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ORIGINAL PAPER

Transcutaneous perineal-ultrasound guided prostate biopsy in men with rectal amputation

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Summary ***Introduction: To evaluate the use of transcutaneous perineal ultrasound to guide prostate biopsy in men previously submitted to rectal amputation.***
Materials and Methods: From January 2018 to January 2025, 10 men aged between 47 and 76 years (median age: 56 years) previously submitted to proctocolectomy (7 men for rectum cancer and 3 men for benign disease) were evaluated for the suspicion of prostate cancer (PCa). The indications for biopsy were PSA > 10 ng/mL or PSA values between 4.1-10 ng/ml with free/total PSA < 25% and/or PSA density > 0.20. All the patients submitted for the first time to biopsy underwent extended scheme (ePBx: 12-18 cores); in addition, all the patients underwent multiparametric magnetic resonance (mpMRI) and in the presence of a Prostate Imaging-Reporting and Data System-version 2 (PI-RADS) score ≥ 3 a cognitive targeted biopsy (TPBx: 4 cores) was added to systematic prostate biopsy. Biopsies were freehand using 18-gauge automatic biopsy needles under perineal real-time ultrasound guidance (3.5 MHz convex probe).
Results: Median PSA was 9.7 (range: 4.8-27 ng/ml); in 1/10 (10%) patient mpMRI was negative, conversely in 3 (30%) vs. 3 (30%) vs. 3 (30%) men PIRADS score was 3 vs. 4 vs. 5, respectively. Overall, a csPCa (ISUPGrade Group > 2/Gleason score > 3+4) was found in 5/10 (50%) patients; PCa was located in the peripheric zone in 4 (80%) cases and 1 (20%) case in the anterior zone of the gland. In detail, ePBx vs. TPBx biopsies diagnosed 5/5 (100%) and 4/5 (90%) csPCa. One patient diagnosed with csPCa had negative mpMRI, 1 and 3 men had PIRADS score 4 and 5, respectively. None had clinical complications that needed hospital admission.
Conclusions: Transcutaneous perineal ultrasound-guided prostate biopsy allows to perform accurate systematic and targeted biopsies in men with suspicious PCa previously submitted to rectal amputation.

KEY WORDS: Prostate cancer; Transcutaneous perineal ultrasound guided prostate biopsy; Abdominoperineal resection; Prostate biopsy.

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INTRODUCTION

Prostate cancer (PCa) is the most frequent tumor diagnosed in men with about 2 million procedures carried out in the United States and Europe every year (1). Although detection rates for PCa were overlapping, transperineal biopsy is recommended as the first-choice technique for diagnosis of prostate cancer owing to lower rates of post-procedural sepsis in comparison with transrectal approach (2); in fact, in case of transrectal biopsy the risk of complications requiring hospital admission ranges from 0.1% to 2.5% (3) in most of the cases secondary to *urinary tract infection* (UTI), fever or sepsis.
In addition, transperineal prostate biopsy improves the detection of *clinically significant prostate cancer* (csPCa) located in the anterior zone of the gland (4) especially in men submitted to repeated biopsies or enrolled in *Active Surveillance* (AS) protocols (5, 6).
In men without rectum because submitted to proctocolectomy for benign or malignant diseases, prostate biopsy cannot be performed under transrectal ultrasound guidance (7, 8), moreover, transurethral prostate resection to perform PCa diagnosis is not accurate and/or recommended as prostate biopsy especially for lesions located in the peripheric zone of the gland. In fact, patients presenting at an earlier stage, due to increased PSA testing combined with *multiparametric magnetic resonance imaging* (mpMRI) suspicious for PCa, need systematic combined with targeted needle cores. In these cases, transperineal ultrasound-guided prostate biopsy has emerged as an alternative and unique approach (9).
In this retrospective study we report the use of transcutaneous transperineal ultrasound to guide prostate biopsy in men previously submitted to pancolectomy with rectal amputation.

