

Thirteen Years of Experience with Opportunistic Bilateral Salpingectomy During TLH in Low-Risk Premenopausal Women

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Abstract

Background Opportunistic bilateral salpingectomy (OBS), also called as prophylactic salpingectomy or risk-reducing salpingectomy is the concurrent removal of the fallopian tubes in premenopausal women. Though there are some studies comparing the intraoperative complications and effect of salpingectomy on ovarian reserve, limited data are available on long-term follow-up after OBS.

Purpose of the Study To evaluate the surgical outcome of routine bilateral salpingectomy during total laparoscopic hysterectomy (TLH) in terms of intraoperative and postoperative complications. We also evaluated the incidence and reoperation rate for adnexal pathology after TLH.

Methods A retrospective study of 1470 patients undergoing total laparoscopic hysterectomy (TLH) with opportunistic bilateral salpingectomy (OBS) over 13 years was carried out at Paul's Hospital.

Results The mean age of the subjects was 43.6 ± 4.2 years, mean body mass index was 27 ± 5.4 kg/m², and median parity was 2 (range 0–7). 43% of women had at least one previous surgery. The most common indication for surgery was fibroid uterus (67%, $n = 985$). The total complication rate was 4.4% ($n = 65$). One specimen showed paratubal borderline serous malignancy. The follow-up period ranged from 6 months to 13 years during which 17 (1.1%) women had adnexal pathology, and eight women (1.1%) needed resurgery for it. No ovarian malignancies were reported on follow-up.

Conclusions OBS is a simple and short surgical step during TLH without increasing morbidity. OBS eliminates the risk of future diseases of tubal origin, and there might be a possible reduction in incidence and reoperation rate for future ovarian pathologies.

Keywords Total laparoscopic hysterectomy · Opportunistic bilateral salpingectomy · Prophylactic salpingectomy · Adnexal pathology · Ovarian cancer

Introduction

Opportunistic bilateral salpingectomy (OBS), also called as prophylactic salpingectomy or risk-reducing salpingectomy, is the concurrent removal of the fallopian tubes in premenopausal women without a background of a BRCA mutation during the hysterectomy [1]. In the view of the close anatomical association of the blood supply and the nervous system of the adnexal structures, potential adverse effects on the ovarian function following a total salpingectomy have been postulated. However, several studies have challenged this theory since investigators have failed

to observe a deleterious effect on ovarian function or blood flow after salpingectomy [2]. Other reasons stated for not performing OBS during hysterectomy are no benefit in reducing the risk of cancer, increased operative time, and increased risk of intraoperative complications [3].

Over the last decade, possible benefits of OBS have been substantiated by increasing evidence such as possible risk reduction in the incidence of ovarian and tubal cancers [4, 5], postoperative infectious complications, the need for resurgery for benign tubal disease, and elimination of the risk of tubal vaginal prolapse. Though there are some studies comparing the intraoperative complications and effect of salpingectomy on ovarian reserve, limited data are available on long-term follow-up after OBS.

In our hospital, OBS has been routinely combined with total laparoscopic hysterectomy (TLH) for benign uterine pathologies since October 2003. In our prior experience, some post-TLH women presented with hydrosalpinx in remnant distal tubal stumps, which was often confused with ovarian cysts necessitating surgical intervention. To overcome this problem, the policy of routine bilateral salpingectomy in all the women undergoing hysterectomy was adopted as an institutional standard. The aim of this study is to evaluate the surgical outcome of routine bilateral salpingectomy during TLH in terms of intraoperative and postoperative complications. We also evaluated the incidence and reoperation rate for adnexal pathology after TLH.

Material and Methods

This retrospective descriptive study (Canadian Task Force level II-3) was conducted at the Department of advanced gynecological endoscopy, Paul's Hospital, Kochi, India, to evaluate the clinical benefit of concomitant OBS in premenopausal women undergoing TLH for benign conditions. The study included all the cases from October 2003 to December 2016, in which TLH with OBS was performed. All the patients undergoing OBS were counseled and written consent obtained for the procedure.

