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Comparison of prostate biopsy pathology and radical prostatectomy pathologies

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Abstract

Objectives: The rate of prostate cancer has increased with the identification of the prostate-specific antigen; however, data on biopsy pathologies determined by transrectal ultrasonography may be incompatible with the pathology indicated in radical prostatectomy specimens. This situation puts patients in need of curative treatment at risk while in some patients they are overtreatment. The aim of this study was to compare Gleason scores in radical prostatectomy specimens with the Gleason scores determined by transrectal ultrasound-guided biopsy pathologies.

Methods: The data of patients who underwent radical prostatectomy in our clinic between January 2007 and November 2018 were evaluated retrospectively. Data included preoperative biopsy values, biopsy cores, biopsy percentage, Gleason scores from transrectal ultrasound-guided pre-biopsy biopsy cores, Gleason scores after radical prostatectomy, tissue cancer rates, surgical margins, and pathological stage. The ISUP-WHO (Society of Urological Pathology: ISUP-World Health Organization) 2014 classification was used for the pathological classification.

Results: A total of 159 patients were evaluated. Transrectal ultrasonography-guided biopsy pathology revealed that 82 (75.9%) patients with Gleason scores <7 had radical prostate pathology with Gleason scores of <7. Transrectal ultrasonography-guided biopsy pathology revealed a Gleason score of 7 in 10 (38.4%) patients. The Gleason score was > 7 in 24 (48.9%) of the patients who had a Gleason score> 7 based on transrectal ultrasonography-guided pathology. The radical pathology of 109 patients with biopsy pathology was ISUP 1 in 83 (76.1%) patients. The radical pathology was ISUP 3 in 5 of 16 patients with biopsy pathology ISUP 3 (31.2%). Six patients with biopsy pathology ISUP 4 and 2 patients with ISUP 5 was reported at different stages.

Conclusions: Differences occur between the Gleason scores reported in transrectal ultrasonography-guided biopsy and radical prostatectomy pathologies. These differences become more evident as age increases, as PSA level increases and as prostate volume decreases.

Keyword: Prostate cancer, biopsy, Gleason score.

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Prostat biyopsi patolojisi ile radikal prostatektomi patolojilerinin karşılaştırılması

Öz

Amaç: Prostat spesifik antijenin tanımlanmasından sonra prostat kanserinin tanı oranı yükselmiştir. Prostat kanseri tanısı koymak için yapılan transrektal ultrasonografi eşliğinde prostat biyopsisi ile radikal prostatektomi spesimenindeki patolojilerin verileri arasında uyumsuzluk olabilmektedir. Bu durum küratif tedavi ihtiyacı olabilecek hastaları riske atarken, bazı hastalar için aşırı tedavi almasına neden olmaktadır. Bu çalışmada; radikal prostatektomi spesimenlerindeki Gleason skorları ile transrektal ultrasonografi eşliğinde biyopsi patolojilerindeki Gleason skorlarının karşılaştırılması amaçlanmıştır.

Yöntemler: Ocak 2007 ile Kasım 2018 tarihleri arasında, kliniğimizde radikal prostatektomi cerrahisi geçirmiş hastaların verileri retrospektif olarak değerlendirildi. Hastaların transrektal ultrasonografi eşliğinde biyopsi öncesi PSA değerleri, biyopsi kor sayıları, kanser pozitif biyopsi kor sayıları, biyopsideki kanser yüzdeleri ve Gleason skorları tespit edilerek, radikal prostatektomi sonrası Gleason skorları, doku kanser oranları, cerrahi sınırlar ve patolojik evre ile karşılaştırıldı. Patolojik sınıflamada ISUP-WHO (Society of Urological Pathology:ISUP-World Health Organization) 2014 sınıflaması kullanılmıştır.

