HHS Public Access

Author manuscript

Am J Obstet Gynecol. Author manuscript; available in PMC 2018 November 01.

Published in final edited form as:

Am J Obstet Gynecol. 2017 November ; 217(5): 605.e1–605.e5. doi:10.1016/j.ajog.2017.07.017.

Feasibility of prophylactic salpingectomy during vaginal hysterectomy

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Abstract

BACKGROUND: The American Congress of Obstetricians and Gynecologists recommends that "the surgeon and patient discuss the potential benefits of the removal of the fallopian tubes during a hysterectomy in women at population risk of ovarian cancer who are not having an oophorectomy," resulting in an increasing rate of salpingectomy at the time of hysterectomy. Rates of salpingectomy are highest for laparoscopic and lowest for vaginal hysterectomy.

OBJECTIVE: The primary objective of this study was to determine the feasibility of bilateral salpingectomy at the time of vaginal hysterectomy. Secondary objectives included identification of factors associated with unsuccessful salpingectomy and assessment of its impact on operating time, blood loss, surgical complications, and menopausal symptoms.

STUDY DESIGN: This was a multicenter, prospective study of patients undergoing planned vaginal hysterectomy with bilateral salpingectomy. Baseline medical data along with operative findings, operative time, and blood loss for salpingectomy were recorded. Uterine weight and pathology reports for all fallopian tubes were reviewed. Patients completed the Menopause Rating Scale at baseline and at postoperative follow-up. Descriptive analyses were performed to characterize the sample and compare those with successful and unsuccessful completion of planned salpingectomy using Student *t* test, and χ^2 test when appropriate. Questionnaire scores were compared using paired *t* tests.

RESULTS: Among 77 patients offered enrollment, 74 consented (96%), and complete data were available regarding primary outcome for 69 (93%). Mean age was 51 years. Median body mass index was 29.1 kg/m^2; median vaginal parity was 2, and 41% were postmenopausal. The indications for hysterectomy included prolapse (78%), heavy menstrual bleeding (20%), and fibroids (11%). When excluding conversions to alternate routes, vaginal salpingectomy was successfully performed in 52/64 (81%) women. Mean operating time for bilateral salpingectomy was 11 (±5.6) minutes, with additional estimated blood loss of 6 (±16.3) mL. There were 8 surgical complications: 3 hemorrhages >500 mL and 5 conversions to alternate routes of surgery,

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but none of these were due to the salpingectomy. Mean uterine weight was 102 g and there were no malignancies on fallopian tube pathology. Among the 17 patients in whom planned bilateral salpingectomy was not completed, unilateral salpingectomy was performed in 7 patients. Reasons for noncompletion included: tubes high in the pelvis (8), conversion to alternate route for pathology (4), bowel or sidewall adhesions (3), tubes absent (1), and ovarian adhesions (1). Prior adnexal surgery (odds ratio, 2.9; 95% confidence interval, 1.5–5.5; P – .006) and uterine fibroids (odds ratio, 5.8; 95% confidence interval, 1.5–22.5; P = .02) were the only significant factors associated with unsuccessful bilateral salpingectomy. Mean menopause scores improved after successful salpingectomy (12.7 vs 8.6; P < .001).

CONCLUSION: Vaginal salpingectomy is feasible in the majority of women undergoing vaginal hysterectomy and increases operating time by 11 minutes and blood loss by 6 mL. Women with prior adnexal surgery or uterine fibroids should be counseled about the possibility that removal may not be feasible.

Keywords

benign; fallopian; hysterectomy; prophylactic; salpingectomy; vaginal

Introduction

Hysterectomy is one of the most common operations performed in the United States, with >400,000 per year.[1] Of women who undergo hysterectomy for benign gynecologic indications, 39% have elective bilateral salpingooophorectomy (BSO) to prevent ovarian cancer.[2] Premenopausal women and women age <65 years may consider ovarian conservation, as preserving ovaries prevents bone resorption, and surgical menopause increases long-term risk of psychosexual, cognitive, and both fatal and nonfatal cardiovascular disease.[3–5] Although more patients of younger ages are electing for ovarian conservation, there may be benefit to performing salpingectomy. Increasing evidence demonstrates that high-grade serous carcinoma, the most lethal ovarian malignancy, actually originates in the distal fallopian tube and not in the ovaries.[6–8] In November 2013, the Society of Gynecologic Oncology issued a clinical practice statement suggesting that in women who choose to retain their ovaries, salpingectomy should be considered at the time of hysterectomy or other pelvic surgery for women at average risk for ovarian cancer.[9] The American Congress of Obstetricians and Gynecologists (ACOG) also recommends that surgeons offer and discuss the benefits of salpingectomy to patients undergoing hysterectomy.[10]

