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Establishment of Prospective Registry of Active Surveillance for Prostate Cancer: The Korean Urological Oncology Society Database

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Purpose: To establish a prospective registry for the active surveillance (AS) of prostate cancer (PC) using the Korean Urological Oncology Society (KUOS) database and to present interim analysis.

Materials and Methods: The KUOS registry of AS for PC (KUOS-AS-PC) was organized in May 2019 and comprises multiple institutions nationwide. The eligibility criteria were as follows: patients with (1) pathologically proven PC; (2) pre-biopsy prostate-specific antigen (PSA) ≤20 ng/mL; (3) International Society of Urological Pathology (ISUP) grade 1 or 2 (no cribriform pattern 4); (4) clinical T stage ≤T2c; (5) positive core ratio ≤50%; and (6) maximal cancer involvement in the core ≤50%. Detailed longitudinal clinical information, including multi-parametric magnetic resonance imaging and disease-specific outcomes, was recorded.

Results: From May 2019 to June 2021, 296 patients were enrolled, and 284 were analyzed. The mean±standard deviation (SD) age at enrollment was 68.7±8.2 years. The median follow-up period was 11.2 months (5.9–16.8 mo). Majority of patients had pre-biopsy PSA ≤10 ng/mL (91.2%), PSA density <0.2 ng/mL^2 (79.7%), ISUP grade group 1 (94.4%), single positive core (65.7%), maximal cancer involvement in the core ≤20% (78.1%), and clinical T stage of T1c or lower (72.9%). Fifty-two (18.3%) discontinued AS for various reasons. Interventions included radical prostatectomy (80.8%), transurethral prostatectomy (5.8%), primary androgen deprivation therapy (5.8%), radiation (5.8%), and focal therapy (1.9%). The mean±SD time to intervention was 8.9±5.2 months. The reasons for discontinuation included pathologic reclassification (59.6%), patient preference (25.0%), and radiologic reclassification (9.6%). Two (4.8%) patients with pathologic Gleason score upgraded to ISUP grade group 4, no biochemical recurrence.

Conclusions: The KUOS established a successful prospective database of PC patients undergoing AS in Korea, named the KUOS-AS-PC registry.

Keywords: Active surveillance; Database; Prostate cancer; Prospective registry

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INTRODUCTION

Prostate cancer (PC) is the second commonest cancer in men and the fifth leading cause of death in men worldwide [1]. The PC burden is projected to rise to approximately 2.3 million new cases and 740,000 deaths by 2040 worldwide, solely due to a growing and an aging population [1]. A family history of PC, old age, and black race are some of the few well-known risk factors for PC [2]. Diets with certain nutrients including fat, protein, carbohydrates, vitamin (A, D, and E), and polyphenols increase the risk of PC and are related to progression [3]. Many studies have shown significant international differences in long-term incidence, mortality, and trends in PC, presumed to reflect genetic differences such as high-risk Africans and low-risk Asians, availability and access to medical services [4], and regional differences, particularly represented by prostate-specific antigen (PSA) screening and benign prostatic hyperplasia surgery [5].

Active surveillance (AS) was introduced as a way of reducing over-treatment by preventing the side effects of invasive treatment in patients with low risk localized PC and by selecting only patients who really need definitive therapy [6,7]. A large prospective cohort of AS with a programmed follow-up plan and treatment regimen recommendations showed an excellent 10-year cause-specific survival rate of 98% to 99% [8-11].

The number of newly diagnosed PC in Korea was 3,461 in 2005, and 14,857 in 2018, increase of 4.3 times [12]. It has the 4th highest incidence rate among Korean men [12]; therefore, it is considered one of the most important cancers in elderly Korean men, and some low-risk patients are under AS, as in other countries [13]. Several researches of AS have also been reported by each institution. However, it is difficult to generalize retrospective studies conducted by a single or several centers due to differences in protocol details and small sample sizes. Therefore, a well-organized prospective, multi-center, large-scale cohort database system is required for conducting clinically meaningful research, and should specifically and consistently contain a much more diverse and vast amount of data than the protocols each hospital has been running to date.

The Korean Urological Oncology Society (KUOS) research team confirmed through a retrospective multicenter study that if the existing Western AS standard is applied to Koreans, it could lead to unfavorable disease outcomes and long-term biochemical recurrence (BCR) due to many upgrades and upstaging [14]. It means that data collection in Korean is necessary for the optimal diagnosis and treatment of Korean PC patients. The clinical results and guidelines currently in use for existing AS were obtained from a study conducted in Western patients. Because Koreans show different characteristics and progression of cancer compared to Westerners, the research team deemed it necessary to establish a prospective multi-center registry among Koreans with PC, identify treatment trends in Korea through long-term follow-up, and establish a specific basis for Koreans.

