Quality of life in prostate cancer: active surveillance versus radical prostatectomy

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A Capstone Paper submitted to the Faculty of Graduate Studies of
The University of Manitoba, Faculty of Medicine
in partial fulfillment of the requirements of the degree of'

MASTER OF PHYSICIAN ASSISTANT STUDIES
Class of 2015

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ABSTRACT

Introduction: This purpose of this review is to summarize current literature surrounding quality of life research in men with prostate cancer who choose either active surveillance (AS) or radical prostatectomy (RP), targeting anxiety, urinary and sexual symptoms.

*Method*s: A PUBMED search on anxiety, urinary, and sexual symptoms in active surveillance and prostatectomy in prostate cancer was performed using MESH search terms. Literature in English from 2005 to 2015 was included, and augmented with relevant articles found amongst reference lists. Thirteen original research articles were selected for review.

Results: Men in AS vs RP groups do not significantly differ in terms of anxiety, depression or distress. A higher proportion of men have difficulty achieving erections firm enough for intercourse and higher rates of urinary incontinence after RP. No data was found comparing urinary obstructive symptoms in RP and AS, though obstructive symptoms are known to be higher in watchful waiting.

Conclusion: Active surveillance is advantageous in having lower rates of erectile dysfunction and urinary incontinence, and is not associated with higher rates of anxiety. There are few studies comparing health related quality of life in active surveillance to radical prostatectomy, and more literature is required to fully understand the quality of life outcomes of each treatment choice.

INTRODUCTION

Prostate cancer remains the 3rd leading cause of cancer death in Canadian men (1). One in six men will be diagnosed with prostate cancer throughout their lifetime, however 97% of men with low risk prostate cancer will die with their prostate cancer, not because of it (2). Screening for

prostate cancer, while controversial, typically uses digital rectal examination with or without the serum marker known as prostate specific antigen (PSA) (3). PSA is a glycoprotein produced by the epithelial cells lining the ducts of the prostate gland and is used as both a screening tool for prostate cancer and for monitoring progression of the disease. PSA is not specific for cancer; other conditions that can cause an elevated PSA level include prostatitis, benign prostatic hyperplasia, and recent biopsy of the prostate or instrumentation of the urethra (4). Clinical suspicion of prostate cancer is confirmed by trans-rectal ultrasound guided biopsy, which also provides detail on how poorly differentiated the malignant tissue is (known as the Gleason score) and how much prostatic tissue is involved.

Once a diagnosis of prostate cancer is confirmed, the patient must decide on a treatment plan. Current active treatment options include radical prostatectomy, brachytherapy, and external beam radiation. Another option for many men with low-risk cancer is to opt for no immediate treatment at all. In the past this has been called watchful waiting but has evolved into active surveillance since the early 2000s. Many men will survive for years with their prostate cancer, whether they choose to undergo active treatment or not. Therefore, research into the quality of those years of survivorship is of importance when making decisions regarding treatment.

Watchful Waiting & Active Surveillance

Watchful waiting involves observing a diagnosis of prostate cancer, with no intervention until the patient becomes symptomatic, which is often indicative of advanced or metastatic disease (5). Active surveillance is a similar process, but involves pre-determined and regular follow up to monitor disease progression, and active treatment can be chosen at any point. Discontinuing watchful waiting is based on clinical progression, while discontinuing active surveillance is based on evidence of biochemical progression of disease. Choosing active surveillance or

watchful waiting does not mean avoiding treatment, but rather deferring treatment until such a time that it becomes more beneficial for the patient. Treatment of prostate cancer incurs risks and side effects, most notably erectile dysfunction and urinary incontinence, though these vary by treatment modality (6). Active surveillance reduces the risk of these side effects and avoids overtreatment in the numerous men who will never require treatment (6,7).

Careful selection is required for active surveillance to ensure that patients with higher grade disease receive appropriate treatment. An example of criteria listed in the literature includes: a Gleason score of <7 (with no 4 or 5 scores), PSA ≤ 10 ng/ml, and T of T1a-T2a disease (2). T2a is defined as palpable on digital rectal examination but involves no more than half of one side of the prostate gland. This also corresponds to Stage I disease (3).

