Original Article

Patient-reported pain associated with grid-based transperineal magnetic resonance imaging (MRI)/ultrasound (US) software fusion biopsy of the prostate under local anesthesia: a multicenter experience

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Background: Biopsy by transperineal (TP) approach is recommended standard for prostate cancer (PC) diagnosis. To avoid pain, patients undergoing TP biopsy may be offered sedation or general anesthesia. Our aim was to investigate the degree of patient-reported pain for magnetic resonance imaging (MRI)/ultrasound (US) fusion biopsy of the prostate being performed under local anesthesia (LA) and to study for possible factors associated with increased risk of significant pain (SP) in this setting.

Methods: In this retrospective observational study, we reviewed data of consecutive patients without a prior diagnosis of PC who underwent MRI/US software fusion biopsy of the prostate under LA with lidocaine at two centers between May 2020 and April 2022, and who reported their periprocedural pain on a Wong-Baker FACES Pain Rating Scale (0–10). We defined SP as reported pain score of 6–10. Patient and procedure characteristics together with SP were studied for interdependencies.

Results: A total of 299 patients were included. Median pain score was 2 (interquartile range: 2–4), with SP having been reported by 55 (18.4%) patients. Among patient characteristics, only age demonstrated association with SP [odds ratio (OR), per 10 years =0.53, 95% confidence interval (CI): 0.35–0.80, P=0.003] and patients aged 62 or above were significantly less likely to report SP (OR =0.33, 95% CI: 0.18–0.60, P<0.001).

Conclusions: Performing TP MRI/US fusion prostate biopsy under LA is associated with low rates of SP, with the risk being significantly lower in older men. The results of this study can serve as evidence resource for preprocedural counselling in patients especially concerned about the risk of pain.

Keywords: Prostate cancer (PC); fusion biopsy; transperineal biopsy; pain; local anesthesia

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Introduction

The transperineal (TP) approach for biopsy of the prostate is becoming gold standard in clinical practice, as advocated by the contemporary guidelines (1). Firstly, while recent evidence demonstrates no significant difference (2), TP biopsy may be superior to transrectal (TR) biopsy in diagnostic performance when combined with magnetic resonance imaging (MRI)/ultrasound (US) fusion (3-6), likely associated with improved cancer detection rates for anterior tumors (7). Secondly, the TP approach typically does not involve violation of the rectal mucosa, hence this route of bacterial spread is avoided, the risk of urinary tract infection (UTI) or sepsis is significantly decreased if not virtually eliminated with a TP biopsy, compared to a TR procedure (8,9). However, a TP biopsy requires the needle to penetrate through highly innervated layers of the pelvic floor. This approach, as opposed to the TR biopsy, has been traditionally linked to an increased risk of significant pain or discomfort to the patient, necessitating the use of higher-grade anesthesia (10). However, office-based TP biopsy under local anesthesia (LA) is becoming increasingly popular and several reports demonstrating safety with this setting have been recently published in the literature (11-15). On the other hand, some early studies concluded that TP biopsy under LA may be significantly more painful than a TR biopsy under LA (16-18). More recent studies have shown comparable pain scores (19-21) and a large multicenter, randomized trial aimed to provide high-quality evidence has been developed (22). Also, given that some patients may still require conversion to sedation during TP under LA (12), the knowledge gap in regard to which patients would be more likely to experience higher degree of pain during the procedure, appears to be clinically significant.

In this retrospective observational study, we aimed to investigate the degree of patient-reported pain associated with MRI/US TP fusion biopsy of the prostate being performed under LA, as well as to study for possible factors associated with increased risk of significant pain (SP) with this setting. We present this article in accordance with the STROBE reporting checklist (available at https://tau.amegroups.com/article/view/10.21037/tau-23-139/rc).

Highlight box

Key findings

- Transperineal (TP) fusion prostate biopsy under local anesthesia (LA) was associated with low risk (18.4%) of patient-reported significant pain (SP, ≥6 on a 0–10 scale).
- Age was inversely associated with SP. Patients aged ≥62 years were three times less likely to report SP (P<0.001).

