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Original Article

Pathological outcomes in men with prostate cancer who are eligible for active surveillance

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Abstract

Background: In order to prevent over treatment of prostate cancer and significant adverse effects after surgical intervention, active surveillance was suggested in low risk or very low risk patients. This study aimed to retrospectively analyze the adverse pathological results of candidates eligible for active surveillance.

Methods: A total of 904 patients underwent robot-assisted laparoscopic radical prostatectomy in this single institute, from 2005 to April 2014. One hundred and thirty-two patients were eligible for active surveillance (AS). Candidates for active surveillance were defined as low risk (T1/T2a, prostate specific antigen 10 ng/ml or less, and Gleason score 6 or less) and very low risk (T1c, prostate specific antigen density 0.15 or less, Gleason score 6 or less, 2 or fewer positive biopsy cores, 50% or less cancer involvement per core) patients. Adverse pathological results were defined as Gleason sum more than 6, and non-organ-confined disease.

Results: There were 132 patients eligible for active surveillance. One hundred and thirteen (85.6%, 113/132) patients had low risk disease and nineteen (14.4%, 19/132) patients had very low risk disease. The adverse pathological results of low risk disease were upgrading Gleason sum and non-organ-confined disease, 41.6% (47/113) and 28.3% (32/113), respectively. The adverse pathological results of very low risk disease were upgrading Gleason sum and non-organ-confined disease, 15.8% (3/19) and 15.8% (3/19), respectively.

Conclusion: We conclude that although AS may prevent over treatment and significant adverse effects after surgical intervention, stratification of patients with low risk prostate cancer is of paramount importance when choosing appropriate candidate for AS. The risk of adverse pathological results should be well informed in the pretreatment counseling.

Keywords: Laparoscopy; Prostate; Prostatectomy; Prostatic neoplasms; Risk

1. Introduction

Prostate cancer is a very important cancer worldwide. It is ranked the second most common cancer in men. Over the most two decades, the incidence of prostate cancer has grown gradually upwards in Taiwan. There is a general awareness that PSA (prostate specific antigen) is a reliable biomarker, which helps early detection of prostate cancer. It helps discover early stage prostate cancer and decreases prostate cancer related deaths. Walsh et al. declared

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that radical prostatectomy is the gold standard treatment since 1980.[1]

However, the trend of management has changed in recent years: from aggressively surgical intervention to the more conservative AS. Prostate cancers that received radical prostatectomy had significantly declined from 2004 to 2013, especially in the early stage of the disease.[2] In consideration of cancer control, active surveillance and surgery have equal outcomes in low-risk prostate cancer. Patients' quality of life has become a more important factor in choosing treatment for prostate cancer. In a three years study of low-risk prostate cancer patients, patients who choose active surveillance have a better quality of life. They have better sexual function, voiding habits, and also mental health.[3] For low-risk prostate cancer, the current trend is toward active surveillance now. Surgeons can avoid over treatment for prostate cancer, significant adverse effects after operation, morbidity, and mental health decline. However, there are still some adverse results in these patients receiving active surveillance. A study from Johns Hopkins hospital showed the adverse results of upstaging and upgrading in low-risk patients are about 20%, and less than 15% in very low-risk patients.[4] This study aimed to analyze the adverse pathological results of candidates eligible for active surveillance in Asian patients in a single institute.

2. Methods

This study was a prospective data collection and retrospective-analysis. The hospital's ethics committee approved the study protocol and all of the participants provided written informed consent.

From December 2005 to April 2014, 904 patients with prostate cancer underwent robot-assisted laparoscopic radical prostatectomy in this institute. We reviewed the pre-operative data, including digital rectal examination (DRE) finding, PSA, Gleason score, PSA density, transrectal ultrasonography biopsy results, and pathological findings. Low risk and very low risk patients, who were eligible for active surveillance, were defined by the National Comprehensive Cancer Network (NCCN) version 2.2014.[5]

There were total a total 132 patients (14.6%) eligible for active surveillance before operation. These patients were classified in to two groups, low-risk and very low-risk. The low risk group was cT1 or cT2a, PSA 10 ng/ml or less, and Gleason score 6 or less. The very low risk group was cT1c, PSA less than 10 ng/ml, PSA density 0.15 or less, Gleason score 6 or less, 2 or fewer positive biopsy cores, and 50% or less cancer involvement per core.