Effective use of active surveillance requires repeating serum PSA and prostate biopsy at predetermined intervals, though the intervals recommended vary by institution and there is no clear consensus(5). An example would be monitoring serum PSA every 3-6 months and repeating the transrectal ultrasound guided biopsy every 1-4 years after the initial biopsy to reassess Gleason score. Changes in clinical or histological progression, PSA doubling time (or a significant rise), as well as patient preference are triggers for intervention. In a prospective cohort study, 30% of men proceeded to definitive therapy at a median of 6.8 years, and the 10-year cancer-specific survival rate for men on AS was 97% (8). In contrast, watchful waiting does not provide the same survival benefit. Research involving a cohort of 695 men with prostate cancer found that men with watchful waiting had higher rates of both death and distant metastases compared to RP (9).

A systematic review comparing 10 publications from 2008 onwards found no change in ten year disease specific survival in active surveillance patients when compared to radical prostatectomy, and the estimated ten year survival rate is between 96%-100% (10). Additionally, the study postulated that active surveillance reduces overtreatment of low grade prostate cancer.

Radical Prostatectomy

Radical prostatectomy involves surgical removal of the entire prostate gland and is performed when the cancer cells are believed to be confined entirely within the prostate. Research involving over 23000 patients showed that radical prostatectomy for all stages of prostate cancer has a 15 year cancer specific mortality rate of 7%, while low-risk prostate cancer had a 15 year prostate cancer specific mortality rate of just 1.2%(11).

Given such a high long-term survival rate using radical prostatectomy in low risk prostate cancer, the quality of life in survivors is a topic of interest. The most notable side effects of prostatectomy are erectile dysfunction and incontinence. Incontinence and erectile dysfunction rates vary widely by surgeon, experience and technique. (12).

Potency rates have been reported as ranging anywhere from 11-87% (12). Nerve sparing surgery, a newer technique, preserves the autonomic cavernous nerves within neurovascular bundles, leading to less impotence (13,14). This technique is only used in patients where the removal of malignant tissue will not be compromised, generally in men with Gleason scores of 6 (15). In surgery, the cavernous nerves can be damaged in a multitude of ways (cautery, stretching), however they may be able to regenerate over time, which may account for increases in sexual function several years after RP (14).

The rate of erectile function recovery correlates with the surgical approach used – non-nerve sparing, unilateral nerve sparing and bilateral nerved sparing had recovery rates of 13%, 33%, 50% respectively at 24 months (16). A study involving over 550 patients reported that 88% of the patients had poor erections at 2 months after surgery, decreasing to rates of 80%, 67%, and 58% at 6, 12, and 24 months, respectively (13). Penile rehabilitation is also emerging in the literature, and while no preferred method of rehabilitation exists, advocates suggest starting immediately after surgery. Current options include PDE5i inhibitors, implants, vacuum devices and injections(17).

Urinary incontinence occurs in 5-74% of men after radical prostatectomy, depending on the surgical technique used and the article (18). The degree to which incontinence affects men after RP varies from occasional dribbling to complete loss of bladder control, however some men regain their continence over time. Regardless of the method of treatment, men with a diagnosis of prostate cancer have higher rates of incontinence than those without prostate cancer (19).

Other Treatments

Other treatments for low-grade prostate cancer include brachytherapy and radiation therapy. Brachytherapy involves the implantation of radioactive seeds into the prostate directly and requires only a single visit for placement of the seeds. External beam radiation therapy lasts for 7-8 weeks and delivers high doses of radiation aimed directly at the prostate, though the radiation may reach surrounding gastrointestinal and genitourinary tissues (3).

After treatment, if curative, a patient's PSA should fall to undetectable levels. A rising PSA after treatment indicates biochemical recurrence and is not uncommon. For radical prostatectomy, a

PSA of greater than 0.2 ng/ml is considered to be biochemical recurrence (20). A common next step is the use of androgen deprivation therapy (ADT). ADT is associated with delayed time to metastasis and a reduced PSA, but does not appear to reduce mortality, and produces side effects including breast tenderness, osteoporosis and sexual dysfunction(20). There is evidence to support that early addition of hormonal treatments (before failure of another treatment) produces a relative reduction of mortality by 14% (21).

