a cohort of 102 consecutive transperineal image-guided classification biopsies

<table>
<thead>
<tr>
<th>Patient (n = 102)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>65.2 (63.1–68.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior sets of biopsies</td>
<td>1 (1–2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostate volume (ml)</td>
<td>53 (48–59)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSA (ng/ml)</td>
<td>9.4 (8.2–10.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSA density (ng/ml²)</td>
<td>0.16 (0.14–0.18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤0.15</td>
<td>n = 46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;0.15</td>
<td>n = 56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary meeting MRI review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index target diameter (mm)</td>
<td>14 (12–16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior location</td>
<td>n = 69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI-RADS 3</td>
<td>n = 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI-RADS 4</td>
<td>n = 52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI-RADS 5</td>
<td>n = 41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second target</td>
<td>44 targets, 8 ISUP 1, 4 ISUP 2, 2 ISUP 3 positive on TPER a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third target</td>
<td>12 targets, one ISUP 1 positive on TPER a</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Initial TRUS</th>
<th>2nd TPER</th>
<th>Wilcoxon matched-pair signed rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cores</td>
<td></td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Total number of cores</td>
<td>14 (14–14)</td>
<td>7 (6–8)</td>
<td></td>
</tr>
<tr>
<td>Number of positive cores</td>
<td>1 (1–2)</td>
<td>3 (2–4)</td>
<td>0.0005</td>
</tr>
<tr>
<td>Cumulated tissue length (mm)</td>
<td>189 (176–205)</td>
<td>98 (88–107)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Maximum cancer core length</td>
<td>1.3 (1–2.1)</td>
<td>3 (1.5–6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cumulated cancer core length</td>
<td>2 (1–3)</td>
<td>6 (2.5–14)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Index target cores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of cores</td>
<td>4 (3–4)</td>
<td>4 (4–6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Number of positive cores</td>
<td>0 (0–1)</td>
<td>2 (1–2)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cumulated tissue length (mm)</td>
<td>42.5 (38–48)</td>
<td>56 (48–61)</td>
<td>0.0003</td>
</tr>
<tr>
<td>Maximum cancer core length</td>
<td>0 (0–0.4)</td>
<td>3 (1.5–6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cumulated cancer core length</td>
<td>0 (0–0.4)</td>
<td>5 (2–12)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

ISUP = International Society of Urological Pathology; IT = index target; MRI = magnetic resonance imaging; PI-RADS = Prostate Imaging Reporting and Data System; PSA = prostate-specific antigen; TPER = transperineal image-guided biopsy; TRUS = transrectal elastic-fusion biopsy.
Median and 95% confidence interval are presented for continuous variables.

a No changes in terms of Cambridge Prognostic Group compared with TPER-IT in all patients but one where two ISUP 1 cores were demonstrated on the second target.

Fig. 2 – Venn diagram of the different types of nonconcordant findings between transrectal image-guided biopsies of the prostate and multiparametric MRI. Red dots indicate patients in whom cores targeted at the index target by repeat transperineal biopsy (TPER-IT) entailed treatment reassignment. ISUP = International Society of Urological Pathology; MCCL = maximum cancer core length; MRI = magnetic resonance imaging; PI-RADS = Prostate Imaging Reporting and Data System; TRUS-P = transrectal image-guided biopsies of the prostate.
Table 2 – Cross-tabulation of highest ISUP group by biopsy method

<table>
<thead>
<tr>
<th>TPER-IT</th>
<th>No cancer</th>
<th>ISUP 1</th>
<th>ISUP 2</th>
<th>ISUP 3</th>
<th>MCCL (mm)</th>
<th>CCCL (mm)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPER-IT</td>
<td>No cancer</td>
<td>18</td>
<td>12</td>
<td>4</td>
<td>–</td>
<td>–</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>ISUP 1</td>
<td>3</td>
<td>19</td>
<td>–</td>
<td>3.0 (1–5)</td>
<td>3.3 (1–11)</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>ISUP 2</td>
<td>5</td>
<td>25</td>
<td>3</td>
<td>2.0 (0.5–3.0)</td>
<td>8.0 (8–11)</td>
<td>21 (18–28)</td>
</tr>
<tr>
<td></td>
<td>ISUP 3</td>
<td>4</td>
<td>7</td>
<td>–</td>
<td>9.0 (4–14)</td>
<td>14 (6–41)</td>
<td>11</td>
</tr>
<tr>
<td>MCCL (mm)</td>
<td>–</td>
<td>3.1 (2.1–4.0)</td>
<td>1.0 (0.5–2.5)</td>
<td>1.3 (0.5–2.0)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>CCCL (mm)</td>
<td>–</td>
<td>5.0 (3.0–7.0)</td>
<td>2.0 (1.0–4.0)</td>
<td>1.8 (0.5–3.0)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>63</td>
<td>7</td>
<td>2</td>
<td>–</td>
<td>–</td>
<td>102</td>
</tr>
</tbody>
</table>

CCCL = cumulated cancer core length; ISUP = International Society of Urological Pathology; MCCL = maximal cancer core length; TPER-IT = transperineal image-guided biopsies of the index target.

