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Impact of Total Salpingectomy Versus Tubal Conservation During Abdominal Hysterectomy on Ovarian Function

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ABSTRACT

Background: Hysterectomy is one of the most common surgeries in women worldwide. It is applied for the treatment of various problems, such as pelvic pain, menstrual problems, tumors, and other related diseases.
Objective: The aim of this work was to preservation of ovarian function as long as possible to decrease manifestation of menopause in hysterectomized patients.
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 during the period from April 2017 to October 2018. All patients were scheduled to total abdominal hysterectomy without oophorectomy due to benign uterine disease. Patients was classified into two groups randomly: Group 1: 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. **Results:** There was no significant difference between groups regarding Operation, time Hospital stay and Bleeding. Also regarding number of antral follicle post operatively. While these are significant differences between Ovary size distributions between studied groups at different times. **Conclusions**: It could be concluded that salpingostomy with abdominal hysterectomy is a safe and convenient treatment that does not have a deleterious effect on ovarian reserve.
Keywords: Ovarian conservation, Salpingectomy, Hysterectomy

INTRODUCTION

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 [(1)].

Hysterectomy alters intraovarian blood flow and may impair ovarian function [(2)]. 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[(3)].

Strandell *et al.* [(4)] studied the effect of prophylactic salpingectomy on ovarian response in IVF treatment and found no impairment of ovarian response after prophylactic salpingectomy moreover; **Sezik *et al.*** [(5)] suggested that complete removal of fallopian tubes has no advantageous effect on ovarian blood supply during abdominal hysterectomy.

Xiangying *et al.* [(6)] found that the total blood supply to the ovary was reduced after hysterectomy due to loss of blood supply coming from uterine arteries and advised not to remove the uterus in patients for whom other conservative measures can be performed, otherwise new technique must be followed to keep an intact artery network as possible between fallopian tubes and ovary for patients requiring hysterectomy. Furthermore **Repasy *et al.*** [(7)] found that 35% of the patients without tubal excision developed hydrosalpinx or tubo-ovarian cysts causing symptoms that led to additional surgery. Although rarely encountered, the occurrence of post-hysterectomy carcinoma in the preserved fallopian tube has been reported [(8)].

The aim of this study was to preservation of ovarian function as long as possible to decrease manifestation of menopause in hysterectomized patients.

PATIENTS AND METHODS

This case control study included a total of 58 patients scheduled to total abdominal hysterectomy without oophorectomy due to benign uterine disease, attending at Outpatient Clinic, Department of Obstetrics and Gynecology, Zagazig University Hospital, and Banha Teaching Hospital. This study was conducted between April 2017 to October 2018.

Patients were classified into two groups randomly: Group 1: included odd number of patients (n =29). They were subjected to total abdominal hysterectomy with bilateral complete excision of the tubes. Group II: included an even number of patients (n =29) They were subjected to the classical approach of hysterectomy.

***Ethical Consideration*:**

Informed written consent was taken from all participants, and the study approved by the local Hospital Ethics Committee, Zagazig University and Banha Teaching Hospital and performed as per the ethical standards laid down in 1964 (Declaration of Helsinki and its later amendments).

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Inclusion criteria: Age 40-43 years, absence of menopausal symptoms, baseline FSH value of <10 IU/ml, and mean ovarian volume > 5cm^3.

Exclusion criteria: Hormonal treatment or hormonal contraception for the last 6 months. History of previous pelvic surgery, and any cystic or solid ovarian mass >10 mm.

A comprehensive history was taken from each participant. Clinical examination, laboratory investigations including serum FSH (measured by ELISA technique) before hysterectomy and repeated 6 months and 1 year after hysterectomy. Transvaginal ultrasonographic examination was carried out for all patients at early follicular phase (when no follicles beyond the diameter of 10 mm were visualized to be sure that the patients were in early follicular phase) to detect the number of antral follicles and ovarian volume calculation. Mean ovarian volume was calculated by taking the mean value of the two ovarian measurements. Antral follicle count (follicles measuring 2-8 mm was obtained in two dimensional planes in both ovaries) by transvaginal ultrasound examination. Doppler study to ovarian stromal blood flow was done. Ovarian stromal blood flow resistance index (RI) and pulsatility index (PI) was measured.

