Correlation between Gleason Scores of Prostatic Biopsies and Radical Prostatectomy Specimens

Panitta Sitthinamsuwan, M.D.*, Samrerng Ratanarapee, M.D.*, Sunai Leewansangthong, M.D., Sansanee Senawong, M.D.*****

**Department of Pathology, **Department of Surgery, ***Department of Immunology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.*

ABSTRACT

Objective: The incidence of prostatic adenocarcinoma in Thailand has been increasing since 1989. Increased public awareness may have contributed to early detection of the disease. Findings of abnormal digital examination, elevated serum prostate-specific antigen (PSA) level and abnormal transrectal ultrasonography (TRUS) lead to more multiple core biopsies. The Gleason grading system is the most common histologic grading of prostate carcinoma as approved by the World Health Organization. The Gleason score, one of the prognostic predictors, thus plays an important part in the therapeutic decision. The correlation between Gleason scores in biopsies and subsequent prostatectomy specimens is the main purpose of this study. Associations of Gleason scores with organ confinement, perineural invasion and serum PSA levels before prostatectomy were also studied.

Methods: The specimens from 100 patients, who underwent TRUS core biopsy and subsequent prostatectomy between January 2001 and June 2004, were included.

Results: Gleason grade concordance was found in 35 cases. In TRUS core biopsy, 35, 9, and 1 cases were 1, 2, and 3 scores undergraded, respectively. Thirteen and 7 cases were 1 and 2 scores overgraded, respectively. Eighty three percent show a difference of not more than 1 score.

Conclusion: We concluded that the Gleason scoring in prostatic biopsy remains a good predictor of the final Gleason grading of the radical prostatectomy specimen. However, the urologists and radiotherapists should keep in mind that undergrading and overgrading in TRUS core biopsies are both possible.

Keywords: Prostate adenocarcinoma, Gleason grading, Gleason score, radical prostatectomy, TRUS core biopsy

Siriraj Med J 2009;61:13-15
E-journal: http://www.sirirajmedj.co

Prostatic adenocarcinoma was the third most common malignant neoplasms in male patients in Siriraj Hospital in 2003.[1] In Thailand, the prevalence of the disease has been increasing since 1989.[2] Serum prostate-specific antigen (PSA) level is now generally used as a screening test for asymptomatic patients. Patients with elevated serum PSA level and/or abnormal digital rectal examination usually undergo multiple prostatic core biopsies to detect early prostatic carcinoma. The most commonly used grading system in reporting tumor differentiation is the Gleason system. There are five architectural patterns in the Gleason system and the Gleason score is a summation of the first and second most common patterns present. Firstly, the Gleason score was created by Donale F. Gleason in 1966.[3-4] In 2005, the International Society of Urological Pathology (ISUP) proposed a modified Gleason score in the conference of Gleason grading of prostate carcinoma.[5] Once adenocarcinoma is diagnosed, various treatments may follow depending on many factors, including the patient's age and underlying conditions, the stage of disease, and tumor differentiation. The various treatments include radical prostatectomy, castration, chemotherapy, hormonal treatment and radiation. Initially, our department reported the grading of prostatic adenocarcinoma in the Gleason pattern. Now, the Gleason score is used instead. In the present study we intended to correlate the Gleason scores in prostatic adenocarcinoma obtained from transrectal ultrasound

Correspondence to: Panitta Sitthinamsuwan

guided (TRUS) biopsies and subsequent radical prostatectomy. The Gleason scores and perineural invasion in both core biopsies and radical prostatectomy specimens were assessed. Organ confinement was also considered. Association of serum PSA levels and tumor differentiations were also studied.

MATERIALS AND METHODS

Specimens from one hundred patients with prostatic adenocarcinoma who underwent TRUS core biopsies and subsequent radical prostatectomy at Siriraj Hospital between January 2001 and June 2004 were included in this study. All the sections were assessed for their Gleason score (primary + secondary pattern), perineural invasion, organ confinement/extraprostatic invasion. TRUS core biopsies were graded before all of the radical prostatectomy specimens were subsequently graded in order to avoid bias. Two pathologists devoid of any clinical data or previous pathological diagnoses reevaluated all histologic gradings independently. Any interobserver variability was resolved at multiheaded scope sessions. Fifty-seven patients have preoperative serum PSA available.

