

Chapter 6

Hysterectomy: A risk factor for urinary incontinence?

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Introduction

The lifetime risk for women over 60 years of age to have a hysterectomy is approximately 25%.^{1,2} Although hysterectomy is an effective procedure for curing a number of gynecologic diseases, it has been associated with the development of changes in urinary function, especially urinary incontinence (UI).³⁻⁵ Recently it was suggested that practitioners should discuss the possibility of an increased likelihood of urinary incontinence later in life with women planned for hysterectomy.³

For urinary incontinence, a distinction is made between symptoms of urine leakage related to increase in abdominal pressure (stress incontinence) and urine leakage related to a feeling of urgency (urge incontinence). The pathophysiology of these two types of incontinence is believed to be different. Stress incontinence has been related to poor pressure transmission to the urethra due to hypermobility of the bladder neck or insufficient closure function of the urethra itself. Urge incontinence is related to involuntary detrusor contractions or hyperreflexia. These differences suggest that different factors cause different types of urinary incontinence. Therefore, it may be expected that effects of hysterectomy on stress incontinence and urge incontinence differ.

The nature of urinary incontinence (stress-related or urgency-related) has been associated with the impact that women experience from incontinence on their quality of life. Urge incontinence appeared to adversely affect quality of life more than symptoms of stress incontinence.^{6,7} Nevertheless, the majority of women with urinary incontinence report not to be bothered by it at all. Therefore, information on the severity of urinary incontinence, reflected as a high degree of bother, is also of importance in the assessment of the consequences of hysterectomy on urinary incontinence.

The primary objective of the present study was to examine whether hysterectomy is an independent risk factor for stress-related and for urgency-related urinary incontinence. In addition we evaluated whether hysterectomy is associated with bothersome incontinence symptoms.

Methods

Study population

The study population consists of a random population sample of 2322 women, between 35 and 75 years of age. This sample was obtained from the population registration office of a suburban area in the central part of the Netherlands in 1999. These women were invited to participate in a study on the prevalence and consequences of urogenital and defaecatory symptoms in the female community. All women received a questionnaire with an accompanying letter explaining the purpose of the study. Care was taken to encourage women without any symptoms to participate, emphasizing the importance to compare their situation with women with symptoms. All women received a reminding letter after four weeks. Sixteen-hundred and eighty-nine questionnaires were returned (72.2%). Twenty-nine questionnaires were returned because the women had moved and 34 women refused to participate, leaving 1626 fully evaluable women (70.0%). In this sample 1417 women (87%) had no history of hysterectomy and 209 had a history of hysterectomy (13%). All hysterectomies were performed for non-malignant conditions.

Measurements

All women received a self-administered questionnaire in 1999. The study was approved by the local ethics committee, with the restriction that contacting non-responders was not allowed.

The questionnaire consists of 162 items about urogenital symptoms, defaecatory symptoms, quality of life, depressive symptoms, health-locus of control and coping strategies. For the present study we used the data from the following items and scales.

For every woman data on age, parity, history of urinary incontinence surgery and educational level were collected. Educational level was included since a low educational level has been related to an increased risk of having a hysterectomy and to report transient and persistent health-related limitations as compared to a higher educational level.^{1,8} Educational level was dichotomized into primary only and secondary/higher level.

Urogenital symptoms were measured with the Urogenital Distress Inventory (UDI).⁹ The UDI consists of 19 items and each item measures whether a *symptom* is present and the amount of bother the woman experiences from that symptom. The latter is measured on a four-point Likert scale ranging from not at all to greatly. Following the recommended International Continence Society definition of different types of UI¹⁰ and in concordance with other studies,^{11,12} we selected two questions from the UDI. A woman was considered to have stress urinary incontinence if she replied positively to the question “do you experience urine leakage related to physical activity, coughing or sneezing?” A woman was considered to have urge urinary incontinence if she replied positively to the question “do you experience urine leakage related to a feeling of urgency?”. Overall urinary incontinence was defined as having stress and/or urge urinary incontinence. Bothered stress incontinence was defined as reporting moderately or greatly bother by the symptom. Women without stress incontinence and women with stress incontinence who were not at all or slightly bothered by it were regarded as not having bothersome stress incontinence. The same dichotomization was performed to separate bothersome from not-bothersome urge incontinence.