The final pathologic diagnosis is decided by whole mount prostate specimens. We focused on the tumor grading and tumor stage. When the tumor grading, Gleason sum, is more than 6, it is defined as an adverse pathological result. Also, if the final pathological result is not organ-confined disease, we called it an adverse pathological result. The relationship between risk groups and adverse pathological results was analyzed.

Functional outcome of continence at one year following surgery was defined as using no pad and the result was recorded. Biochemical failure was defined as two serial PSA level >0.2 ng/ml.

3. Results

A total 132 patients eligible for active surveillance before operation were identified. These patients had chosen radical prostatectomy as the primary treatment option after providing a careful explanation of the risks and benefits of treatments. Among them, three (2.27%) were cT1a, six (4.54%) were cT1b, 81 (61.36%) were cT1c, 42 (31.81%) were cT2a, respectively. Patients were divided into two groups, low-risk patients and very low-risk patients. One hundred and thirteen patients (85.6%) were low-risk prostate cancer and nineteen patients (14.4%) were very low-risk prostate cancer. Patients' general data were compared (Table 1). There was little statistical significance in patients' age, tumor volume, mean tumor percentage and blood loss during operation. The low risk group has a lower body mass index (BMI) than the very low-risk group (23.96 kg/m^2 vs 24.91 kg/m^2, $p = 0.03$). It also has a higher PSA level and PSA density than the very low-risk group (6.71 ng/dl vs 5.73 ng/dl, $p = 0.001$; and 0.209 vs 0.114, $p < 0.0002$). The low risk group has smaller prostate volume, too (35.4 ml vs 44.89 ml, $p < 0.05$).

According to the pathology report from the whole mount prostate specimens, adverse effects were recorded (Table 2). In the low-risk group, the percentage of Gleason sum upgrading to more than 6 is 41% (47/113). Most of these patients' Gleason sum is 7 (91.48%). Additionally, there were 28.31% (32/113) of patients encountering upstaging disease, such as extra-capsular extension or seminal vesicle invasion.

Table 1
Baseline clinical characteristics of patients.

	Very-low-risk (n = 19)	Low-risk (n = 113)	*p*
Age (year)	61.78	63.03	0.559
BMI (kg/m^2)	24.91	23.96	0.03*
PSA (ng/dl)	5.13	6.71	0.001*
PSA density	0.114	0.209	0.0002*
Prostate volume (ml)	44.89	35.4	<0.05*
Tumor volume (ml)	3.15	3.57	0.755
Mean tumor percentage	6.87%	10.87%	0.128
Blood loss (ml)	147	136.96	0.232

Mann–Whitney U test.
*Statistically significant difference ($p < 0.05$).

Table 2
Final pathologic results of low-risk patients (n = 113) and very low-risk patients (n = 19).

	Low-risk group	Very low-risk group
Gleason Score ≧7	47/113 (41.6%)	3/19 (15.8%)
7	43	3
8	3	0
9	1	0
10	0	0
Non-organ confined	32/113 (28.31%)	3/19 (15.8%)
pT3a	29	3
pT3b	3	0

Upgrading and upstaging diseases were fewer in the very low-risk group than the low-risk group. The percentage of both upgrading and upstaging diseases were 15.8% (3/19). All of the upgrading patients were Gleason sum = 7 and all of the upstaging patients were extra-capsular extension.

The Continence rate at one year following surgery was slightly higher in the low-risk group than the very low-risk group (96.5% vs 89.5%, $p = 0.17$). The biochemical failure rate was greater in the low-risk group than the very low-risk group (8% vs 0%) but did not reach statistical significance ($p = 0.2$). The nine patients with late biochemical failure in the low-risk group received either adjuvant hormone therapy or adjuvant radiation therapy.