Statistical Analysis

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi square test ($\chi 2$) to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean ± SD (Standard deviation). Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data). P value < 0.05 was considered significant.

RESULTS

Patient's average age was 42.1±1.04 & 41.89±1.14 (years) and BMI **(kg/m^2)** 25.65±2.1 & 25.47±2.0 respectively without significant difference between groups (table 1).

Table (1): Clinical data of the studied groups:

			Group 1 (N(29)	Group 2 (N=29)	t/X2	P
Age (years)			**42.1±1.04**	**41.89±1.14**	**0.718**	**0.476**
BMI (kg/m^2)			**25.65±2.1**	**25.47±2.0**	**0.337**	**0.737**
Parity	**1**	**N**	**2**	**2**	**0.7**	**0.87**
		%	**6.9%**	**6.9%**		
	2	**N**	**10**	**12**		
		%	**34.5%**	**41.4%**		
	3	**N**	**12**	**9**		
		%	**41.4%**	**31.0%**		
	4	**N**	**5**	**6**		
		%	**17.2%**	**20.7%**		
Total		**N**	**29**	**29**		
		%	**100.0%**	**100.0%**		

Table 2 shows 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

			Group		Total	X2	P
			Group1	Group 2			
Comorbidity	**No**	**N**	**24**	**23**	**47**	**0.11**	**0.73**
		%	**82.8%**	**79.3%**	**81.0%**		
	Yes	**N**	**5**	**6**	**11**		
		%	**17.2%**	**20.7%**	**19.0%**		
Total		**N**	**29**	**29**	**58**		
		%	**100.0%**	**100.0%**	**100.0%**		

Table 3 shows that there was no significant difference between the studied groups as regard causes of hysterectomy

Table (3): Causes of hysterectomy distribution between the studied groups

			Group		Total	X2	P
			Group1	Group 2			
Indications of hysterectomy	Adenomyosis	N	2	2	4	0.41	0.93
		%	6.9%	6.9%	6.9%		
	Chronic pelvic Pain	N	4	4	8		
		%	13.8%	13.8%	13.8%		
	Disfunctional uterine bleeding	N	8	6	14		
		%	27.6%	20.7%	24.1%		
	Myomas	N	15	17	32		
		%	51.7%	58.6%	55.2%		
Total		N	29	29	58		
		%	100.0%	100.0%	100.0%		

Table 4; 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 (4): Comparison of the operation time, hospital stay, blood loss and antral follicle count between the studied groups

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

Table 5 shows that group 2 significantly higher at 1 month and 6 months postoperative but at 12 months they were nearly matched as pre operative.

Table (5): Ovarian size distribution between the studied groups at different times

	Group 1	Group 2	t	P
Ovarian size preoperative	5.58±1.21	5.96±1.26	-1.166	0.249
Ovarian size _1month postoperative	4.37±1.39	5.72±1.3	-3.783	0.00**
Ovarian size 6months postoperative	3.96±1.11	4.82±1.1	-2.955	0.005*
Ovarian size _12months postoperative	3.62±0.77	3.86±0.83	-1.142	0.258

Table 6 shows that Group 2 significantly higher at 1 and 6 months posoperative but at 12 months they were nearly matched as preoperative

Table (6): FSH (IU/ml) distribution between the studied groups at different times

	Group 1	Group 2	t	P
FSH_preoperative	7.1±1.12	7.02±1.03	0.268	0.790
FSH_1month postoperative	6.31±1.29	6.88±0.8	-2.106	0.049*
FSH_6months postoperative	5.76±0.95	6.33±0.65	-2.638	0.011*
FSH_12months posoperative	6.0±0.8	6.1±0.72	-0.188	0.851

Table 7; showed that Group 2 significantly higher at 1 month but at 6 & 12 months postoperative they were nearly matched as preoperative.