Health Related Quality of Life

Health related quality of life (HRQOL) is difficult to measure as it encompasses many aspects of human experience and is based solely on patient perception. The Prostate Cancer Working Group recommends that five domains be measured in men with prostate cancer: urinary incontinence, obstruction and irritation; sexual dysfunction, bowel symptoms and hormonal symptoms (22). Tools currently used are mostly congruent with this, measuring urinary symptoms, bowel symptoms, erectile dysfunction, and general feelings of well-being (23). Quality of life symptoms are often measured with surveys and validated instruments, such as the UCLA Prostate Cancer Index (UCLA-PCI), and the Expanded Prostate Cancer Index Composite (EPIC) though many others are used (24,25).

The UCLA-PCI is a 20 item survey used to address 6 HRQOL indicators: sexual, urinary, and bowel function; and sexual, urinary, and bowel bother (24). This survey takes approximately twenty minutes to complete and is well-tolerated by older patients. A higher number on the UCLA-PCI scale correlates with a higher quality of life.

EPIC is a one page, 16 item questionnaire that examines domains of urinary incontinence, irritation/obstruction, sexual function, bowel function, and hormonal impact (25). Older versions

of this instrument with more items exist, however the most recent EPIC-CP is more condensed, and strongly correlates scores to previous versions. A lower score on the EPIC-CP scale indicates higher quality of life.

Predictors of high quality of life in men on AS have been studied. Poorer QOL in AS is predicted by lack of a spouse and impaired mental health, while consulting with multiple physicians before making a treatment decision and a greater number of cores taken at biopsy predicted higher quality of life (26).

Anxiety surrounding prostate cancer treatment and the rejection of active surveillance has been studied, with conflicting results. None of the patients in a 2012 study (27) discontinued AS due to anxiety, but instead because they no longer met the criteria for AS due to cancer progression on subsequent biopsies (27). However, another study that found 4 of the 23 participants who ceased active surveillance had higher prostate-cancer specific anxiety measure scores than the remainder of participants (28), suggesting that anxiety may play a role in deciding on prostatectomy.

Several articles compare quality of life in brachytherapy, radiation or prostatectomy. This research has not found any one treatment to be markedly more beneficial to quality of life than any other, however has noted that each treatment modality has its own benefits and risks (29,30). When compared to brachytherapy, prostatectomy has worse urinary and sexual function implications, but does not differ in overall quality of life at three months of follow up (30). These results highlight the importance of discussing each treatment option with patients as well as the importance into research surrounding quality of life.

How Do Men Choose?

Despite the known safety of active surveillance, many men who are eligible choose to pursue immediate treatment instead. Factors influencing decision making in prostate cancer treatment have been studied. Physician recommendation of a particular treatment choice is known to influence decision making, as do family/friend opinions, education level and socioeconomic status (31).

In 2008, Barocas et al (32) reported that 16.4% of prostate cancer patients met the criteria for active surveillance. These criteria selected only low-risk prostate cancers as determined by their PSA levels, PSA density, clinical stage, number of positive cores on biopsy, and a Gleason score of <7 with no 4s or 5s. Only 9% of those eligible for active surveillance chose AS (32). Of the men who chose AS, 72% agreed with choosing AS "To avoid side effects of the therapies and maintain my quality of life" (26). Other common reasons were trusting physician advice (74%), being able to choose treatment later (47%) and trusting the cancer center where they received treatment (58%) (26). Volk et al (33) showed that a well-structured active surveillance protocol provides reassurance to patients choosing AS. The 15 men in his study demonstrated a deep understanding of their surveillance protocols, and were able to give highly detailed, accurate descriptions of AS (33).

In a group of 15 men who chose active treatment (prostatectomy, brachytherapy or radiation) for low risk prostate cancer over active surveillance for low risk prostate cancer did so because they preferred to remove the cancer from their body (33). This was again supported in a study involving 768 patients, where 305 (40%) chose RP, the majority of whom (60%) cited the same reason (34). Fear of disease progression may be the rationale to immediately reject active

surveillance at the time of decision making around cancer treatment modality, as immediate treatment may give patients a sense of control over their disease (35).