All the premenopausal women who underwent TLH without oophorectomy to treat benign uterine pathologies between October 2003 and December 2016 were identified by searching the hospital electronic database. The paper-based and electronic charts of patients were reviewed to determine eligibility for the study. Premenopausal women who underwent hysterectomy with bilateral salpingectomy for benign gynecological conditions were included in the study. Women who underwent TLH with bilateral salpingo-oophorectomy were excluded. The following clinical data were collected: age, parity, body mass index, the indication of surgery, estimated blood loss, surgical time,

uterine size, intraoperative and postoperative complications, readmissions, length of hospital stay.

Preoperatively, patients underwent detailed clinical evaluation including transvaginal ultrasonography (TVS) and routine blood investigations. All the surgical procedures were performed by a single surgeon (first author).

All patients received prophylactic antibiotic at the beginning of the surgery. Pneumatic compression stockings and low molecular weight heparin were given for deep venous thrombosis prophylaxis according to the Caprini risk model assessment [6].

Total laparoscopic hysterectomy was performed by standard four-port technique. After the induction of pneumoperitoneum by veress needle, one 10-mm camera port and three 5-mm working ports (one supra-pubic and two lateral) are placed. The salpingectomy was performed at the beginning of the surgical procedure after round ligament is coagulated and divided close to the uterus. The lateral end of the fallopian tube is grasped with an atraumatic forceps and the fimbria ovarica attached to the ovarian surface is coagulated and divided with scissors or energy devices. The mesosalpinx is serially coagulated and divided from lateral to medial end, keeping close to the tube. This is followed by the opening of the uterovesical fold and dissection of the bladder, the uterine arteries were coagulated with bipolar forceps or vessel sealing devices, and laparoscopic culdotomy was performed with a monopolar hook electrode. The specimen was removed vaginally after morcellation with a scalpel (when needed in bigger uteri). The vaginal cuff was closed vaginally or laparoscopically in a continuous non-locking fashion with No. 1-0 polyglactin suture. The duration of the surgery was calculated from the time of induction of anesthesia until the end of the procedure. The time taken for salpingectomy step was deduced statistically by stratified random sampling technique by reviewing video records. Intraoperative and postoperative complications were classified according to the revised Clavien–Dindo classification. This classification divides surgical complications into five grades. Grade 1 comprises of complications which are minor and do not require pharmacological treatment or surgical, endoscopic, or radiological intervention. Grade 2 complications necessitate pharmacological treatment, blood transfusions, or total parenteral nutrition. Grade 3 requires surgical, endoscopic, or radiological intervention. Grade 4 are life-threatening complications requiring ICU management. Grade 5 is the death of the patient [7]. Duration of hospital stay was calculated from admission to discharge.

Follow-up Data Collection

All the patients who underwent surgery are advised follow-up visit at 1 month and 6 months after surgery and annual

visits after that. At each visit, complaints were noted, and complete physical examination and ultrasonography were done. All these visits are electronically documented. In January 2017, a questionnaire was mailed to all the patients included in the study. Patients were asked to provide information about any further medical or surgical treatment following hysterectomy. Particularly, patients were asked whether they had been treated for a benign adnexal pathology or diagnosed with a malignant neoplasia (ovarian or peritoneal cancer) since their hysterectomy. They were advised a clinical visit and 456 out of 1470 patients who were not able to visit the clinic were interviewed telephonically.

Results

During the study period, a total of 2710 hysterectomies were carried out of which 1470 women underwent TLH with OBS and the remaining 1240 underwent TLH with bilateral salpingo-oophorectomy. The characteristics and indications for surgery of the 1470 women who underwent TLH + OBS during the study period are summarized in Table 1. The mean age (\pm SD) of patients at the time of surgery was 43.6 years (\pm 4.2), and mean body mass index (BMI) was 27 kg/m² (\pm 5.4). The median parity was 2 (range 0–7). A total of 137 (9.3%) of women had previous at least one laparoscopic surgery, 186 (12.7%) of women had at least one previous laparotomy, and 309 (21%) had at least one cesarean delivery. The majority of women underwent surgery for fibroid uterus 985 (67%), with multiple indications for some women.