Despite the necessity, no detailed database of PC patients undergoing AS, especially those that include clinicopathological data, has been created in Korea [14].

For this reason, the KUOS report on the establishment of a prospective registry of AS for PC using the KUOS database, and report the results of interim analysis.

MATERIALS AND METHODS

1. Ethics statement

This study was approved by the local ethics committee of Seoul National University Bundang Hospital (approval number: B-1904/535-303). Informed consent was obtained from all participants prior to enrollment.

2. Organization

The The KUOS registry of AS for PC (KUOS-AS-PC) was organized in May 2019 and comprises academic institutions nationwide. Eleven institutions participated until June 2021.

3. Patient enrollment

The plan was to recruit patients for 5 years (until March 2024), but it can be extended if necessary. Follow-up was planned for up to 30 years after recruitment was completed. Rather than limiting to low risk PC, it was determined that the optimal selection criteria of AS for Korean would be found by setting broad spectrum criteria including intermediate risk PC and accumulating data. Therefore, it was decided to use the following eligibility criteria in consideration of life expectancy more than 10 years and risk factors of PC. The eligibility criteria included those aged ≥18 and <80 years old; with pathologically proven PC; pre-biopsy

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PSA ≤20 ng/mL; International Society of Urological Pathology (ISUP) grade group 1 or 2 (no cribriform pattern 4), clinical T stage ≤T2c, positive core ratio ≤50%, maximal cancer involvement in core ≤50%, and scheduled for prostate biopsy within 1 year. Detailed longitudinal clinical information, including multi-parametric magnetic resonance imaging (MRI) and disease-specific outcomes, was recorded.

4. Follow-up protocol

Outpatient follow-up was performed every 3 or 6 months at the discretion of the attending physician, and PSA was measured during each visit. Multiparametric MRI was performed every 1 year. All 2nd biopsies were performed within 1 year, and subsequent ones were performed at the clinician's discretion.

5. Definition of reclassification

If pathologic or radiologic reclassification was observed during follow-up, AS was discontinued, and intervention was performed. Pathologic reclassification was defined as a case of ISUP upgrade, an increase in the number or percentage of positive cores, or an increase in the maximum percentage of cores. Radiologic reclassification was defined as upstaging to T3a or higher, lymph node involvement, or metastasis on imaging.

6. Data collection

Personal information such as resident registration and hospital ID numbers were not collected for protection of patient's privacy.

The database protocol was decided upon in July 2019. We constructed electronic case report forms (eCRFs) and made them as detailed as possible. This protocol consisted of 9 domains (demographics, eligibility criteria, medical history and medication, baseline cancer characteristics, initial laboratory findings, MRI findings, follow-up biopsy, PSA, and oncologic outcome summary) and 387 fields.

Specifically, baseline cancer characteristics (pre-biopsy PSA, clinical T stage, Gleason score (GS), and other cancer information) and oncologic outcome summary (result of AS, metastasis outcome, survival outcome) were recorded and analyzed. Data collection and analysis was approved by the Institutional Review Boards of each hospital participating in this project.

All data were collected using the Research Electronic Data Capture (REDCap) system with three backup systems. REDCap is a secure web-based application designed to support data capture for research [15]. Through numerous clinical studies, the necessary privacy policy and data management methodology have been verified. eCRFs consist of several forms (designated as 'instruments' in REDCap), and selected forms can be repeatedly entered to capture longitudinal data [16].

7. Statistical analysis

We summarized the current enrollment status, basic demographics, and follow-up information. Descriptive data were expressed as mean±standard deviation (SD) or median with quartiles. All statistical analyses were performed using IBM SPSS version 25.0 (IBM Corp., Armonk, NY, USA) software.

They were compared with other large cohorts of AS for PC. Some data were excluded from the analysis because of insufficient or missing variables.

RESULTS

A total of 296 patients were enrolled in the KUOS-AS-PC registry from May 2019 to June 2021. Of these, 284 were analyzed, and 12 whose records were insufficient for analysis were excluded.