Bulgular: Toplam 159 hastanın verileri değerlendirildi. Transrektal ultrasonografi eşliğinde prostat biyopsi patolojisinde, Gleason skoru <7 olan hastaların 82'inde(%75,9), radikal prostatektomi spesimeninde Gleason skoru da <7 olarak tespit edildi. Prostat biyopsi patolojisinde Gleason skoru 7 olan 10 hastada(%38,4) radikal prostatektomi spesimen patolojisi Gleason skoru 7 olarak tespit edildi. Prostat biyopsi patolojisinde Gleason skoru >7 olan 24 hastada(%48,9) radikal prostatektomi spesimeninde Gleason skoru >7 olarak tespit edildi. Biyopsi patolojisi ISUP 1 olan 109 hastanın 83 (%76,1) tanesinde radikal prostatektomi patolojisi ISUP 1 gelirken; biyopsi patoloji ISUP 2 olan 26 hastanın 8'inde(%30,7) radikal patolojisi ISUP 2 geldi. Biyopsi patolojisi ISUP 3 olan 16 hastanın ise 3'ünde(%31,2)radikal patolojisi ISUP 3 olarak rapor edildi. Biyopsi patolojisi ISUP 4 olan 6 hastanın ve ISUP 5 olan 2 hastanın ise radikal patolojisi farklı evrede rapor edildi.

Sonuç: Transrektal ultrasonografi eşliğinde biyopsi patolojilerinde bildirilen Gleason skorları ile radikal prostatektomi Gleason skorları arasındaki fark; hastanın yaşı ve PSA değeri artıkça, prostat volümü azaldıkça bu fark daha belirgin olmaktadır.

Anahtar kelimeler: Prostat kanseri, biyopsi, Gleason skoru.

INTRODUCTION

Many clinical and laboratory parameters have been investigated to determine their utility in predicting prostate cancer. Today, prostate-specific antigen (PSA) and nomograms that employ PSA are both widely accepted, as the PSA level has a high predictive value for prostate cancer. Another parameter, the PSA density, has also demonstrated a direct relationship with prostate cancer; a PSA density over 0.15 in patients with a PSA value from 4–10 ng/dl and a suspicion of cancer upon digital rectal examination (DRE) following transrectal ultrasonography (TRUS) have been suggested as indicators for prostate biopsy[1-3]. Radical prostatectomy is performed as a treatment for appropriate patients.

The 'Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial' (PLCO) study, which investigated a large number of patients undergoing radical prostatectomy, showed that some of these patients were subjected to unnecessary surgery[4]. Patients with a clinical local stage (cT1-cT2), a PSA level <10 ng/dl, a biopsy Gleason score <7, and less than 50% tumor in 2 cores are considered in the early stage and at low risk, so they can be followed up without any treatment. This situation emphasizes the importance of transrectal ultrasonography-guided biopsy (TRUS-bx) for the diagnosis of prostate cancer, both in terms of the technique of removal and in terms of pathological evaluation. Improperly evaluated TRUS-bx results may alter the treatment

decision for the patient and, as a result, put the patient at risk. In this study, our aim is to compare biopsy Gleason scores with the Gleason scores obtained following radical prostatectomy. Our focus was on comparing the compliance of patients who could be actively followed up after TRUS-bx with their pathology in prostate cancer specimens and whether the observed difference caused a possible treatment change.

METHODS

This retrospective study, which was approved by the Ethics Committee of Clinical Research in Malatya, Turkey (protocol number 2018/20-4), was conducted in a single urology clinic to review the medical data of 157 patients who underwent prostate needle biopsy between January 2007 and November 2018. Evaluations included the pre-biopsy history of the patients, DREs, transrectal ultrasonography, routine laboratory tests (including blood biochemistry, complete blood count, and urinalysis), urine cultures, biopsy cores, cancer positive biopsy cores, biopsy cancer percentages, and Gleason scores. Any subjects with hematologic, infectious, or chronic diseases or patients who had undergone anti-androgen or 5-alpha reductase inhibitor therapy before TRUS-bx or who had biopsy cores less than 10 were excluded from this study. Patients with missing data were also excluded. The pathologies, Gleason scores, tissue cancer rates, surgical margins, and pathologic stages of radical prostatectomy specimens of the same patients were determined and compared with their TRUS-bx results. The prostate cancer and TRUS-bx pathologies in our hospital were evaluated by a single pathologist. The pathological classification followed the ISUP-WHO (Society of Urological Pathology: ISUP-World Health Organization) 2014 classification.

