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Importance of Malignant Core Length in the Detection of Clinically Significant Prostate Cancer in Transrectal Prostate Biopsies

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What's known on the subject? and What does the study add?

The main factors in the evaluation of the adequacy of biopsy specimens include the absence of non-prostatic tissues in the biopsy specimen, the presence of glandular prostate tissue, fragmentation of specimens, total core length, and length of each core according to the biopsy localization. In published studies, the biopsy samples were compared between the patients with and without a diagnosis of prostate cancer (PCa). In addition to the biopsy cores of the patients with PCa, we analyzed PCa subgroups, and to our knowledge, this is the first study in the literature to evaluate the core samples of PCa subgroups (CsPCa vs. non-CsPCa). In this study, although there was no statistically significant difference between the PCa and non-Ca groups or between the PCa subgroups in terms of the mean final core length, when the malignant cores were separately examined, their mean length was found to be statistically significantly greater in the CsPCa group. This raises the probability of underestimation due to shorter core length, resulting in overlooking high Gleason grading that would have led to the diagnosis of CsPCa.

Abstract

Objective: To examine cores obtained using prostate biopsy under transrectal ultrasound guidance and determine the ideal total malignant core length for the diagnosis of clinically significant prostate cancer (PCa).

Materials and Methods: From the beginning of 2017 to the end of 2021, 1.611 transrectal ultrasonography-guided prostate biopsy procedures were retrospectively analyzed. The data were divided into two groups as PCa and non-cancer (non-Ca) according to the pathology reports. The PCa group was further divided into two subgroups as clinically significant and non-significant. After comparing the core numbers and lengths between the groups, a statistical analysis was undertaken to determine the optimal cut-off value of the total malignant core length in predicting the diagnosis of clinically significant PCa.

Results: A total of 1.181 biopsy procedures were included in the evaluation. The mean malignant core lengths of the clinically significant and non-significant PCa groups were 6.7±5.1 and 3.6±2.9, respectively, indicating a statistically significant difference between these subgroups. In the presence of PCa, the mean length of malignant cores was found to have an area under the curve value of 0.708 (95% confidence interval: 0.654-0.759) in the prediction of clinically significant PCa, and it had 56.44% sensitivity and 78.05% specificity at a cut-off value of >4.7 cm.

Conclusion: Taking the cut-off value of the mean length of malignant cores as 4.7 cm, if the total length of malignant cores is above this value according to the pathology report following transrectal prostate biopsy, the probability of detecting clinically significant PCa increases.

Keywords: Clinically significant prostate cancer, core length, gleason underestimation, prostate cancer, transrectal biopsy

Introduction

Prostate cancer (PCa) is the second most frequently diagnosed cancer in men, with an estimated 1.4 million diagnoses worldwide in 2020 (1). A systematic review of autopsy studies reported a PCa prevalence of 5% in patients aged <30 years, increasing to 59% (48-71%) by >79 years, with an odds ratio (OR) of 1.7 per decade (2).

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Since defined by Hodge et al. (3) in 1989, prostate biopsy has become the gold standard for diagnosis, and it has been shown that the length of the biopsy tissue significantly correlates with the PCa detection rate (4). A core length greater than 11.9 mm has been associated with an increased detection rate of PCa [OR: 2.57, 95% confidence interval (CI): 1.46-4.52] (5). Some researchers have suggest that the lower ideal limit of the mean core length is 12 mm. When values are below this number, it is necessary to repeat the sampling of the prostate (6). In another study conducted to evaluate whether the core length taken during the biopsy affected the accuracy of the procedure and the underestimation of the Gleason score by comparing biopsy samples with radical prostatectomy (RP) samples, each unit increase in core length in millimeters was shown to reduce the risk of Gleason upgrading by 89.9% (OR: 0.10, 95% CI: 0.01-0.99) (7).

The definition of clinically significant PCa (CsPCa) is widely used to distinguish PCa that can cause morbidity or mortality associated with other types of PCa. This differentiation is particularly important since clinically non-significant PCa (non-CsPCa) is very common and does not cause any harm (2). In the literature, the lengths of biopsy cores reported as malignant and benign have been previously compared (5-8). To contribute to the literature, in the current study, we evaluated patients diagnosed with PCa in more detail and further examined biopsy core lengths in PCa subgroups. We also tried determining a cut-off value for core length that could increase the detection of CsPCa.