The intraoperative outcomes are summarized in Table 2. The mean uterine size was 258.1 grams (\pm 105.6). The mean operating time was 96 min (\pm 46.7). Blood loss was estimated by the surgeon, anesthesiologist agreement, and

Table 1 Patient characteristics

Patient characteristics	Value
1) Mean age (\pm SD)	43.6 (\pm 4.2) years
2) Mean BMI (\pm SD)	27 (\pm 5.4) kg/m ²
3) Median parity (range)	2 (0–7)
4) Women with previous laparoscopy	137 (9.3%)
5) Women with previous laparotomy	186 (12.7%)
6) Women with previous Cesarean section	309 (21%)
7) Indication for surgery	
a) Fibroids	985 (67%)
b) Abnormal uterine bleeding (AUB)	206 (14%)
c) Cervical dysplasia	15 (1%)
d) Endometriosis/adenomyosis	242 (16.5%)
e) Pelvic organ prolapse	22 (1.5%)

Table 2 Intraoperative characteristics

Characteristics	Mean (\pm SD)
1. Mean uterine size	258.1 g (\pm 105.6)
2. Mean operating time	96 min (\pm 46.7)
3. Mean blood loss	136.4 mL (\pm 105.4)
4. Women requiring blood transfusion	24 (1.6%)
5. Mean hospital stay	28 \pm 8.4 h

by correlating preoperative and postoperative hemoglobin level. The mean blood loss was 136.4 mL (\pm 105.4). The average duration of hospital stay was 28 \pm 8.4 h from admission to discharge. In our study, stratified random sample analysis of the operating time taken for bilateral salpingectomy during the hysterectomy (measured from recorded videos) showed that the unbiased estimate of the average time taken was 3 min 51 s. 95% CI is between 2 min 56 s and 4 min 47 s.

Intraoperative and immediate postoperative complications are enumerated in Table 3. The total complication rate was 4.4% (n = 65). Complications were further classified according to Clavien–Dindo classification where grade 1 and 2 complications were considered minor and

grade 3 was considered major complications. There were no grade 4 and 5 complications in the study cohort. Minor complications included 12 women with postoperative fever, which was symptomatically managed. Two cases of postoperative upper limb paresthesias (ulnar palsy) and one lower limb paresthesia (meralgia paresthesia) were managed conservatively. Three women had deep venous thrombosis which was medically managed with anticoagulants. Blood transfusions were needed in 1.6% of women (n = 24).

Major complications included bowel injury in two cases, both of which were identified intraoperatively, converted to laparotomy, and repaired. Five bladder injuries were repaired laparoscopically during surgery. One case of ureteric injury was identified intraoperatively and repaired. Another case of ureteric injury was presented on the 8th postoperative day with leakage of urine. She needed re-laparoscopic surgery for ureteric reimplantation. Fourteen women presented to emergency department with secondary hemorrhage. They were readmitted, and 11 cases were managed by vaginal packing, 2 needed hemostatic suturing of vault vaginally, and one was managed by internal iliac artery embolization. Eighteen cases (1.2%) had readmission. The causes for readmission were ureteric fistula in 1

Table 3 Complications

Complication	N (%)	Intervention
<i>Minor (Clavien–Dindo, grade 1 and 2)</i>	42	
1. Postoperative fever	12 (0.8%)	Antibiotics
2. Nerve compression	3 (0.2%)	Conservative
3. Deep venous thrombosis	3 (0.2%)	Anticoagulants
4. Blood transfusion	24 (1.6%)	
<i>Major (Clavien–Dindo, grade 3)</i>	23	
1. Bowel Injury	2 (0.1%)	Conversion to laparotomy and Primary repair
2. Urological injury	Bladder injury-5 (0.3%) Ureteric injury-2 (0.1%)	Primary repair Primary repair (1 case) Repeat laparoscopy and ureteric reimplantation (1 case)
3. Secondary hemorrhage	14 (0.9%)	Vaginal packing, hemostatic sutures and arterial embolization

