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Arousal Incontinence in Men Following Radical Prostatectomy: Prevalence, Impact and Predictors

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Abstract

Background—Arousal incontinence (AI) occurs during physical or psychological sexual stimulation in men and has been described after radical prostatectomy (RP).

Aim—The goals of this study are to describe the characteristics of men experiencing AI, outline the nature of their symptoms, and assess for predictors of this condition.

Methods—A survey with questions on AI, stress urinary incontinence (SUI), the IIEF-6 (International Index of Erectile Function) and IPSS (International Prostate Symptom Score) were sent out to men who had undergone an RP within the past 24 months at a single institution. The data was de-identified and analyzed using descriptive statistics. Comparisons between men with and without AI were made using t-test, Chi-square, and Fisher Exact tests. Logistic regression in univariable and multivariable analyses were used to define predictors of AI.

Outcomes—The outcomes of this study included prevalence of AI, symptom severity and timing, patient and patient-perceived partner bother, management strategies employed by the patients, and concurrent SUI.

Results—226 (32%) of men completed the survey. Of these men, almost half (49%) experienced AI at some point during their recovery. Improvement over time was endorsed by 62% of men. 57% of men reported AI in less than half of the sexual encounters with the amount of urine leakage

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being equivalent to a tablespoon or less in 88% of men. On univariate analysis, increasing degree of SUI, as measured by pads per day (PPD), was associated with AI (p=0.01). Lower IPSS was also associated (p=0.05). On multivariate analysis, the absence of hypertension and pads per day were associated with AI (p=0.01 for both).

Clinical Implications—AI occurred in almost half of the respondents in our series. Thus, AI should be discussed with patients preoperatively to allow for realistic expectations.

Strengths & Limitations—Strengths of this study include the largest patient population analyzed to date regarding AI, and the only one addressing timing and patient experiences with the use of validated instruments for erectile and urinary function. Limitations include single-center data, non-validated AI patient reported outcomes, and poor survey response rate.

Conclusion—Based on the available data, AI is reported by almost half of men following RP and is associated with SUI.

Keywords

Arousal incontinence; sexual incontinence; foreplay incontinence; sexual dysfunction; stress urinary incontinence

INTRODUCTION

Prostate cancer (PC) is the most common non-skin cancer in US men. It has been estimated that in 2018, 164,690 new prostate cancer cases and 29,430 deaths occurred.[1] Radical prostatectomy (RP) is a commonly employed therapeutic option in the management of prostate cancer. Frequently discussed complications after RP include erectile dysfunction (ED) and stress urinary incontinence (SUI).

A systematic review of over 12,000 men revealed that at 48 months post-op, ED was seen in 0–40% of men after robotic prostatectomy and in 26–51% of men status-post retropubic prostatectomy.[2] A systematic review of 51 studies on SUI post-RP showed that at 12 months post-op, incontinence was still present in 4–31% of men.[3] There also exists a series of more neglected side effects to RP, such as penile shortening, alterations in orgasm, and incontinence during sexual activity (sexual incontinence).

Contemporary data suggests that the rate of climacturia (urine leakage during orgasm) following RP ranges from 20–93%, with 48% of men reporting significant bother from climacturia.[4–8] An under-appreciated type of sexual incontinence is arousal incontinence (AI), which is urinary leakage that occurs during either physical or psychological arousal. AI has also been referred to as foreplay incontinence; however, this term is believed to be too narrow as it excludes incontinence that occurs with cognitive arousal outside of sexual activity.

While AI can potentially cause significant bother and result in avoidance of sexual relations, there have been few efforts to characterize this important side effect of RP. The primary hypothesis of this study was to define the prevalence and time course of AI following radical

prostatectomy. Secondary hypotheses were to ascertain the predictors of AI and gain a better understanding of patient experiences with AI.

METHODS

Study Population

Men who had undergone RP as monotherapy for prostate cancer within the prior 24 months at a single institution constituted the study group. The study was approved by our Institutional Review Board (Protocol 16–469). There was no transmission of protected health information and thus no formal consent process. Completion of the survey communicated acceptance by the patient. Men were separated into 3 categories: current AI (cAI), prior AI (pAI), and no AI (nAI).