Statistics

The data were outlined by calculating the median (min-max) values. The Mann-Whitney U test was used for the comparison of Gleason scores, tissue cancer rates, and pathologic stages values between the two groups. The optimal cutoff points for Gleason scores, tissue cancer rates, and pathologic stages were evaluated by receiver operating curve (ROC) analysis. The optimum cutoff point was determined using the Youden Index criteria. A value of $P < 0.05$ was considered significant. The data were analyzed using the SPSS software program for Windows, version 22.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

The results of 271 patients were evaluated, and the files of 159 patients were included in the study. The average patient age was 64.5 (49–76) years. The mean PSA of the patients before biopsy was 9.4 ng/dl (the lowest was 1.1 ng/dl and the highest was 49.0 ng/dl). The mean prostate volume was 39.79 ml (the lowest prostate volume was 15 ml and the highest was 95 ml). The general characteristics of the patients are shown in Table 1.

All prostate specimens of the patients included in the study were reported as prostate adenocarcinoma. In 87 (54.71%) patients, the biopsy Gleason score was consistent with the Gleason score in the radical prostatectomy material. In 18 (11.32%) patients, the Gleason score in the radical material was lower than the Gleason score in the biopsy, while in 54 (33.96%) patients, the radical prostatectomy Gleason score was higher than the biopsy Gleason score. The distribution of patients according to primary and secondary Gleason scores is shown in Table 2.

The radical pathology of 109 patients with biopsy pathology was ISUP 1 in 83 (76.1%) patients. In 5 of 16 patients with biopsy pathology ISUP 3 (31.2%), the radical pathology was reported as ISUP 3. Six patients with biopsy pathology ISUP 4 and 2 patients with ISUP 5 was reported at different stages. The biopsy and radical prostatectomy material

ISUP classifications of the patients are shown in Table 2.

Table 1: The general characteristics of the patients.

	N= 159	Mean (min-max.)	Std. Deviation	P<0.05
BIOPSY GLEASON SCORE	N= 159	6(3-10)	1,04	0.17
RADICAL PROSTATECTOMY GLEASON SCORE	N= 159	6(5-9)	0,84	0.44
AGE (year)	N= 159	64,5(49-76)	5,72	**0.036**
PROSTATE VOLUME (ml)	N= 158	39,7(15-95)	15,25	**0.05**
PSA(ng / dl)	N= 159	9,49(1,1-49)	6,96	**0.017**
FreePSA/TotalPSA	N= 159	14,8(0,07-48)	7,54	0.09

DISCUSSION

The Gleason score is an effective factor for use in the prognosis and treatment of prostatic adenocarcinomas. Therefore, the Gleason score should be determined accurately in order to establish the most appropriate treatment method. However, the Gleason scores obtained by transrectal fine needle biopsy are not always consistent with those obtained by radical prostatectomy. Investigations into the consistency of the Gleason scores between needle biopsy and radical prostatectomy materials in a number of studies have revealed inconsistency rates between 23% and 56%[5-7].

In the studies conducted in our country (Turkey), the rate of increase in Gleason score was between 33% and 40.8%[8-10]. In our study, this rate of increase was 33.96%. Technical reasons for this discrepancy include pathological interpretation differences, intermediate degrees, and sampling errors, as well as small prostate volume, high PSA values, advanced age, number of tumors, and large tumor volumes in the biopsy[6,7,12-14]. A previous study indicated that the rate of increase in Gleason score was 5 times higher in cases where the prostate volume was 20 cc and below than in cases with volumes of 50 cc or more[12]. The same study reported that the tumor was more severe and aggressive in the small prostate cases. Epstein et al.[6] investigated a large series and reported a rate of increase in the Gleason score of 43.5% in patients with prostate volume below 25 ml and 22.5% in patients with prostate volumes of 75 ml. Similarly, in our study, a correlation was found between low prostate volume and the rate of increase in the Gleason score, although the relationship was statistically weak (P = 0.05).

Table 2: The distribution of patients according to primer and secondary Gleason scores and ISUP classifications of the patients.