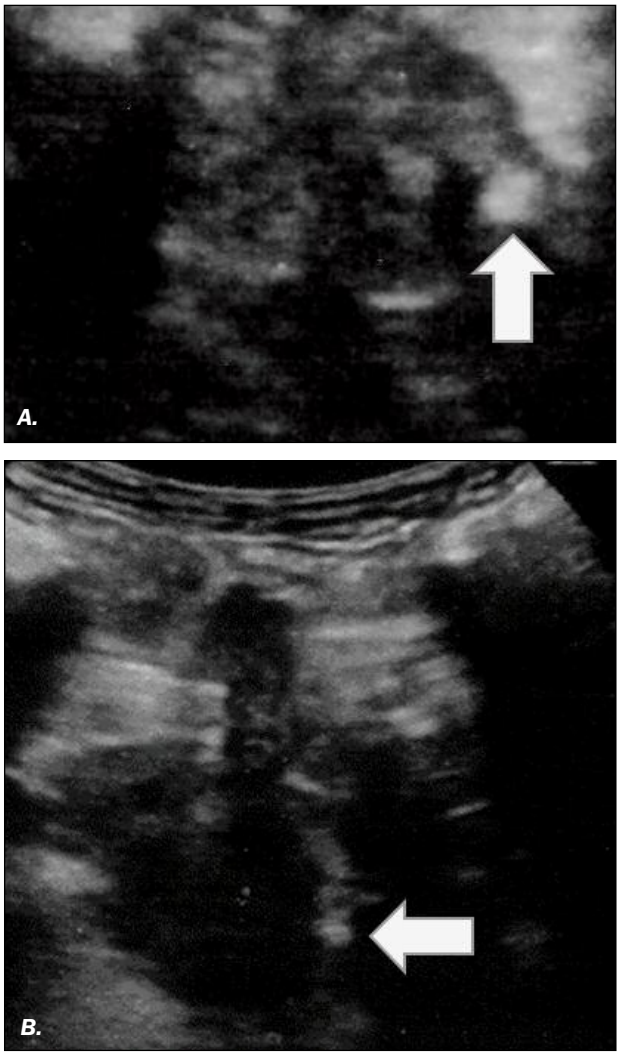
MATERIALS AND METHODS

From January 2018 to January 2025, 10 men aged between 47 and 76 years (median age: 56 years) previously submitted to proctocolectomy (7 men for rectum cancer and 3 men for benign disease) were evaluated for the suspicion of PCa. The study is retrospective and informed consent to publish was obtained before the procedure by each subject whose data were anonymized; moreover, the study was performed according to the ethical principles of the Declaration of Helsinki. The indications for biopsy were PSA > 10 ng/mL or PSA values between 4.1-10 ng/ml with free/total PSA < 25% (10, 11)

and/or PSA density > 0.20 (12). All the patients underwent mpMRI evaluation, moreover, in all cases digital rectal examination was not performed because rectum amputation. All mpMRI examinations were performed using a 1.5 or 3.0 Tesla scanner, (*ACHIEVA 3T; Philips Healthcare Best, the Netherlands*) equipped with a 16-channel phased-array coil placed around the pelvic area with the patient in the supine position; a multi-planar turbo spin-echo T2-weighted, an axial diffusion weighted imaging and an axial dynamic contrast enhanced MRI were obtained (13).

All the patients submitted for the first time to biopsy underwent extended scheme (ePBx: 12-18 cores) (14); in addition, in the presence of a *Prostate Imaging-Reporting and Data System*-version 2 (PI-RADS) score ≥ 3, a cognitive *targeted biopsy* (TPBx: 4 cores) was added to systematic prostate biopsy (15). All the patients underwent biopsy under sedation and antibiotic prophylaxis (a single intravenous dose of 2 grams of cefazolin).

Figure 1.
Transcutaneous perineal ultrasound-guided prostate biopsy. A convex probe (3.5 MHz) is located upon perineal skin to guide transperineal biopsy (white arrow) of the left prostatic lobe (a: anterior biopsy; b: peripheric biopsy).



The perineal skin was disinfected using iodophor, the prostate was examined to determine the puncture sites and paths using transperineal ultrasound. Biopsies were performed using 18-gauge automatic biopsy needles (Figure 1) under perineal real-time ultrasound guidance by a 3.5 MHz convex probe.

Results

Median PSA was 9.7 (range: 4.8-27 ng/ml); in 1/10 (10%) patient mpMRI was negative, conversely in 3 (30%) *vs.* 3 (30%) *vs.* 3 (30%) men PIRADS score was 3 *vs.* 4 *vs.* 5, respectively. Overall, a csPCa (Grade Group 2/Gleason score ≥ 3 + 4) was found in 5/10 (50%) patients, whereas 5 (50%) men had a normal parenchyma. Overall, clinical parameters and histological findings in presence of PCa are listed in Table 1; 4/5 (80%) csPCa were located in peripheric zone and 1 (20%) in the anterior zone of the gland. In detail, ePBx *vs.* TPBx biopsies diagnosed 5/5 (100%) and 4/5 (90%) csPCa. One patient with csPCa had negative mpMRI, one had PIRADS score 4 and 3 men PIRADS score 5 (100%), respectively. None had clinical complications that needed hospital admission.

Table 1.
Clinical and histological characteristics of prostate cancer in 5 patients submitted to transcutaneous perineal ultrasound-guided prostate biopsy.

