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Analysis of Risk Factors for Post-Hysterectomy Vaginal Vault Prolapse

Histerektomi Sonrasi Vajinal Kuff Prolapsusu İçin Risk Faktörlerinin Analizi

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ABSTRACT

Purpose: To identify risk factors for vaginal vault prolapse after hysterectomy and also estimate incidence of post-hysterectomy vault prolapse.

Material and Methods: This is a retrospective study of women who underwent hysterectomy for benign indications between January 2010 and December 2012. Medical records were reviewed from two groups of women. Case group was women who had undergone surgery for vault prolapse after hysterectomy; control group was women who were not identified with vault prolapse after hysterectomy by the time of the study. Multivariate regression model identified odds of post-hysterectomy vault prolapse.

Results: Of 1758 hysterctomies, 56 (3.19%) were cases. Multivariate regression analysis demonstrated that age at hysterectomy ≥60 years, presence of asthma, previous pelvic organ prolapse surgery, vaginal route of hysterectomy, genital prolapse as indication of hysterectomy, body mass index ≥27 kg/m^2 and number of vaginal delivery ≥2 are independent risk factors for development of post-hysterectomy vault prolapse.

Conclusions: Vault prolapse after hysterectomy is a relatively rare complication. Elderly age, obesity, chronic obstructive lung diseases, prior genital prolapse sugery, vaginal hysterectomy, genital prolapse as indication of hysterectomy and the number of vaginal delivery ≥2 increase vault prolapse risk. Identification of these risk factors is important to prevent this complication.

Key Words: Hysterectomy, risk factors, vaginal vault prolapse.

ÖZET

Amaç: Histerektomi sonrası vajinal kuff prolapsusu için risk faktörlerini belirlemek ve histerektomi sonrası kuff prolapsusu sıklığını tahmin etmek

Materyal ve Metod: Bu çalışma, Ocak 2010 ve Aralık 2012 yılları arasında benign sebeplerden dolayı histerektomi yapılan kadınlardan oluşan retrospektif bir çalışmadır. Medikal kayıtlar iki grup hastadan toplanmıştır. Vaka grubu, vajinal kuff prolapsusu için cerrahi uygulanan kadınlar iken kontrol grubu çalışma süresince yapılan histerektomi sonrasında vajinal kuff prolapsusu tesbit edilmeyen kadınlar idi. Çoklu regresyon modeli uygulanarak histerektomi sonrası risk faktörleri tanımlandı.

Bulgular: 1758 histerektominin 56 (3.19%) tanesi vaka grubu idi. Çoklu regresyon analizi histerektomi sırasında yaşın ≥60 olmasını, astım, eski pelvik organ prolapsusu cerrahisi varlığını, vajinal yoldan histerektomi yapılmasını, genital prolapsus nedeni ile histerektomi yapılmasını, vücut kitle indeksinin ≥27 kg/m^2 ve vajinal doğum sayısının ≥2 olmasını histerektomi sonrası vajinal kuff prolapsusu gelişimi için risk faktörleri olduğunu gözterdi.

Sonuç: Histerektomi sonrası kuff prolapsusu nadir bir komplikasyondur. İleri yaş, obesite, kronik akciğer hastalığı, önceki genital prolapse cerrahisi, vajinal histerektomi, 2 ve üstü vajinal doğum varlığı kuff prolapsusu riskini arttırmaktadır. Bu risk faktörleri tanımlamak bu komplikasyonu önlemede önemlidir.
Anahtar kelimeler: Histeerktomi, risk faktörleri, vajinal kuff prolapsusu

INTRODUCTION

Post-hysterectomy vault prolapse (PHVP) is defined as the decline of the vaginal vault/cuff scar towards a point that is located above the hymenal ring and 2 cm shorter than the total vaginal length[1]. It is a distressing and sometimes a disabling condition for women with a common complaint of feeling something comming down through the vagina or feeling pressure in the vagina[2].

Previous studies have investigated the risk factors for PHVP, including patient demographics, surgical techniques, and pre/post-operative anatomic changes of the pelvis [3-8]. But, the controversy about the underlying etiopathogenesis an potential risk factors of PHVP still continues. Therfore, in this present study we aimed to identify potential risk factors that might be associated with vaginal vault prolapse among women who underwent hysterectomy and also to estimate the incidence of PHVP.