Previous Research

Prior to the emergence of active surveillance, research into safety, efficacy and HRQOL was done on watchful waiting. The Scandinavian Prostate Cancer Group (SPCG-4) studied quality of life indicators in 695 men aged 75 or younger with localized prostate cancer and a life expectancy of greater than ten years. Men were assigned to watchful waiting or radical prostatectomy groups randomly. 349 of these men participated in a subsequent study regarding quality of life indicators. After 4 years of follow up, no significant difference in overall quality of life was found between the two groups, however, the most problematic symptoms had different prevalence in each group. Urinary irritation/obstructive symptoms were found more commonly in watchful waiting, and erectile dysfunction and urinary incontinence were found more often in RP. This was then supported by Katz & Rodriguez (36) who reported that choosing watchful waiting was not associated with any adverse effect on overall quality of life.

The SPCG-4 study was then followed up nearly a decade later by Johansson et al (37). Participants included 182 men who underwent prostatectomy and 167 men who were assigned to watchful waiting at a median of 12.2 years of follow up since randomization. Results indicated that only 6% from each group reported none of the following: erectile dysfunction, weak urinary stream, nocturia, or urinary leakage. Results showed higher rates of urinary leakage in RP (41%) than watchful waiting (11%). Though men experienced nocturia more often in watchful waiting (63%) than RP (49%), and also had weaker urinary stream (40% in watchful waiting and 29% in RP). This study showed similar rates of sexual dysfunction at 12.2 years of follow up (84% in

RP and 80% in watchful waiting), and nearly equal rates of moderate to great distress from their decreased sexual function (37% in RP, 35% in watchful waiting).

When compared to watchful waiting, anxiety levels have been proven to be lower in prostatectomy (23%) than in watchful waiting (31%) (38). In recent years, data has emerged surrounding active surveillance and HRQOL. A recent systematic review showed that choosing active surveillance over radical prostatectomy or other forms of active treatment such as radiation or androgen deprivation therapy did not result in higher levels of patient anxiety, psychological symptoms, or satisfaction with their medical decisions (6).

As of the time of this writing, there are no large scale meta-analyses comparing active surveillance to radical prostatectomy focusing on quality of life indicators. Reviews comparing active surveillance to prostatectomy in the three domains of urinary symptoms, sexual symptoms, and mental health were not found. Clinical trials and reviews comparing HRQOL in prostatectomy versus other modalities of therapy exist, and several studies compare AS or RP in only one or two domains. Multiple studies exist for each of RP and AS separately in the domains reviewed in this paper. The purpose of this review is to highlight the evidence surrounding AS and RP for the health related quality of life indicators of urinary symptoms, sexual symptoms, and mental health in men with prostate cancer.

METHODS

A PubMed search was conducted and included watchful waiting/active surveillance, prostatic neoplasm, and quality of life as MESH terms. This search yielded 31 results when limited to English articles. Of these, 14 articles were selected for review after screening abstracts for relevance.

Another PubMed search was conducted using prostatectomy, prostatic neoplasms, and quality of life as MESH terms, which yielded 118 results when limited to English articles including only clinical trials, reviews, and meta-analyses from the last ten years on human participants. Abstracts were screened for relevance and 21 articles were selected for review. References in the resulting articles were also reviewed for relevancy. Three other such studies were found this way.

To be included in this review, research was required to meet the following criteria: list the number of participants; evaluate one of: depression, anxiety, urinary function, sexual function or overall quality of life in relation to either RP, AS, or both; define the severity of prostate cancer in the study; and must not have used the same data as another study already reviewed. Many validated HRQOL screening tools exist for each domain of HRQOL and are not easily convertible. Therefore, data was included only if there was another dataset for comparison, such as the UCLA-PCI (appearing frequently).

RESULTS

Thirteen articles meeting all of the criteria were reviewed, two of which directly compared active surveillance and radical prostatectomy. Only one article discussed all of the domains listed : mental health, sexual function and urinary function (39), though this article focused on the mental health aspect of HRQOL.

Mental Health

Punnen et al (39) divided 679 men into AS and RP groups who responded to surveys regarding depression, anxiety, and general distress. No significant difference was found in the severity or the proportion of patients that suffered between AS and RP groups (39). As expected, levels of

anxiety, depression and distress were higher for men with prostate cancer in any treatment group than for men without prostate cancer (39).

Anderson et al (28) screened 86 AS patients in Australia with validated tools and reported low levels of prostate cancer related anxiety and good overall HRQOL. Disease specific anxiety was measured by the MAX-PC (Memorial Anxiety Scale for Prostate Cancer) tool was found to be low in 87% of the participants (28). No comparison to radical prostatectomy was made in this article.