The baseline characteristics are summarized in Table 1. The mean±SD age at enrollment was 68.7±8.2 years. The median follow-up period was 11.2 months (5.9–16.8 mo), respectively. Majority of patients had pre-biopsy PSA ≤10 ng/mL (91.2%), PSA density (PSAD) <0.2 ng/mL^2 (79.7%), ISUP grade group 1 (94.4%), single positive core (65.7%), maximal cancer involvement in the core ≤20% (78.1%), and clinical T stage of T1c or lower (72.9%).

Outcomes of confirmatory biopsy and interventions are presented in Table 2. Excluding patients less than 1 year after initial biopsy, 148 (66.7%) of 222 underwent confirmatory biopsy. Among them, 20 (13.5%) showed ISUP upgrading, 34 (23.0%) showed increase of percentage of positive core, and 13 (8.8%) showed both of them. The mean±SD time to confirmatory biopsy was 9.5±4.6 months. Fifty-two (18.3%) discontinued AS for various reasons. Interventions included radical prostatectomy (80.8%), transurethral resection of the prostate (5.8%), primary androgen deprivation therapy (5.8%), radiation (5.8%), and focal therapy (1.9%). The mean±SD time to intervention was 8.9±5.2 months. The reasons

Table 1. Baseline characteristics

Characteristic	Value
Total number of patients	284
Age at enrollment (y)	68.7±8.2
Body mass index (kg/m^2)	24.3±3.0
Hypertension	134 (47.2)
Diabetes mellitus	57 (20.1)
Chronic kidney disease (MDRD GFR [mL/min/1.73m^2] <60 mL/min)	14 (4.9)
Smoking	
Nonsmoker	99 (34.9)
Ex-smoker	129 (45.4)
Current smoker	33 (11.6)
Unknown	23 (8.1)
ECOG performance status	
0	261 (91.9)
1	20 (7.0)
2	3 (1.1)
Charlson Comorbidity Index score	
0	207 (72.9)
1	47 (16.5)
≥2	30 (10.6)
Follow-up periods (mo)	11.2 (5.9–16.8)
Follow-up ≥12 mo	113 (39.8)
Pre-biopsy PSA (ng/mL)	5.7±2.9
Pre-biopsy PSA ≤10 ng/mL	259 (91.2)
PSAD (ng/mL^2)	0.15±0.12
PSAD <0.2 ng/mL^2	216/271 (79.7)
Gleason score	
3+3	268 (94.4)
3+4	16 (5.6)
Positive biopsy cores	268 (94.4)
1	176 (65.7)
2	58 (20.9)
≥3	34 (12.7)
Maximum % cancer, ≤20%	203/260 (78.1)
MRI, yes	273 (96.1)
Pre-biopsy	91 (33.3)
Post-biopsy	182 (66.7)
PI-RADS ≤3	200 (73.9)
Clinical T stage	
≤T1c	207 (72.9)
T2	77 (27.1)
Total number of biopsy at enroll	
1	250 (88.0)
≥2	34 (12.0)

Values are presented as number only, mean±standard deviation, number (%), or median (interquartile range).
MDRD: modification of diet in renal disease, GFR: glomerular filtration rate, ECOG: Eastern Cooperative Oncology Group, PSA: prostate-specific antigen, PSAD: PSA density, MRI: magnetic resonance imaging, PI-RADS: Prostate Imaging–Reporting and Data System.

Table 2. Outcomes of confirmatory biopsy and intervention

Outcome	Value
Confirmatory biopsy[a]	148 (66.7)
Upgrading of ISUP grade	20 (13.5)
Increase of PPC	34 (23.0)
Both (upgrading with increase of PPC)	13 (8.8)
Time to confirmatory biopsy (mo)	9.5±4.6
Interventions	52 (18.3)
Radical prostatectomy	42 (80.8)
TUR-P	3 (5.8)
Primary ADT	3 (5.8)
Radiation	3 (5.8)
Focal therapy	1 (1.9)
Time to intervention (mo)	8.9±5.2
Triggers for intervention	
Pathologic reclassification	31 (59.6)
Patient's request	13 (25.0)
Radiologic reclassification	5 (9.6)
Others (age, general condition, *etc.*)[b]	3 (5.8)
Radical prostatectomy pathologic GS	
4+3	3 (7.1)
4+4	2 (4.8)
BCR, yes	0 (0.0)

Values are presented as number (%) or mean±standard deviation.
ISUP: International Society of Urological Pathology, PPC: percentage of positive cores, TUR-P: transurethral resection of the prostate, ADT: androgen deprivation therapy, GS: Gleason score, BCR: biochemical recurrence.
[a]Patients less than 1 year after the initial biopsy were excluded from the denominator.
[b]Two patients were elderly and had concomitant dysuria, and one patient had recurrent prostatitis. All three patients underwent TUR-P.

for discontinuation included pathologic reclassification (59.6%), patient preference (25.0%), and radiologic reclassification (9.6%). Three (7.1%) had pathologic GS upgrade to ISUP grade group 3, two (4.8%) had pathologic GS upgrade to ISUP grade group 4, and no BCR was reported at the time of analysis.