Questionnaires

Men within 24 months of their RP were mailed a set of questionnaires. The questionnaires were sent out with pre-addressed and pre-paid envelopes to facilitate their return. All returned questionnaires were de-identified. The questionnaires included a demographics questionnaire, the International Prostate Symptom Score (IPSS), the Erectile Function Domain of the International Index of Erectile Function (IIEF-6), and a 10-item AI questionnaire developed (but not validated) by the authors (Appendix A). The AI questionnaire separated patients into those currently experiencing AI and those who had previously experienced AI. Questions focused on timing in relation to surgery, changes in symptoms, frequency and amount of leakage, and symptom triggers (manual stimulation versus fantasy or visual stimulation). The amount of leakage was qualitative, with ‘small’ defined as drops, ‘moderate’ defined as a tablespoon, and ‘severe’ being defined as greater than a tablespoon. Patients were also asked about personal and perceived partner distress, preventative measures, avoidance behaviors and the coincidence of SUI.

Statistics

The data was initially analyzed using descriptive statistics. Comparisons between men with and without AI, as well as comparisons between men with current and with past AI, were performed using t-test for continuous variables (e.g., age), Chi-square for categorical variables (e.g., race), and Fisher’s Exact test for categorical variables with cell sizes less than 5. Logistic regression in univariable and multivariable analyses were used to define predictors of AI. First, univariable models were fitted for each potential correlate. A fitted multivariable model was built using backwards selection including significant correlates from the unadjusted models, with an alpha of 0.10 used for retention criteria. All statistical analysis was conducted in SAS 9.4 (Cary, NC) and type I error rate set to 0.05.

RESULTS

Study Population

Characteristics of the patient population are summarized in Table 1. There was a 32% response rate, with 226/700 men returning the questionnaires and being included in the analysis. The mean patient age was 63.9±8.2 years. Most (75%) were between 13–24

months (mean 18.3±5.5 months) post-RP. The median number of pads used per day was 0 (IQR 0,1). In terms of other urinary symptoms, men had a mean IPSS score of 6.5±4.9. Men had varying degrees of erectile dysfunction and were separated into 3 categories: those not using any erectogenic medication, those on phosphodiesterase 5 inhibitors (PDE5i) and those using intracavernosal injections (ICI). Predictably, those men not using any medication had lower IIEF EFD (erectile function domain) scores with a mean of 8.5±9.4 compared to 11.7±10.8 in men on PDE5i and 11±12 in patients using ICI. Men were separated into 3 AI categories: current AI (cAI), prior AI (pAI), and no AI (nAI).

Arousal Incontinence

50% of respondents reported experiencing AI at some point post-RP, with 39% of men reporting current AI and 11% of men reporting previous AI. AI started within 3 months of RP in 85% of men experiencing AI. In those reporting previous AI, it had resolved by a mean of 8.6±6.8 months, with half of men reporting resolution by 7 months. Men with current AI had worse SUI as measured by pads per day (PPD) (Table 1). Just over half of men with current AI (57%) reported using zero PPD, compared to 80% of men without AI who said they were using zero PPD (p=0.01). Most (76%) of men reported leakage with physical stimulation with about one third of those (24% of total) reporting leakage with psychological arousal also. Few (5%) of men reported leakage only with psychological arousal. Subjective improvement over time was reported by 62% of men. In terms of frequency and quantity of urinary leakage, 57% of men reported AI in less than half of their sexual encounters, with the amount of urine leakage being estimated at about a tablespoon or less in 88% of men.

Predictors of AI

When comparing men who currently experience AI and those who did not experience AI, demographic factors such as age, race, marital status, and BMI, were not associated with the presence of AI. Baseline characteristics were similar between the cAI and pAI men. Interestingly, while diabetes, coronary artery disease and hyperlipidemia rates were similar in the two groups, hypertension was more common in the men without AI (55% vs 37%, p=0.01) and this was maintained in the multivariable model. Worsening stress urinary incontinence, as measured by pads per day (PPD) was associated with AI (p=0.001) as was a lower IPSS score (7.5±8.7 vs 8.9±10, p=0.05). However, on multivariable analysis, IPSS was eliminated from the model and only number of pads per day and the absence of hypertension were associated with AI (Table 3), p=0.01 for both.