4. Discussion

There has been concern about the over diagnosis and over treatment of prostate cancer since the adoption of widespread PSA screening. AS established in the 1990s was aimed at reducing unnecessary treatments and treatment related complications of these patients with clinically insignificant prostate cancer. The safety and efficacy of AS had been well shown.[6] However, controversies over selecting appropriate subjects for AS persists.[7]

14%−35% of active surveillance patients progressed to definitive prostate cancer treatment.[8] The chance of tumor upgrading and upstaging determined by subsequent follow-up biopsy during AS was significantly lower in the very low risk group than the low risk group.[9] The difference is further evidenced by analyzing pathological outcomes of patients meeting the criteria for AS and receiving radical prostatectomy. In a review of 7486 patients, the low-risk patients have a relative risk of 1.89 (95% CI 1.21−2.95) for Gleason sum upgrading compared to the very low-risk patients. Also, the low-risk patients have a relative risk of 2.06 (95% CI 1.19−3.57) for finding non-organ confined prostate cancer compared to the very low-risk patients.[4] A comparison of final pathological results are shown in Table 3. The percentage of both upgrading and upstaging diseases in the low risk group were higher in our cohort. Nine (6.82&) patients had prostate cancer found by transurethral prostate resection. 69 (52.27%) patients had more than or equal to 12 cores at initial biopsy. 54 (40.9%) patients had less than 12 cores at initial biopsy. The differences among studies can be partially explained by a relative high percentage of inadequate biopsy cores in our cohort and racial differences as well as the limited sample size. Our data supports that the very low-risk patients had less adverse pathological results than the low-risk group in Asian people.

Table 3
Comparison of our results with study from Johns Hopkins Hospital.

	Present study	Conti et al.[8]	Tosoian et al.[4]
Total numbers for AS	132	1097	7486
Low-risk	113 (85.6%)	1055 (96.2%)	7333 (97.9%)
GS upgrading	41.6%	28%	21.8%
Non-organ-confined PCa	28.31%	22% ECE, 12% SVI	23.1%
Very low-risk	19 (14.4%)	42 (3.8%)	153 (2.1%)
GS upgrading	15.8%	23%	13.1%
Non-organ-confined PCa	15.8%	7% ECE, 2% SVI	8.5%

AS = active surveillance, GS = Gleason sum, ECE = extracapsular extension, PCa = prostate cancer, SVI = seminal vesicle invasion.

Despite the promising results shown by AS, missing a high grade or a non-organ confined tumor during follow-up biopsy remains a concern. All patients contemplating surveillance must have a confirmatory biopsy must be performed for patients contemplating AS. The targeted biopsy areas should include the anterior prostate and the anterolateral horn to find occult high-grade or large-volume cancers. Continued efforts have been made for optimizing the accuracy of TRUS biopsy. By using magnetic resonance imaging targeted biopsy, Ouzzane et al. reported 10% (28 of 281 patients) were reclassified as not eligible for AS.[10] Hansen et al. reported MRI/TRUS image fusion guided prostate biopsy yielded high detection rates among Gleason sum 7−10 prostate cancer and high negative predictive values for excluding Gleason sum 7−10 prostate cancer.[11] Additionally, PSA density and race were also reported as being valuable predictors for better selecting candidates eligible for AS.[12]

Theoretically, the very-low-risk patients had the highest probability of receiving nerve sparing surgery and keeping postoperative urinary continence and avoiding postoperative erectile dysfunction. In a study of a total of 4003 patients, functional outcomes after radical prostatectomy from 338 patients fulfilling the criteria for very-low-risk prostate cancer were reviewed. 44% of these patients had satisfactory erectile function and 84% reported urinary continence at 1 year postoperatively.[13] The reported functional outcomes varied in different studies and seemed to be best in high-volume centers.[14] The impact of multiple biopsies during AS on postoperative outcomes after radical prostatectomy was also reviewed. Sooriakumaran et al. reported that men receiving multiple preoperative prostate biopsies were more likely to be impotent postoperatively than those who received a single biopsy.[15]

The optimal follow-up tools and schedule for AS are not yet to be established. With the help of MRI, clinically significant prostate cancers were more likely to be identified at repeat biopsy.[16] Targeted prostate biopsy will play an important role in both enrollment and follow-up during AS programs in the near future.

Today, AS and radical prostatectomy are both important treatment options for localized prostate cancer. Identifying different risks and choosing appropriate candidates for AS are important. All patients should be well informed about the benefits and risks of receiving AS and radical prostatectomy.

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