Materials and Methods

Transrectal ultrasonography (TRUS)-guided procedures performed at a tertiary education and research hospital between January 01, 2017, and December 31, 2021, and routine examinations undertaken before these procedures were retrospectively evaluated from the hospital information management system. The patients' age, pre-biopsy -free prostate-specific antigen (PSA) and total PSA values, and parameters included in the pathology reports of the procedure (diagnosis, number of cores, and core length) were recorded.

Patients with suspected PCa according to the physical examination and/or high PSA values were included in the study. Excluded from the sample were patients whose pathology results or pre-biopsy PSA values could not be obtained, those referred from an external center for consultation, and those with a PSA value above 20 ng/mL to ensure the homogenization of the sample.

Systematic biopsy procedures were performed in the lateral decubitus position following the rectal application of an anesthetic agent using an automatic biopsy gun with a 30-cm 18-gauge side-notch cutting needle (cutting length of 17 mm). Biopsy samples were taken in the sagittal plane using the same ultrasound device. The quality of the cores was evaluated macroscopically, and if the sample was of insufficient quality, a new sample was immediately obtained from the same site. For histopathological analysis, each sample taken was transferred to the laboratory in separate tubes containing 10% formol, with the necessary information's being noted on the tubes. If a second core was obtained from the same site, it was placed in the tube reserved for that site with the previously obtained suboptimal core.

In the pathology report, the length of each core was defined in cm. In cases where multiple fragments were obtained from a single site due to the fragmentation of tissues or a second core was obtained due to the poor quality of the first, the pathologist recorded the length of each tissue in the report. The sum of the lengths of all fragmented cores taken from the same site was recorded and analyzed. The cores with a pathology result of atypical small acinar proliferation (ASAP) or non-prostatic tissue (i.e., containing only rectal mucosa, periprostatic tissue, or blood) were excluded from the evaluation. Patients diagnosed with high-grade prostatic intraepithelial neoplasia were categorized into the same group as those with benign outcomes while patients with basal cell carcinoma were evaluated in the CsPCa group.

The data were divided into two groups as PCa and non-Ca according to the pathology reports. The PCa group was further divided into two subgroups. The data of the procedures with a Gleason score of 3+4 and above in the pathology report were included in the CsPCa group, and those of the procedures with a Gleason score below 3+4 were included in the non-CsPCa group. The number and length of cores were compared between the PCa and non-Ca groups, as well as between the CsPCa and non-CsPCa groups. The final number and length of cores were obtained by subtracting the number and lengths of the excluded cores from those of all biopsy cores obtained. Statistical analyses were performed to determine the minimum acceptable cut-off value of the mean biopsy core length in the prediction of a CsPCa diagnosis.

Statistical Analysis

The data were examined using the Shapiro-Wilk test to determine whether they had a normal distribution. The results are presented as mean ± standard deviation (minimum-maximum) or frequency and percentage values. Continuous variables were compared using Student's t-test when the data were normally distributed and the Mann-Whitney U test otherwise. The receiver operating curve (ROC) at the optimal cut-off value for malignant core lengths was constructed using MedCalc Statistical Software version 19.1.5 (MedCalc Software bv, Ostend, Belgium; https://www.medcalc.org; 2020). Sensitivity

and specificity at the optimal cut-off value were also derived from the ROC analysis. The univariate logistic regression analysis was performed, and ORs were reported along with their 95% CIs. The statistical significance level was accepted as α=0.05. Statistical analyses were performed using IBM SPSS ver. 28.0 (IBM Corp. Released 2021. IBM SPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp.).

Results

The data of 1.611 TRUS-biopsy procedures performed in 1.077 patients between January 01, 2017, and December 31, 2021, were analyzed retrospectively. Figure 1 presents the flowchart of the study. After applying the exclusion criteria, the final sample consisted of 980 patients, of whom 97 had repeated biopsy procedures (four times in one patient, three times in five, and twice in 91).

There was more than one diagnosis in the pathology reports of 46% of the 1.181 biopsy procedures included in the study. Figure 2 summarizes the diagnoses included in the final pathology reports of the samples taken during the biopsy procedures.

Table 1 summarizes the data on age, free and total PSA values, and free/total PSA ratios, as well as statistical differences between the groups.