What is known and what is new?

- Good tolerability of TP biopsy under LA has been already reported and we confirm this.
- We provide evidence that age was strongly associated with SP, with older patients tolerating the procedure better.

What is the implication, and what should change now?

- As many may consider higher-tier anesthesia appropriate for TP biopsy, we provide another evidence encouraging wider adoption of the procedure under LA.
- Our data may help in preprocedural counselling, especially in patients concerned about pain.
- Younger patients may be best candidates for pre-emptive analgesia if such management is considered, however, further research is necessary.

Methods

We retrospectively analyzed consecutive patients without a prior diagnosis of prostate cancer (PC) who underwent MRI/US software fusion biopsy of the prostate under LA at two centers (European Health Center Otwock, affiliated with the Second Department of Urology at Centre of Postgraduate Medical Education, Warsaw, and Department of Urology at St. Anna Hospital, Piaseczno), between May 2020 and April 2022. Data were collected in May 2022 from medical patient records and included: age, previous medical history, pre-biopsy prostate-specific antigen (PSA) level, MRI report, biopsy procedure report, and pathology report. Only patients with positive MRI (i.e., PIRADS category 3 or higher) were included. Patients for whom procedure-associated pain reports were not available were excluded from the study. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). According to local law regulations, due to the retrospective and noninterventional character of the study, there was no need for ethics approval nor patient informed consent.

MRI/US fusion biopsy

All biopsies were performed with TP approach, using the KOELIS Trinity MRI/US OBT Fusion® system, with the aid of the KOELIS Mini Grid™ device. Two experienced urologists performed all the procedures at the two participating centers. A digital rectal examination (DRE) was carried out and recorded just before the procedure.

Every biopsy included cores targeted at all the PIRADS ≥3 lesions identified in the MRI report. Occasionally, additional lesions considered suspicious by the performing urologists might have been subject to targeted biopsy. The minimal number of targeted cores was 3 per lesion in every case and additional cores might have been taken in case of larger or more complex lesions. Systematic biopsy was a part of the procedure in every biopsy-naïve patient. In other patients, systematic biopsy was performed if deemed necessary by the urologist, based on individual risk assessment. No specific template for systematic biopsy was used. The number and distribution of systematic cores were at the discretion of the performing urologist, dependent predominantly on the lesion location and size, as well as prostate volume (PV). Cores were taken with an 18-gauge needle. Most of the patients received preprocedural antibiotic prophylaxis consisting of a single dose of either 400 mg cefixime or 960 trimethoprim/sulfamethoxazole, administered 2 hours prior to the biopsy.

Local anesthesia procedure

Patients did not receive pre-emptive analgesia nor sedation. In every case, after placing and draping the patient in the lithotomy position, and skin decontamination, firstly, a total of 10 mL of 1% lidocaine solution was subcutaneously injected with a fine needle at multiple sites to the perineal area. Secondly, after inserting the TR probe into the rectum and visualization of the prostate, a TP bilateral injection of 0.5% lidocaine was administered with a 22-gauge needle to the presumed localization of neurovascular bundles along the posterolateral periprostatic area, with 15–20 mL of solution being injected on each side (larger amounts with larger PV). The total lidocaine dose was 175–200 mg and never exceeded the World Health Organization recommended maximum dose of 4.5 mg/kg or 300 mg. No additional intravenous sedation was administered.

Pain reporting

Immediately after the procedure patients were asked to report their overall experience with the biopsy on the Wong-Baker FACES Pain Rating Scale diagram (available at https://wongbakerfaces.org), shown by the performing urologist. The original version of the diagram, consisting of 0-1-2-3-4-5 numbers, was used in the office. For the purpose of this study, we converted (doubled) all the patient reported scores to the updated scale of 0-2-4-6-8-10. We defined SP as reported pain score of ≥6, which corresponds to the three most upset faces.

Other definitions

Clinically significant prostate cancer (csPC) was defined as grade group ≥2 cancer detected at biopsy.