DISCUSSION

Prostate cancer is a common malignancy in males with on average a 1 in 9 lifetime risk of being diagnosed with prostate cancer and a 1 in 41 risk of dying from this disease in US men.[1] Treatment of prostate cancer includes active surveillance, watchful waiting, RP, radiation therapy and androgen deprivation therapy. While RP is only typically offered to men with localized disease and who are good surgical candidates, this still results in an enormous number of patients who undergo a RP in the US each year. A study evaluating

inpatient discharges after RP in the US from 2001–2013 found that this number could be as high as 88,381 annually and was 58,430 in 2013 which was the most recent year evaluated.[9]

Sexual incontinence is a broad term that encompasses climacturia (urinary incontinence at the time of orgasm) and arousal incontinence (urinary incontinence at the time of physical and/or psychological arousal). While there has been a growing body of evidence on incontinence associated with sexual activity following RP, much of the available literature has either evaluated the side effect as a single entity[10–12] or focused on climacturia.[4–6, 8, 13, 14]

While the mechanism of climacturia following RP has yet to be clearly elucidated, the evidence suggests that climacturia is not closely associated with diurnal incontinence. However, a decrease in functional urethral length and bladder neck incompetence are thought to be associated with this condition.[5, 6, 12, 15] With regard to AI, expert opinion has suggested that this is more likely related to external sphincteric deficiency. Supporting this, we found that diurnal incontinence (as measured by number of pads per day) was indeed associated with AI on multivariable analysis. The improvement in AI seen in our study also mirrors the progression typically seen with diurnal incontinence following RP, further enforcing a potential linked pathophysiology between the diurnal and arousal incontinence.

In general, SUI worsens at times of relaxation of the pelvic floor musculature. For example, many men endorse a worsening of their post-RP SUI at times when they are physically tired,[16] and this is thought to be related to fatigue of the pelvic floor musculature. Our post-RP patients often endorse worsening of their SUI at the end of the day. Similarly, we have anecdotal reports in our practice that alcohol intake worsens post-RP SUI. Therefore, it is our belief that SUI worsens at times of fatigue or pelvic floor relaxation. This may explain why AI is correlated with SUI as arousal translates into pelvic floor relaxation. Conversely, climacturia occurs at a time of orgasm during which the bladder neck and internal sphincter normally contract, which may account for its weaker association with SUI. The link between the absence of hypertension and AI is without explanation at this time. Of course, we categorized hypertension categorically (yes/no) when in fact it is a heterogenous disorder and not all patients have the same degree of blood pressure change and it is not clear if the blood pressure elevations were mild, moderate or severe in our patient population.

To our knowledge, our study is the largest to investigate AI in men following RP and the only one to characterize both the time course and patient experiences with AI. We found the prevalence of AI to be high, with half of patients reporting AI at some point following RP and with most men with this condition (85%) developing AI within the first three months following RP. It is likely that the timing of onset of AI is related to the timing of commencement of sexual activity after RP, thus, those commencing such activity earlier are more likely to experience the onset of AI.

Our findings are consistent with the only two other small studies that have specifically investigated AI. Guay et al. evaluated incontinence in men post RP. Of the 24 men without diurnal incontinence, 9 men (38%) endorsed AI, which was described as the loss of up to a teaspoon of urine during hugging, kissing, or genital foreplay.[17] All 9 men with AI reported

embarrassment or bother stemming from the situation, with 6 men (67%) avoiding sexual relations as a result. Jain et al. analyzed 15 men who had undergone either artificial urinary sphincter or male sling placement for SUI following RP. Of the 11 men in this study who reported being sexually active, 9 men (82%) reported AI, with 7 men reporting their AI to be a major problem and 2 men reporting their AI to be a minor problem.[18]

There remains a paucity of evidence on how best to manage AI. Guay et al. anecdotally described success using a latex ring applied to the base of the penis prior to foreplay, while Jain et al. report an improvement in sexual quality of life in 9/11 patients following placement of an artificial urinary sphincter or male sling.[17, 18] In our practice, we recommend the use of a variable tension ring[19] in men who are significantly bothered by AI. However, this can be difficult to incorporate as arousal is often unpredictable.

The clinical implications of this study are significant given the utilization of RP for prostate cancer. We need to properly educate patients regarding the possibility of AI and the steps to be taken to manage it. As half of our patients experience AI, it is of paramount importance that we educate them about the possibility of AI and management strategies in order to set realistic expectations post-operatively.

