RELATIONSHIP BETWEEN BIOPSY GLEASON SCORE AND RADICAL PROSTATECTOMY SPECIMEN GLEASON SCORE IN PATIENTS UNDERGOING SEXTANT VS 12 CORE BIOPSIES


Summary.- OBJECTIVES: Our goal is to analyze the degree of concordance between the Gleason score (GS) obtained in prostate biopsies and the one after radical prostatectomy. The intention is to know whether 12-core biopsy, instead of 6 (sextant biopsy), improves, or not, this correlation.

METHODS: A Cohort/prevalence study was conducted on 128 patients who underwent prostate biopsy and subsequent radical prostatectomy. Patients showing biopsy Gleason values greater or equal to 6 were selected as candidates for radical prostatectomy.

RESULTS: Mean age of the group of 128 patients was 62.9 years, with a mean PSA value of 8.53ng/ml. There was concordance between biopsy Gleason score and that obtained after radical prostatectomy in 63.28% of cases, while discordance was found in 36.72% of cases. There were not significant statistical differences after comparing results obtained between Gleason score concordance after 6 or 12-core biopsies and that obtained after radical prostatectomy.

CONCLUSIONS: We have noticed a low correlation between Gleason score after biopsy when it was compared with that obtained after radical prostatectomy, while these results are similar to those found in the literature. We did not find better results regarding Gleason score correlation after biopsies performed with 12 cores instead of 6.

Keywords: Prostate Cancer. Gleason Score. Prostate biopsy. Sextant biopsy. 12-core.

Correspondence

Miguel Angel Arrabal-Polo
Camino de Ronda, 143
18003 Granada (Spain)
arabalp@ono.com

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Resumen.- OBJETIVO: El cáncer de próstata es una patología cada vez más prevalente por la longevidad de la población. Es por ello que cada vez con más frecuencia se somete a los pacientes a realización de biopsia prostática para realizar su diagnóstico de certeza.

Nuestro objetivo fue analizar la relación del score gleason obtenido en la biopsia de próstata con el obtenido tras prostatectomía radical. Se pretendió analizar si la obtención de 12 cilindros en lugar de 6 (biopsia sextante) mejora o no esta relación.
INTRODUCTION

Prostate cancer is a more and more frequent pathology, and is also diagnosed earlier thanks to the progressive improvement of diagnostic methods available. After clinic or analytic suspicion of prostate cancer, pathology can be histologically confirmed after prostate biopsy. As for the histological description of the biopsy sample, Gleason score plays a key role in deciding which will be the subsequent treatment if the objective is to eradicate the disease completely, and for that reason, external radiotherapy, brachytherapy, cryotherapy or radical prostatectomy are the therapies to choose from (1). The Gleason grade was described by Gleason and Mellinger in 1974; it assesses the two most frequent patterns in tumor cell differentiation that occur in the sample, where the sum of 2 to 10 is the result (2, 3). Sometimes, there are discrepancies between the Gleason grade of the prostate biopsied and that of the radical prostatectomy, which is a fact that may change the prognosis and future therapeutical measures (1, 3, 9).

The objective is to analyze Gleason grade concordance in 129 patients who underwent prostate biopsy and radical prostatectomy after a retrospective survey, and determine whether an increase of prostate biopsy cylinders enhances the degree of concordance.

MATERIAL AND METHODS

We conducted a cohort/prevalence study, from January 2000 to March 2009, in 128 patients who underwent prostate biopsy; biopsies yielded histological confirmation of prostate cancer, which determined subsequent radical prostatectomies. From these 128 patients belonging to the study, 98 of them underwent sextant prostate biopsy, while the remaining 30 patients underwent 12-cylinder biopsies.

Exclusion criteria: Patients who underwent prostate biopsies, who showed a high or low PIN grade; patients under antiandrogen treatments, or LHRH analogs, or 5-alpha-reductase inhibitors, patients with a Gleason score below 6, and patients with a positive biopsy for prostate cancer, who were not candidates for radical prostatectomy.

Inclusion criteria: Patients who underwent sextant or 12-cylinder biopsy, Gleason score biopsy equal or higher than 6, and candidates for radical prostatectomy.