The association of Gleason scores between prostatic biopsies and radical prostatectomy specimens was assessed by t-test. Chi-square test was used for Gleason scores in biopsies and perineural invasion in prostatectomy specimens, and organ confinement. The relation between serum PSA levels and Gleason grading was also similarly assessed. This study was also approved by Siriraj Hospital's Ethics Committee.

RESULTS

The patients were between the ages of 52 to 82 years old (mean, 67 years). Table 1 showed the Gleason scores in biopsy and prostatectomy. Table 2 summarized the difference of the Gleason scores between biopsies and radical prostatectomies.

Of the 100 cases, 35 cases were found to have concordant scores; 35 cases were 1 score undergraded; 13 cases were 1 score overgraded; 9 cases were 2 scores undergraded; 7 cases were 2 scores overgraded; and one case was 3 scores undergraded (Table 2). There were 83 cases with no difference over 1 score.

The association between the Gleason scores in the biopsies and the stage of tumor were statistically significant ($p < 0.01$) (Table 3). The biopsies with Gleason score 6 usually were organ-confined disease. The biopsies with Gleason score 7-10 were more often presented as non-organ-confined disease. The association between Gleason scores in the radical prostatectomy and stage of the disease had a similar tendency ($p < 0.01$).

TABLE 1. Distribution of Gleason scores in biopsies and radical prostatectomies.

Gleason Score in TRUS biopsies	Gleason Scores in radical prostatectomies					Total Number of cases
	6	**7**	**8**	**9**	**10**	
6	3	20	3	1	-	27
7	2	19	6	6	-	33
8	1	8	9	9	-	27
9	-	6	2	4	-	12
10	-	-	-	1	-	1
Total number of cases	6	53	20	21	0	100

TABLE 2. Differences of Gleason scores between biopsies and radical prostatectomies.

Differences	%of cases (100 cases)
Undergraded 3 scores	1
Undergraded 2 scores	9
Undergraded 1 score	35
Equal scores	35
Overgraded 1 score	13
Overgraded 2 scores	7

The study about perineural invasion found that the perineural invasion in radical prostatectomy specimens was associated with non-organ-confined disease. The presence of perineural invasion in the radical prostatectomy specimens in 81% of cases indicated tumor involvement beyond the prostate gland ($p<0.01$) (Table 4). In addition, all biopsies that found perineural invasion also found perineural invasion in radical prostatectomy specimens; however, forty-eight cases (70.6%) without perineural invasion in biopsies were found to show perineural invasion in prostatectomies. There was no statistical significance between PSA level before radical prostatectomy and the final Gleason score ($p= 0.6$).

DISCUSSION

The Gleason grading system has been widely accepted for the grading of prostatic adenocarcinoma. It provides information on patient management and prognosis. There are many studies about the correlation of the Gleason score between biopsies and radical prostatectomy. The studies commonly reported that the Gleason scores of biopsies were likely to be undergraded as compared to prostatectomies.[6-10] Our study showed a similar tendency. In addition, we found 24 cases, in which undergraded scoring from a Gleason score 6 in biopsies became more than Gleason score 6 in radical prostatectomy specimens. This result indicates that it there is a possibility of undergraded scoring which causes a change of prognosis and decision making in various choices of treatments after radical prostatectomy.

The Gleason score in biopsy can be used to predict the stage of disease. Willis et al. studied the correlation between the Gleason score from biopsies and the stage of prostatic adenocarcinoma. They found that 89% of cases with a Gleason score of 6 or less were organ confined while 90 % of cases with a Gleason score of 7 or more showed non-organ-confined tumor.[11] In the study of Taille et al., they found that 78% of cases with a Gleason score of 6 or less in biopsy specimens had organ-confined disease, and 52% of cases with Gleason score more than 6 in biopsy specimens had non-organ-confined disease.[12] As a result of our study, the Gleason score more than 6 in biopsy was statistically significant for non-organ-confined disease.

Although there is a significant result of perineural invasion in radical prostatectomy and stage III

TABLE 3. Association of Gleason scores in biopsies and tumor stage.

Gleason scores in biopsies	Stage	
	I and II (Organ-confined)	III and IV (Non-organ-confined)
6	15 (55%)	12 (45%)
7	7 (24%)	26 (76%)
8	7 (27%)	19 (73%)
9	3 (19%)	9 (81%)
10	0	2 (100%)

p < 0.01

TABLE 4. Association between perineural invasion in radical prostatectomies and tumor stage.