The strengths of this study include the fact that it represents the largest patient population studying AI to date and the only study investigating time course and patient experiences. Additionally, we used validated instruments for erectile and urinary function (IIEF and IPSS, respectively). However, our study is not without limitations. The data were from a single-center, so results may not be generalizable. Secondly, our response rate of 32% was low and may have introduced bias in that the men without these symptoms may have been less likely to respond to the questionnaire. Given the nature of the confidential questionnaire, there was no identifying data to compare the data from responders and non-responders. Additionally, we used an AI questionnaire which has not been validated, however, such an inventory does not exist. The degree of SUI was subjective, as no pad weight data was available. The degree of SUI was measured by pads per day, which is a routine clinical endpoint in our clinic. The retrospective nature of the survey questions introduces the potential for recall bias. Lastly, the cross-sectional nature of this survey rendered us unable to assess the exact timing of AI improvement.

CONCLUSION

We have demonstrated that AI is a common complication of RP, occurring in half of patients. Worsening stress urinary incontinence is predictive of AI on multivariable analysis.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

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REFERENCES

[1]. Society AC. Facts & Figures 2018 Atlanta, GA: American Cancer Society; 2018.

[2]. Kilminster S, Muller S, Menon M, Joseph JV, Ralph DJ, Patel HR. Predicting erectile function outcome in men after radical prostatectomy for prostate cancer. BJU Int. 2012;110: 422–6. [PubMed: 22182202]

[3]. Ficarra V, Novara G, Rosen RC, et al. Systematic review and meta-analysis of studies reporting urinary continence recovery after robot-assisted radical prostatectomy. Eur Urol. 2012;62: 405–17. [PubMed: 22749852]

[4]. Barnas JL, Pierpaoli S, Ladd P, et al. The prevalence and nature of orgasmic dysfunction after radical prostatectomy. BJU Int. 2004;94: 603–5. [PubMed: 15329121]

[5]. Choi JM, Nelson CJ, Stasi J, Mulhall JP. Orgasm associated incontinence (climacturia) following radical pelvic surgery: rates of occurrence and predictors. J Urol. 2007;177: 2223–6. [PubMed: 17509325]

[6]. Nilsson AE, Carlsson S, Johansson E, et al. Orgasm-associated urinary incontinence and sexual life after radical prostatectomy. J Sex Med. 2011;8: 2632–9. [PubMed: 21699660]

[7]. Messaoudi R, Menard J, Ripert T, Parquet H, Staerman F. Erectile dysfunction and sexual health after radical prostatectomy: impact of sexual motivation. Int J Impot Res. 2011;23: 81–6. [PubMed: 21471982]

[8]. Lee J, Hersey K, Lee CT, Fleshner N. Climacturia following radical prostatectomy: prevalence and risk factors. J Urol. 2006;176: 2562–5; discussion 65. [PubMed: 17085160]

[9]. Halpern JA, Shoag JE, Artis AS, et al. National Trends in Prostate Biopsy and Radical Prostatectomy Volumes Following the US Preventive Services Task Force Guidelines Against Prostate-Specific Antigen Screening. JAMA Surg. 2017;152: 192–98. [PubMed: 27806151]

[10]. Fode M, Serefoglu EC, Albersen M, Sonksen J. Sexuality Following Radical Prostatectomy: Is Restoration of Erectile Function Enough? Sex Med Rev. 2017;5: 110–19. [PubMed: 27566909]

[11]. Frey A, Sonksen J, Jakobsen H, Fode M. Prevalence and predicting factors for commonly neglected sexual side effects to radical prostatectomies: results from a cross-sectional questionnaire-based study. J Sex Med. 2014;11: 2318–26. [PubMed: 24995845]

[12]. Mitchell SA, Jain RK, Laze J, Lepor H. Post-prostatectomy incontinence during sexual activity: a single center prevalence study. J Urol. 2011;186: 982–5. [PubMed: 21791358]

[13]. O'Neil BB, Presson A, Gannon J, et al. Climacturia after definitive treatment of prostate cancer. J Urol. 2014;191: 159–63. [PubMed: 24050893]