Seiler et al (40) studied anxiety, distress and general health related quality of life in 133 men with prostate cancer and their partners. Low levels of anxiety and depression were found using HADS (Hospital Anxiety and Depression Scale) in the patients. Interestingly, the partners of men had higher levels of both anxiety and depression at all intervals of follow. Anxiety was again measured using MAX-PC and found to be low (40). Anxiety specific to PSA level was also found to be low in men on AS (28,40).

Erectile Dysfunction

In a 2012 study by Van den Berg et al (41), 266 Men enrolled in either active surveillance, radical prostatectomy or radiation therapy completed questionnaires regarding their sexual function at six months and again at 18 months from the time of diagnosis (see Table 1). For men in the RP group at 6 months, 88% never have spontaneous erections (17% in AS), 23% are very dissatisfied with their sex life (2% on AS) and 83% have had difficulty achieving an erection in the last two weeks nearly every time (7% in AS) (41). At 18 months from diagnosis, 86% never have spontaneous erections (26% in AS), 23% are very dissatisfied with their sex life (4% on

AS) and 83% have had difficulty achieving an erection in the last two weeks nearly every time (10% in AS).

In 2008, Sanda (13) surveyed 1201 patients who chose either RP, brachytherapy, or radiation at regular intervals regarding sexual, urinary, bowel and hormonal symptoms (13). At two years, 372 men who chose RP continued to participate, 64% of whom reported their erections were not firm (improved from 90% at 2 months), while 42% reported difficulty with orgasm. At 1 year, 26% stated that sexual function overall was a big problem. Comparison to active surveillance was not made.

In 2010, 620 patients were evaluated after more than four years follow up from RP regarding sexual function only with no comparison to other treatment modalities in a study by Le et al (42). Sexual function was evaluated at regular intervals of follow up after prostatectomy. Ability to achieve erection, erection quality, erection frequency and awakening with erections all declined within 6 months after radical prostatectomy. No comparison to active surveillance was made.

Shinohara (43) examined HRQOL in 71 patients in Japan using the SF-36(not tabulated) and UCLA-PCI indices for patients enrolled in RP and intensity modulated radiation therapy (IMRT) over 5 years of follow up. The UCLA-PCI results are tabulated in Table 2. No comparison to active surveillance was made (43).

Jayadevappa (44) also discussed UCLA-PCI sexual function in a 2006 study involving 115 men in either RP or brachytherapy groups at 3, 6, and 12 months of follow up. Results from the 12 month follow up survey are compared in table 2. No comparison to active surveillance was made.

Hashine (30) discussed sexual function after RP or brachytherapy in 204 patients, 122 of whom received RP at 1, 3, 6 and 12 months of follow up, using the UCLA-PCI tool. The results of the 12 month follow up surveys are compared in table 2. No comparison to active surveillance was made.

Urinary Incontinence

706 men with prostate cancer in the Osteoporotic Fractures in Men Research Group responded to questionnaires surrounding urinary incontinence (19). These men were divided into groups based on treatment modality: RP, RT, ADT, Observation, or other. Observation was not clearly defined. Men in the observation group had more respondents with no urinary leaking at all (45.2% vs RP 21.0%) and fewer patients using at least one pad per day (7.1% vs 27.1% in RP) (see Figure 1).

Holm (45) studied 844 patients treated with RP regarding urinary incontinence. 70% of men included had full continence at baseline before RP, while only 26% had full continence at 12 months after RP. The data is reported in Figure 1, and no comparison to active surveillance was made.

In addition to the research on sexual function detailed above, Sanda et al (13) reported data on urinary incontinence after RP. At two years after RP, 14% reported urinary leakage more than once per day, and 76% found urinary continence to be no problem or a very small problem.

Comparison between RP, radiation therapy and brachytherapy occurred in 704 patients in Spanish hospitals, 193 of whom chose RP (46). This study used the EPIC questionnaire with 50 items. High scores on EPIC were reported for RP in the domains of incontinence, obstructive symptoms, bowel, and hormonal symptoms, corresponding to a high HRQOL in those areas, and

a lower score in the sexual domain, corresponding to lower HRQOL (not tabulated). This study found that brachytherapy has the best HRQOL of the three (46) and did not include an active surveillance group.