Number of patients and median values with 95% confidence intervals of MCCL and CCCL by biopsy methods.

Fig. 3 – Maximum cancer core length measured on the cores obtained from the index target by transrectal image-guided biopsies or by transperineal elastic registration biopsies. CI = confidence interval; TPER-IT = transperineal image-guided biopsies of the index target; TRUS = transrectal elastic-fusion biopsy.

Placing such emphasis onto MRI in the detection and staging of prostate cancer spurred us to question the inconsistencies that may arise when it is contradicted by the results of IGB cores. The institutional PCMM was organized with the objective to control the risks that the MRI pathway overlooked significant cancers.

It was first necessary to define the situations where the results of MRI and TRUS IGBs should be considered equivocal. To that end, in 2018, we proposed three scenarios that have been used systematically since then at our institution to recommend reassessment IGBs.

The technique of biopsy also had to be adapted to the specific constraints of repeat biopsies. The transperineal method was preferred to the transrectal route that showed limitations in accessing the base and the apex [11,19] and entailed a higher risk of infection [20], a matter of particular concern in reassessment biopsies since recent transrectal biopsy may drive serious infectious complications [21]. Software-assisted elastic-fusion registration was preferred to the template method as it required fewer cores and was feasible under local anesthesia [13]. In this setting, we obtained a median number of four cores from the IT, which was recently demonstrated in a cohort of 478 PI-RADS ≥3 targets to be sufficient to control under grading [22].

Ultimately, it was necessary to demonstrate the clinical relevance of that process to treatment recommendations. The objectives of IGBs are twofold, to demonstrate cancer and to procure optimal samples for characterization.

To this end, reporting of both well-differentiated ISUP 1 cancer and benign tissue was considered equivocal and categorized as type I discordant result in PI-RADS ≥4 IT and type II in anterior IT. In MRI-visible cancers, molecular dissection recently highlighted the co-occurrence of pathological, molecular, and microenvironmental defects—the nimbosus phenomenon—which correlates with hypoxia and aggressive features [23]. It also showed that MRI visibility increased with the summation of key molecular hallmarks [24], in line with the classical correlation between PI-RADS categories and Gleason scores [6–8] or ISUP groups [9]. Reverse reasoning, therefore, cautioned against reporting no cancer or well-differentiated ISUP grade 1 cancer within a readily visible target (type I). Indeed, of the 88 patients in that situation, TPER-IT demonstrated ISUP 2 and 3 cancers in 31 (35.2%) and ten (11.4%) patients, respectively, thereby redressing the inconsistency in a patient out of two.

However, benign tissue could also be representative of the true state of the IT. This situation was recently shown to correlate with a higher density of connective tissue, basal cell hyperplasia, and inflammation than observed in concurrent systematic biopsies [25]. In the present series, it was observed in 18 patients, of whom 12 showed active or
chronic inflammation. They represented 11.7% of the cohort, in line with the 8.2% prevalence of prostatitis in the general population [26]. Inflammation is a classical limitation of prostate imaging [27,28], which pending developments in imaging [29,30] and biomarkers [31] should be detailed in the pathology report, as it can clarify the troubling situation of negative cores taken within highly suspicious targets.

The location of the target was also considered an independent source of confusion, and type II categorization was designed to acknowledge the two limitations of IGBs of anteriorly located targets: the imprecision entailed by the deformation of the gland during the progression of the TRUS needle throughout its posterior half [13], and the prevalence in the transition zone (TZ) of stromal hyperplasia and prostatitis that impair PI-RADS performance [11,32]. In addition, while in the TZ the distinction between MRI equivocal (PI-RADS 3) and probable abnormal findings (PI-RADS 4) can be elusive [33], positioning the target in relation to the zonal anatomy is straightforward even for physicians of moderate experience in MRI. Here, type II was mostly assigned in conjunction with type I, where it selected a subpopulation of patients at a higher risk of treatment misallocation by the initial TRUS-P (Fig. 2). Of the 63 patients in that situation, treatment recommendations were reassigned after TPER-IT in 29 (46%).

