
GYNECOLOGY

Predicting factors for excessive intraoperative blood loss during abdominal hysterectomy for benign gynecologic diseases

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ABSTRACT

Objectives: To determine the incidence of excessive intraoperative blood loss (≥ 500 ml) and to examine risk factors associated with excessive blood loss during abdominal hysterectomy for benign gynecologic conditions.

Materials and Methods: The clinical, operative, and histopathologic data of 597 women who underwent simple abdominal hysterectomy for benign gynecologic conditions at Maharaj Nakorn Chiang Mai hospital from January 2004 to December 2006 were retrospectively reviewed. Association of the clinico-pathologic factors and excessive blood loss was examined by using the chi-squared test or Fisher's exact test as appropriate. Logistic regression analysis was performed to determine the independent factors that were associated with an increased risk of excessive blood loss.

Results: The mean blood loss was 750 ml (350-1400). One hundred and seventy seven (29.6%) patients had excessive blood loss. From univariate analysis, age ≤ 50 years, parity < 2 , uterine weight ≥ 250 gm, BMI ≥ 25 kg/m², preoperative diagnosis of endometriosis or tuboovarian abscess, and premenopause were associated with excessive blood loss. Multivariate analysis identified preoperative diagnosis, uterine weight, BMI, and menopausal status as independent factors determining the likelihood of excessive blood loss.

Conclusion: Approximately one-third of the patients in this study had excessive blood loss. The chance of having excessive intraoperative blood loss can be predicted preoperatively by examining various clinical factors. This would lead to appropriate counseling, patient preparation, blood components request, and consultation planning.

Keywords: blood loss, complications, hemorrhage, hysterectomy

Introduction

For decades, hysterectomy has been the most common major gynecologic operation performed worldwide. The procedure is regarded as a definite and effective treatment for various benign and

malignant gynecologic conditions.⁽¹⁾ For benign conditions, a simple (class I) hysterectomy is usually performed without the need to remove adjacent parametria.⁽²⁾ This can be accomplished through one of the three routes, i.e. abdominal, vaginal, and

laparoscopic, depending on pelvic accessibility, uterine mobility, uterine size, and surgeon's experience. Although the simple hysterectomy is relatively safe, some patients have experience significant intraoperative and postoperative complications, regardless of the route. Excessive blood loss has been identified as the most common intraoperative complication in many studies with an incidence ranging from 2.4% to 55.3%.^(3,4)

Chiang Mai University's Maharaj Nakorn Chiang Mai hospital is the largest medical center in the Northern region of Thailand. Gynecologic operation comprised 89% of all major operations in Department of Obstetrics and Gynecology. In 63% of these gynecologic operations, hysterectomy was the main procedure. Approximately 85% of simple hysterectomy for benign conditions was performed through abdominal route.

The aim of this study was to determine the incidence of excessive intraoperative blood loss (≥ 500 ml) and to examine risk factors associated with excessive blood loss during simple hysterectomy for benign gynecologic conditions.

Materials and Methods

From January 2004 to December 2006, a total of 597 women underwent simple abdominal hysterectomy for benign gynecologic conditions at Maharaj Nakorn Chiang Mai hospital, Chiang Mai, Thailand. Medical records and pathological reports of these patients were retrospectively reviewed for clinical, operative, and histopathologic data. The patients with known coagulopathy or taking anti-coagulant were excluded. The information collected included age, parity, menopausal status, hormone use, body mass index (BMI), coexisting medical diseases, previous abdominal surgery, indication for hysterectomy, level of surgeon, anesthetic use, intraoperative blood loss (as estimated and recorded by anesthesiologists), blood transfusion, uterine weight, and final histology of the uterine specimens.

The incidence of excessive blood loss was determined. Association of the clinical factors with

excessive blood loss and the need for blood transfusion was examined using chi-squared or Fisher's exact test as appropriate. Stepwise logistic regression model was applied in a multivariate analysis to determine the independent factors associated with excessive blood loss and blood transfusion. The p-value of < 0.05 was considered significant.

The study was carried out under the ethical approval of the Research Ethics Committee of Faculty of Medicine, Chiang Mai University.