DISCUSSION

There are several types of prospective cohorts and registries [17]. Population-based cohorts systematically collect data on a specific disease, region, and period using national claims data and statistics [18]. This is excellent in terms of generalizability and representation, but there is a limit to the quality of the data [19]. A single institutional cohort is a traditional and widely used method. Numerous studies have been conducted

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as retrospective single-center case series rather than as real cohorts [20,21]. The advantage is that data can be collected in detail, and quality control is easy. However, it has the drawback of being less representative. Community and/or multicenter cohorts are the most common and probably ideal cohorts [17]. CaPSURE, initiated in 1996, is perhaps one of the most successful prospective cohort of PC [17,22,23]. This is a very large cohort, recruiting more than 15,000 patients from 43 centers over 30 years. As such, the more organizations participate, the greater the possibility of generalization and quality due to the vast amount of data and wide coverage. Although cost and quality control are difficult, a well-designed database will be very pervasive.

AS, which was proposed experimentally in the 2000s, has evolved and become a widely used and preferred method for low-risk PC [24]. Nevertheless, there is still no clear consensus on the enrollment criteria for AS, follow-up protocol, and intervention. For this, there are large groups such as the PC Research International AS (PRIAS) study, which was initiated in 2006. As of 2016, there were more than 150 participating centers in 18 countries with 5,302 patients. In the other group, the Movember Global Action Plan PC AS (GAP3) consortium contains the largest integrated data of AS for PC worldwide as of 2021. In this centralized database, the number of patients aggregated in 15 countries and 25 centers from 2014 to 2016 exceeded 15,000 [25].

In the case of the GAP3 consortium, which is probably the largest PC-AS data worldwide, most of the participating institutions and patients are western, with only 3 of 25 institutions, and 428 of 15,101 (2.8%) from Asia [25]. It is thought that truly meaningful research results in PC-AS will be derived through the world's largest database (GAP3), but there is a possibility that it will not properly reflect the characteristics of Asians. In addition, since Western and Korean PC are proven to be different, large-scale, well-planned research, limited to the Korean patients is needed in AS. In a previous study, it was confirmed that the risk of pathologic upgrading was high and unfavorable in long-term BCR and outcome, when Western eligible criteria for AS were applied to Korean men with PC. Therefore, we concluded that broad spectrum enrollment criteria were more appropriate for Korean PC than Western patients, and more suitable for confirming the natural course of PC in Koreans. In Table 3, the criteria for AS of prospective PC-AS cohorts known worldwide are presented together with those of this study [8-10,26,27]. A comparison here confirms at a glance that the enrollment criteria used in this study are broader than those of others.

Although there are many AS cohorts and research results, there are not many well-planned prospective PC-AS cohorts. Table 4 compares the clinical and biopsy characteristics of patients in this study with those of other prospective PC-AS cohorts [10,26,28,29]. Likewise, the proportion of Asians was small. In the case of the PRIAS study, only Japanese was 11.8%, and in the case of JHU, it is estimated that only 4.2% of other ethnic backgrounds were accounted for. For the rest, racial information could not be found, but for Western single institution registry, the proportion of Asians is expected to be very small. Interestingly, when compar-

Table 3. Summary of criteria for active surveillance

Protocol	Biopsy GS	Clinical stage	PSA (ng/mL)	PSAD (ng/mL^2)	Number or PPC	Maximum cancer involvement rate in an core
Royal Marsden [26]	3+3, 3+4	≤T2c	<15	-	≤50%	50%
UOFT [8]	3+3, 3+4	≤T2c	≤20	-	-	-
UCSF [27]	3+3	≤T2c	<10	-	≤33%	50%
JHU [9]	3+3	T1c	-	<0.15	≤2	50%
PRIAS study [10]	3+3, 3+4	≤T2b	≤10	≤0.2	-No maximum in MRI targeted biopsies on positive lesions -4 (≤15% of saturation biopsy ≥20 cores)	10% (GS 3+4 only)
KUOS-AS-PC	3+3, 3+4	≤T2c	≤20	-	≤50%	50%

GS: Gleason score, PSA: prostate-specific antigen, PSAD: PSA density, PPC: percentage of positive cores, Royal Marsden: The Royal Marsden Hospital (Sutton, Surrey, UK), UOFT: University of Toronto, Sunnybrook Health Sciences Centre (Toronto, ON, Canada), UCSF: University of California (San Francisco, CA, USA), JHU: Johns Hopkins University (Baltimore, MD, USA), PRIAS: Prostate Cancer Research International Active Surveillance, KUOS-AS-PC: Korean Urological Oncology Society registry of active surveillance for prostate cancer, MRI: magnetic resonance imaging.

Table 4. Comparison of clinical and biopsy characteristics of patients

Protocol	n	Age (y)	Clinical stage, T2 or higher	Serum PSA(ng/mL)	Biopsy Gleason score		Prostate volume (mL)	Positive cores (n)	Max % of cancer in any one core
Royal Marsden [26]	471	66 (range 51–79)	54 (11)	6.4 (range 0.2–14.5)	3+3	438 (93.0)	45 (range 10–159)	N/A	10 (range 1–95)
					3+4	33 (7.0)			
UOFT [29]	1,051	67 (61–72)	165 (17)	5.78 (4.03–7.79)	3+3	917 (88.6)	N/A	2 (1–3)	17.0 (10.0–33.0)
					3+4	118 (11.4)			
UCSF [29]	1,500	63 (57–68)	450 (30)	5.44 (4.20–7.40)	3+3	1,311 (88.4)	37.0 (28.0–52.0)	2 (1–3)	17.0 (10.0–33.0)
					3+4	144 (9.7)			
					4+3	24 (1.6)			
					≥4+4	4 (0.3)			
JHU [29]	1,457	66 (62–69)	N/A	4.80 (3.60–6.27)	3+3	1,428 (99.6)	45.0 (35.0–60.0)	1 (1–2)	5.0 (1.0–10.0)
					3+4	6 (0.4)			
PRIAS study [10]	5,302	65.9 (61–70.4)	653(12.3)	5.7 (4.5–7.1)	3+3	5,271 (99)	45 (35,59)	1 (1–2)	N/A
					3+4	31 (1)			
PRIAS JAPAN [28]	856	68 (63–73)	69 (8.1)	5.3 (4.3-6.5)	3+3	831 (97.1)	37.9 (30.1–47.7)	1 (1–2)	N/A
					3+4	16 (1.9)			
KUOS-AS-PC	284	70 (63–75)	77 (27.1)	5.11 (3.90–7.01)	3+3	268 (94.4)	40.1 (30.1–51.7)	1 (1–2)	10.0 (5.0–20.0)
					3+4	16 (5.6)			

Values are presented as number only, median (interquartile range), or number (%).

PSA: prostate-specific antigen, Royal Marsden: The Royal Marsden Hospital (Sutton, Surrey, UK), UOFT: University of Toronto, Sunnybrook Health Sciences Centre (Toronto, Canada), UCSF: University of California (San Francisco, CA, USA), JHU: Johns Hopkins University (Baltimore, MD, USA), PRIAS: Prostate Cancer Research International Active Surveillance, KUOS-AS-PC: Korean Urological Oncology Society registry of active surveillance for prostate cancer, N/A: not available.

ing patients in the KUOS group with those in other PC-AS groups including PRIAS, PSA at enrollment was lower but patients were higher in age and clinical stage. Although it is not yet possible to judge prematurely, this may be related to the characteristics of PC in Koreans. However, there is a possibility that the clinical stage is exaggerated due to the broad spectrum of the enrolment criteria, and Korean doctors have enrolled patients in AS while taking a conservative approach in elderly patients, so long-term data collection and analysis are needed. The largest validated prospective AS cohort study in Asia is probably the one conducted in Japan [28]. We compared our data with those in this study to determine the differences between Asian countries. Interestingly, it was confirmed that there were very similar trends in age, serum PSA level, distribution of GS, and prostate volume compared to other cohorts. Compared to PRIAS-JAPAN, similar to PRIAS, KUOS-AS-PC showed older age, lower PSA level, and higher clinical stage. This is most likely due to the enrollment criteria of PRIAS itself, but it may be the difference between PC in Koreans and Japanese. This may also be due to the medical systems and practices in both countries. Further comparative analyses in the future may yield interesting results.