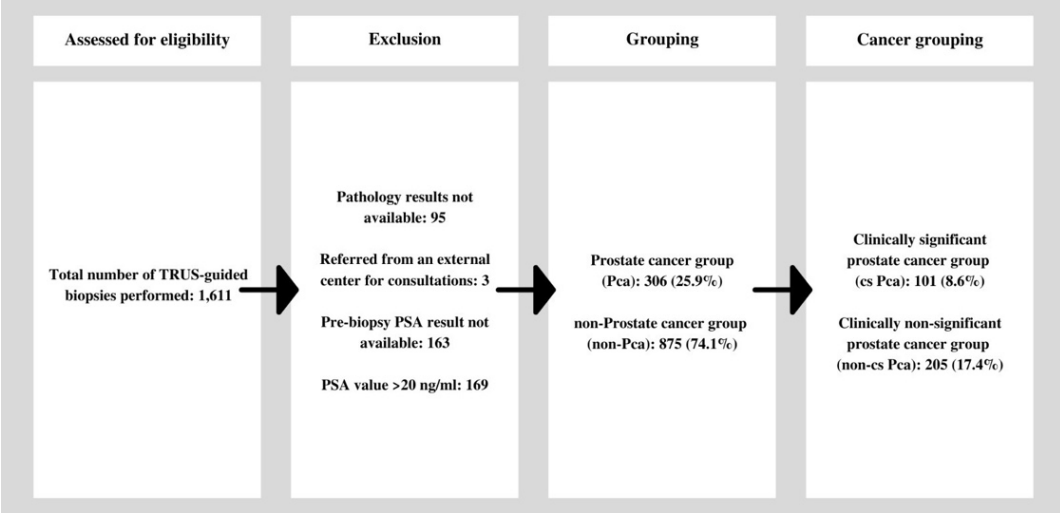

Figure 1. Flowchart of the study

TRUS: Transrectal ultrasonography, PSA: Prostate-specific antigen

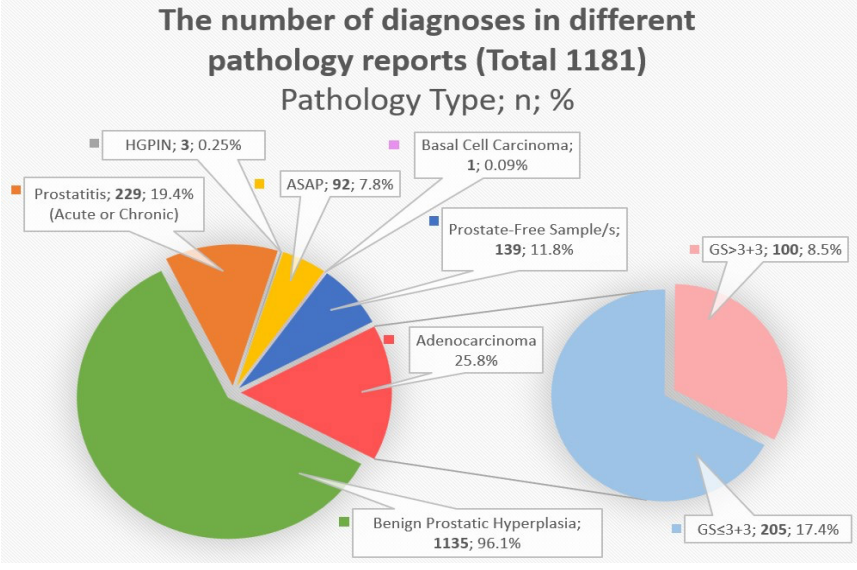

Figure 2. Distribution of diagnoses in the pathology reports of biopsy procedures*

*More than one diagnosis can be found to be related to any procedure due to the differences in the pathology results of the biopsy cores

ASAP: Atypical Small Acinar Proliferation, HGPIN: High Grade Prostatic Intraepithelial Neoplasia, GS: Gleason score

In this study, first the number of cores taken from the prostate lobes and then the number of excluded cores were calculated. Subsequently, the number of excluded cores was subtracted from the number of cores taken to obtain the final core number. When the number of cores taken per prostate was examined, it was determined that the mean number of cores in the PCa group was statistically significantly higher than in the non-Ca group (p<0.05) (Table 2).

After calculating the length of cores taken from the prostate, the length of excluded cores was subtracted from the length of all cores taken, and the final core length was obtained. When the mean final length of cores per prostate was examined, no statistically significant difference was observed between the groups (p>0.05) (Table 3).

Since the mean final length of cores taken per prostate did not statistically significantly differ between the non-Ca and

Table 1. Age, free and total PSA values, and free/total PSA ratios according to the groups

	Non-Ca and PCa Groups			Non-CsPCa and CsPCa Groups		
	Non-Ca	PCa	p	Non-CsPCa	CsPCa	p
Age[α]	63.1±6.6 (41.0-80.0)	65.8±7.1 (44.0-84.0)	<0.001*	66.6±7.4 (44.0-84.0)	68.3±7.7 (48.0-84.0)	0.006*
Free PSA[α]	1.7±1.0 (0.2-7.5)	1.5±1.0 (0.2-6.2)	0.034	1.4±0.9 (0.2-6.2)	1.6±1.1 (0.2-5.7)	0.124
Total PSA[α]	7.6±3.5 (0.8-19.7)	8.9±4.2 (1.3-19.8)	<0.001*	8.3±4.0 (1.3-19.5)	10.2±4.3 (2.1-19.8)	<0.001*
Free/total PSA[α]	0.2±0.1 (0.0-0.7)	0.2±0.1 (0.0-0.8)	<0.001*	0.2±0.1 (0.0-0.8)	0.2±0.1 (0.0-0.6)	0.287

[α]Data are presented as mean ± standard deviation (min-max)
*statistically significant at p<0.05

Table 2. Data on the number of cores taken from the prostate according to the groups

	Non-Ca and PCa Groups			Non-CsPCa and CsPCa Groups		
	Non-Ca	PCa	p	Non-CsPCa	CsPCa	p
Total number of cores taken from the left lobe[α]	5.280, 6.0±0.5 (0.0-12.0)	1.846, 6.0±0.4 (1.0-9.0)	0.329	1.238, 6.0±0.5 (1.0-9.0)	608, 6.0±0.2 (6.0-8.0)	0.453
Total number of cores taken from the right lobe[α]	5.271, 6.0±0.4 (0.0-12.0)	1.845, 6.0±0.3 (5.0-9.0)	0.691	1.235, 6.0±0.3 (5.0-9.0)	610, 6.0±0.4 (5.0-9.0)	0.987
Total number of cores taken from the prostate[α]	1.0551, 12.1±0.8 (4.0-24.0)	3.691, 12.1±0.6 (6.0-16.0)	0.173	2.473, 12.1±0.6 (6.0-15.0)	1.218, 12.1±0.5 (11.0-16.0)	0.325
Number of excluded cores taken from the left lobe[α]	224, 0.3±0.6 (0.0-5.0)	55, 0.2±0.6 (0.0-6.0)	0.019*	43, 0.2±0.7 (0.0-6.0)	12, 0.1±0.4 (0.0-2.0)	0.202
Number of excluded cores taken from the right lobe[α]	267, 0.3±0.8 (0.0-6.0)	86, 0.3±0.8 (0.0-6.0)	0.345	68, 0.3±0.9 (0.0-6.0)	18, 0.2±0.5 (0.0-3.0)	0.290
Total number of excluded cores[α]	491, 0.6±1.2 (0.0-11.0)	141, 0.5±1.2 (0.0-10.0)	0.015*	111, 0.5±1.4 (0.0-10.0)	30, 0.3±0.8 (0.0-5.0)	0.254
Total final number of cores for the left lobe[α]	5056, 5.8±0.8 (0.0-12.0)	1791, 5.9±0.8 (0.0-9.0)	0.009*	1.195, 5.8±0.9 (0.0-9.0)	596, 5.9±0.5 (4.0-8.0)	0.498
Total final number of cores for the right lobe[α]	5.004, 5.7±0.9 (0.0-12.0)	1.759, 5.7±0.9 (0.0-9.0)	0.169	1.167, 5.7±1.0 (0.0-8.0)	592, 5.9±0.6 (3.0-9.0)	0.472
Total final core number[α]	10.060, 11.5±1.4 (1.0-24.0)	3.550, 11.6±1.4 (2.0-16.0)	0.007*	2.362, 11.5±1.6 (2.0-15.0)	1.188, 11.8±0.9 (7.0-16.0)	0.593

[α]Data are presented as n, mean ± standard deviation (min-max)
*statistically significant at p<0.05

PCa groups, the cores were separately evaluated as benign and malignant. There was a statistically significant difference between the PCa subgroups in terms of the mean length of malignant cores (p<0.05) (Table 4).