Table 4 Adnexal pathology

Adnexal pathologies	N	Intervention (8, 0.5%)
1. Benign adnexal pathology	17 (1.2%)	
a. Simple ovarian cysts	6	Conservative
b. Complex ovarian cysts	3	Laparoscopic oophorectomy (2 cases)
c. Solid ovarian tumor	1	lost to follow-up
d. Endometriomas	3	Laparoscopic oophorectomy (2 cases)
e. Ovarian torsion	3	Laparoscopic oophorectomy (3 cases)
f. Peritoneal inclusion cyst	1	Laparoscopic excision
2. Malignant adnexal pathology	0	

case, deep venous thrombosis in lower limbs in 3 cases, and secondary hemorrhage in 14 cases.

Follow-up data related to adnexal pathology are summarized in Table 4. The follow-up period ranged from 6 months to 13 years, based on when the surgery was done. Ninety-two percent of patients had at least one visit after 6 months, and 69.5% women had at least one visit after 1 year of surgery. Forty-three percent of women had greater than 5 years of follow-up. Of these, 17 (1.2%) women reported adnexal mass lesion after TLH, of which 8 (0.5%) women underwent resurgery. Six women had simple ovarian cyst which was managed conservatively with periodic follow-up. Three cases of ovarian torsion were reported, for which laparoscopic oophorectomy was done. Three recurrent endometriomas were reported, of which one was 2 cm and managed medically. Other two 8-cm endometriomas were managed by laparoscopic oophorectomy. Three complex ovarian cysts were diagnosed, two of which were managed by laparoscopic oophorectomy and other was lost to follow-up. One solid ovarian tumor was diagnosed, which were lost to follow-up. One case of large peritoneal inclusion cyst was diagnosed, which was excised laparoscopically.

Discussion

Ovarian cancer is the seventh most common cancer in women worldwide, causing 3.6% of all cancers in the women annually [8]. Recent large studies have provided significant evidence that the fallopian tubes are the site of initial malignant transformation in the large majority of high-grade serous ovarian cancers [9]. Bilateral salpingectomy has been associated with an approximate 40–65% reduction in future ovarian cancer incidence according to a meta-analysis [4]. Routine removal of fallopian tubes during hysterectomy offers additional advantage of reducing future tubal pathologies and the need for reoperation.

The mean age and BMI of the patients in our study are 43.6 ± 4.2 years and 27 ± 5.4 kg/m² which is comparable to other studies [1, 10, 11]. In our study, 43% of women had at least one previous abdominal surgery, either laparoscopy or laparotomy or cesarean delivery, whereas in the Minig et al. series, it was 37.2%. The most common indication for surgery was fibroid uterus (67%), followed by endometriosis and adenomyosis (16.5%), while some women had multiple indications. This is similar to the indications quoted in other studies like Berlitz et al. [11] where the common indication was fibroid uterus. In our study, the average time taken for the surgery was 96 (± 46.7) minutes, and mean blood loss was 136.4 (± 105.4) mL. In Vorwerck study [1], the mean time for

surgery in OBS group was 142.9 ± 63.3 min and 139.72 ± 49.31 min in the non-OBS group. In Minig et al. study [10], the mean surgical time and mean blood loss in OBS group were 87.1 ± 26.2 min and 126.2 ± 100.4 mL, and 94 ± 31.1 min and 143.2 ± 83.5 mL in the non-OBS group. These studies did not find statistically significant difference in Estimated Blood Loss (EBL), operative time, and hospital stay in OBS and non-OBS groups [1, 10].

Stratified random sample analysis of the operating time taken for bilateral salpingectomy during hysterectomy showed that the unbiased estimate of the average time taken was 3 min 51 s. 95% CI is between 2 min 56 s and 4 min 47 s. There are no other studies on time taken for salpingectomy during laparoscopic hysterectomy.