MATERIALS and METHODS

A retrospective study was performed on the data of patients underwent hysterectomy for benign indications at Gynecology Department of Zekai Tahir Burak Woman's Health and Education Hospital, Ankara/Turkey in the period from January 2010 to December 2012. Of these patients, 56 women who required surgical correction of vaginal vault prolapse after hysterectomy constructed the case group. The control group consisted of 1702 women who had undergone a hysterectomy and were not identified with vaginal prolapse by the time of data collection. The approval for the study was obtained from the regional ethics committee of hospital. The patients, for whom medical reports were not available, who had concomitant therapeutic vaginal/abdominal vault suspension procedure with hysterectomy and who had any genital prolapse correction except vault prolapse after hysterectomy were excluded. The women who had undergone any type of laparoscopic hysterectomy, and who required supracervical hysterectomy were also excluded, since they were few. All the variables were collected from the hospital records. The preoperative data assessed were woman's age, weight, height, parity, number of vaginal deliveries, previous cesarean operations, menopausal status and duration, presence of current smoking, chronic obstructive pulmonary disease, prior surgery for genital prolapse. Preoperatively, all women had a standardized prolapse assessment, using the Baden-Walker classification[9] which was in use in our clinic as it was simple and effective for our practice. The date, type, indication of hysterectomy (myomas, abnormal uterine bleeding, pelvic organ prolapse (POP), endometriosis, adenomyosis, or endometrial hyperplasia) and presence of concomitant pelvic compartment repair surgery (cyctocele, rectocele or enterocele correction operation) abstracted from hospital records were intraoperative data. All hysterectomies were carried out by three consultant gynecologists and their senior residents and fellows with standard procedures as described in Te Linde's operative gynecology[10]. The operations involved suturing the cardinal and uterosacral ligaments to the vaginal cuff. The post-hysterectomy complications including vault abscess or hematomas and the date of PHVP surgery were also collected as postoperative variables. The time from hysterectomy to PHVP surgery was calculated as postopeative follow up period of cases. The duration between the hysterectomy date and the study start time was reported as the postoperative follow-up period of controls. PHVP was defined according to the International Continence Society defination[1].

Statistical analysis was performed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). Variables were presented as mean±standard deviation or numbers and percentage. To examine risk factors, Student's t-test was used to compare means of continuous data and Chi-squared test for analysis of numbers and percentage. Univariate regression analysis was performed for the variables. Variables demonstrating statistical significance in the univariate logistic regression analysis were included in a multivariate analysis to determine independent risk factors. Differences were considered statistically significant at $p<0.05$.

RESULTS

A total of 2823 women who underwent hysterectomy from January 2010 to December 2012 were evaluated under the period of data management between June 2013 and January 2014. Of these, 589 women for whom medical reports were not available, 3 women who had undergone any type of laparoscopic hysterectomy, 4 women who required supracervical hysterectomy and 200 women who had genital prolapse surgery after hysterectomy were excluded. A further 269 women who had concomitant vaginal cuff suspension operation were excluded. PHVP repair was detected in 56 (3.19%) of the remaining 1758 women. The distribution of PHVP grade was grade 1 in 7 (12.5%), grade 2 in 27 (48.2 %), grade 3 in 21 (37.5 %), grade 4 in 1 (1.8%) women.

The characteristics of case and control groups are shown in Table 1. Mean age of the patients in cases (53.11±6.49) was significantly higher than that of the controls (49.28±5.12). Statistically lower parity, body mass index (BMI) and number of vaginal delivery means were reported in the controls compared with cases. The cases were characterized by a statistically greater ratio of menopausal status and asthma. The ratio of hysterectomy performed for POP was more common in case group than in control group ($p<0.001$). The remaining parameters listed in Table 1 showed no statistically significant difference between groups.