Type III categorization was designed to acknowledge the risks that small samples entailed in terms of analyzing grade and tumor volume [14,34], two crucial determinants in treatment recommendations (Supplementary Table 1). In a minority of patients (11/36 patients, 30.6%; Fig. 2), complementary TPER-IT of type III discordance modified treatment allocation, although most also showed discordance of the two other types.

As a whole, types I and II readily identified a subset that was underevaluated by the current optimum of multidisciplinary review in a high-volume institution. Conversely, little information was gained in isolated type III, suggesting that complementary TPER-IT should be restricted to cases when no or well-differentiated cancers were detected in PI-RADS 4–5 (type I) or anteriorly located targets (type II).

Besides the proper selection of patients recommended for reassessment biopsies, optimal placement of the needle biopsy is also crucial to inform the true nature of the cancer. In a prospective study of the precision of transrectal biopsies, we observed that when off-target, even by a few millimeters, image-guided cores were less likely to demonstrate cancer [3] than on-target cores. It also measured that the targeting errors ranged from 7.1 mm for cognitive to 2.8 mm for elastic-fusion registration [3]. Regarding the transperineal approach, a 2–3 mm targeting error was
reported in a fixed phantom model with software-assisted rigid registration [35]. Following our institutional experience in the transperineal placement of brachytherapy needles where the motions and deformations induced by the probe and the needle are classical hurdles [36], we preferred to upgrade to a 3D deformable TRUS/MRI image registration system. It proved well suited to this highly selected population, where it obtained longer stretches of cancer material from the IT for analysis than the initial TRUS-P (p < 0.0001; Fig. 3). Improved placement by TPER-IT may also address the limitations of small stretches of cancer that may be wrongly suggested of poorly formed irregular Gleason pattern 4 glands [14]. Longer stretches of cancer tissue, therefore, contribute to the confident assignment of cancer grade by pathologists, one cornerstone in treatment recommendations [1,2]. Indeed, here the diagnosis of ISUP 2 and 3 cancers relied on longer cancer samples with TPER-IT than with TRUS-P (median cumulated cancer core length: 20 vs 2 mm and 14 vs 1.8 mm, for ISUP 2 and 3, respectively, both p < 0.0001; Table 2). TPER-IT also upgraded a significant minority (32 patients; Table 3) across the CPG classification, a better predictor of cancer death than the traditional three-tier classification [16].

Ultimately, to be clinically relevant, characterization of nonconcordance by TPER-IT should influence a patient’s management. This was true, in terms both of ISUP upgrading (Table 2) and treatment recommendations where it reduced the gray zone of AS and directed more patients toward treatments with curative intent (Table 4).

However, this study showed limitations. First, it was retrospective although based on data accrued prospectively. Second, targeting the IT by the transperineal method failed in a minority to confirm the diagnosis of cancer obtained by TRUS-P (Table 2). However, TPER-IT false negative rate (16 negative TPER-IT in 72 positive TRUS-P, 22.2%) was in line with a recent report on confirmatory in-bore MRI-guided biopsies that reported a false negative rate of 15.5%, compared with primary TRUS-guided biopsies [37]. In addition, this was observed mostly in patients diagnosed by the systematic cores of the TRUS-P, further attesting to the value in initial biopsy of combining targeted and systematic cores [12,38]. Third, current systems of risk classification are based on systematic biopsies, while the value of IGBs in the decision process and the prediction of clinical outcomes are still under investigation. Although IGBs were shown to correlate better with adverse pathological factors in recent European studies [38,39], the clinical utility of improved anticipation of ISUP grades (Supplementary Table 2) will require further studies before implementation in the clinical routine.

5. Conclusions

Nonconcordance between pathology and imaging was observed in a significant minority of patients receiving image-guided TRUS-P in the MRI pathway. Here, we showed that no or well-differentiated ISUP grade 1 cancer on TRUS-P targeting either PI-RADS ≥4 (type I) or anterior (type II) IT was prone to ISUP undergrading. TPER-IT was more informative regarding the presence and grade of cancer, thereby reassigning a significant share of patients initially considered for follow-up (12/30, 40%) or AS (30/61, 49%).

Author contributions: Bernard Malavaud had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Bajeot, Covin, Ploussard, Roumigué, Malavaud.

Acquisition of data: Bajeot, Covin.

Analysis and interpretation of data: Bajeot, Ploussard, Roumigué, Malavaud.

Drafting of the manuscript: Bajeot, Malavaud.

Critical revision of the manuscript for important intellectual content: Bajeot, Covin, Meyrignac, Pericart, Aziza, Portalez, Graff-Cailleaud, Ploussard, Roumigué, Malavaud.

Statistical analysis: Bajeot, Malavaud.

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Supervision: Malavaud.

Other: None.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi: https://doi.org/10.1016/j.euo.2021.06.001.

References


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