Table (7): Pulsatile Index distribution between the studied groups at different times

	Group 1	Group 2	t	P
PI_preoperative	1.48±0.17	1.44±0.18	0.800	0.427
PI_1month postoperative	0.84±0.13	0.99±0.13	-2.436-	0.015*
PI_6months postoperative	0.83±0.09	0.86±0.09	-0.877	0.384
PI_12months posoperative	0.77±0.09	0.78±0.1	-0.675	0.502

Table 8; showed that Group 2 significantly higher at 1 month but at 6 & 12 months postoperative they were nearly matched as preoperative.

Table (8): Resistance Index distribution between the studied groups at different times

	Group 1	Group 2	t	P
RI_preoperative	**0.63±0.1**	**0.61±0.09**	**0.700**	**0.487**
RI_1month posoperative	**0.51±0.09**	**0.59±0.1**	**-2.438**	**0.025***
RI_6months postoperative	**0.48±0.08**	**0.47±0.07**	**0.551**	**0.584**
RI_12months postoperative	**0.45±0.08**	**0.44±0.07**	**0.463**	**0.645**

DISCUSSION

There are no significant differences between two group regarding age, parity and BMI. Our results are in agreement with findings reported by **Nouh *et al.*** [9] as they showed no significant difference between the both groups regarding age and body mass index.

Our results are supported by findings reported by **Asgari *et al.*** [10] who stated 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.

Regarding distribution of Co-morbidity, **Behnamfar and Jabbari** [11] found that there were no significant differences between studied groups.

Tehranian *et al.* [12] reported that there were no complications directly attributable to performing salpingectomy.

Hysterectomy is a widely performed surgery in women of pre-menopausal and menopausal age group. TAH with bilateral salpingo-oophorectomy (TAH-BSO) definitely leads to surgical menopause, but whether TAH with preservation of ovaries and tubes or TAH with bilateral salpingectomy leads to or accelerates menopause is controversial .In the present study there was no significant difference between groups regard distribution of Cause of hysterectomy.

Our results are supported by findings reported by **Mitra *et al.*** [13] who stated 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%).

Regarding cause of hysterectomy, **Tehranian *et al.*** [12], found tha**t** there were no significant differences between studied groups.

Our results show that there was no significant differences between groups regarding operation, time hospital stay and bleeding.

Our results are in agreement with findings reported by **Tehranian *et al.*** [12] who stated 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 and Jabbari** [11] reported that there was no significant difference between groups regarding Operation time and Bleeding.

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.*** [9] 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 tube12 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.

The ovarian blood flow is the first parameter to be affected; the antral follicle count is also affected early by disrupted blood supply to the ovaries while ovarian volume and hormonal changes are late. This is consisted with the results of **Chan *et al.*** [14] who studied the effect of salpingectomy on ovarian reserve in term of ovarian volume, antral follicle count, and stromal blood flow in women undergoing laparoscopic or laparotmic salpingectomy for tubal ectopic pregnancy, and they stated that" ovarian ultrasound parameters were similar after salpingectomy on the normal and on the operated side, however decreased ovarian blood flow after laparoscopic but not on laparotomic salpingectomy.

According to **Mitra *et al.*** [13], these 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.

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 and Jabbari [11],** 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 IU/ml. This finding may reflect ovarian reserve has decreased regardless type of surgery.

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.* [13]** 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."

CONCLUSIONS

It could be concluded that salpingectomy with abdominal hysterectomy is a safe and convenient treatment that does not have a deleterious effect on ovarian reserve. It is suggested that multicenter RCT studies with higher sample size and longer duration of follow-up are done to extract more accurate and reliable results about the effects of salpingectomy on fertilization**.**

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