Statistical analysis

Logistic regression was used to obtain odds ratio's (OR) with 95% confidence interval (CI) of the type and bothersomeness of urinary incontinence for hysterectomy. A multi-variate logistic regression analysis was used to adjust the odds ratio for hysterectomy for urinary incontinence symptoms. The variables age, parity (nulliparae versus primi/multiparae) and educational level (primary versus secondary/higher) were entered one at a time into the model. All statistics were performed with SPSS 10.0.

Results

Characteristics of women with or without a hysterectomy

Table I shows the characteristics of the non-hysterectomy and hysterectomy groups. Women with a history of hysterectomy were older, had a lower educational level, were more often parous and more often had a history of urinary incontinence surgery.

Table 1. Characteristics of the non-hysterectomy and hysterectomy groups.

	Non-hysterectomy (n=1417)	Hysterectomy (n=209)	P-value
Age in years	50.3 (10.0)	57.4 (7.6)	<0.001 *
Education level			
Primary only	321 (22.7)	78 (36.7)	<0.001†
Secondary or higher	1096 (77.3)	131 (63.3)	
Parity			
0	290 (20.5)	25 (11.7)	<0.001†
≥1	1127 (79.5)	184 (88.3)	
History of urinary incontinence surgery	16 (1.1)	20 (9.6)	<0.001†

Values are numbers (%) or means (standard deviation)

* Student's t-test, † Fisher exact-test

Effects of hysterectomy on urinary incontinence

Table 2 shows the prevalence of the different types of urinary incontinence among women with and without a history of hysterectomy. Overall urinary incontinence (stress symptoms and/or urgency symptoms) was reported by 64.0% (133/209) of women with a history of hysterectomy and by 55.1% (781/1417) of women without a history of hysterectomy (OR 1.4, 95% CI 1.1 - 1.9). After adjustment for age, parity and educational level, the odds for “overall” urinary incontinence for women with a history of hysterectomy was 1.4 (95% CI 1.0 - 1.9) as compared to women without a history of hysterectomy.

As it has been suggested that age is an important modifier of the effect of hysterectomy, a separate analysis was performed for women younger than 60 years (n=1226) and 60 years or over (n=400). Eighty-nine women (24.0%) of 60 years or over and 114 (9.5%) women younger than 60 years had a hysterectomy. Among women with a history of hysterectomy aged 60 years and over, the odds for urinary incontinence was increased by 60 percent (OR 1.6, 95%CI 1.0 - 2.6, p=0.07) as compared to women without a history of hysterectomy. Among women with a hysterectomy younger than 60 years of age, the odds for urinary incontinence was 1.3 (95%CI, 0.9 - 2.0, p=0.22) as compared to women without a history of hysterectomy.

Table 2. Prevalence of urinary incontinence among women with and without a history of hysterectomy.

	Non-hysterectomy (n=1417)	Hysterectomy (n=209)	P-value
Symptoms			
Urinary incontinence (overall)	781 (55.1)	133 (64.0)	<0.01
Stress incontinence	716 (50.5)	118 (57.0)	NS
Bothersome stress incontinence	120 (8.5)	23 (11.1)	NS
Urge incontinence	320 (22.6)	80 (38.3)	<0.0001
Bothersome urge incontinence	44 (3.1)	21 (9.7)	<0.0001

Values are numbers (%). Stress- and urge incontinence not mutually exclusive.

Fisher exact test. NS = Not significant

Table 3. Crude and adjusted odds ratio's (95% confidence interval) for urinary incontinence for women with and without a history of hysterectomy.

	Urinary incontinence			
	Stress	Bothersome stress	Urge	Bothersome urge
Hysterectomy				
Crude	1.3 (0.9 - 1.8)	1.4 (0.8 - 2.2)	2.1 (1.6 - 2.9)*	3.4 (1.9 - 5.9)*
Adjusted for age	1.3 (0.9 - 1.8)	1.2 (0.7 - 2.0)	1.9 (1.4 - 2.7)*	2.7 (1.5 - 4.7)*
Adjusted for age and parity	1.2 (0.9 - 1.6)	1.2 (0.7 - 1.9)	1.9 (1.4 - 2.7)*	2.7 (1.5 - 4.7)*
Adjusted for age, parity and educational level	1.2 (0.9 - 1.6)	1.2 (0.7 - 1.8)	1.9 (1.4 - 2.6)*	2.6 (1.4 - 4.4)*

* $p < 0.05$

Table 3 shows the crude and adjusted odds ratio's of stress symptoms, bothersome stress symptoms, urgency symptoms and bothersome urgency symptoms urinary incontinence for hysterectomy. After adjustment for age, parity and educational level, both the odds for stress incontinence and bothersome stress incontinence for women with a history of hysterectomy decreased to 1.2. Especially adjustment for parity decreased the odds. The odds for urge- and bothersome urge incontinence symptoms for women with a history of hysterectomy decreased slightly after adjustment but were still highly significant. In this model increasing age caused the greatest reduction in odds ratio.

Again, a separate analysis was performed for women younger and older than 60 years of age. Table 4 shows the crude and adjusted odds ratio's for urinary incontinence for women with a history of hysterectomy in the two age groups. The crude and adjusted odds for both urge- and bothersome urge incontinence symptoms for women with a history of hysterectomy are significantly increased in both age groups. The crude and adjusted odds of both stress- and bothersome stress incontinence symptoms for women with a history of

hysterectomy are not significantly increased in the age groups.

Table 4. Crude and adjusted odds ratio's (95% confidence interval) for urinary incontinence for women with compared to women without a history of hysterectomy, according to age < 60 years and ≥60 years.

	Age	
	< 60 YEARS (n=1226)	≥60 YEARS (n=400)
Urinary incontinence		
Stress		
Crude	1.3 (0.9 - 1.9)	1.5 (0.9 - 2.4)
Adjusted ‡	1.1 (0.8 - 1.7)	1.4 (0.8 - 2.2)
Bothersome stress		
Crude	1.5 (0.8 - 2.7)	1.1 (0.5 - 2.5)
Adjusted ‡	1.2 (0.7 - 2.3)	1.1 (0.5 - 2.5)
Urge		
Crude	2.2 (1.5 - 3.2)*	2.2 (1.3 - 3.6)*
Adjusted ‡	1.7 (1.1 - 2.5)*	2.2 (1.3 - 3.6)*
Bothersome urge		
Crude	3.6 (1.8 - 7.3)*	2.7 (1.1 - 6.7)*
Adjusted ‡	2.5 (1.2 - 5.2)*	2.7 (1.1 - 6.8)*

* p < 0.05

‡ Adjustments were made for age, parity and educational level

The effect of parity and educational level on urinary incontinence

In addition to our main findings regarding the consequences of hysterectomy on urinary incontinence, we separately examined the effect of parity and educational level on urinary incontinence symptoms. Parous women were more likely to have stress incontinence symptoms (55.2% versus 34.8%, OR 2.31, 95%CI 1.78 - 2.98) and urge incontinence symptoms (26.6% versus 16.5%, OR 1.84, 95%CI 1.33 - 2.55) as compared to nulliparous

women. Lower educated women reported more urge incontinence symptoms (30.4% versus 22.8%, OR 1.47, 95%CI 1.14 - 1.89) but not stress incontinence symptoms as compared to higher educated women.

Discussion

Our findings show that hysterectomy is associated with an increased risk of urge incontinence and bothersome urge incontinence symptoms, but not with stress- or bothersome stress incontinence symptoms, independent of age, parity and educational level. This finding did not markedly differ for women younger or older than 60 years. Additional findings were that parity was associated with both stress- and urge incontinence symptoms and a low educational level was associated with urge-, but not with stress incontinence symptoms.

A strength of our study is that we separated symptoms of urine leakage related to physical activity or increased abdominal pressure from those related to sensations of urgency. Differentiating these two types of urinary incontinence is of clinical importance for the individual patient since the consequences of having stress or urge incontinence symptoms for well-being are different. A second strength is that we included the perceived severity (bothersomeness) of urinary incontinence into our analysis. The degree of bothersomeness has been related to the frequency of urine loss.¹¹ Women with weekly occurring urine loss reported to be significantly more bothered by it than women who reported infrequent (less than once a week) urine loss. When counseling women about the sequella of hysterectomy, women may respond differently to an increased risk of having infrequent, not-bothersome urinary incontinence as compared to an increased risk of frequent urine loss that is reported by other women to affect their well-being. A final strength is that we used a random population based cross-sectional study design in which the prevalence of urinary incontinence was assessed with standardized questions independent of age, parity and history of hysterectomy.

Our study also has several potential limitations that need to be addressed. First, we

did not objectively demonstrate urine leakage, which is a requirement for a sign-based definition of urinary incontinence. Urodynamic investigation is necessary to make a condition-based diagnosis of stress or urge incontinence, but whether it has to be considered as the 'golden standard' is debatable. There is a considerable difference between patients' self-reported symptoms and actual findings from routine office urodynamic testing.¹³ However, 40 to 84% of patients who complained of urge urinary incontinence and that did not have unstable bladder contractions on office urodynamics, were shown to have bladder instabilities during ambulatory urodynamics.¹⁴ Furthermore, with the use of ambulatory urodynamics, several studies have shown that more than 40% of continent subjects have unstable bladder contractions.¹⁵ Whatever the value of urodynamics may be in establishing urinary incontinence as a condition, the objective of our study was to assess urinary incontinence as a symptom. We therefore carefully defined urinary incontinence as stress- or urge incontinence symptoms from a symptom-based definition point of view.

Secondly, overweight, as measured with the Body Mass Index (BMI), has been related to an increased odds of having urinary incontinence.¹⁶ It has been associated with stress incontinence and urge incontinence.¹² Women after hysterectomy are reported to have a higher BMI as compared to controls.¹⁷ This is probably due to weight gain after hysterectomy, which starts early after surgery, and not to pre-existing overweight.¹⁸ Therefore, overweight does not appear to be a risk factor for having a hysterectomy and therefore cannot be considered to be an important confounder. In our study population information on BMI was not available and therefore we were unable to correct our results for this possible modifying factor.

The association we found between hysterectomy and overall urinary incontinence is similar to that of a recent meta-analysis on the subject.³ Although it has been reported that urgency symptoms have a greater negative impact on quality of life as compared to stress symptoms,^{6,7} few studies report on differences between urge and stress incontinence after hysterectomy.^{12,19-24} However, the heterogeneity of these studies limit overall interpretation. Some studies are limited by sample-size^{19,21}, do not state the questions used to distinguish

stress from urge incontinence¹⁹ and have a remarkable low prevalence of hysterectomy (6.3% in women aged 30-59 years)²³. All but one study did not adjusted for age and parity. The study by Kuh and co-workers adjusted their results for age, parity and educational level.¹² This study reports increased adjusted odds (odds ratio 1.3, 95%CI 0.93 - 2.0) of urge incontinence after hysterectomy. The association between hysterectomy and stress incontinence was not reported. However, the domain of this study was 48-year old women and therefore the results cannot be well compared to ours.

Why hysterectomy is a risk factor for urgency symptoms is not clear. The cause of detrusor instability is not fully understood but has been related to innervation problems of the detrusor muscle. Development of post-junctional supersensitivity of the detrusor muscle seems to play an essential role.²⁵ Partial denervation of the detrusor appears to be the mechanism responsible for this post-junctional supersensitivity. During hysterectomy blunt dissection of the bladder from the uterus and cervix may damage a major part of the detrusor innervation, and division of the cardinal ligaments may also damage the main branches of the pelvic plexus.²⁶ On the other hand, stress incontinence seems to be related to changes in the function of structures (like the pubo-urethral ligaments, pubococcygeus muscle and suburethral vaginal wall) closely related to the urethra.²⁷ It is unlikely that hysterectomy causes direct damage to these structures. At six months after hysterectomy no changes in urethral length and maximal closure pressure were detected as compared to pre-hysterectomy values.²⁸ However, bladder sensitivity had increased significantly. Therefore, it seems plausible that hysterectomy is more likely to be related to the development of urge incontinence symptoms instead of stress incontinence symptoms.

In conclusion, although hysterectomy itself is very effective for resolving uterine bleeding problems, our results show that patients have increased odds of urge- and bothersome urge incontinence symptoms after hysterectomy. This should be discussed with the individual patient and weighted against the expected beneficial effects of hysterectomy.

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