Impact of Total Salpingectomy versus Tubal Conservation with Abdominal Hysterectomy on Ovarian Function

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Abstract

Background: Ovarian conservation during abdominal hysterectomy in a premenopausal woman with sufficient ovarian reserve is a subject to be considered, since oophorectomy may cause sudden hormonal imbalance, aggravation of menopausal symptoms and decrease of libido. This study aimed to Tubal preservation during hysterectomy has any impact on ovarian function versus its removal. Patients and Methods: The study was case control study included 58 patients attendant in outpatient clinic of Obstetrics and Gynecology department, Zagazig University Hospital, and Banha Teaching Hospital. The duration of the study had been from 6 to 12 months. Results: There was significant differences between Ovary size distributions between studied groups at different times. Also there was a significant change except at group 2 at preoperative and 6 months postoperative as regarding ovarian size, FSH and resistant index. Conclusions: Salpingectomy with abdominal hysterectomy is a safe and convenient treatment that does not have a deleterious effect on ovarian reserve.

Keywords: Salpingectomy, Hysterectomy, Ovarian reserve

Introduction:

Hysterectomy is one of the most common surgeries in women worldwide [1]. It is applied for the treatment of various problems, such as pelvic pain, menstrual problems, tumors, and other related diseases. However, based on the patient’s problem, in addition to the uterus, removal of the fallopian tubes, ovaries, or cervix may be necessary [2]. Every year, 600,000 women are undergoing hysterectomy surgery in the USA [3]. The surgery is done as abdominally and vaginally, but from 1980 onwards, it is also done by laparoscopy, which plays a major role in the treatment of gynecologic malignancies, uterine leiomyoma, endometrial hyperplasia, and uterine prolapse [3, 4].

Hysterectomy may have complications. One of the most important complications is reduced ovarian function, which is not dependent on the type of surgery and is very important for women of reproductive age [1, 5]. Previous studies have shown that women undergoing hysterectomy experience menopausal symptoms faster and compared with other women have lower number of follicles, lower serum progesterone levels, and higher levels of follicle-stimulating hormone (FSH) [6]. The measures for preserving ovarian function after hysterectomy are always important.

Salpingectomy is a procedure for sterilization and with hysterectomy leads to good results, especially in recent decades [7, 8]. Salpingectomy can be due to different reasons, including
treatment of ectopic pregnancy, infections in the fallopian tubes, and fallopian tube prolapse treatment after hysterectomy [9]. It seems that preserving ovarian function after hysterectomy is very important. Hysterectomy preserves the both ovaries and tubes through salpingectomy close to the uterus to preserve blood supply to the mesosalpinx of ovaries [10]. Many gynecologists refuse to perform salpingectomy at the time of hysterectomy due to blocking uterine blood flow to the ovaries and disrupting its function [11]. There is no agreement on the effect of salpingectomy, and some studies revealed the devastating impact of salpingectomy [12]. Interestingly, findings of studies have shown that the primary source of ovarian cancer is fallopian tubes and if hysterectomy is along with salpingectomy, cancer progression may be prevented. The preferred surgery is removing tubes associated with hysterectomy in women who have high levels of uterine cancer [13]. So, the aim of this study was to evaluate ovarian function and reserve after total abdominal hysterectomy with preservation both ovaries with total salpingectomy and with preservation of both tubes in other group.

Patients and Methods:

The study was case control study included 58 patients attendant in outpatient clinic of Obstetrics and Gynecology department, Zagazig University Hospital, and Banha Teaching Hospital. Patients was classified into two groups randomly: Group I: included odd number of patients 29 was subjected to total abdominal hysterectomy with bilateral complete excision of the tubes. Group II: included an even numbers of patients (n =29) for whom the classical approach of hysterectomy was performed. The duration of the study had been from 6 to 12 months.

The participants were premenopausal women aged 40 to 43 years who were undergoing abdominal hysterectomy without oophorectomy due to benign uterine disease. All patients gave written informed consent before any study-related tests were done and the study approved by the local hospital ethics committee of Zagazig University and Banha Teaching Hospital.

The inclusion criteria were age < 43 years, Absence of menopausal symptoms, Baseline FSH value of <10 IU/ml, Mean ovarian volume >5cm³. Exclusion criteria were; Hormonal treatment or hormonal contraception for the last 6 months. History of previous pelvic surgery, Any cystic or solid ovarian mass >10 mm.

A comprehensive history was taken from each participant. Clinical examination, Blood samples were extracted from all patients for hormonal assay (serum FSH), FSH were measured by ELISA kits before hysterectomy and repeated after 6 months and 1 year after hysterectomy. Transvaginal ultrasonographic examination was carried out for all patients at early follicular phase. Mean ovarian volume was calculated by taking the mean value of the two ovarian measurements. Doppler study to ovarian stromal blood flow was done. Ovarian stromal blood flow resistance index (RI) and pulsatility index (PI) was measured.