Statistical analysis

Categorical and quantitative variables were reported as numbers (with percentages) and medians (with interquartile ranges), respectively. Percentages and continuous variables were compared with Chi-square and Mann-Whitney test, respectively. Associations between categorical and continuous variables and a dependent variable were investigated using logistic regression models. Outcomes of analyses were expressed as odds ratios (OR) with 95% confidence intervals (95% CIs). We considered the results statistically significant if P value <0.05. Additionally, to assess the level of discrimination we performed receiver operating characteristics (ROC) analysis and calculated area under the curve (AUC). Optimal threshold for discrimination was calculated using the Youden's method. Statistical analyses were performed using SPSS (IBM, version 24.0.0.0) and Matlab (MathWorks, version R2023a).

Results

We identified 459 patients who met the inclusion criteria. After exclusion of patients for whom pain reports were not available (n=160), 299 patients were eventually included into the analyses. The patient characteristics are presented in *Table 1*.

The median score of patient-reported pain was 2 (IQR: 2–4). Distribution of pain scores is presented in *Figure 1*. Significant pain (score ≥6) was reported by 55 (18.4%) patients.

Comparison of patient characteristics in regard to the level of reported pain (significant versus non-significant) is provided in *Table 2*. Associations between patient-related factors and significant pain, computed with univariable models, are presented in *Table 3*. As only one factor demonstrated significant association with the dependent variable, we did not proceed with multivariable modeling.

For patient age we computed an ROC model measuring the level of discrimination of SP from non-SP and revealed the AUC to be 0.65 (95% CI: 0.58–0.72). The optimal

Table 1 Patient characteristics

Characteristic	Center 1 (n=240)	Center 2 (n=59)	P value	Total (n=299)
Median age, year [IQR]	64 [59–69]	67 [62–70]	0.01	65 [60–69]
Median PSA, ng/mL [IQR]	6.8 [4.8–10.0]	6.4 [4.9–8.9]	0.56	6.6 [4.8–9.7]
Median PV, mL [IQR]	40 [33–56]	38 [32–57]	0.56	40 [33–56]
Median PSAD, ng/mL^2 [IQR]	0.17 [0.11–0.25]	0.15 [0.10–0.25]	0.68	0.17 [0.10–0.25]
Positive DRE, n (%)	66 (27.5)	7 (11.9)	0.01	73 (24.4)
Biopsy-naïve, n (%)	176 (73.3)	29 (49.2)	<0.001	205 (68.6)
PIRADS category, n (%)			0.10	
3	32 (13.3)	12 (20.3)		44 (14.7)
4	127 (52.9)	35 (59.3)		162 (54.2)
5	81 (33.8)	12 (20.3)		93 (31.1)
Lesion involving AFS, n (%)	33 (13.8)	19 (32.2)	<0.001	52 (17.4)

IQR, interquartile range; PSA, prostate-specific antigen; PV, prostate volume; PSAD, PSA density; DRE, digital rectal examination; PIRADS, Prostate Imaging Reporting and Data System; AFS, anterior fibromuscular stroma.

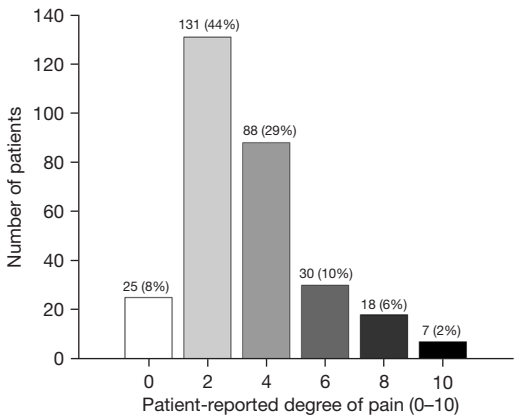

Figure 1 Distribution of patient-reported degree of pain scores.

threshold for discrimination was identified as age of less than 62 years, with sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) being 55%, 72%, 30%, and 88%, respectively. Comparison of SP rates between patients aged <62 and ≥62 years revealed that age of ≥62 years was significantly negatively associated with SP (OR =0.33, 95% CI: 0.18–0.60, P<0.001), with SP being reported by 12.5% of patients aged ≥62 years, versus 30.3% in patients <62 years of age.