The total complication rate in our study is 4.4% ($n = 65$), and major complication rate is 1.5% ($n = 23$) and minor complication rate is 2.8% ($n = 42$). The emergency visit and readmission rate in our study is 1.2% ($n = 18$). The possible complications of salpingectomy are hemorrhage or hematoma formation in the mesosalpinx and deleterious effect on ovarian function due to reduced blood supply. The complications reported in our study are complications of laparoscopic hysterectomy and do not appear to be a direct result of OBS. The overall and major complication rate of hysterectomy with OBS in Vorwerck study [1] was 18.8 and 3.1%, respectively. The overall and major complication rate of hysterectomy without OBS in the same study [1] was 17.6 and 6.7%, respectively. In Minig study [10], the intraoperative and postoperative complication rate and emergency visits of hysterectomy with OBS were 4.1, 12.4, and 13.4% respectively. The intraoperative and postoperative complication rate and emergency visits of hysterectomy without OBS were 5.6, 11.3, and 12.7%, respectively. The intraoperative complication rate between OBS and non-OBS groups is comparable with no statistical difference in these studies.

In our study, 12 (0.8%) patients had postoperative fever. Ghezzi et al. [2] have found a statistically significant lower rate of infectious morbidity in women undergoing OBS as compared to non-OBS (2.2 vs. 9.6%, $p = 0.01$). They hypothesized that preservation of the fallopian tubes at the time of hysterectomy results in higher risk of postoperative infectious morbidity. They speculated that the blind loop of fallopian tube might act as a nidus of infection, increasing the postoperative infection rate in women in whom the tubes were preserved. In Minig et al. study [10], postoperative infection was reported in 7 cases (7.3%) in OBS group and 4 cases (5.6%) in the non-OBS group, with no statistically significant difference.

On follow-up, clinically relevant adnexal pathologies were reported in 17 women (1.1%), and reoperation for adnexal pathology was required in 8 (0.5%) women. No cases of malignant ovarian and peritoneal pathologies were

encountered during follow-up of women who underwent TLH with OBS. Only one other study quoted long-term follow-up information after TLH with OBS [1]. They had benign adnexal pathologies in 10 (7.8%) during follow-up period, of which 3 (2.3%) needed surgical intervention in OBS group. In the non-OBS group, 60 (14.5%) cases of benign adnexal pathology were reported during follow-up, and 28 (6.7%) needed surgical intervention. They did not have any ovarian or peritoneal malignancies during follow-up. In our study, the rate of adnexal torsion after TLH with OBS is 0.2%. Adnexal torsion constitutes 2.7% of all gynecological emergencies [12]. Although we do not have a comparison group (non-OBS group), incidence and reoperation rate for adnexal pathology in our study are low.

There were no cases of remnant hydrosalpinx or fimbrial cysts in our study as expected. Benign salpingeal pathologies were reported in 35.5% of patients undergoing hysterectomy with salpinx preservation by Repasy et al. [13]. Guldberg et al. [14] observed a twofold increased risk of benign pathologies of the fallopian tube with the need for surgical revision in a large Danish patient cohort, who underwent hysterectomy without OBS. The authors thus recommended OBS in patients undergoing hysterectomy, regardless of their menopausal state. Fallopian tube prolapse into the vaginal vault is a rare complication after hysterectomy with adnexal preservation. The exact incidence of fallopian tube prolapsed is difficult to estimate as it is underreported.

We recognize all the potential bias and shortcomings of our study design which is a retrospective descriptive study. There is no control group in our study, as routine OBS during TLH is an institutional practice. However, the areas of strength of the present investigation comprise the inclusion of a large number of subjects, all the cases performed by a single surgeon, thus excluding the operator bias, standardized patient management and follow-up ranging from 6 months to 13 years.

Conclusions

OBS is a simple and short surgical step during TLH without increasing morbidity. OBS eliminates the risk of future diseases of tubal origin and there might be a possible reduction in incidence and reoperation rate for future ovarian pathologies. The procedure of OBS can be easily integrated into surgical steps of laparoscopic hysterectomy without much increase in the operative time.

Compliance with Ethical Standards

Conflict of interest The authors declared that they have no conflict of interest.

Ethics Committee Approval Written informed consent was obtained from the patients for publication. The retrospective observational nature of the study did not necessitate the local institutional ethics committee approval.

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