The ROC analysis revealed that the mean length of malignant cores provided a maximum Youden index at >4.7 cm. Therefore, the cut-off value of the mean length of the malignant cores was determined as 4.7 cm. In the presence of PCa, the mean

Table 3. Data on the lengths of cores taken from the prostate according to the groups

	Non-Ca and PCa Groups			Non-CsPCa and CsPCa Groups		
	Non-Ca	PCa	p	Non-CsPCa	CsPCa	p
Total length of the cores taken from the left lobe[α]	5,756.7, 6.6±2.1 (0.0-16.1)	2,010.9, 6.6±2.0 (0.5-15.7)	0.957	1,358.9, 6.6±2.0 (0.5-13.0)	652.0, 6.5±2.1 (2.7-15.7)	0.483
Total length of the cores taken from the right lobe[α]	5,581.2, 6.4±2.3 (0.0-15.8)	1,940.4, 6.3±2.0 (1.7-13.2)	0.784	1,293.6, 6.3±2.0 (1.7-12.2)	646.8, 6.4±2.0 (3.1-13.2)	0.697
Total length of cores taken from the prostate[α]	11,337.9, 13.0±4.1 (4.0-31.4)	3,951.3, 12.9±3.6 (4.8-28.0)	0.858	2,652.5, 12.9±3.7 (4.8-23.1)	1,298.8, 12.9±3.6 (6.7-28.0)	0.858
Total length of the excluded cores taken from the left lobe[α]	152.1, 0.2±0.6 (0.0-5.7)	44.1, 0.1±0.7 (0.0-8.2)	0.496	39.5, 0.2±0.9 (0.0-8.2)	4.6, 0.0±0.2 (0.0-1.5)	0.024*
Total length of the excluded cores taken from the right lobe[α]	155.4, 0.2±0.6 (0.0-6.8)	61.4, 0.2±0.8 (0.0-7.5)	0.611	50.8, 0.2±0.9 (0.0-7.5)	10.6, 0.1±0.3 (0.0-1.7)	0.047*
Total length of the excluded cores[α]	307.5, 0.4±1.0 (0.0-10.2)	105.5, 0.3±1.4 (0.0-13.9)	0.929	90.3, 0.4±1.7 (0.0-13.9)	15.2, 0.2±0.4 (0.0-1.8)	0.019*
Total final length of the cores for the left lobe[α]	5,604.6, 6.4±2.1 (0.0-15.6)	1,966.8, 6.4±2.1 (0.0-15.7)	0.874	1,319.4, 6.4±2.1 (0.0-13.0)	647.4, 6.4±2.1 (2.7-15.7)	0.917
Total final length of the cores for the right lobe[α]	5,425.8, 6.2±2.3 (0.0-15.8)	1,879.0, 6.1±2.1 (0.0-13.2)	0.685	1,242.8, 6.1±2.1 (0.0-12.2)	636.2, 6.3±2.0 (2.0-13.2)	0.352
Total final core length[α]	11,030.4, 12.6±4.1 (1.1-31.4)	3,845.8, 12.6±3.8 (2.2-28.0)	0.886	2,562.2, 12.5±3.8 (2.2-23.1)	1,283.6, 12.7±3.6 (5.9-28.0)	0.646

[α]Data are presented in centimeter as mean ± standard deviation (min-max)
*statistically significant at p<0.05

Table 4. Characteristics of the malignant and non-malignant (benign) cores

	Non-Ca and PCa Groups			Non-CsPCa and CsPCa Groups		
	Non-Ca	PCa	p	Non-CsPCa	CsPCa	p
Number of benign cores[α]	10,060, 11.5±1.4 (1.0-24.0)	2,353, 7.7±3.2 (0.0-13.0)	<0.001*	1,747, 8.5±2.6 (0.0-13.0)	606, 6.0±3.6 (0.0-11.0)	<0.001*
Length of benign cores[β]	11,030.4, 12.6±4.1 (1.1-31.4)	2,439.6, 8.0±4.1 (0.0-19.3)	<0.001*	1,828.7, 8.9±3.8 (0.0-19.3)	610.9, 6.0±4.0 (0.0-16.7)	<0.001*
Number of malignant cores[α]	-	1,197, 3.9±3.0 (1.0-16.0)	-	615, 3.0±2.2 (1.0-12.0)	582, 5.8±3.6 (1.0-16.0)	<0.001*
Length of malignant cores[β]	-	1,406.2, 4.6±4.1 (0.5-28.0)	-	733.5, 3.6±2.9 (0.5-16.6)	672.7, 6.7±5.1 (0.8-28.0)	<0.001*

[α]Presented as n, mean ± standard deviation (min-max)
[β]Presented in centimeter as mean ± standard deviation (min-max)
*statistically significant at p<0.05

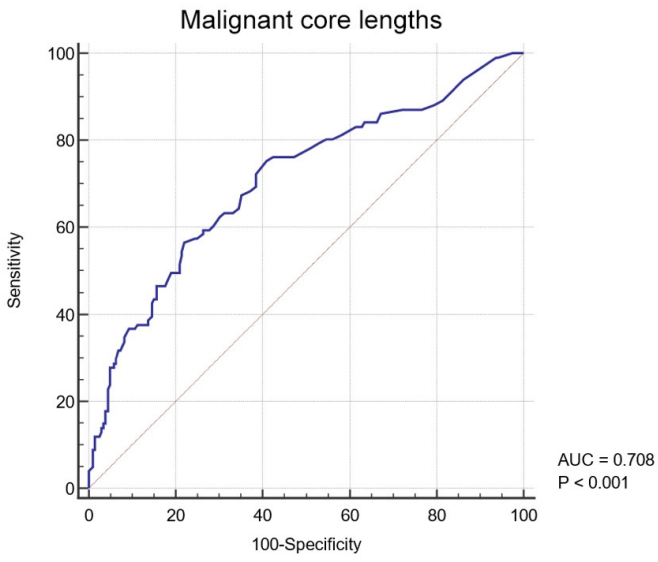

Figure 3. ROC curve of the mean length of malignant cores

ROC: Receiver operating curve

length of malignant cores had an area under the curve value of 0.708 in the prediction of CsPCa (95% CI: 0.654-0.759), and it had 56.44% sensitivity and 78.05% specificity (OR: 1.23, 95% CI: 1.14-1.32) at a cut-off value of >4.7 cm (Figure 3).

Discussion

The role of the urologist in prostate biopsy procedures is to provide adequate tissue samples to assist the pathologist to identify and map cancer in the prostate, in addition to obtaining clinical history, including data on the patient's identity, PSA level, and/or reason for the biopsy, and, if relevant, previous diseases of the genitourinary tract (9).

Currently, there are no defined definitive criteria for evaluating the adequacy of prostate needle biopsies for a histopathological examination. The main factors in the evaluation of the adequacy of biopsy specimens include the absence of non-prostatic tissues in the biopsy specimen, the presence of glandular prostate tissue, fragmentation of specimens, total core length, and length of each core according to the biopsy localization (4,10,11). However, there are only few studies on this issue, which is one of the important parameters to determine biopsy quality (4-6,12). In published studies, the biopsy samples were compared between the patients with and without a diagnosis of PCa. In addition to the biopsy cores of the patients with PCa, we analyzed PCa subgroups, and to our knowledge, this is the first study in the literature to evaluate the core samples of PCa subgroups (CsPCa vs. non-CsPCa).

In almost all studies, the effect of core length on cancer detection was evaluated by comparing the samples of patients with PCa and those with other (benign) pathologies, and cores with cancer were found to be longer. This suggests the possibility that cancer may be overlooked because of shorter core lengths in patients with benign pathology (6). In our study, there was no statistically significant difference in the mean total core length between the PCa and non-Ca groups and between the PCa subgroups. However, when the mean total length of malignant cores was examined in the PCa subgroups, a statistically significant difference was observed between the CsPCa and non-CsPCa groups (6.7±5.1 vs. 3.6±2.9). This raises the possibility that CsPCa may have been overlooked because of shorter core lengths in patients whose pathology result was reported as non-CsPCa. For this reason, we evaluated the samples of the patients with cancer in more detail and determined a cut-off value for the mean length of malignant cores that can be accepted in the literature.

In a retrospective study by Öbek et al. (5) evaluating the data of 245 patients, the mean length of whole biopsy cores was reported as 11.4 mm. The mean length of cores containing cancer was found to be statistically longer (12.3 mm) than those without cancer (11.4 mm). In the same study, there was a linear increase in the cancer detection rate in cases of long biopsy cores. Biopsy core being longer than 11.9 mm was associated with a 2.5-fold higher probability of detecting PCa.

Although Ergün et al. (6) determined the cut-off value of the core length to be 12 mm in the detection of cancer in biopsy, they also noted that a core length of at least 10 mm had diagnostic value, while the cancer detection rate was significantly reduced when the core length was below this limit. Similarly, Boccon-Gibod et al. (9) suggested that taking 10 mm tissue as the shortest acceptable length, the mean needle biopsy length should be a quality control measure.

In a study by Fiset et al. (12), evaluating 197 Canadian patients with an average of 11 cores taken during biopsy, it was found that the cancer-positive cores were significantly longer (mean length: 14.1 mm) than the benign cores (13.2 mm) ($p<0.001$). Additionally, 13-mm cores had optimal sensitivity (42.8%) and specificity (76.5%) in the detection of carcinoma (OR: 2.43) (12).

Van der Kwast et al. (11) evaluated cores from different centers and reported that the rate of cancer detection increased in direct proportion to the total sample length obtained. In another study, Berber et al. (8) showed that the total core length greatly affected the rate of cancer detection in the 12-core biopsy method. There was a 65.3% difference in the rate of cancer detection between the patients with a total core length of <10 cm and those with a total core length of ≥10 cm, indicating that no significant portion of cancers in patients with a core

length of <10 cm could be diagnosed. In the same study, it was reported that the rate of cancer detection increased as the total core length value increased from 10 cm to 15 cm, but there was no additional increase in the rate of cancer detection at the total core length values of 15 cm and above (8). In our study, the mean final total core length was found to be 12.6 cm in the non-Ca and PCa groups, and it was determined to be of ideal size for a diagnosis.

Dogan et al. (10) stated that the rate of cancer detection in glandular cores decreased in patients with serum PSA levels between 4-10 ng/mL. In the current study, we examined the effect of the total core length by excluding patients with non-prostate cores and those whose pathology result was ASAP; therefore, we did not evaluate the effect of glandular cores on the rate of PCa detection.

In this study, although there was no statistically significant difference between the PCa and non-Ca groups or between the PCa subgroups in terms of the mean final core length, when the malignant cores were separately examined, their mean length was found to be statistically significantly greater in the CsPCa group. This raises the probability of underestimation due to shorter core length, resulting in overlooking high Gleason grading that would have led to the diagnosis of CsPCa. In the literature, a high Gleason grading discrepancy of approximately 32-73% has been reported between the rates of biopsy and radical prostatectomy samples (7,13,14). This may be related to the insufficiencies in the length of malignant cores.

In this study, the mean final core length in the PCa group was 12.6 cm, and the cut-off value of the mean length of malignant cores was 4.7 cm. In other words, if the length of malignant cores exceeds 37% of the final core length (4.7/12.6x100), the pathology report is more likely to result in CsPCa. Additionally, the mean final number of cores was calculated as 11.6 in the PCa group, suggesting that the pathology report is more likely to result in CsPCa if 4.4 cores (11.6x0.37) and above are found to be malignant in a biopsy procedure. Based on our results, if malignancy is seen in more than 4.4 (~5) cores according to the pathology report of a biopsy procedure, but the Gleason score is reported to be 3+3 (non-CsPCa) in the same report despite the expectation of a CsPCa result, we would suspect the possibility of Gleason underestimation. To evaluate this new hypothesis, a separate study must examine the pathology reports obtained after the final RP.

Biopsy core length may vary according to different factors, such as trans-rectal versus trans-perineal route, urologist performing the biopsy, needle used, biopsy tissue retrieval and handling methods, and pathological analysis (7).

Study Limitations

In the current study, although all biopsies were performed transrectally using the same ultrasound device and biopsy gun and needle, there are still certain limitations. First, the study was a retrospective design. Second, the transrectal biopsy procedures were performed by different urologists. Finally, the pathology results were evaluated by different pathologists.

Conclusion

Taking the cut-off value of the mean length of malignant cores as 4.7 cm, if the total length of malignant cores is above this value according to the pathology report following transrectal prostate biopsy, the probability of detecting CsPCa increases. Conversely, if the total length of the malignant cores is greater than 4.7 cm and the pathology result is non-CsPCa, the possibility of Gleason underestimated should be considered.

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Ethics

Ethics Committee Approval: For this study, permission was obtained from the Clinical Research Ethics Committee of Health Sciences University Bursa Yüksek İhtisas Training and Research Hospital with the protocol number 2011-KAEK-25 2021/06-01.

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: G.D., Concept: A.E., Design: G.D., Data Collection or Processing: G.D., Analysis or Interpretation: A.E., Literature Search: G.D., Writing: G.D.

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References

1. Culp MB, Soerjomataram I, Efstathiou JA, Bray F, Jemal A. Recent Global Patterns in Prostate Cancer Incidence and Mortality Rates. Eur Urol 2020;77:38-52.
2. Bell KJ, Del Mar C, Wright G, Dickinson J, Glasziou P. Prevalence of incidental prostate cancer: A systematic review of autopsy studies. Int J Cancer 2015;137:1749-1757.

3. Hodge KK, McNeal JE, Terris MK, Stamey TA. Random systematic versus directed ultrasound -guided transrectal core biopsies of the prostate. J Urol 1989;142:71-74; discussion 4-5.
4. Iczkowski KA, Casella G, Seppala RJ, Jones GL, Mishler BA, Qian J, Bostwick DG. Needle core length in sextant biopsy influences prostate cancer detection rate. Urology 2002;59:698-703.
5. Öbek C, Doğanca T, Erdal S, Erdoğan S, Durak H. Core length in prostate biopsy: size matters. J Urol 2012;187:2051-2055.
6. Ergün M, İslamoğlu E, Yalçınkaya S, Tokgöz H, Savaş M. Does the length of prostate biopsy cores impact the diagnosis of prostate cancer? Turk J Urol 2016;42:130-133.
7. Reis LO, Sanches BC, de Mendonça GB, Silva DM, Aguiar T, Menezes OP, Billis A. Gleason underestimation is predicted by prostate biopsy core length. World J Urol 2015;33:821-826.
8. Berber U, Haholu A, Küçükodacı Z, Yılmaz. 12 Kadran prostat biyopsi protokolünde toplam kor uzunluğunun kanser saptanma oranına etkisi. Gülhane Tıp Dergisi 2013;55:203-206. (Turkish)
9. Boccon-Gibod L, van der Kwast TH, Montironi R, Boccon-Gibod L, Bono A; European Society of Uropathology; European Society of Pathology Uropathology Working Group. Handling and pathology reporting of prostate biopsies. Eur Urol 2004;46:177-181.
10. Dogan HS, Aytac B, Kordan Y, Gasanov F, Yavascaoglu İ. What is the adequacy of biopsies for prostate sampling? Urol Oncol 2011;29:280-283.
11. van der Kwast TH, Lopes C, Santonja C, Pihl CG, Neetens I, Martikainen P, Di Lollo S, Bubendorf L, Hoedemaeker RF; Members of the pathology committee of the European Randomised Study of Screening for Prostate Cancer. Guidelines for processing and reporting of prostatic needle biopsies. J Clin Pathol 2003;56:336-340.
12. Fiset PO, Aprikian A, Brimo F. Length of prostate biopsy cores: does it impact cancer detection? Can J Urol 2013;20:6848-6853.
13. Colleselli D, Pelzer AE, Steiner E, Ongarello S, Schaefer G, Bartsch G, Schwentner C. Upgrading of Gleason score 6 prostate cancers on biopsy after prostatectomy in the low and intermediate tPSA range. Prostate Cancer Prostatic Dis 2010;13:182-185.
14. Reis LO, Zani EL, Freitas LL, Denardi F, Billis A. Higher prostate weight is inversely associated with Gleason score upgrading in radical prostatectomy specimens. Adv Urol 2013;2013:710421.