The univariate analysis of preoperative, intraoperative and postoperative variables are reported in Table 2 and 3. Age at hysterectomy≥60 years were strongly associated with an increased risk of reoperation for vault prolapase after hysterectomy (OR:1.99; 95% CI:1.82-2.17, $p<0.001$). Number of vagial delivery≥2 (OR:0.03; 95% CI:0.01- 0.05; $p<0.001$) and the hystory of POP surgery before hysterectomy, regardless of which pelvic floor compartment was involved (OR:0.07; 95% CI:0.04-0.11; $p<0.001$) and BMI≥27 kg/m^2 (OR:0.04; 95% CI:0.01-0.06; $p<0.001$) were associated with a significant increase in the risk. History of delivery of a baby weighing ≥4000g also appeared as a risk factor (OR:0.04; 95% CI:0.01-0.06; $p=0.008$). Genital prolapse as indicaion of hysterectomy was significantly associated with reoperation (OR:0.06; 95% CI:0.04- 0.08; $p<0.001$) (Table 2).

Presence of concomitant POP surgery during hysterectomy regardless of which pelvic flor compartment was involved (OR:0.03, 95% CI:0.01-0.05; $p<0.001$) and vaginal route of hysterectomy (OR:0.03; 95% CI:0.01- 0.05; $p=0.001$) were significantly more frequent in the case group than in the control group (Table 3).

In multivariate analysis, age at hysterectomy ≥60 years (adjusted OR:8.08, 95% CI:2.29-28.57; $p=0.001$), presence of asthma (adjusted OR:0.41, 95% CI:0.20-0.85, $p=0.017$), presence of POP surgery before hysterectomy (adjusted OR:0.29, 95% CI:0.12-0.71, $p=0.006$), vaginal hysterectomy (adjusted OR:3.16, 95% CI:1.36-7.31; $p=0.007$), genital prolapse as indication of hysterectomy (adjusted OR:6.26; 95% CI:2.30-17.03; $p<0.001$), BMI≥27 (adjusted OR:9.31; 95% CI:3.53-24.52; $p<0.001$) and number of vaginal delivery ≥2 (adjusted OR:10.07; 95% CI: 2.11-48.18; $p=0.004$) were the independent risk factors. However, history of a delivery of a baby ≥4000 g ($p=0.329$) and concomitant POP surgery with hysterectomy

(p=0.087) were not statistically significant risk factors after adjustment (Table 4).

Table 1. Characteristics of groups at hysterectomy

	Cases (n=56)	Controls (n=1702)	p*
Age (years)	53.11±6.49	49.28±5.12	0.001
Parity (number)	5.13± 1.47	3.89± 1.14	0.046
BMI(kg/m^2)	27.85±±0.61	26.68±1.78	<0.001
Current smooking	20 (35.7)	563 (33.1)	0.680
Menopausal status	38 (67.9)	734 (43.1)	<0.001
Menopausal period (years)	7.63±5.45	6.16±5.02	0.080
Diabetes mellutus	14 (25.0)	414 (24.3)	0.908
Asthma	38 (67.9)	471 (27.7)	<0.001
Number of vaginal delivery	3.95±1.31	2.93±1.16	<0.001
Presence of cesarean section	16 (28.6)	415 (24.4)	0.473
Hysterectomy indications			<0.001
Pelvic organ prolapse	24 (42.9)	293(16.7)	
Others‡	32 (57.1)	1409 (83.3)	

Data were presented as mean±standard deviation and number (%). BMI: Body Mass Index

*p<0.05 was considered as statistically significant.

‡ Other indications were myoma uteri, abnormal uterine bleeding, endometriosis, adenomyosis or endometrial hyperplasia

Table 2. Univariate analysis of preoperative variables

	Cases (n=56)	Controls (n=1702)	OR(95% CI)	P*
Age at hysterectomy (years)				
<60	41 (73.2)	1575 (92.5)	Reference	
≥60	15 (26.8)	127 (7.5)	1.99 (1.82-2.17)	<0.001
Parity				
<2	15 (24.6)	462 (33.5)	Reference	
≥2	46 (75.4)	916 (66.5)	0.02(0.01- 0.04)	0.145
Number of vaginal delivery				
<2	2 (3.6)	417 (24.5)	Reference	
≥2	54 (96.4)	1285 (75.5)	0.03(0.01- 0.05)	<0.001
Delivery of a baby ≥4000g				
No	44 (78.6)	1526 (89.7)	Reference	
Yes	12 (21.4)	176 (10.3)	0.04(0.01- 0.06)	0.008
BMI (kg/m^2)				
<27	5 (8.9)	859 (50.5)	Reference	

≥27	51 (91.1)	843 (49.5)	0.04(0.01-0.06)	<0.001
Previous POP surgery				
No	42 (75.0)	1594 (93.7)	Reference	
Yes	14 (25.0)	108 (6.3)	0.07(0.04-0.11)	<0.001
Hysterectomy indication				
Others	32 (57.1)	1433 (84.2)	Reference	
POP	24 (42.9)	269 (15.8)	0.06(0.04- 0.08)	<0.001
Preoperative stage of POP				
<2	28 (50.0)	1136 (66.7)	Reference	
≥2	28 (50.0)	594 (33.3)	0.01 (0.01-0.03)	0.369

OR: Odds Ratio; CI:Confidence Interval; POP: Pelvic Organ Prolapse.

Data were presented as number (%).

*p<0.05 was considered as statistically significant

Table 3. Univariate analysis of intraoperative and postopeartive variables

	Cases (n=56)	Controls (n=1702)	OR(95% CI)	p*
Hysterectomy type				
Abdominal	15 (26.8)	857 (51.4)	Reference	
Vaginal	41 (73.2)	845 49.6)	0.03(0.01- 0.05)	0.001
POP surgery with hysterectomy				
No	19 (33.9)	1065 (62.6)	Reference	
Yes	37 (66.1)	637 (37.4)	0.03 (0.01-0.05)	<0.001
Postoperative complication				
No	48 (85.7)	1484 (87.2)	Reference	
Yes	8 (14.3)	218(12.8)	0.02 (0.01-0.03)	0.497
Follow-up period (months)				
<18	33 (58.9)	1181 (69.4)	Reference	
≥18	23 (41.1)	521 (30.6)	0.02(0.01-0.03)	0.228

OR: Odds Ratio; CI: Confidence Interval; POP: Pelvic Organ Prolapse.

Data were presented as number (%).

*p<0.05 was considered as statistically significant

Table 4. Multivariate analysis of risk factors

	B	Adjusted OR (95%CI)	P
Age at hysterectomy ≥60 years	2.09	8.08 (2.29-28.57)	0.001
Delivery of a baby ≥4000g	0.55	1.72 (0.58-5.17)	0.329
Asthma	-0.90	0.41 (0.20-0.85)	0.017
POP surgery concomitant with hysterectomy	-0.72	0.49 (0.21-1.11)	0.087
POP surgery before hysterectomy	-1.23	0.29 (0.12-0.71)	0.006
Vaginal hysterectomy	1.15	3.16 (1.36-7.31)	0.007
BMI≥27 kg/m^2	1.84	9.31 (3.53-24.52)	<0.001
Hysterectomy for POP	2.23	6.26 (2.30-17.03)	<0.001
Number of vaginal delivery ≥2	2.31	10.07 (2.11-48.18)	0.004
B: logistic regression coefficient, OR: Odds Ratio; CI: Confidence Interval; POP: Pelvic Organ Prolapse; BMI: Body Mass Index			

DISCUSSION

PHVP is a rare complication of hysterectomy. It sometimes has a negative impact on a woman's quality of life due to associated urinary, anorectal, as well as sexual disfunction[11]. The true incidence of this complication is uncertain, because the women with severe pelvic floor symptoms are more prone to seek treatment, however the women with non-severe ones, who do not need to be corrected surgically, often goes unnoticed. Thus, it is more likely that the patients with mild and moderate symptoms are missed[12]. Furthermore the patient with the severe ones do not return to their initial medical center due to their dissatisfaction about previous operation. In a large cohort, it was reported that the overall incidence of PHVP was 3.6 per 1000 women and the risk of PHVP was 5.5 times higher among women whose initial hysterectomy was for genital organ prolapse as opposed to other indications[3]. Marchionni et al. were also in agreement with these results who found that vaginal vault prolapse followed 11.6% of hysterectomies performed vaginally for prolapse and 1.8% of hysterectomies performed abdominally for other indications [13]. More recently, Dallendach et al. conducted a case control study among 6214 women who underwent hysterectomy from 1982 to 2002. They reported that 32 women (0.5%) of this cohort were reoperated for subsequent vaginal vault prolapse. The distribution of vault prolapse grade that required surgical suspension was grade 1 in 13.3%, grade 2 in 43.3%, grade 3 in 36.7% and grade 4 in 3.3% women[8]. In the present study, we have stated that the incidence of PHVP is 3.19%. Among these women found to have vault prolapse, 7 (12.5%) had grade 1 vault prolapse, and 49 (87.5%) had grade 2 or more vault prolapse.

In literature, the etiology of POP and PHVP is considered to be multifactorial, however all of the factors and the role of each one are not fully understood. In our study, we have demonstrated that woman's age at hysterectomy ≥60 years, presence of asthma, POP surgery before hysterectomy, vaginal route of hysterectomy, genital prolapse as indication of hysterectomy, BMI≥27 kg/m^2 and number of vaginal delivery ≥2 are the independent risk factors for development of PHVP.

It has demonstrated that the prevalence of POP and PHVP increases in elder population[2,14,15]. Namely, with each year of advancing age the increase in the incidence of severe POP is 12% as well as the incidence is doubling for every decade of life[16]. It is possible to assume that the substantially increased risk for PHVP in women

aged 60 or older is related to age or postmenopausal degenerative changes which weaken the pelvic floor supportive tissues.

Chronic obstructive lung diseases such as asthma and obesity may put excessive strain on pelvic floor tissue by increasing intra-abdominal pressure, which in turn may lead to vaginal vaut prolapse in hysterectomized women[6].

In literature, it was stated that the incidence of PHVP was increased when hysterectomy was performed for prolapse rather than for other reasons[8,13,17] and also with the history of previous POP surgery[4]. These data suggest that weakness of pelvic floor supportive tissues, such as muscles, ligaments and connective tissues at the time of hysterectomy may increase the risk of subsequent vault prolapse. In addition, any previous pelvic floor surgery may cause changes of vaginal dynamics and as such predispose to PHVP requiring surgical correction.

Each additional childbirth significantly increased the risks for prolapse surgery compared with having only one child[18]. Hysterectomized women with only one vaginal childbirth prior to their hysterectomy had a 1.6 times increased risk for prolapse surgery, whereas women with at least 4 vaginal childbirths undergoing a hysterectomy had a nearly 8-fold risk increase for subsequent prolapse surgery[15]. In the literature, this is explained by the hypothesis that repeat trauma during the passage of fetus through the birth canal causes significant pudendal nerve and pelvic floor supportive tissues damages which promotes to vaginal prolapse, being further aggravated by a subsequent hysterectomy[15, 19, 20].

There is no consensus on the role of hysterectomy as a cause of subsequent development of PHVP[4,8,15,21]. During removing the uterine by vaginal route, a great deal of tension is commonly applied to the apical vaginal support. Pulling and stretching of the supportive tissues may add to the surgical trauma and the vaginal prolapse may be further occured. In addition, patients selected for a vaginal hysterectomy on average differ from those selected for abdominal procedures with regard to vaginal laxity. As a consequence, vaginal hysterectomy may have a greater tendency to develop PHVP. However, during our study period, vaginal hysterectomy was performed mostly if prolapse was present. This is a bias for our study.

Although our study was able to control for several important factors known to influence the development of PHVP, it has some limitations. Retrospective design is the main limitation. Furthermore, detailed sociodemographic and clinical data such as race, sexual life, hormone replacement therapy use, family history of POP and detailed surgical procedure data were not available. The numbers of laparoscopic and subtotal abdominal hysterectomies were too small, so we couldn't draw any conclusions on the consequences of these techniques.

In conclusion, our study shows that PHVP that requires surgical correction is relatively rare. Elderly age, obesity, chronic obstructive lung disorders, vaginal hysterectomy, previous POP surgery, uterine prolapse as indication of hysterectomy and number of vaginal delivery ≥2 are associated with the risk of PHVP. This data can be evaluated and discussed with the patient by surgeon in order to prevent or minimize this complication and also to make the patient aware of this complication before performing hysterectomy for benign indications. However, large, population based, prospective studies should be performed.

Conflict of Interest: None
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