	RADICAL PROSTATECTOMY SPECİMEN ISUP SCORES / GLEASON SCORES	ISUP 1/ ≤3+3	ISUP 2/ 3+4	ISUP 3/ 4+3	ISUP 4/ 4+4, 5+3	ISUP 5/ 4+5
BIOPSY ISUP SCORES / BIOPSY GLEASON SCORES						
ISUP 1/ ≤3+3		83	18	3	5	
ISUP 2/3+4		8	11	1	4	2
ISUP 3/ 4+3		3	1	5	4	3
ISUP 4/ 4+4, 5+3		2		2		2
ISUP 5/ 4+5		1		1		

Another factor that plays a role in the mismatch in Gleason score between needle biopsy and radical prostatectomy is the experience of the uropathologist. Previous studies have shown that the results of uropathologists were more compatible than were those of general pathologists[14].

Advanced age is another factor that affects the Gleason score mismatch between biopsy and radical prostatectomy. Almost all studies have shown that advanced age is associated with

increased Gleason score[6]. In our study, the increase in Gleason score was statistically significant in patients aged 60 years and older (p = 0.03).

Studies that have evaluated the relationship between PSA and Gleason score have generated conflicting results. Some researchers have found a significant association between high PSA and Gleason score, whereas others have not detected this relationship[6,7,15-17]. In our study, a significant correlation was evident between the increase in PSA value and the increase in radical prostatectomy Gleason score (p = 0.017).

The heterogeneity and multifocal nature of prostate cancer may also result in a low or high Gleason score rating based on the location and the amount of tissue taken with the needle[18]. Many technical approaches, such as taking biopsies from the lateral direction[19], increasing the number of cores[20], taking apical biopsies[21], using transitional zone biopsy in selected patients[22], and performing MRI fusion biopsy, have been proposed to increase the accordance[23,24]. A study conducted by Capitanio et al.[25] on 301 patients compared the results of biopsy and radical prostatectomy and reported a Gleason score increase of 23.5% in cases who underwent 18 or more core biopsies versus 47.9% in those who underwent 10–12 core biopsies. Some researchers have demonstrated that same patients in the transrectal biopsies are Gleason score is lower[26]. In our study, the compatibility of biopsies taken from peripheral zone or apex was not evaluated.

Prostate cancer originates from the peripheral zone, but the frequency of tumors is as high as 82% in the apex[27]. The relationship between transrectal ultrasound-guided biopsy-derived cores and the increase in Gleason score was not clear, but the relationship between laterality and Gleason score was evaluated in a previous study[28]. Transperineal biopsies with ultrasound guidance have been suggested to overcome this problem[29]. A comparative study showed that the number of biopsy areas containing cancer was higher in transperineal biopsies than with the transrectal method[30]. Another study showed that the number of biopsy areas containing cancer was greater in transperineal biopsies accompanied by MRI than with the transrectal method[31,32]. In these studies, although the number of biopsy areas containing cancer was higher in transperineal biopsies accompanied by MRI, the Gleason score of 6 and below was not superior to ultrasound for detecting cancer[31]. Transperineal prostate biopsy accompanied by MRI is also more costly than ultrasound-guided biopsy, so MRI-guided biopsy is not a common procedure. New techniques that can reduce costs should be developed.

The results of the present study indicate that the transrectal biopsy technique used in our clinic gave Gleason scores that were moderately related with the radical prostatectomy Gleason score. Although our compliance rate is consistent with the literature values, improvements are still clearly needed, such as increasing the number of biopsy cores and using the MRI transperineal biopsy method.

CONCLUSION

The concordance between the biopsy Gleason score and the true Gleason score of the tumor remains a problem when deciding on less invasive treatments versus avoiding the risk of misdiagnosis and inappropriate treatment. The difference between Gleason scores reported in transrectal ultrasonography-guided biopsy pathologies and radical prostatectomy pathologies becomes more evident with increasing age, decreasing prostate volume, and increasing PSA level. Although the rate of accordance between needle biopsy Gleason score and radical prostatectomy Gleason score in our clinic is within the literature values, our data suggest that we should focus on new

technical approaches for more accurate grading with biopsy.

Declaration of Conflicting Interests: The authors declare that they have no conflict of interest.

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