The median number of cores taken was 10 (IQR: 9–12). Interestingly, on a univariable model, increasing number of cores was negatively associated with SP (OR =0.86, 95% CI: 0.75–0.97, P=0.016). Patient age was not significantly associated with the number of cores taken being equal to or greater than median, i.e., ≥10 (OR =1.01, 95% CI: 0.97–1.05, P=0.73).

Any PC and csPC were diagnosed in 196 (65.6%) and 122 (40.8%) patients, respectively. Men who reported SP tended to be diagnosed with csPC less often than non-SP patients [17/55 (30.9%) *vs.* 105/244 (43.0%), P=0.10]. Rates for any PC were similar between the two groups [34/55 (61.8%) *vs.* 162/244 (66.4%), P=0.52].

Discussion

We present results of a study aimed to investigate the risk of significant pain in patients undergoing TP biopsy of the prostate under LA. We demonstrate that the procedure, if performed under LA, is generally well tolerated in terms of pain, with 18% of the patients having reported their pain as either 6, 8, or 10 on a 0–10 score, i.e., at the level at which we considered the pain to be significant.

In general, the results of our study are in line with multiple other papers already published in the literature, as TP biopsy of the prostate has already been reported to be well tolerated by patients. Moreover, marked heterogeneity in regard to the LA technique used in particular studies, selective use of pre-emptive oral sedation in some studies, as well as LA procedure not being routinely described in detail, impair consideration of our results on the background of available evidence. Nevertheless, in most

Table 2 Comparison of patient characteristics in regard to the level of reported pain

Characteristic	SP (n=55)	Non-SP (n=244)	P value
Median age, year [IQR]	61 [56–66]	66 [61–70]	<0.001
Median PSA, ng/mL [IQR]	5.7 [4.5–10.4]	6.9 [4.9–9.7]	0.25
Median PV, mL [IQR]	40 [34–52]	40 [32–59]	0.83
Median PSAD, ng/mL^2 [IQR]	0.17 [0.10–0.25]	0.15 [0.10–0.25]	0.56
Positive DRE, n (%)	16 (29.1)	57 (23.4)	0.37
Biopsy-naïve, n (%)	42 (76.4)	163 (66.8)	0.17
PIRADS category 5, n (%)	15 (27.3)	78 (32.0)	0.50
Lesion involving AFS, n (%)	6 (10.1)	46 (18.9)	0.16

SP, significant pain; IQR, interquartile range; PSA, prostate-specific antigen; PV, prostate volume; PSAD, PSA density; DRE, digital rectal examination; PIRADS, Prostate Imaging Reporting and Data System; AFS, anterior fibromuscular stroma.

Table 3 Associations between patient-related factors and significant pain (univariable logistic regression)

Factor	OR (95% CI)	P value
Age, year/10[†]	0.53 (0.35–0.80)	0.003
PSA, ng/mL	1.01 (0.98–1.03)	0.70
Prostate volume, mL	1.00 (0.99–1.01)	0.66
PSAD, ng/mL^2	1.09 (0.29–4.10)	0.90
Positive DRE	1.35 (0.70–2.59)	0.37
Biopsy-naïve[‡]	1.61 (0.82–3.16)	0.17
PIRADS category 5[§]	0.80 (0.42–1.53)	0.50
Lesion involving AFS[¶]	0.53 (0.21–1.30)	0.17

[†], age was divided by 10 for better interpretation of the OR; [‡], versus history of previous negative biopsy; [§], versus PIRADS category 3 or 4; [¶], versus lesions located in other zones of the prostate. OR, odds ratio; CI, confidence interval; PSA, prostate-specific antigen; PSAD, PSA density; DRE, digital rectal examination; PIRADS, Prostate Imaging Reporting and Data System; AFS, anterior fibromuscular stroma.

studies in which a 0–10 pain scale (Visual Analogue Scale or Numerical Rating Scale) was employed, neither mean nor median patient reported overall pain exceeded 4 out of 10 (11,13,15,17,18,23,24), reflecting good efficacy of LA. In one small cohort, mean patient-reported pain with TP approach was 8.02 (out of 10) (16), which, however, may be considered a significantly outlying result. Interestingly, the recently published results of the APROPOS study demonstrate that anesthesia using perineal nerve block, instead of periprostatic block, may lead to improved pain control and patient satisfaction (25).

While the abovementioned studies, as well as our study, evaluated the patient-reported pain in general, some researchers aimed to assess the level of pain separately for particular stages of the procedure, demonstrating that the highest degree of discomfort was associated with the administration of LA, becoming lower at the time of biopsy gun fire (2,12,14,26,27). However, we believe that the overall patient feedback may be considered a reflection of their general satisfaction with the anesthesia type. An interesting outcome was proposed by Hong *et al.*, who reported that the vast majority of patients (85%) would opt for a repeat TP biopsy under LA if the need for the procedure arises again (14). In the study by Kum *et al.*, 9% of patients required sedation in addition to LA (12), which may serve as another outcome for analyzing patient tolerability of TP biopsy under LA. As including and measuring the abovementioned alternative outcomes could have led to even better evaluation of patient experience with TP biopsy under LA, lack of this data may be considered a minor limitation to our study. Moreover, pain associated with prostate biopsy may not be the only aspect of discomfort perceived by the patient. Embarrassment, as well as other inconveniences related to unnatural patient positioning or rectal manipulation may serve as other components of procedure tolerability. Whether this influenced the degree of reported pain, remains subject to speculations. Considering this widened scope of tolerability for the purpose of future study design is necessary.

As our results confirm the good pain tolerability of TP biopsy performed under LA, they may serve as aid in developing strategies aimed at improving cost-effectiveness of PC diagnostic process. A large-cohort

analysis demonstrated that even with intravenous anesthesia the mean overall cost of a procedure, which included both biopsy and re-presentations, was significantly lower for TP than TR (28). One could suppose that replacing higher-grade anesthesia with LA could have further increased the difference in favor of TP. Recently, Hogan *et al.* reported that TP biopsy under LA consumed significantly less resources than TP performed under general anesthesia (26). Further studies aimed to verify the hypothesis of TP biopsy under LA being the most cost-effective approach are necessary.

In our study, we also investigated the associations between possible patient-related factors and the risk of pain during TP MRI/US fusion biopsy of the prostate. Among other variables included into our analyzes, only patient age demonstrated significant association with SP, with older patient demonstrating better tolerance of the procedure. This finding is in line with a previously published study by Marra *et al.* (27), who also reported age to be a protective factor for severe biopsy pain. The role of aging in increasing the pain tolerance threshold is well-established in the literature, although the exact nature of the process still remains unclear (29,30). Although the ROC AUC for patient age discriminating between SP and non-SP fell slightly below the universally used level of acceptance (i.e., 0.70), given the significant associations demonstrated in other analyses, we believe that our results may be helpful in preprocedural counselling in patients especially concerned about the risk of pain or discomfort. While further studies would be necessary to establish the role of higher-grade anesthesia in patients at predefined, increased risk of SP during TP biopsy under LA, one could consider our results significant enough to discuss pre-emptive analgesia or mild sedation, or even general anesthesia, with younger men or patients who report low thresholds of pain tolerance, as well as to reassure patients deemed to be at lower risk of significant pain.

Although we assumed that patients who had been already familiar with the procedure would have experienced lower levels of discomfort, our data show that being biopsy-naïve was not associated with SP. As local concentration of the anesthetic agent injected into the periprostatic area might have been smaller with larger prostates, we investigated for a link between PV and SP, however, finding no significant association. We hypothesized that the location of lesion and thus targeting a number of cores at different sites in the prostate could have influenced the degree of pain. As the anterior fibrous stroma (AFS) differs from the other prostate zones in regard to its histology, being relatively less vascular and more fibrous (31), we decided to evaluate lesion being located in the AFS as a possible factor for lower risk of SP. Despite, indeed, slightly lower rates of SP with AFS being targeted during the procedure, the association was non-significant. A possible explanation is that it might have been not the biopsy needle shots itself, but the LA injection that was responsible for most of the pain experienced by the patients (2,12,14,26,27).

We hypothesized that in patients with an ongoing chronic inflammatory process in the prostate, a condition whose clinical image may rise suspicion of csPC and lead to an unnecessary biopsy (32), the periprocedural pain would be increased, as prostatitis or chronic pelvic pain syndrome (CPPS) is commonly linked to altered nociception in the pelvis (33). As DRE status and PSA level, as well as PSAD, might have been different in those patients, as compared to patients truly harboring PC, we investigated those factors for a possible link with SP, although, no association was found. Also, any differences in cancer detection rates (any PC or csPC) between SP and non-SP patients were non-significant, which is in line with already published evidence (27). Unfortunately, we lack data on the presence of pathologic features of prostatitis in our patients, as our institutional pathologist do not typically mention this fact in the biopsy pathology report in case of PC being diagnosed in the specimen. Nevertheless, even if such an association existed, we would not consider it clinically significant, as the pathology status is not known before biopsy and thus cannot not be used for pre-procedural decision making in regard to the anesthesia type. However, reliable history in regard to prostatitis or CPPS could have been included as a possible factor for SP in our analyses and lack of this data may be considered a limitation to our study.

The association between higher number of cores taken and lower rates of SP is difficult to discuss, as many would expect the relation to be opposite. A possible explanation for this finding would be that the performing urologist could have decided to take less systematic cores during a procedure in which a patient was demonstrating worse tolerance, which could have caused a bias. However, due to the retrospective design of our study, the exact explanation of this problem remains a matter of speculation. In our opinion, this topic is worth further, prospective investigation, as if an association between pain and biopsy quality exists (e.g., because of less cores being taken or targets being missed due to patient moving on the table), this would have important clinical implications. However, Hogan *et al.* (26) did not find a

difference in cancer detection rates between TP biopsies under local or general anesthesia.

Our definition of SP representing a score of ≥6 was arbitrary. As the scale used for pain reporting was six-degree, we considered the "worse" half of the scale (scores 6–10) as "more pain", i.e., SP, as compared to "less (or no) pain" with scores 0–4 (the "better" half of the scale). Moreover, only the faces corresponding to scores 6–10 depict unequivocally negative feelings. Whether those scores were in fact considered "significant" by the patients, remains a matter of speculations. Importantly, the patients might have also expressed the significance of pain by a decrease in ability to cooperate, possibly reflected in, e.g., prolonged duration of the procedure, increased risk of biopsy needle missing the target, or bleeding complications. While our results do not provide answers to this hypothesis, we consider it an interesting area for future research. Differentiation between procedure stages for the purpose of pain reporting could further help in gaining deeper understanding of this aspect.

Our study was performed in two separate institutions, with the same method of assessing patient-reported pain being used. We consider it a strength, especially given the fact, that the comparison of patient characteristics demonstrated the patient profile to be markedly different between the two centers, making our results more representative of general, heterogeneous population.

In addition to the issues already mentioned in the above paragraphs, the retrospective character of the study remains its major limitation. Being better aware of possible risk factors of decreased pain threshold within the pelvis, as well as taking into consideration various outcomes helpful in measuring patient satisfaction with anesthesia, may represent other issues crucial for designing further prospective studies. We believe that such studies are necessary before any strong recommendations in regard to details of periprocedural anesthesia in patients undergoing TP biopsy can be made.

Conclusions

We present a multicenter study demonstrating that grid-based TP MRI/US software fusion prostate biopsy under LA is associated with low levels of patient-reported pain. Given that the TP approach is being advocated as gold standard for prostate biopsy, our evidence may further help in wide adoption of the procedure being performed under LA in ambulatory practice. We also demonstrated that older age was inversely associated with the risk of reporting significant pain, which may justify discussing pre-emptive analgesia or higher-grade anesthesia in younger patients, especially if low threshold of pain tolerance is reported. Further research is necessary to prospectively confirm our findings.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://tau.amegroups.com/article/view/10.21037/tau-23-139/rc

Data Sharing Statement: Available at https://tau.amegroups.com/article/view/10.21037/tau-23-139/dss

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://tau.amegroups.com/article/view/10.21037/tau-23-139/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspect of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). According to local law regulations, due to the retrospective and noninterventional character of the study, there was no need for ethics approval nor patient informed consent.