A Gleason score lower or equal to seven has been regarded as a favorable histological grade and a Gleason score higher than 7 as unfavorable.

Result assessment: The objective is to assess the degree of concordance between biopsy Gleason score and that obtained after radical prostatectomy, as well as the relation of the Gleason score with PSA levels and tumor stage, and determine whether 12-cylinder biopsies improve the histological correlation biopsy-radical prostatectomy against the classical sextant biopsy.

RESULTS

Mean age of the group of 128 patients was 62.9 years (47-80), a mean PSA value of 8.53 ng/ml (4.2-16). Mean Gleason score (GS) of prostate biopsy was 6.41 (6-9); in 83 patients, GS was 6 (64.8%); in 39 cases, GS was 7 (30.5%); in 4 cases, GS was 8 (3.1%); and in 2 cases, GS was 9 (1.6%). The group of 83 patients with prostate biopsy GS 6 exhibited a 3+3 pattern; of the 39 patients with GS 7, 33 exhibited a 3+4 pattern, as for the remaining, the pattern was 4+3; of the 4 patients with GS 8, 3 exhibited a pattern 4+4, 1 of them a pattern 5+3, while the remaining 2 patients, with a biopsy GS 9, exhibited a pattern 4+5. On the other hand, mean GS of the radical prostatectomy specimen was 6.71 (6-9); 60 cases with GS 6 (46.9%); 47 cases with GS 7 (36.7%); 7 cases with GS 8 (5.5%); and 9 cases with GS 9 (7%). As for 5 patients (3.9%) who underwent radical prostatectomy after positive biopsy, no cancer
was found (3 cases yielded absence of neoplasias, 1 case exhibited a low PIN degree, and 1 case exhibited a high PIN degree). The group of 60 patients with GS after radical prostatectomy showed a pattern 3+3; of the 47 cases with GS after radical prostatectomy, 35 patients exhibited a pattern 3+4, and 12 patients exhibited a pattern 4+3; 7 cases with GS 8 after radical prostatectomy, 1 case showed a pattern 3+5, and 6 cases a pattern 4+4; and in 9 cases with GS 9 after radical prostatectomy, 7 cases exhibited a pattern 4+5 and 2 cases a pattern 5+4 (Table I).

In the group of 83 patients with prostate biopsy GS 6, 54 cases (65.06%) reported concordance with radical prostatectomy specimen; there was under-staging in 25 cases (30.12%) (21 cases with GS 7, 2 cases with a GS 8, and 2 cases with a GS 9 after radical prostatectomy), there was over-staging in 1 case (1.20%) (high grade PIN after radical prostatectomy), and 3 cases of absence of neoplasia after radical prostatectomy (3.61%). In 39 patients with prostate biopsy GS 7, concordance with radical prostatectomy specimen was observed in 24 of them (61.54%), there was under-staging in 9 cases (2.13%) (4 cases with GS 8, and 5 cases of GS 9 after radical prostatectomy); there was over-staging in 6 cases (1.54%) (5 cases of GS 6 and 1 case showing a low grade PIN after radical prostatectomy). As for 4 patients with prostate biopsy GS 8, there was concordance with radical prostatectomy specimen in 1

<table>
<thead>
<tr>
<th>BIOPSY GS 6</th>
<th>BIOPSY GS 7</th>
<th>BIOPSY GS 8</th>
<th>BIOPSY GS 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>3+3 (83/60)</td>
<td>3+4 (33/35)</td>
<td>4+3 (6/12)</td>
<td>4+4 (3/6)</td>
</tr>
<tr>
<td>5+3 (5/3)</td>
<td>4+5 (1/1)</td>
<td>5+4 (2/7)</td>
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GS: Gleason score; B: Biopsy prostate; P: Radical Prostatectomy.