A total of 29 men (10 from Ireland, 19 from USA) undergoing active surveillance participated in surveys regarding urinary, bowel and sexual function (47). UCLA-PCI scores were determined separately for each group and are included in Table 2.

RP and Brachytherapy were compared in a study involving 168 men using the EPIC-50 questionnaire to evaluate HRQOL (48). Brachytherapy was advantageous in the urinary and sexual domains as well as overall patient satisfaction. No comparison to active surveillance was made.

DISCUSSION

This review found one article reporting no measureable difference in anxiety, depression, or general distress in AS compared to RP patients. Two other articles reported that anxiety is low in patients on active surveillance, but did not directly compare these patients to a cohort of RP patients. Overall, this suggests that anxiety is low in AS, but more research is needed surrounding direct comparison of RP to AS.

Data collected on sexual function from several studies was compiled into table 1. The data from (41) shows that sexual activity was just as important for men who chose RP as it was for men choosing AS. The men in the RP group, however, had more difficulty achieving erections, whether intended or spontaneous, were less sexually active because of it, and were overall more dissatisfied with their sex life than men in the Active Surveillance group. Interestingly, while the erectile function of men who undergo prostatectomy tends to improve over time, the data from

van den Berg (49) shows a slow trend of worsening sexual function in those who chose active surveillance. No control group of the aging general male population was used, so it is difficult to determine the significance of this finding.

In Table 2, higher UCLA-PCI scores (corresponding to higher quality of life) on the UCLA-PCI sexual function domain were reported in the active surveillance groups than in the RP groups, suggesting active surveillance offers better HRQOL in the domain of sexual function. However, due to the increasing potency and continence rates years after RP, further research on AS vs RP should consider measuring potency and continence for both groups several years after treatment, when functionality rates have plateaued.

Urinary symptoms are compared between RP and Observation (19), however observation is not defined in the article. Whether observation resembles active surveillance or watchful waiting most closely may have little bearing, as both processes involve no physical intervention on the urinary system, so urinary symptoms should remain similar. Urinary function UCLA-PCI scores reported in Table 2 suggest that AS offers better urinary function (less incontinence than RP), but also offers worse urinary bother (higher rates of obstructive symptoms than RP).

A limitation of this review is the variability in instruments used. There are multiple validated screening tools for each domain of HRQOL, and some tools have multiple versions. Several articles reviewed analyzed the same domains of quality of life were not comparable due to the use of different instrumentation. Anxiety measurements encountered in this review included the UCLA-PCI, MAX-PC, SF-36, EPIC, and RAND-36 questionnaires, among others. Future research should attempt to limit the variation in HRQOL tools used for easier comparison.

Another limitation is the lack of specificity around the type of prostatectomy performed in the majority of RP articles reviewed. Men with nerve-sparing (unilateral or bilateral) and non-nerve sparing surgeries have different rates of erectile dysfunction, as noted previously (13,14). Literature examining erectile dysfunction in RP versus AS should state whether nerve sparing or non-nerve sparing procedures are used for more accurate comparison. The literature reviewed also does not consistently define the proportion of each group who had full potency prior to the initiation of treatment, which may affect results.

Additionally, active surveillance is relatively new in the management of prostate cancer. As many men eligible for AS live a very long time with their cancer, long term follow up studies will take several more years to emerge.

CONCLUSION

The information reviewed in this article can be used a decision-making aid for patients newly diagnosed with prostate cancer when contemplating treatment modalities. The data reviewed suggests that men undergoing active surveillance for prostate cancer have higher rates of urinary obstruction, lower rates of erectile dysfunction and urinary leakage, and similar rates of depression, anxiety and distress as men who choose radical prostatectomy. In terms of prognosis, men who choose active surveillance do not have higher rates of morbidity and mortality; in fact the cancer specific survival at 15 years exceeds 97%, making research into the quality of years of survival important.

Despite the evidence suggesting that active surveillance is a viable option for many men with low risk prostate cancer, few choose AS. Research into decision making surrounding RP and AS has shown that men choose RP to “get rid of the cancer”, while the reason men choose AS has

not been so well-established. Further research should be directed towards understanding why men choose AS, to discover and eliminate any misconceptions surrounding AS.