Results

Mean age of our study population was 56.0 years old (44.0-76.0). Median parity was 2 (0-3). The BMI was 25.6 kg/m² on average. Only 3 (3.9%) postmenopausal patients had been receiving hormone replacement therapy at the time of the operation. The most frequent indication of hysterectomy was uterine fibroid, 360 (60.3%) cases. Other hysterectomy indications included adenomyosis in 83 (13.9%) cases, endometriosis in 47 (7.9%), tuboovarian abscess in 7 (1.2%) cases, dysfunctional uterine bleeding in 4 (0.7%) cases, and endometrial hyperplasia in 2 (0.3%) cases. Of note, 91 (15.2%) patients had hysterectomy done as an incidental procedure during adnexal mass surgery. Mean operative time was 136 min (110-170). Median uterine weight was 200 gm (40-2,700). Table 1 demonstrates demographic and clinical characteristics of the patients included in this study.

Mean blood loss was 750 ml (350-1,400). In 177 (29.6%) patients, the intraoperative blood loss was considered excessive (≥ 500 ml).

Clinical characteristics that were significantly associated with excessive blood loss in univariate analysis included age < 50 years old, parity < 2 , premenopause, BMI ≥ 25 kg/m², diagnosis of endometriosis or tuboovarian abscess (TOA), and uterine weight ≥ 250 gm. (Table 1) In multivariate analysis, preoperative diagnosis (OR 7.32; 95% CI 3.75-14.29), uterine weight (OR 2.91; 95% CI 1.85-4.56), BMI (OR 2.11; 95% CI 1.43-3.13), and menopausal status (OR 0.46; 95% CI 0.22-0.95),

were demonstrated as independent factors predicting the risk of excessive blood loss. Uterine weight ≥ 250 gm. and diagnosis of endometriosis/

TOA were characteristics significantly associated with the need for blood transfusion in both univariate and multivariate analysis. (Table 1)

Table 1. Association of the clinical factors with excessive blood loss and the need for blood transfusion

Characteristics	N (%)	Blood loss > 500 N (%)	p-value	Transfusion N (%)	p-value
Age (years)					
< 50	450 (75.4)	149 (33.1)	< 0.01*	26 (5.8)	0.65
≥ 50	147 (24.6)	28 (19.0)		10 (6.8)	
Parity					
< 2	256 (42.9)	90 (35.2)	0.01*	15 (5.9)	0.88
≥ 2	341 (57.1)	87 (25.5)		21 (6.2)	
Menopausal status					
Premenopause	520 (87.1)	167 (32.1)	< 0.01*	33 (6.3)	0.61
Postmenopause	77 (12.9)	10 (13.0)		3 (3.9)	
BMI (kg/m ²)					
< 25	396 (66.3)	98 (24.7)	< 0.01*	23 (5.8)	0.75
≥ 25	201 (33.7)	79 (39.3)		13 (6.5)	
Coexisting disease					
Yes	215 (36.0)	54 (25.1)	0.07	11 (5.1)	0.48
No	382 (64.0)	123 (32.2)		25 (6.5)	
Previous abdominal surgery					
None	307 (51.4)	86 (28.0)	0.58	19 (6.2)	0.57
Tubal resection	102 (17.1)	30 (29.4)		8 (7.8)	
Others	188 (31.5)	61 (32.4)		9 (4.8)	
Hysterectomy indications					
Endometriosis/TOA*	54 (9.0)	34 (63.0)	< 0.01*	8 (14.8)	0.01*
Others	543 (91.0)	143 (26.3)		28 (5.2)	
Uterine weight (gm)					
< 250	248 (42.5)	51 (20.6)	< 0.01*	5 (2.0)	< 0.01*
> 250	336 (57.5)	121 (36.0)		30 (8.9)	
Surgeon levels					
Attending physician	298 (49.9)	91 (30.5)	0.45	18 (6.0)	0.3
Chief resident	130 (21.8)	42 (32.3)		11 (8.5)	
PGY2 [#]	169 (28.3)	44 (26.0)		7 (4.1)	
Anesthesia					
General	576 (96.5)	174 (30.2)	0.12	36 (6.2)	0.63
Others	21 (3.5)	3 (14.3)		0 (0.0)	

Characteristics	N (%)	Blood loss > 500 N (%)	p-value	Transfusion N (%)	p-value
SO [§]					
No	168 (28.1)	46 (27.4)	0.27	5 (3.0)	0.10
Unilateral	78 (13.1)	29 (37.2)		4 (5.1)	
Bilateral	351 (58.8)	102 (29.1)		27 (7.7)	
Appendectomy					
Yes	228 (38.2)	68 (29.8)	0.94	12 (5.3)	0.54
No	369 (61.8)	109 (29.5)		24 (6.5)	

*TOA: Tubo-ovarian abscess # PGY2: Postgraduate year 2 § SO: Salpingo-oophorectomy

Discussion

Although meta-analysis has shown that simple hysterectomy performed through the vaginal or laparoscopic route is associated with a faster recovery and shorter hospital stay,⁽⁵⁾ the majority of hysterectomy is still accomplished by laparotomy.⁽¹⁾ This is also true concerning the route of hysterectomy used in our institution. In this study, almost one third of the patients who had abdominal hysterectomy encountered excessive blood loss. This rate appears well within the range of reported incidence in the literature. However, the reported rate of excessive blood loss during hysterectomy varies widely, most likely due to different cut-off level that was used to define the volume of blood loss as excessive in each study.

The uterine weight of ≥ 250 gm, the BMI of ≥ 25 kg/m², the diagnosis of endometriosis/TOA, and premenopausal status were significantly associated with increased risk of excessive blood loss in our population. However, only the uterine weight and the diagnosis were demonstrated as independent predicting factors for the need of blood transfusion.

A significant correlation between increased uterine size and operative blood loss as well as blood transfusion has been clearly reported.^(3,6,7) This relationship is most obvious when hysterectomy for the < 500 gm uterus is compared with that for the very large >1000 gm uterus.⁽³⁾ In one study, there was no increase in operative complication with hysterectomy for the uterus larger than 12-week size (280 gm).⁽⁶⁾ In our study, however, the risk of

excessive intraoperative blood loss is already increased in those with the uterine weight of over 250 gm. This cut-off uterine size is roughly comparable to the 12 weeks gestational uterine size (280-320 gm).⁽⁸⁾ Greater blood loss with hysterectomy for large uterus could result from limited exposure of the operative field because of large myomas, increase in vascular supply to the uterus with myomas or adenomyosis, and distorted uterine anatomy which makes it more difficult to properly place the clamp on vascular pedicles.

Increased blood loss and other complications with hysterectomy for endometriosis or TOA are well recognized. The finding from this study has clearly confirmed this notion. These conditions are frequently associated with dense pelvic adhesion that is difficult to dissect as well as increased vascular supply to the area due to the process of inflammation. On the other hand, previous abdominal surgery did not appear to have much adverse effect on operative blood loss in this study. Although this condition is usually associated with some degree of adhesion, the surgical dissection plane is still generally preserved. This finding supports the important effect of inflammation on formation of adhesion that obliterates the surgical plane and makes the dissection difficult and frequently bloody.

For obese patients who had elective general surgery, the reported morbidity rate is not much different from those with normal weight, except for increased risk of wound infection.⁽⁹⁾ However, a

study on the effect of obesity in abdominal hysterectomy has shown that for women weighing > 200 lb, there are increase in blood loss and transfusion, operative time, wound complication, postoperative fever, and length of hospital stay.⁽¹⁰⁾ Our data support the effect of overweight or obesity on increased blood loss which could be explained by the limited exposure of the operative field resulting from thick abdominal wall. However, we did not find significant effect of overweight on the need for blood transfusion.

Menopausal patients were found to have significantly lower risk of excessive blood loss in this study. This could be explained by the fact that endometriosis or infectious conditions which are substantially associated with increased blood loss were found less commonly in these patients (2.6% vs. 10.0%). However, because of the small proportion of the menopausal to premenopausal patients in this study, clinically meaningful conclusion on this issue can not be reached.

There were certain limitations with this study. The problem with missing or incompletely recorded data is commonly encountered in retrospective study like this one. In addition, the measurement of intraoperative blood loss was not absolutely objective. However, anesthesia team routinely estimated amount of blood loss by measuring the amount of blood in the suction container and counting the number of bloody laparotomy sponges and swabs. This method could be considered partly objective and surgeon bias was minimized. Also, the uterine weight was usually measured at the pathology department, not immediately after specimen removal in the operating room. Therefore, the reported uterine weight might not precisely represent the uterine size. However, the discrepancy should be quite small and this system consistently provided objective assessment of all hysterectomy specimens in this study.

For the patients with higher risk of excessive intraoperative blood loss, the potential for blood transfusion should be discussed preoperatively. Also, autologous blood donation and intraoperative

blood salvage should be considered and arranged in advance. Drugs that increase the risk of bleeding; such as nonsteroidal anti-inflammatory drugs (NSAIDs) and vitamin E should be discontinued for at least 7 days and 10-14 days before surgery, respectively.⁽¹⁾ In addition, preoperative iron supplementation to maintain satisfactory hemoglobin level, and menstrual suppression with GnRH agonists to keep normal hemoglobin level and to reduce the uterine size and make the operation easier should be considered.⁽¹⁾ At the time of the operation, the abdominal incision that would provide adequate and comfortable exposure should be used. For the obese patients, vaginal route might be a preferred approach for hysterectomy because of the better exposure, the shorter operation time, the lower rate of wound complications, and the faster recovery.⁽¹¹⁾

Conclusion

Approximately one-third of the patients in this study had excessive blood loss. The chance of having excessive intraoperative blood loss can be predicted preoperatively by examining various clinical factors. This would lead to appropriate counseling, patient preparation, blood components request, and consultation planning.

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ปัจจัยเสี่ยงต่อภาวะเสียเลือดมากในขณะผ่าตัดมดลูกออกทางหน้าท้องในโรคทางนรีเวชที่มีไขมันะเร็ง

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วัตถุประสงค์ : เพื่อศึกษาถึงอุบัติการณ์การเกิดภาวะเสียเลือดมาก (มากกว่า 500 มล.) ระหว่างการผ่าตัดมดลูกทางหน้าท้องในโรคทางนรีเวชที่มีไขมันะเร็ง และปัจจัยที่สัมพันธ์กับภาวะดังกล่าว

วัสดุและวิธีการ : เป็นการศึกษาวิจัยแบบเก็บข้อมูลย้อนหลัง โดยเก็บข้อมูลในส่วนของรายละเอียดของผู้ป่วย การผ่าตัดและข้อมูลทางพยาธิวิทยา ของผู้ป่วยที่เข้ารับการผ่าตัดมดลูกผ่านทางหน้าท้องในโรคทางนรีเวชที่มีไขมันะเร็ง ที่โรงพยาบาลมหาราชนครเชียงใหม่ ระหว่าง มกราคม 2547 ถึง ธันวาคม 2549 โดยรวมผู้ป่วยทั้งหมด 597 คน ข้อมูลที่เกี่ยวข้องทั้งหมดจะถูกนำมาวิเคราะห์ทางสถิติ เพื่อศึกษาหาปัจจัยที่เป็นอิสระและมีผลต่อภาวะเสียเลือดมากระหว่างการผ่าตัด

ผลการศึกษา : ปริมาณการเสียเลือดระหว่างการผ่าตัดโดยเฉลี่ย 750 มิลลิลิตร (350-1400) ผู้ป่วยที่มีภาวะเสียเลือดมาก 177 ราย (ร้อยละ 29.6) เสียเลือดระหว่างการผ่าตัดมากกว่าหรือเท่ากับ 500 มิลลิลิตร ปัจจัยที่มีผลต่อภาวะดังกล่าว ได้แก่ กลุ่มผู้ป่วยอายุน้อยกว่า 50 ปี, มีบุตรน้อยกว่า 2 คน, มีน้ำหนักเกิน, ได้รับการวินิจฉัยก่อนการผ่าตัดเป็นกลุ่มโรคเกี่ยวกับภาวะเยื่อโพรงมดลูกเจริญผิดที่หรืออุ้งเชิงกรานอักเสบเป็นหนอง, กลุ่มผู้ป่วยที่ยังไม่หมดประจำเดือน และกลุ่มผู้ป่วยที่มีน้ำหนักของมดลูกที่มากกว่าหรือเท่ากับ 250 กรัม การวิเคราะห์ข้อมูลทางสถิติเพิ่มเติมพบว่า ปัจจัยที่เป็นอิสระต่อภาวะดังกล่าวได้แก่ ภาวะอักเสบเป็นหนองในอุ้งเชิงกราน และเยื่อโพรงมดลูกเจริญผิดที่, กลุ่มผู้ป่วยที่มีน้ำหนักเกิน, วยก่อนหมดประจำเดือน และน้ำหนักของมดลูกมากกว่าหรือเท่ากับ 250 กรัม

สรุป : พบว่าผู้ป่วยประมาณหนึ่งในสามของการศึกษานี้มีภาวะเสียเลือดมาก ปัจจัยที่มีผลต่อภาวะเสียเลือดมากระหว่างผ่าตัดทั้งหมด ล้วนเป็นปัจจัยที่สามารถตรวจพบได้ตั้งแต่การเตรียมตัวผู้ป่วยก่อนการผ่าตัด ดังนั้นการค้นพบว่าผู้ป่วยมีปัจจัยเสี่ยงดังกล่าว จะช่วยให้เราสามารถเตรียมความพร้อมสำหรับการผ่าตัดได้ดีมากยิ่งขึ้น