[14]. Koeman M, van Driel MF, Schultz WC, Mensink HJ. Orgasm after radical prostatectomy. Br J Urol. 1996;77: 861–4. [PubMed: 8705222]

[15]. Manassero F, Di Paola G, Paperini D, et al. Orgasm-associated incontinence (climacturia) after bladder neck-sparing radical prostatectomy: clinical and video-urodynamic evaluation. J Sex Med. 2012;9: 2150–6. [PubMed: 22759835]

[16]. Deffieux X, Hubeaux K, Dick J, Ismael SS, Raibaut P, Amarenco G. Urine leakage related to physical fatigue in women with urinary stress incontinence. J Obstet Gynaecol Res. 2009;35: 738–45. [PubMed: 19751336]

[17]. Guay A, Seftel AD. Sexual foreplay incontinence in men with erectile dysfunction after radical prostatectomy: a clinical observation. Int J Impot Res. 2008;20: 199–201. [PubMed: 18200019]

[18]. Jain R, Mitchell S, Laze J, Lepor H. The effect of surgical intervention for stress urinary incontinence (UI) on post-prostatectomy UI during sexual activity. BJU Int. 2012;109: 1208–12. [PubMed: 21895932]

[19]. Mehta A, Deveci S, Mulhall JP. Efficacy of a penile variable tension loop for improving climacturia after radical prostatectomy. BJU Int. 2013;111: 500–4. [PubMed: 22672308]

Table 1:

Characteristics of Patient Population (N=226)

	All	Current AI (cAI) (n = 87)	Prior AI (pAI) (n = 24)	No AI (nAI) (n = 115)	p-value
Age, mean (SD); years	63.9 (8.2)	64.4(6.9)	63 (6.4)	63.8(9.5)	0.61
Married/ Partnered, n (%)	186 (82%)	72 (83%)	18 (75%)	96 (83%)	0.89
BMI, mean (SD)	27.5 (4.9)	27.5 (4.3)	27.4 (5.6)	27.5 (5.3)	0.98
Comorbidities, n (%)					
Hypertension	108 (48%)	32 (37%)	13 (54%)	63 (55%)	**0.01**
Hyperlipidemia	114 (50%)	47 (54%)	15 (63%)	52 (45%)	0.21
Diabetes	24 (11%)	9 (10%)	3 (13%)	12 (10%)	0.98
Coronary artery disease	22 (10%)	8 (9%)	3 (13%)	11 (10%)	0.93
Number of Pads/Day, median (IQR)	0 [0-1]	0 [0-1]	0 [0-0]	0 [0-0]	**0.01**
IPSS Total, mean (SD)	6.5 (4.9)	7.4 (4.8)	5.9 (4.4)	5.9(5)	**0.05**
EFD without meds, mean (SD) [n]	8.5 (9.4) [187]	7.5 (8.7) [71]	10.2 (9.3) [16]	8.9(10) [100]	0.35
EFD with PDE5i, mean (SD) [n]	11.7 (10.8) [151]	11.8 (9.8) [64]	11.6 (10.5) [14]	11.7(11.8) [73]	0.96
EFD with injections, mean (SD) [n]	11.1 (12.2) [84]	10.8(12.1) [31]	16.9 (10.8) [8]	10.2 (12.4) [45]	0.84

Table 2:

Frequency and Quantity of AI

	All, n (%)	Current AI, (cAI) n (%)	Prior AI, (pAI) n (%)	p-value
Frequency				
Almost never or never	25 (24%)	12 (11%)	13 (57%)	**0.0004**
A few times	35 (33%)	31 (38%)	4 (17%)	
Sometimes	20 (19%)	14 (17%)	6 (26%)	
Most times	12 (11%)	12 (15%)	0 (0%)	
Almost always or always	13 (12%)	13 (16%)	0 (0%)	
Quantity				
Small	53 (52%)	46 (55%)	7 (39%)	0.6434
Moderate	37 (36%)	27 (32%)	10 (56%)	
Large	12 (12%)	11 (13%)	1 (6%)	

Table 3:

Predictors of Arousal Incontinence on Multivariable Analysis

Variable	OR	95% CI	p-value
Pads/day	1.55	(1.12, 2.13)	**0.01**
HTN	0.44	(0.25, 0.80)	**0.01**