Literature exists describing RP in each HRQOL domain listed, as well as its comparison to other treatments such as brachytherapy and radiation therapy, but comparisons of RP to AS directly are few in number. The current body of literature lacks a large randomized control trial comparing multiple domains of quality of life in prostate cancer for RP versus AS. As the literature supports the use of active surveillance as a viable treatment option in men with low grade prostate cancer, further research into the quality of life of men on AS compared to other treatment modalities, is required.

APPENDIX

Table 1. Percent of men agreeing with statements regarding sexual dysfunction undergoing radical prostatectomy or active surveillance at 18 months to five years of follow up from select articles (13,46,49).

Question	Radical Prostatectomy	Active Surveillance	Follow Up Period (months)	Study
Describing sex as "important"	46	44	18	Van Den Bergh Et Al., 2012*
Difficulty achieving erection (nearly always) firm enough for intercourse	83 83.8* 64	10 - -	18 60 24	Van Den Bergh Et Al., 2012 Ferrer Et Al., 2013 Sanda Et Al., 2008
Not sexually active in past 2 weeks due to inability to achieve erection	86	30	18	Van Den Bergh Et Al., 2012*
No spontaneous erections during past week	88	17	18	Van Den Bergh Et Al., 2012*
Current overall dissatisfaction with sex life	23 43	4 -	18 24	Van Den Bergh Et Al., 2012* Sanda et al., 2008

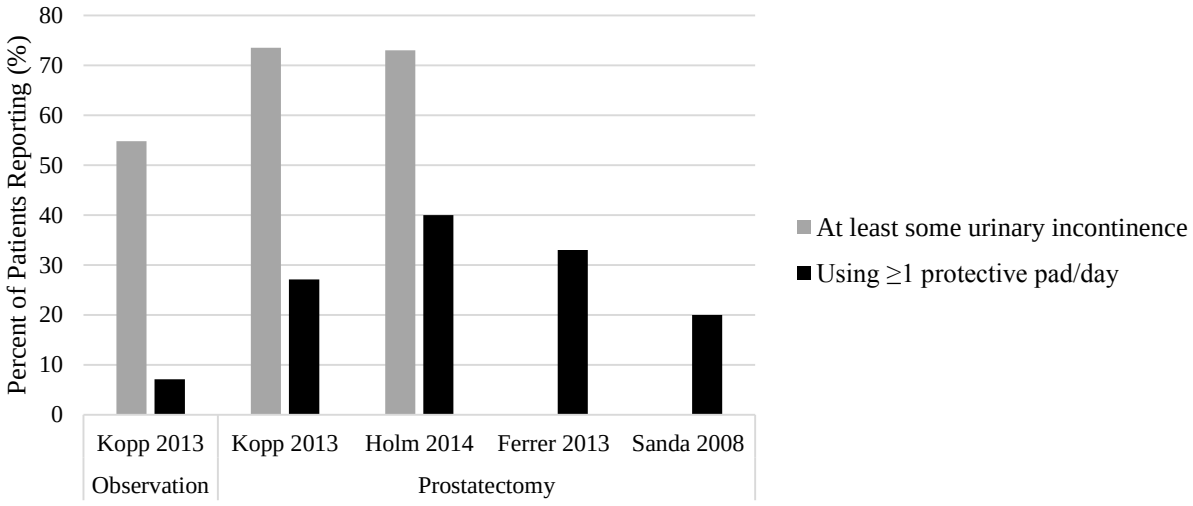

Figure 1. Percent of patients with urinary incontinence or daily protective pad use after either Observation or RP from selected studies (13,19,46,45).

Table 2. Comparison of UCLA-PCI quality of life indicators with either RP or AS from select studies (44) (50)(43) at varying levels of follow up. A higher UCLA-PCI score represents a higher quality of life.

	Radical Prostatectomy			Active Surveillance	
	Jayadevappa et al., 2006 (12 months)	Hashine et al., 2014	Shinohara et al., 2013	Hegarty 2008 American Arm	Irish Arm
Sexual Function	21.7	5.2	14.0	41.3	38.5
Sexual Bother	32.7	51.6	67.0	65.3	46.9
Urinary Function	77.1	74.6	72.0	89.2	86.5
Urinary Bother	85.7	84.8	85.0	71.4	84.4

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