References

1. European Association of Urology. EAU Guidelines. Edition presented at the EAU Annual Congress Amsterdam 2022. ISBN 978-94-92671-16-5.
2. Hogenhout R, Remmers S, van Leenders GJLH, et al. The transition from transrectal to transperineal prostate biopsy without antibiotic prophylaxis: Cancer detection rates and complication rates. Prostate Cancer Prostatic Dis 2023. [Epub ahead of print]. doi: 10.1038/s41391-022-00641-3.
3. Loy LM, Lim GH, Leow JJ, et al. A systematic review and meta-analysis of magnetic resonance imaging and ultrasound guided fusion biopsy of prostate for cancer detection-Comparing transrectal with transperineal approaches. Urol Oncol 2020;38:650-60.
4. Tu X, Liu Z, Chang T, et al. Transperineal Magnetic Resonance Imaging-Targeted Biopsy May Perform Better Than Transrectal Route in the Detection of Clinically Significant Prostate Cancer: Systematic Review and Meta-analysis. Clin Genitourin Cancer 2019;17:e860-70.
5. Ber Y, Segal N, Tamir S, et al. A noninferiority within-person study comparing the accuracy of transperineal to transrectal MRI-US fusion biopsy for prostate-cancer detection. Prostate Cancer Prostatic Dis 2020;23:449-56.
6. Ippoliti S, Fletcher P, Orecchia L, et al. Optimal biopsy approach for detection of clinically significant prostate cancer. Br J Radiol 2022;95:20210413.
7. Rai BP, Mayerhofer C, Somani BK, et al. Magnetic Resonance Imaging/Ultrasound Fusion-guided Transperineal Versus Magnetic Resonance Imaging/Ultrasound Fusion-guided Transrectal Prostate Biopsy-A Systematic Review. Eur Urol Oncol 2021;4:904-13.
8. Xiang J, Yan H, Li J, et al. Transperineal versus transrectal prostate biopsy in the diagnosis of prostate cancer: a systematic review and meta-analysis. World J Surg Oncol 2019;17:31.
9. Pradere B, Veeratterapillay R, Dimitropoulos K, et al. Nonantibiotic Strategies for the Prevention of Infectious Complications following Prostate Biopsy: A Systematic Review and Meta-Analysis. J Urol 2021;205:653-63.
10. Chang DT, Challacombe B, Lawrentschuk N. Transperineal biopsy of the prostate--is this the future? Nat Rev Urol 2013;10:690-702.
11. Stefanova V, Buckley R, Flax S, et al. Transperineal Prostate Biopsies Using Local Anesthesia: Experience with 1,287 Patients. Prostate Cancer Detection Rate, Complications and Patient Tolerability. J Urol 2019;201:1121-6.
12. Kum F, Elhage O, Maliyil J, et al. Initial outcomes of local anaesthetic freehand transperineal prostate biopsies in the outpatient setting. BJU Int 2020;125:244-52.
13. Wetterauer C, Shahin O, Federer-Gsponer JR, et al. Feasibility of freehand MRI/US cognitive fusion transperineal biopsy of the prostate in local anaesthesia as in-office procedure-experience with 400 patients. Prostate Cancer Prostatic Dis 2020;23:429-34.
14. Hong A, Hemmingway S, Wetherell D, et al. Outpatient transperineal prostate biopsy under local anaesthesia is safe, well tolerated and feasible. ANZ J Surg 2022;92:1480-5.
15. Kozel Z, Martin C, Mikhail D, et al. Initial experience and cancer detection rates of office-based transperineal magnetic resonance imaging-ultrasound fusion prostate biopsy under local anesthesia. Can Urol Assoc J 2022;16:E350-6.
16. Udeh EI, Amu OC, Nnabugwu II, et al. Transperineal versus transrectal prostate biopsy: our findings in a tertiary health institution. Niger J Clin Pract 2015;18:110-4.
17. Guo LH, Wu R, Xu HX, et al. Comparison between Ultrasound Guided Transperineal and Transrectal Prostate Biopsy: A Prospective, Randomized, and Controlled Trial. Sci Rep 2015;5:16089.
18. Shankar PR, Ellimoottil C, George AK, et al. Testing-Related Health Impact of Transrectal and Transperineal Prostate Biopsy as Assessed by Health Utilities. J Urol 2021;206:1403-10.
19. Wang H, Lin H, He B, et al. A Novel Perineal Nerve Block Approach for Transperineal Prostate Biopsy: An Anatomical Analysis-based Randomized Single-blind Controlled Trial. Urology 2020;146:25-31.
20. Szabo RJ. "Free-Hand" Transperineal Prostate Biopsy Under Local Anesthesia: Review of the Literature. J Endourol 2021;35:525-43.
21. Basourakos SP, Allaway MJ, Ross AE, et al. Local anaesthetic techniques for performing transperineal prostate biopsy. Nat Rev Urol 2021;18:315-7.
22. Bryant RJ, Yamamoto H, Eddy B, et al. Protocol for the TRANSLATE prospective, multicentre, randomised clinical trial of prostate biopsy technique. BJU Int 2023;131:694-704.
23. Günzel K, Magheli A, Baco E, et al. Infection rate and complications after 621 transperineal MRI-TRUS fusion biopsies in local anesthesia without standard antibiotic prophylaxis. World J Urol 2021;39:3861-6.
24. Cerruto MA, Vianello F, D'Elia C, et al. Transrectal