Also, worthy of note is the fact that the pathologic report of radical prostatectomy was ISUP grade 4 which was performed with pathologic upgrading at 1 year of AS. At the time of enrollment for AS, the low risk group had an initial PSA less than 10 ng/mL with biopsy showing 1 and 2 core positives with ISUP grade 1. However, one year later, PSA was above 10 ng/mL and ISUP grade, number of positive cores, and maximum cancer involvement were all increased, so radical prostatectomy was performed. Although the sample size is too small to present a standard or statistical verification for this, there are some similarities between the two. Enrollment was performed at an older age, the prostate size was larger, and the PSAD was below average. This may indicate that current AS criteria are inadequate. If the number of patients increases and data are accumulated, analysis becomes possible and the criteria for prompt intervention can be presented without considering AS as the first treatment option. On the other hand, we must also consider the possibility that 'miss the significant PC', a chronic problem in prostate biopsy, has occurred. Recently, many improvements have been made using MR fusion biopsy, but the problem often occurs depending on the location of the lesion. In addition, many systemic biopsies are still being performed, and in fact, one of these two cases was also a systemic biopsy. Remembering that the quality of prostate biopsy is very important, clinicians must keep this in mind when enrolling patients for AS.

Another interesting result to mention is that patient's preference was very high at 25.6% as the trigger for intervention in our data. This may be related to anxiety among Korean characteristics. Ahn et al [30] showed that except for disease progression as the reason for terminating AS, patient's anxiety was selected as the main reason. The accumulated data and information on this can be an important issue to consider in analyzing data of AS of Koreans.

To the best of our knowledge, the KUOS-AS-PC is the second largest prospective registry following the PRIAS-JAPAN study in Asia. This is the first and largest multicenter prospective PC-AS cohort in Korea. Until now, in Korea, AS was independently implemented by each institution, and a database was formed. Due to the small size of each institution data, it was difficult to derive clinically meaningful research results, and merge data due to different protocols for each institution. Accordingly, we planned a prospective, multi-center registry to maximize quality and availability; the data collection items of all participating organizations were defined and standardized as much as possible. In addition, a consensus on the format and timing of data collection was also discussed. Through this, we have enrolled 284 people so far, and created a very large prospective AS registry base in Asia. Since this is a prospective cohort, its size will only increase, so it can be used to draw meaningful research conclusions on PC-AS in Asians as well as Koreans in the future. This could make a significant contribution to the development of evidence-based consensus guidelines for AS and consequently contribute to adequate treatment and quality of life for patients with low-risk PC.

There are some limitations to our database. First, this was a multicenter database. Because of this, there may be in consistencies in the data. However, we have unified enrollment criteria and case-report forms, and are conducting data quality management through periodic data verification and feedback. Through this, we hope to achieve quality control, and minimize the disadvantages of multi-center data collection. Second, the follow-up duration was short. This will be resolved with long-

term follow-up. Currently, it is not a complete cohort of AS for PC in Koreans. However, because of the nature of Korean medical care, most cancer patients are followed-up at tertiary hospitals on a large scale, so it is thought that most AS patients were included.

Despite these limitations, the KUOS-AS-PC registry is important for representing trends in AS for PC. This is of great significance in that it was possible to more consistently, unify the application and monitoring of AS, which were slightly different in each institution. Obviously, the KUOS-AS-PC registry is considered valuable because it is a globally elusive prospective registry for AS of PC with intermediate risk as well as low risk. Moreover, there is a clear significance because it is a registry of Asian PCs that show a different aspect from western. As time passes, the significance of this project will become clear, and that it will become a representative database of Asia as well as Korea.

CONCLUSIONS

The KUOS established a successful prospective database of patients with PC undergoing AS in Korea, named KUOS-AS-PC registry. It is expected that the AS criteria suitable for Koreans will be determined through long-term research.

Conflict of Interest

The authors have nothing to disclose.

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Author Contribution

Conceptualization: SSB, SSJ, CK, HA. Data curation: GJ, JHC, CWJ, JYJ, TGK, SWP. Formal analysis: GJ, JKK. Investigation: GJ, JHC, CWJ, JYJ, TGK, SWP. Methodology: SSB, CWJ. Project administration: SSB, SSJ, CK, HA. Software: CWJ. Supervision: SSB. Validation: JKK. Writing – original draft: GJ, JKK, JHC, CWJ. Writing – review & editing: SSB, SSJ, CK, HA, JYJ, TGK, SWP.

Data Sharing Statement

The data analyzed for this study have been deposited in HARVARD Dataverse and are available at https://doi.org/10.7910/DVN/ZYH5ME.

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