<table>
<thead>
<tr>
<th>CONCORDANCE</th>
<th>NO CONCORDANCE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOPSY GS 6</td>
<td>54 (65.06%)</td>
<td>29 [34.94%]</td>
</tr>
<tr>
<td>BIOPSY GS 7</td>
<td>24 (61.54%)</td>
<td>15 [39.46%]</td>
</tr>
<tr>
<td>BIOPSY GS 8</td>
<td>1 (25%)</td>
<td>3 (75%)</td>
</tr>
<tr>
<td>BIOPSY GS 9</td>
<td>2 (100%)</td>
<td>0 (0%)</td>
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| TOTAL       | 81 | 47 | 128 |

GS: Gleason Score; PIN HG: Intraepithelial high grade neoplasia; PIN LG: Intraepithelial low grade neoplasia; AN: Absence neoplasia.
case (25%), and over-staging in 3 cases (75%) (1 case with GS 6 and 2 cases with GS 7 after radical prostatectomy). In 2 patients with prostate biopsy GS 9, there was concordance with radical prostatectomy in both cases (100%) (Table II).

Overall, there has been concordance between biopsy GS and GS after radical prostatectomy in 81 cases (63.3%), and discordance in 47 cases (36.7%) (Under-staging, 26.56%; over-staging, 7.81%; absence of neoplasia, 2.34%).

Results obtained according to the number of prostate biopsy cylinders:

• Sextant prostate biopsy was performed on 98 cases, and there was GS concordance with radical prostatectomy specimen in 63 cases (64.28%), and discordance in 35 cases (35.72%).

• 12-cylinder prostate biopsy was performed in 30 cases; there was GS concordance with radical prostatectomy specimen in 18 cases (60%), and discordance in 12 cases (40%) (Table III).

Analysis through chi-square test does not report significant statistical differences ($p>0.05$) between concordance degree and the GS in biopsy-specimen-surgery removal when conducting sextant or 12-cylinder biopsy.

**DISCUSSION**

Gleason Score represents the histological assessment of the different cellular differentiation degrees in prostate cancer; mostly frequent tumor patterns are regarded as primary grade, while those that are next in frequency are regarded as secondary grade. The sum of both patterns enables classification on the basis of differentiation and good prognosis of patterns (a good prognosis and good cellular differentiation yields a GS 2-5; medium prognosis and moderate cellular differentiation a GS 6-7; bad prognosis and bad cellular differentiation a GS 8-10 (2, 4).

In order to get a reliable diagnosis of prostate cancer, it is necessary to conduct prostate biopsy through a fine needle to know GS grade and involvement of one or both lobules; this will subsequently allow us to determine the most appropriate treatment for the patient. In the case of a radical prostatectomy, the histological report will again be based on GS, lobular involvement, vascular or neural invasion, and extra-prostate invasion.

Numerous studies have been so far conducted on the degree of correlation between biopsy GS and GS after radical prostatectomy. Kvale et al reported, in a population study comprising 1116 patients who were included in a cancer registry in Norway, that the correlation between biopsy GS cases and GS after radical prostatectomy 53%; thirty eight percent of them were under-staging cases, and 9% were over-staging cases after biopsy, very similar results to those were obtained in our study (1). Noguchi et al report a lower concordance percentage, 36%, after examining 222 males; under-staging was 46%, and over-staging 18% (8). In an extensive review on 1670 patients, Rajinikanth et al refer a degree of 69% concordance rate between biopsy GS and GS obtained after radical prostatectomy in 1363 patients who met inclusion criteria, whereas under-staging is around 26%, and over-staging is 5%. It is worth mentioning that patients with GS 7 (78%) show the highest percentage of concordance, patients with GS 6, or less, show the highest percentage of under-staging, and cases with GS 8 to 10 (35%) show the highest percentage of over-staging (9). Köksal et al describe a group whose degree of correlation between biopsy GS and that after radical prostatectomy increase when Gleason score increases, 15% in GS 2-4, and 97% in GS 5-7, and it is 100% with GS 8-10; they conclude that the potential for correlation error is greater in a GS >7, or clearly differentiated, a result that does not coincide with those seen in our study or others studies re-