Perineural invasion in radical prostatectomies	Stage	
	I and II	III and IV
Absence	17 (81%)	4 (19%)
Presence	15 (19%)	64 (81%)

p < 0.01

and IV of disease, perineural involvement in core needle biopsies is rarely detected, probably due to a limitation of the specimens. In our study, there were 70.6% of cases without perineural invasion in biopsies that were found to have perineural invasion in radical prostatectomies. Thus, the absence of perineural invasion in biopsies did not support organ confinement. Egan et al. evaluated 349 biopsies to predict extraprostatic extension from biopsy and found 51% of sensitivity, 70% specificity and 49% of positive predictive value.[13]

The limitation of this study was that gross examination of all specimens was not done by the same pathologist because this study was retrospectively performed. Therefore, some radical specimens were entirely examined while some specimens were partially submitted.

CONCLUSION

In conclusion, the Gleason score in biopsy remains a good predictor of the Gleason grading of radical prostatectomy specimens. The Gleason score and perineural involvement in biopsy can be used to predict the stage of the disease. The PSA level is not associated with grading and it can be used as a tool to follow up the disease. However, there are still some limitations for the Gleason grading. Undergrading and overgrading are possible. Perineural invasion may not be found in biopsy specimens. Thus, in using the Gleason score as a predictor of prognostic factors in patients and for decision of treatments urologists and radiotherapists should be aware of these limitations.

REFERENCES

1. Siriraj Cancer Centre, Faculty of Medicine Siriraj Hospital, Mahidol University. Tumor Registry: Statistic report 2003. Bangkok: Siriraj Cancer Center 2003.
2. Sriplung H, Sontipong S, Martin N, Wiangnon S, Vootiprux V, Cheirsilpa A, Kanchanabat C, Khunhaprema T. Cancer incidence in Thailand, 1995-1997. Asian Pac J Cancer Prev 2005;6:276-81.
3. Epstein JI, Yang XJ. Prostate Biopsy Interpretation. Philadelphia: Lippincott, William & Wilkins, 2002.
4. Young RH, Srigley JR, Amin MB, Ulbright TM, Cubilla AL. Atlas of Tumor Pathology, Tumors of the Prostate Gland, Seminal Vesicles, Male Urethra, and Penis. Washington DC: Armed Forces Institute of Pathology, 2000.
5. Epstein JI, Allsbrook WC, Amin MB, Egevad LL, and The ISUP Grading committee. The 2005 international society of urological pathology (ISUP) consensus conference on Gleason grading of prostate carcinoma. Am J Surg Pathol 2005;29:1228-42.
6. Danzinger M, Shevchuk M, Antonescu C, Matthews GJ, Fracchia JA. Predictive accuracy of transrectal ultrasound-guided prostate biopsy: correlations to matched prostatectomy specimens. Urology 1997;49:863-7.
7. Mills SE, Fowler JE. Gleason grading of prostate carcinoma correlations between biopsy and prostatectomy specimens. Cancer 1986;57:346-9.
8. Tomaskovic I, Bulimbasic S, Custovic Z, Reljic A, Kruslin B, Kraus O. Correlation of Gleason grade in preoperative prostate biopsy and prostatectomy specimens. Acta Clin Croat 2003;42:225-7.
9. Lattouf JB, Saad F. Gleason score on biopsy: Is it reliable for predicting the final grade on pathology? BJU Int 2002;90:694-8.
10. Cooksoon MS, Fleshner NE, Soloway SM, Fair WR. Correlation between Gleason score of needle biopsy and radical prostatectomy specimen: accuracy and clinical implication. J Urol 1997;157:559-62.
11. Willis ML, Sauvageot J, Partin AW, Gurganus R, Epstein JI. Ability of sextant biopsies to predict radical prostatectomy stage. Urology 1998;51:759-64.
12. Talle A, Rubin MA, Bagiella E, et al. Can perineural invasion on prostate needle biopsy predict prostate specific antigen recurrence after radical prostatectomy? J Urol 1999;162:103-6.
13. Egan M, Bostwick DG. Prediction of extraprostatic extension of prostate cancer based on needle biopsy finding. Am J Surg Pathol 1997;21:1496-500.