Clinical parameters	5 cases
Median PSA (range)	15.2 ng/ml (7.4-27)
ISUP GG3/Gleason score 4+3 (1 case)	PI-RADS score 2
ISUP GG3/Gleason score 4+3 (1 cases)	PI-RADS score 4
ISUP GG3/Gleason score 4+5 (3 cases)	PI-RADS score 5
Median mpMRI index lesion diameter (range)	12 millimeter (7-20)
Detection of csPCa (ISUP GG > 2)	5 (100%)
Systematic prostate biopsy	5/5 (100%)
TPBx	4/5 (80%)
Median number of positive cores (range)	6 (4-9)
TPBx	2 (0-4)
Systematic biopsy	5 (5-7)
Median GPC (range)	65%
TPBx	60% (0-100%)
Systematic biopsy	70% (50-100%)
PSA density (range)	0.21 (0.16-0.26)
PSA free/total (range)	12% (7-31%)
Median prostate weight (grams)	45 (20-115 grams)

PSA: Prostate Specific Antigen; TPBx: targeted cognitive fusion biopsy; PI-RADS (Prostate Imaging-Reporting and Data System); GG: Grade Groups ISUP (International Society of Urological Pathology); csPCa: clinically significant prostate cancer.

Discussion

In the last years, with the use of PSA and derivatives (11) combined with mpMRI (16), PSMA PET/CT (17-19) or genetic (20-24) evaluation the necessity to improve the accuracy of prostate biopsy and to reduce the number of unnecessary procedures has increased (25, 26). The management of the patient with an elevated PSA and no rec-

tum is challenging for the urologist; few authors have reported different approaches in obtaining prostate biopsy specimens in patients post abdominoperineal resection such as CT guided random or transgluteal targeted biopsies (27), transurethral ultrasound or transabdominal ultrasound guidance. *McNhicolas et al.* (10) reported their technique to perform prostate biopsy in men submitted to panproctocolectomy: after patient catheterization and by using anatomical surface landmarks, placing traction on the catheter to bring the balloon to the level of the bladder neck and using fluoroscopy, the distance to the apical prostate was estimated and transperineal prostate biopsies were performed. *Amin et al.* (28) used in one patient an endocavitary biplane ultrasound transducer with a transperineal biopsy grid with the ultrasound placed at a 45° angle to the patient invaginating the patients perineum, such that ultrasound images were able to capture the prostate; *Park et al.* (29) in 9 men with PIRADS score 5 performed transperineal cognitive targeted biopsies guided by endfire endo-cavity transducer placed on perineum diagnosing PCa in 7/9 (77.8%) cases. On the other hand, transabdominal ultrasound biopsy of prostate could be associated to the risks injury of the bowel and/or dorsal vein complex and may miss peripheral zone tumours (30).

In our series, we used convex probe located upon perineal skin surface to guide transperineal biopsies and the detection rate for csPCa was equal to 50% of the cases; in detail, systematic *vs.* TPBx diagnosed 100 *vs.* 80% of the cancers without clinical complications that needed hospitalization. The approach allowed, at the same time, to perform accurate peripheric vs. anterior biopsies; moreover, in men with csPCa, median PSA was 15.2 ng/ml and the better biopsy accuracy was achieved in men with PIRADS score 5 (100% of the cases).

Some limitations and considerations of the present study deserve mention. First, the detection rate for PCa was evaluated in biopsy specimen and not in the entire gland; secondly, the biopsy accuracy, probably, might have been lower in the presence of earlier PCa stage characterized by smaller cancer volume. Third, systematic or perilesional prostate biopsy should be always combined with targeted cores to improve the diagnosis of csPCa (31). Four, in the next future, the use of Artificial Intelligence programs (32, 33) combined with genetic evaluation (34, 35) and more accurate imaging (18, 36-38) could better select men at risk for csPCa and improve prostate biopsy procedure. Finally, the number of patients evaluated in our series is low.

In conclusion, transcutaneous perineal ultrasound-guided prostate biopsy allows to perform accurate systematic and targeted biopsies in men with suspicious PCa previously submitted to rectal amputation.

Declarations

Ethical approval: *Institutional review board and ethical committee approval were granted and the informed consent was obtained from all individual participants included in the study.*

Consent for publication: *All authors have read and approved the content and agree to submit for consideration for publication in the journal.*

Availability of data and material: *The data that supports the findings of this study are available from the corresponding author upon reasonable request.*

Competing interests: *The authors declare that there is no conflict of interest.*

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Authors' contributions: *Conceptualization: P.P., P.L., F.V; Investigation: P.P., P.L., F.V; Data curation: P.P., P.L., F.V.; Formal analysis: P.P., P.L., F.V; Methodology: P.P., P.L., F.V, C.M., F.F.; Resources: P.P., P.L., F.V, C.M., F.F.; Software: P.P., P.L., F.V; Writing - original draft: V.S.,P.P., P.L.; Writing - review & editing: P.P., P.L., F.V, C.M., F.F.*

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