**TABLE III. CONCORDANCE RESULTS GLEASON SCORE BIOPSY-RADICAL PROSTATECTOMY BETWEEN 6 AND 12 CYLINDERS.**

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<thead>
<tr>
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<th>CONCORDANCE</th>
<th>NO CONCORDANCE</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>6 CYLINDERS</td>
<td>63 (64.28%)</td>
<td>35 (35.72%)</td>
<td>98</td>
</tr>
<tr>
<td>12 CYLINDERS</td>
<td>18 (60%)</td>
<td>12 (40%)</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td>81</td>
<td>47</td>
<td>128</td>
</tr>
</tbody>
</table>
viewed in the literature (10). Altay et al report a 45.9% degree of concordance in 61 patients, 42.26% show under-staging and 11.84% over-staging (11). Steinberg et al of the Johns Hopkins Hospital (JHH) have published an interesting study which compares results obtained in their center with other results from other centers. Fifty eight percent of a group of 499 patients of the JHH hospital presented GS correlation; concordance was 93% when compared with one-digit GS correlation, whereas 390 patients of another hospital showed concordance in 34% and 67% of cases, respectively (12). Although, Bostwick refers significant statistical differences between biopsy and the radical prostatectomy specimen regarding primary and secondary patterns and GS, while these differences are greater in a clearly or moderately differentiated prostate cancer (13). Results published in Spain about this issue do not vary from those aforementioned, so Montesino et al presented a series of 173 patients whose degree of concordance was 52.6%, under-staging was 32.4% and over-staging was 15% (3). Rodríguez Faba et al, in a study of 129 patients, describe an exact biopsy-prostatectomy correlation in 55.8% of cases, under-staging in 37.2% of cases, and over-staging in 7% of cases; discordance was greater in better differentiated cancer cases (4). In a study comprising 215 patients, Algaba Arrea et al describe an exact GS correlation in biopsy after radical prostatectomy in 49.7% of cases, under-assessment in 38.6%, and over-assessment in 11.6%; GS 7 showed greater similarity (72.7%), while GS 5 showed the lesser (25%), a fact which coincides with aforementioned studies (5). As for our study, the degrees of concordance and discordance was 63.3% and 36.7%, respectively (under-staging was 26.56% and over-staging was 7.81%, and absence of neoplasia, 2.34%), very similar results to those found in the literature. In the analysis of this difference according to Gleason grade, concordance was found in 65.06% of patients with biopsy GS 6, in 61.54% of patients with biopsy GS 7, and in 25% of patients with GS 8, and in 100% of patients with biopsy GS 9; although the number of patients in these last two groups is too small to yield significant results. However, we noted that the degree of correlation in GS 6 and 7 is around 60%, a similar value to that seen in Algaba’s and Bostwick’s studies (5, 13).

On the other hand, in the analysis of the correlation between biopsy GS and GS after radical prostatectomy, and on the basis of the number of biopsy cylinders, King et al mention that the increase in the number of biopsy cylinders, 10 to be precise, not only improves GS concordance, with regard to sextant biopsy, but also enables to detect more precisely the occurrence of a more undifferentiated cellular factor, providing thus a better indication for a subsequent treatment with radiotherapy or surgery (14). San Francisco et al conducted a study aimed at assessing the differences between two groups of patients who underwent radical prostatectomy, a group of 340 patients, who underwent biopsies with 9 cylinders or less, and a group of 126 patients who underwent biopsies with 10 cylinders or more. As for the group of 340 patients, concordance was found in 67% of cases against 76% of cases in the group of 126 patients, which demonstrates there are significant statistical differences, while he concludes that increasing the number of biopsy cylinders better defines the final GS after radical prostatectomy, a conclusion very similar to that expressed by Divrik et al (15, 16). Grossklaus et al, however, do not come up with significant differences in GS after 6, or more, punches in a prostate biopsy, or do see an increase in the chances of detecting indolent tumors showing a volume lower than 0.5 ml (17).

As for this aspect, our results are conclusive to the effect that we have not discovered significant statistical differences in the degree of correlation about Gleason score and radical prostatectomy biopsy after sextant prostate biopsy in 98 patients (64% correlation) against 12-cylinder in 30 patients (60% correlation). Although, the point of divergence lies in the necessity of increasing the number of patients undergoing 12-cylinder biopsies in order to reach more definite conclusions.

CONCLUSIONS

The greatest correlation percentage, with regard to Gleason Score between biopsy and radical prostatectomy, is found in tumors showing a higher degree of cellular differentiation (GS greater or equal to 7), although, such correlation is not improved when number biopsy punches pass from 6 to 12.

REFERENCES AND RECOMMENDED READINGS

(*of special interest, **of outstanding interest)