Group I: Fallopian tubes bilaterally dissected and freed completely from the underlying mesosalpinx through avascular window in the broad ligament, beginning from infundibular portion of the tubes, this was accomplished by bites of Kocher clamps placed parallel to and as close as possible to fallopian tube, followed by incision with scissor, free–tie ligature of zero delayed absorbable suture was placed, caution was given not to damage the underlying vascular structures. Fallopian tubes were resected with the uterus. The mesovary was cut and ligated with the
mesosalpinx in such a way that the lateral portions of the mesovary where the infundibulo pelvic fold and the ovarian vessels reach the organ remain intact and the medial part of it along with ovarian ligament was cut.

**Group II;** clamping the ovarian ligament together with the tube and infundibulopelvic ligament as near as to uterus, fallopian tubes were removed partially leaving behind the neighboring para-ovarian tissue. The patients were followed up 6 and 12 months postoperatively.

**Statistical Analysis:**
Analysis of data was done by IBM computer using SPSS (statistical package for social science version 20) the following tests were used to test differences for significance: difference and association of qualitative variable by Chi square test ($X^2$). Differences between quantitative independent groups by t test, paired by paired t. P value was set at <0.05 for significant results & <0.001 for high significant result.

**Results:**
Age was distributed as 42.1±1.04 and 41.89±1.14, BMI 25.65±2.1 and 25.47±2.0 respectively without significant difference between groups table 1

**Table 1: Clinical data of the studied group**

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (N=29)</th>
<th>Group 2 (N=29)</th>
<th>t/X2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>42.1±1.04</td>
<td>41.89±1.14</td>
<td>0.718</td>
<td>0.476</td>
</tr>
<tr>
<td>BMI</td>
<td>25.65±2.1</td>
<td>25.47±2.0</td>
<td>0.337</td>
<td>0.737</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td>0.7</td>
<td>0.87</td>
</tr>
<tr>
<td>1</td>
<td>N 2</td>
<td>N 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>6.9%</td>
<td>6.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N 10</td>
<td>N 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>34.5%</td>
<td>41.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>N 12</td>
<td>N 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>41.4%</td>
<td>31.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>N 5</td>
<td>N 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>17.2%</td>
<td>20.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>N 29</td>
<td>N 29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2; showed that there was no significant difference between the studied groups as regard the distribution of Co-morbidity (DM, HTN)

**Table 2: Co-morbidity distribution between the studied groups**

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
<th>X2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td>Group1</td>
<td>Group2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>No</td>
<td>24</td>
<td>23</td>
<td>24</td>
<td>23</td>
<td>47</td>
</tr>
<tr>
<td>%</td>
<td>82.8%</td>
<td>79.3%</td>
<td>81.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>%</td>
<td>17.2%</td>
<td>20.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1: showed that there was no significant difference between the studied groups as regard causes of hysterectomy

![Figure 1: Causes of hysterectomy distribution between the studied groups](image)

Table 3: showed that there was no significant difference between the studied groups regarding operation time, hospital stay and bleeding. There was no significant difference in number of antral follicle between two groups post operatively.

**Table 3: Comparison of the operation time, hospital stay, blood loss and antral follicle count between the studied groups**

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation time/minute</td>
<td>149.65±22.5</td>
<td>152.06±21.7</td>
<td>-0.414</td>
<td>0.680</td>
</tr>
<tr>
<td>Hospital stay/ day</td>
<td>3.93±0.75</td>
<td>3.75±0.68</td>
<td>0.910</td>
<td>0.367</td>
</tr>
<tr>
<td>Bleeding/ cc</td>
<td>582.75±143.4</td>
<td>571.1±135.2</td>
<td>0.087</td>
<td>0.955</td>
</tr>
<tr>
<td>Number Of Antral Follicle</td>
<td>5.17±0.88</td>
<td>5.24±0.83</td>
<td>-0.305</td>
<td>0.761</td>
</tr>
</tbody>
</table>

Figure 2: showed that group 2 significantly higher at 1 month and 6 months postoperative but at 12 months they were nearly matched as pre operative.
Figure 2: Ovarian size distribution between the studied groups at different times

Figure 3: showed that Group 2 significantly higher at 1 and 6 months postoperative but at 12 months they were nearly matched as preoperative.

Figure 3: FSH distribution between the studied groups at different times

Figure 4: showed that Group 2 significantly higher at 1 month but at 6 & 12 months postoperative they were nearly matched as preoperative.
Figure 4: Pulsatile Index distribution between the studied groups at different times
Figure 5; showed that Group 2 significantly higher at 1 month but at 6 & 12 months postoperative they were nearly matched as preoperative.

![Figure 5: Resistance Index distribution between the studied groups at different times](image)

Discussion:

There are no significant differences between two group regarding age, parity and BMI. Similarly, Tehranian et al., [14] reported that there are no significant differences between two group regarding parity and BMI.

Our results are supported by findings reported by Asgari et al., [15] as they reported that there were no significant differences in terms of intraoperative complications between both groups. One patient in each group had intraoperative bleeding, so they needed a transfusion of 2 units of packed cells to correct blood loss because of large uterus. There was no bladder or bowel damage in both groups. In both groups, no surgery was converted to laparotomy.