Despite the recommendations from the Society of Gynecologic Oncology and ACOG and the rising rate of prophylactic salpingectomies, salpingectomy at the time of vaginal hysterectomy is low and has not been extensively studied. One large retrospective cohort of >12,000 hysterectomies reported only 17% of vaginal hysterectomies had salpingectomy performed.[11] There have been several studies evaluating the success of removing ovaries vaginally, which show that BSO during vaginal hysterectomy is safe and feasible. Two thirds or more of vaginal hysterectomies with prophylactic salpingo-oophorectomy are completed with minimal or no increases in operative time and surgical morbidity.[12] It isunclear what proportion of patients can have prophylactic salpingectomy successfully performed at the

time of vaginal hysterectomy. We suspect surgeons may be discouraged from vaginal salpingectomy at the time of vaginal hysterectomy with the thought it is technically challenging and may increase operative time and potentially blood loss. Given surgeons may be deterred from removing the fallopian tubes vaginally, we aimed to determine the feasibility of bilateral salpingectomy at the time of vaginal hysterectomy.

Materials and Methods

This prospective, observational study was performed by the Collaborative Research in Pelvic Surgery (CoRPS) Consortium. Columbia University Medical Center served as the data-coordinating center according to the existing Data Use Agreement for CoRPS Consortium members. The trial protocol was approved by the CoRPS Consortium Steering Committee and institutional review board approval was obtained from each of the 4 recruiting centers (Houston Methodist Hospital 2014–10414; University of Wisconsin-Madison 2014–1185; Columbia University Medical Center 2014-AAAN5704; and University of Arkansas for Medical Sciences 2014–203426).

Women (age 18 ≥ years) planning prophylactic bilateral salpingectomy at the time of vaginal hysterectomy were recruited from October 2014 through November 2016. Exclusion criteria included women with: (1) a history of removal of a fallopian tube or ovary,(2) known tuboovarian pathology, and(3) desire for/planning oophorectomy at the time of hysterectomy. All women planning prophylactic vaginal salpingectomy at the time of vaginal hysterectomy were invited to participate by their gynecologic surgeon and informed consent was obtained.

Each participant was assigned a study identification number used for all case report forms and data entry into REDCap, thus creating a deidentified database compliant with the Health Insurance Portability and Accountability Act.

The primary outcome was proportion of planned bilateral salpingectomies successfully completed vaginally. Secondary outcomes included: (1) additional length of time and estimated blood loss (EBL) associated with prophylactic bilateral salpingectomy at the time of vaginal hysterectomy; (2) factors associated with noncompletion of planned salpingectomy; and (3) change in menopausal symptoms following hysterectomy with salpingectomy.

Data regarding age, body mass index (BMI), parity, pertinent medical and surgical history, and pelvic organ prolapse were abstracted from the medical record prior to surgery. Surgical procedure, intraoperative findings, complications, salpingectomy start and end time, and EBL for salpingectomy were recorded in the operating room. After hemostasis of hysterectomy pedicles had been assured, salpingectomy operative time started when the surgeon first grasped the adnexal pedicle to search for the fallopian tube on the first side. Salpingectomy operative time ended when hemostasis was achieved of bilateral fallopian tube pedicles. Participating surgeons used a standardized technique where a single or double clamp was used to clamp across the mesosalpinx and a single or double suture-ligation was used to secure the pedicle following excision of the fallopian tube. Salpingectomy included

removal of the fimbria. Attending surgeons rather than residents or fellows performed all salpingectomies.

Uterine weight and uterine and fallopian tube pathology were abstracted from pathology reports postoperatively. Subjects completed the 11-item written Menopause Rating Scale (MRS)[13] at baseline (0–30 days prior to surgery) and postoperatively (6–12 weeks after date of surgery). The MRS was utilized as a validated tool to see if menopausal symptoms were affected by removal of the fallopian tubes. Investigators at each participating site uploaded collected data into the REDCap database managed by the data-coordinating center.

Descriptive analyses were performed to characterize the sample and determine the proportion of planned salpingectomies successfully completed and additional length of time and EBL associated with salpingectomy. Continuous variables were described with mean (SD) and categorical variables were described with frequencies and percentages. Comparative analyses were then performed between the successful and unsuccessful salpingectomy groups. Statistical tests for continuous data were based on Student *t* test for normally distributed data and categorical variables were compared using the χ^2 test. Menopausal symptoms following surgery were compared to baseline using paired *t* tests to evaluate difference in MRS scores. Software (SPSS, Version16.0; IBM Corp, Armonk, NY) was used for all analyses.

Results

In all, 77 patients were offered enrollment into the study, and 74 patients accepted participation and were consented (96%). Three patients canceled surgery and 2 patients elected preoperatively for BSO. Therefore, 69 patients were included in the analysis. Baseline characteristics were stratified by outcome of attempted salpingectomy status and are included in Table 1. For the entire cohort of patients, mean age was 50.9 years, with a BMI of 29.1, and 41% were postmenopausal. Indications for hysterectomy included prolapse (78.3%), heavy menstrual bleeding (20.3%), and uterine fibroids (11%). Some patients had >1 indication for hysterectomy.

Overall, vaginal salpingectomy was successfully performed in 52/69 (75%) women. Of the unsuccessful salpingectomy cases, there were 4 conversions to alternative routes due to adhesions and other pelvic pathology, and 1 patient had unknown prior salpingectomy for sterilization. When these patients were excluded from the analysis, the rate of successful salpingectomy was 52/64 (81%). Risk factors for unsuccessful completion of salpingectomy were history of adnexal surgery (odds ratio, 2.9; 95% confidence interval, 1.5–5.5; $P = .006$) and fibroids as an indication for hysterectomy (odds ratio, 5.8; 95% confidence interval, 1.5–22.5; $P = .02$). History of adnexal surgery includes prior tubal ligation or ovarian cystectomy. There was a nonsignificant trend toward more successful completion of bilateral salpingectomy with higher parity ($P = .05$) and with prolapse as an indication for hysterectomy ($P = .06$). This would explain why more uterosacral ligament suspensions were performed with women with successful salpingectomy (Table 2). Age, BMI, and history of tubal ligation were not statistically significant factors associated with unsuccessful

salpingectomy. Of the 20 patients with a history of adnexal surgery, 8 had unsuccessful salpingectomy while 12 (60%) had successful bilateral salpingectomy.

Mean operating time for bilateral salpingectomy was 11 (±5.6) minutes, with additional mean EBL of 5.5 (±16.3) mL. There were 8 surgical complications, none of which were related to salpingectomy: 5 conversions to alternate routes of surgery and 3 hemorrhages >500 mL. Of the 3 patients with hemorrhage >500 mL, 1 was in the successful salpingectomy group and 2 patients were in the unsuccessful salpingectomy group. There were no blood transfusions or bladder, ureteral, or bowel injuries in our patients. In those patients requiring conversion to alternate routes, 1 patient had a unicornuate uterus requiring conversion to laparos-copy. Another patient had an ovarian mass detected vaginally requiring laparoscopic salpingo-oophorectomy, and the third patient had a conversion to mini-laparotomy due to dense pelvic adhesions to the uterus and bleeding. The fourth patient had conversion to laparoscopy due to pelvic adhesions during hysterectomy. The fifth patient had a successful vaginal salpingectomy but subsequently, the surgeon reported difficulty visualizing the patient's anatomy for vaginal vault suspension and required conversion to laparoscopy.

Among the 17 patients for whom vaginal bilateral salpingectomy was unsuccessful, 7 underwent unilateral vaginal salpingectomy. Surgeon-identified reasons for unsuccessful completion of salpingectomy included: fallopian tubes too high in the pelvis (8/17, 47%), bowel adhesions to tubes (2/17, 12%), conversion to alternate route for pathology (4/17, 24%), tubal adhesions to ovary (1/17, 6%), tubal adhesions to pelvic sidewall (1/17, 6%), and fallopian tubes were absent due to prior salpingectomy (1/17, 6%) (percentages equal 101% due to rounding).

On gross examination of the fallopian tubes during surgery, surgeons noted ovarian cysts in 7% of patients and paratubal cysts in 13%. Mean uterine weight was 102.5 g and there was no difference in mean uterine weight between successful and unsuccessful salpingectomy groups (Table 2). There were no malignancies detected on fallopian tube pathology. In all, 20% of the final pathologic reports document paratubal cyst despite a lower account by the surgeons intraoperatively. There was a significant decrease in total MRS scores from preoperative to postoperative in the women with bilateral salpingectomy indicating less bother (12.7 vs 8.6; $P < .001$). There was no difference in MRS scores between patients with successful or unsuccessful salpingectomy ($P = .91$).

Comment

Vaginal salpingectomy is feasible in the majority of women undergoing vaginal hysterectomy and results in only minimal increases in operative times and blood loss. We believe this is an important finding that adds to the literature supporting the safety of adnexal surgery during vaginal hysterectomy. ACOG recommends vaginal hysterectomy as the surgical approach of choice for benign indications and states that planned salpingo-oophorectomy should not preclude the utilization of the vaginal route.[14] Despite this recommendation, national surgical data reflect declining rates of vaginal hysterectomy and increasing rates of laparoscopic and robotic-assisted hysterectomy.[15] Although national rates

of prophylactic salpingectomy are increasing, in keeping with ACOG support for this practice to reduce ovarian cancer incidence, rates of salpingectomy at the time of vaginal hysterectomy remain low.[10,16,17] Our data support the continued use of vaginal hysterectomy in a population of women desiring concurrent prophylactic salpingectomy for benign indications.

Previous literature identified risk factors for failure to accomplish a vaginal oophorectomy including obesity, nulli-parity, decreased vaginal access and space, lack of uterine descent, increased uterine size, and tuboovarian disease.[18]

The rate of successful salpingectomy in our study is similar to a previous study published in Canada reporting a successful vaginal salpingectomy rate of 88%. Although this Canadian study was limited by a retrospective design, it showed increasing age and pelvic adhesions were risk factors with unsuccessful removal.[19] Our study showed that prior adnexal surgery and fibroids as an indication for surgery were associated with unsuccessful completion of planned vaginal salpingectomy. Prior adnexal surgery may predispose to tubal adhesions to the ovaries or surrounding structures that may increase difficulty of access to the fallopian tubes for removal. Despite this increased potential challenge, the majority of patients with prior adnexal surgery in our cohort had successful bilateral salpingectomy. We suggest that this characteristic should not deter surgeons, but should motivate patient counseling regarding this possibility. There may be additional risk factors for unsuccessful removal that we were not able to identify due to the small group of unsuccessful salpingectomy cases.

We saw a trend in improvement in MRS score in both groups 6–12 weeks postoperatively. No definitive conclusions can be made regarding the impact of salpingectomy on ovarian blood flow from these data, but we are reassured that symptoms did not appear worse following surgery.

Strengths of this study include its prospective design and our inclusion of a diverse group of surgeons at multiple institutions. Our small sample size limits our ability to control for multiple variables and does not power us to detect changes in MRS scores between groups in which salpingectomy was or was not performed. While the sample size appears small, it is important to consider the overall patient population of the recruiting surgeons, which includes many postmenopausal patients who opt for prophylactic oophorectomy in addition to salpingectomy. Therefore, these results are not necessarily generalizable to postmenopausal patients planning vaginal hysterectomy with desire for prophylactic removal of both tubes and ovaries. Furthermore, some premenopausal patients with advanced pelvic organ prolapse opted for minimally invasive sacrocolpopexy rather than vaginal hysterectomy and were not candidates for this study. The enrollment of 96% of eligible patients is a strength of the study and the sample size is adequate for the descriptive analyses performed. Another limitation is that many of our participating surgeons were urogynecologists, so the majority of patients in this cohort had uterovaginal prolapse, which may have increased the proportion of successfully completed vaginal salpingectomy. The high rate of complications in this study may reflect the increased complexity of the urogynecology patient population.

Our study demonstrated a minimal 11-minute increase in operative time and 6-mL increase in EBL associated with salpingectomy. Further study is needed to identify predictors of successful removal to improve patient counseling and enhance surgical selection. Vaginal surgeons should feel confident that planned salpingectomy at the time of vaginal hysterectomy is reasonable and likely to be successfully undertaken with minimal additional time, blood loss, and risk.

Acknowledgment

The authors would like to thank and acknowledge the following physicians who contributed to recruitment for this study: Tristi Muir, MD, Houston Methodist Hospital, Houston, TX; Jin Hee Kim, MD, MS, Columbia University Medical Center, New York, NY; Timothy Ryntz, MD, Columbia University Medical Center, New York, NY; Connie Young, MD, Columbia University Medical Center, New York, NY; Dobie L. Giles, MD, University of Wisconsin School of Medicine and Public Health, Madison, WI; Christine A. Heisler, MD, MS, University of Wisconsin School of Medicine and Public Health, Madison, WI; and Susan Barr, MD, University of Arkansas for Medical Sciences, Little Rock, AR.

Dr Antosh is site principal investigator for Cook Myo-site randomized trial, funded by Cook (ClinicalTrials.gov identifier: NCT01893138). Dr Brown has research funding from the National Institutes of Health: K12 DK100022. She is site principal investigator for LIBERATE, funded by Pelvalon (ClinicalTrials.gov identifier: NCT02428595).

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TABLE 1

Baseline characteristics

N = 64	Successful salpingectomy n = 52	Failed salpingectomy n = 12	*P*value
Age, y	51.2 (9.9)	48.9 (5.3)	.44
Body mass index, kg/m^2	29.1 (17.1)	29.5 (9.8)	.94
Vaginal parity, mean (SD)	2.4 (1.1)	1.7 (1.1)	.05
Postmenopausal	23 (44.2)	4 (33.3)	.10
History of adnexal surgery	12 (23.1)	8 (66.7)	.006
History of tubal ligation	9 (17.3)	5 (41.7)	.08
Family history of breast or ovarian cancer	9 (17.3)	1 (8.3)	.65
Indication for hysterectomy			
Prolapse	44 (84.6)	7 (58.3)	.06
Pelvic pain	1 (1.9)	1 (8.3)	.34
Abnormal uterine bleeding	12 (23.1)	2 (16.7)	.48
Fibroids	3 (5.8)	4 (33.3)	.02
Other	4 (7.7)	1 (8.3)	.66
Stage of prolapse, when prolapse present			.06
2	20 (38.4)	7 (58.3)	
3	23 (44.2)	0 (0)	
4	1 (1.9)	0 (0)	

Values are N (%) unless otherwise noted.

Antosh et al. Feasibility of vaginal salpingectomy. Am J Obstet Gynecol 2017.

TABLE 2

Operative and postoperative data

N = 64	Successful salpingectomy n = 52	Failed salpingectomy n = 12	*P*value
Salpingectomy operative time, min, mean (SD)	10.9 (5.6)	N/A	N/A
Total estimated blood loss, mL, mean (SD)	196 (135)	275.4 (265.3)	.14
Salpingectomy estimated blood loss, mL, mean (SD)	5.5 (16.3)	N/A	N/A
Concomitant procedures			
Anterior repair	33 (63.5)	4 (33.3)	.06
Posterior repair	28 (53.8)	4 (33.3)	.17
Sacrospinous ligament fixation	3 (5.8)	1 (8.3)	.57
Uterosacral ligament fixation	43 (82.7)	5 (41.7)	.007
Midurethral sling	21 (40.4)	7 (58.3)	.21
Other	3 (5.8)	1 (8.3)	.57
Uterine weight, g	101.8 (83.2)	111.5 (64.3)	.72
Preoperative MRS scores, n = 64	12.7	11.9	.74
Postoperative MRS scores, n = 57	8.6	8.8	.91

Values are N (%) unless otherwise noted.

MRS, Menopause Rating Scale; *N/A*, not applicable.

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