versus transperineal 14-core prostate biopsy in detection of prostate cancer: a comparative evaluation at the same institution. Arch Ital Urol Androl 2014;86:284-7.
25. He BM, Ka-Fung Chiu P, Tao T, et al. Perineal nerve block versus periprostatic block for patients undergoing transperineal prostate biopsy (APROPOS): a prospective, multicentre, randomised controlled study. EClinicalMedicine 2023;58:101919.
26. Hogan D, Kanagarajah A, Yao HH, et al. Local versus general anesthesia transperineal prostate biopsy: Tolerability, cancer detection, and complications. BJUI Compass 2021;2:428-35.
27. Marra G, Zhuang J, Marquis A, et al. Pain in Men Undergoing Transperineal Free-Hand Multiparametric Magnetic Resonance Imaging Fusion Targeted Biopsies under Local Anesthesia: Outcomes and Predictors from a Multicenter Study of 1,008 Patients. J Urol 2020;204:1209-15.
28. Roberts MJ, Macdonald A, Ranasinghe S, et al. Transrectal versus transperineal prostate biopsy under intravenous anaesthesia: a clinical, microbiological and cost analysis of 2048 cases over 11 years at a tertiary institution. Prostate Cancer Prostatic Dis 2021;24:169-76.
29. Lautenbacher S, Peters JH, Heesen M, et al. Age changes in pain perception: A systematic-review and meta-analysis of age effects on pain and tolerance thresholds. Neurosci Biobehav Rev 2017;75:104-13.
30. El Tumi H, Johnson MI, Dantas PBF, et al. Age-related changes in pain sensitivity in healthy humans: A systematic review with meta-analysis. Eur J Pain 2017;21:955-64.
31. Kitzing YX, Prando A, Varol C, et al. Benign Conditions That Mimic Prostate Carcinoma: MR Imaging Features with Histopathologic Correlation. Radiographics 2016;36:162-75.
32. Rourke E, Sunnapwar A, Mais D, et al. Inflammation appears as high Prostate Imaging-Reporting and Data System scores on prostate magnetic resonance imaging (MRI) leading to false positive MRI fusion biopsy. Investig Clin Urol 2019;60:388-95.
33. Grinberg K, Sela Y, Nissanholtz-Gannot R. New Insights about Chronic Pelvic Pain Syndrome (CPPS). Int J Environ Res Public Health 2020;17:3005.

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