According to Nouh et al., [16] 2010, they showed no significant difference between the both groups regarding co-morbidities.

Tehranian et al., [14] reported that there were no complications directly attributable to performing salpingectomy.

Our results are supported by findings reported by Mitra et al., [17] as they reported that there was no significant difference between groups regard distribution of Cause of hysterectomy. Indications for hysterectomy were fibroid (55%), Dysfunctional Uterine Bleeding (DUB) (28.33%), adenomyosis (10%) and chronic lower abdominal pain (6.66%).

Behnamfar & Jabbari, [18] reported that there was no significant difference between groups regard distribution of Cause of hysterectomy.

Our results show that there was no significant difference between groups regarding operation, time Hospital stay and Bleeding.
Our results are in agreement with findings reported by Tehranian et al., [14] as they reported that there was no difference in the mean operative time (mean difference 0.33, 95% CI -22.21 to 22.86, \( P < 0.92 \)), mean blood loss (mean difference – 0.66, 95% CI – 15.8 to 14.46, \( P < 0.97 \)).

Similarly, Behnamfar & Jabbari, [18] reported that there was no significant difference between groups regarding Operation time and Bleeding.

Due to the common blood supply of ovaries and fallopian tubes, some gynecologists prefer preserving ovaries in a hysterectomy, especially for benign reasons, to conserve ovarian function. Based on this fact, numerous studies have been conducted for evaluating the effect of salpingectomy on ovarian function.

In the present study there was no significant difference regarding Number of Antral follicle post operation. These are significant differences between Ovary size distributions between studied groups at different times.

Our results are supported by findings reported by Nouh et al., [16] as they showed that the number of the antral follicles was significantly high in group I who had total excision of the tube 6 & 12 months postoperatively. Ovarian volume was significantly higher in group I who underwent total excision of the tube 12 months postoperatively. We suggested that disruption of arterial blood supply of the ovary through clamping the mesovary with infundibulopelvic ligament in group II could affect ovarian function.

According to Mitra et al., [17], there is significant differences between Ovary volume distribution between studied groups at different times. The increase in the ovarian volume in both the groups in our study can be explained by various previous studies.

Our results are in contrary of findings reported by Tehranian et al., [14] as they reported that these are no significant differences between ovary size distribution between studied groups at different times.

Hysterectomy alters intraovarian blood flow and may impair ovarian function. However, it is not clear whether tubal conservation at time of hysterectomy has any impact on ovarian blood flow, which has dual blood supply from terminal ascending branch of the uterine and corresponding ovarian artery.

In the present study Group 2 FSH distributions significantly higher at 1 m and 6 month but at 12 months they were nearly matched as pre.

Our results are in line with findings reported by Behnamfar & Jabbari, [18] as they found that level of both LH and FSH rose significantly after hysterectomy with/without salpingectomy by 6 months but only a patient in group of hysterectomy with salpingectomy had FSH >45. This finding may reflect ovarian reserve has decreased regardless type of surgery. Our results are consistent with the study of Atalay et al. [19] that presented elevated levels of FSH and LH within 6 months after surgery but is inconsistent with the study of Song et al. [20].

In the present study Group 2 Pulsatile index distribution was significantly higher at 1 m but at 6 & 12 months they were nearly matched as pre. Group 2 Resistance index distribution was significantly higher at 1 m but at 6 & 12 months they were nearly matched as pre.

Our results are supported by findings reported by Mitra et al. [17], as they reported that Flow elevation as shown by the reduction in the PI (Pulsatility Index), is likely to reflect the larger size of the ovaries after the surgery.”

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Our results are in contrary of findings reported by Tehranian et al., [14] as they reported that in multivariate analysis, there was no significant difference between two groups at 3 months after operation (mean difference 4.46, 95% CI −0.19 to 0.04, P < 0.21). It seems that if salpingectomy is done with minimum damage to the ovarian microvascularization, blood flow to the ovaries will be complete and the ovary function remains undisturbed. Adequate amounts of blood flow have a vital role in the follicular maturation, either spontaneously or stimulated, by influencing the synthesis of steroid hormones.

Abdominal hysterectomy is one of the most common gynecological procedures performed in clinical practice. Resection of the ovaries during abdominal hysterectomy is the most challenging part of the operation; some studies demonstrated that ovarian preservation during hysterectomy may not occasionally avoid ovarian failure or menopausal symptoms. Whether salpingectomy affects ovarian function remains controversial issue.

In the present study there were significant changes except at group 2 at pre and 1 m regard Ovary size, FSH and RI.

Conclusions:

Salpingectomy with abdominal hysterectomy is a safe and convenient treatment that does not have a deleterious effect on ovarian reserve.

The most important limitation of the study was lack of long-term follow-up that causes to no tracking medium-term and long-term effects of hysterectomy and salpingectomy in menopause patients and their ovarian function. The lack of uterine blood flow measurement is the limitations of this study.

References:


