

ORIGINAL ARTICLE

Impact of Laparoscopic Ovarian Cystectomy on Serum Follicle Stimulating Hormone: A study among Women with Unilateral Endometrioma

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ABSTRACT

Objective: To evaluate the difference in the serum follicle stimulating hormone (FSH) before and after laparoscopic ovarian cystectomy among women with unilateral endometrioma.

Methods: A quasi-experimental study was conducted at the Patel Hospital, Karachi from April to December 2017. All women of reproductive age (20-40 years) having ultrasonographic findings of unilateral endometrioma of more than 4 cm and body mass index $<30\text{kg/m}^2$ were enrolled. All women were subjected to laparoscopic removal of ovarian cyst. The serum FSH were measured preoperatively and 3 months postoperatively. Mean change in ovarian FSH level was noted. The mean difference in FSH level pre and post laparoscopic cystectomy were taken as mean change.

Results: Of 83 women with unilateral endometrioma, mean age of the women was 24.51 ± 2.85 years. There were 59 (71%) women with normal weight ($\text{BMI } 18\text{-}25 \text{ kg/m}^2$) whereas multiparity was observed in 42 (51%) women. A significant increase in the serum FSH was observed post operatively, i.e. the mean serum FSH pre-operatively was $5.69 \pm 1.15 \text{ mIU/mL}$ while serum FSH post-operatively was $7.68 \pm 1.55 \text{ mIU/mL}$. The mean change of 1.99 mIU/mL was noted ($p\text{-value} < 0.001$). A significant increase in serum FSH level was observed when stratified on the basis of age ($p\text{-value} < 0.001$), BMI ($p\text{-value} < 0.001$), cyst size ($p\text{-value} < 0.001$), duration of symptoms ($p\text{-value} < 0.001$), marital status ($p\text{-value} < 0.001$), occupation ($p\text{-value} < 0.001$), education ($p\text{-value} < 0.001$), and parity ($p\text{-value} < 0.001$).

Conclusion: A considerable upsurge in the serum FSH level was noted after laparoscopic cystectomy among women with unilateral endometrioma.

Key words: Follicle stimulating hormone, ovarian cystectomy, ovarian reserve, laparoscopy

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INTRODUCTION

Endometriosis is explained as the occurrence of stroma as well as endometrial glands of the uterine cavity externally. It is a usual gynecologic disorder, which is mostly present with infertility and pelvic pain.¹ The endometrial glands and stroma form endometrioma as ovarian cyst lining, which accounts for 17 to 44 percent of endometriosis individuals. A pseudocapsule surrounds endometriosis along with healthy ovarian tissue.² After implantation of the endometriotic foci on the ovarian surface,

coelomic metaplasia of the ovarian epithelium or the inverted ovarian cortex invagination are the two theories proposed for endometriosis.³ It has been observed that ovarian endometrioma is a kind and estrogen-dependant cyst, which is reported in 5 to 10 percent of women in its reproductive age. It influences women with infertility in 20 to 40 percent women.⁴ Laparoscopic ovarian cystectomy seems to be the preferred choice on the basis of the current evidence. There is an increasing issue regarding the negative influence on ovarian reserve due to destruction of the healthy ovarian tissue or

inadvertent removal adjacent to the pseudo-capsule of the cyst in spite of the enhancements in the management and technique of symptomatic patients with endometriomas.^{5,6}

Ovarian reserve is represented as the quality and number of the remaining primordial follicles at any specific time and; therefore, considered as the functional potential of the ovary.⁷ None of the tests and markers has been shown to be effective in spite of the fact that there are several tests and markers of ovarian reserve.⁸ Antimullerian hormone, inhibin B, FSH LH, E2, FSH:LH ration are included in static tests. In addition, sonographic variables including stromal blood flow, ovarian volume, and antral follicle count are also included in static tests.⁹ Exogenous FSH ovarian reserve test, GnRH agonist stimulation test, and clomiphene citrate challenge test are included in dynamic tests.¹⁰

So, the aim of this study was to evaluate the changes in serum FSH pre and post operatively in women of reproductive age group undergoing laparoscopic ovarian cystectomy. So that the damage to ovarian reserve inflicted by laparoscopic excision of ovarian cysts could be identified. Thereby decision for the procedure could be taken in future else other modalities could be determined.

METHODS

A quasi-experimental study was conducted at the Department of Obstetrics and Gynecology, Patel Hospital Karachi from April to December 2017. All women aged 20-40 years with ultrasonography findings of unilateral endometrioma of more than 4 cm and having body mass index less than 30kg/m² were consecutively included. Pregnant women (positive Beta HCG), women with previous history of cystectomy, history of contraceptive usage in last three menstrual cycles, women who had previous diagnosis of ovarian tumor and women with polycystic ovarian syndrome (PCOs) were excluded.

The sample size of 83 women was obtained by using open epi online sample size calculator. The statistics considered for sample size estimation were pre laparoscopic FSH level as 6.3 ± 2.9^{11} , post laparoscopic FSH level as 7.5 ± 2.6^{11} , 95%

confidence level and margin of error as 0.6.

The purpose, procedure, risks and benefits of the study were explained and confidentiality were ensured prior to inclusion. Brief history of duration of symptoms were taken and baseline FSH level were done. The serum FSH levels were taken preoperatively on 3rd day of the menstrual cycle. Eligible women were subjected to laparoscopic removal of ovarian cyst and the procedure were performed. The laparoscopic procedure was performed by the consultant gynaecologist having more than 2 years of experience under general anesthesia. A three-port laparoscopy procedure was carried out in which sub-umbilical vertical incision was made inserting 11-mm trocar with 10 mm laparoscope inflating pneumo-peritoneum with CO₂ (12 mmHg) following with the insertion of lateral 10-mm operating port and a central suprapubic 5-mm operating port. The assessment of peritoneal cavity was done and efforts were made to eradicate the cyst without revealing its substances. Ovarian cystectomy was performed by traction and counter traction forces applied by two atraumatic grasping forceps. Hemostasis was achieved by bipolar coagulation, and irrigation was done with Ringer's solution. Reconstruction of ovary was done using sutures. Endobag was used to remove the cyst wall from the abdomen. Post procedure FSH levels were checked on 3 month postoperatively. Mean change in ovarian FSH level was assessed as difference in FSH level between pre and post laparoscopic cystectomy. This information along with the age, height, weight, size of endometrioma and duration of symptoms were noted in a predesigned proforma.

All data were analyzed through computer by using statistical packages for social sciences version 19. The quantitative variables like age, weight, height, BMI, duration of symptoms, ultrasonographic measurement of the size of endometrioma, and pre and post FSH level were presented as mean and standard deviation. The qualitative variables educational level, marital status, occupation, BMI, size of endometrioma, duration of symptoms and parity were presented as frequency and percentages. Paired t-test were used to compare mean change in FSH level before

and 3-months of the procedure. Effect modifiers like age, marital status, parity, educational status, occupation, BMI, size of endometrioma and duration of symptoms were addressed through stratification, post stratification paired t test were applied, p-value less than or equal to 0.05 were taken as significant.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

RESULTS

Out of total of 83 patients, the mean age of the women was 24.51 ± 2.85 years. There were 45 (54%) women with ≤ 25 years of age while 38 (46%) women with > 25 years of age. The mean height, weight and BMI of the women were 1.54

± 0.21 inches, 64.36 ± 3.45 kg and 23.41 ± 2.85 kg/m^2 respectively. The mean duration of symptoms was 10.35 ± 3.86 months. Most of the women had normal weight (n=59, 71%) and multiparty (n=42, 51%). The mean size of endometriomas was 5.86 ± 2.53 cm. Majority of the women were married, i.e. 40 (48%) followed by unmarried 18 (22%), divorced 16 (19%) and separated 9 (11%). (Table 1)

The pre-operative serum FSH was 5.69 ± 1.15 mIU/mL which significantly increased post operatively as 7.68 ± 1.55 mIU/mL (p-value < 0.001). (Table 2)

A significant increase in serum FSH level was observed when stratified on the basis of age (p-value < 0.001), BMI (p-value < 0.001), cyst size (p-value < 0.001), duration of symptoms (p-value < 0.001), marital status (p-value < 0.001), occupation (p-value < 0.001), education (p-value < 0.001), and parity (p-value < 0.001). (Table 3)

Table 1: Baseline Characteristics of Study Variables (n=83)

Variables	Mean \pm SD
Age(years)	24.51 \pm 2.85
BMI (kg/m ²)	23.41 \pm 2.85
Duration of symptoms, (months)	10.35 \pm 3.86
Size of endometrioma (cm)	5.86 \pm 2.53
	n (%)
Parity Distribution	
Nullipara	5 (6%)
Primipara	12 (14%)
Multipara	42 (51%)
Grand-multi Para	24 (29%)
Marital Status	
Married	43 (51.8%)
Unmarried	40 (48.2%)
Educational Level	
Primary	20 (24%)
Secondary	32 (39%)
Intermediate	14 (17%)
Graduate or more	17 (20%)
Occupation Status	
Employed	71 (86%)
Unemployed	12 (14%)

cm: centimeter, Kg: Kilogram, m: meter, n: number, SD: standard deviation

Table 2: Mean Change in Serum Follicle Stimulating Hormone after Laparoscopic Cystectomy in Patients with Ovarian Cysts (n=83)

	Preoperative Mean	Postoperative Mean (3 months)	Mean Change (Postoperative-Preoperative)	p-value	95% CI of the Difference	
					Lower	Upper
FSH (mIU/mL)	5.69±1.15	7.68±1.55	1.99	0.001*	1.62	2.36

Post-operative mean was noted after 3 months of laparoscopic cystectomy

Independent t-test applied, p-value <0.05 was taken as significant

Table 3: Mean change in Follicle Stimulating Hormone level post laparoscopic ovarian cystectomy with respect to general characteristics (n=83)

Variables	Pre-operative FSH	Post-operative FSH	Mean Change (95% C.I)	p-value
Age				
≤25 years	5.8±1.14	7.78±1.43	1.97(1.51-2.44)	<0.001
>25 years	5.58±1.19	7.59±1.7	2.01(1.40-2.61)	<0.001
BMI category				
Normal weight	5.56±1.06	7.73±1.54	2.16(1.72-2.60)	<0.001
Overweight	6.02±1.35	7.6±1.6	1.57(0.88-2.26)	<0.001
Cyst size of endometrium				
Small Size	5.8±1.19	7.68±1.62	1.88(1.46-2.30)	<0.001
Large Size	5.28±0.92	7.72±1.25	2.44(1.64-2.24)	<0.001
Duration of symptoms				
≤10 Months	5.72±1.18	7.78±1.62	2.06(1.61-2.51)	<0.001
>10 Months	5.64±1.13	7.47±1.38	1.82(1.15-2.50)	<0.001
Marital status				
Married	5.55±1.15	7.41±1.59	1.86(1.28-2.45)	<0.001
Unmarried	5.96±1.09	7.62±1.5	1.65(0.98-2.33)	<0.001
Occupation				
Employed	5.61±1.09	7.63±1.43	2.02(1.59-2.44)	<0.001
Unemployed	5.57±0.81	8.14±1.4	2.57(1.57-3.58)	<0.001
Education level				
Primary	5.81±1.23	7.41±1.51	1.83(0.97-2.70)	<0.001
Secondary	5.57±0.95	8.09±1.51	2.28(1.68-2.87)	<0.001
Intermediate	5.81±1.23	7.74±1.94	2.0(1.05-2.95)	0.010
Graduation or More	5.74±1.43	7.22±1.21	1.62(0.79-2.44)	0.010
Parity distribution				
Nullipara (n=5)	6.7±1.36	7.84±0.63	1.13(-0.001-2.27)	0.051
Primipara (n=12)	5.56±0.82	7.45±1.77	1.89(0.74-3.04)	0.004
Multipara (n=42)	5.67±1.16	7.72±1.47	2.05(1.55-2.55)	<0.001
Grand multipara (n=24)	5.6±1.22	7.73±1.77	2.12(1.32-2.92)	<0.001

Normal weight: 18.5-23 kg/m², Overweight: 23-27.5 kg/m², small size of endometrium: ≤5 cm, Large size of endometrium: >5 cm

Independent t-test applied, p-value <0.05 taken as significant

DISCUSSION

Ovarian endometrioma is a type of oestrogen-dependent cyst reported in 5-10% of females in their reproductive era. In 20-40% of females, it affects females with infertility.⁴ It has been indicated that treating endometriosis still remains a confronting issue due to the presence of most often incidence found in reproductive aged women; therefore, preserving reproductive function becomes the main objective.^{12,13} In addition, the least expensive approach as well as the least invasive approach should be integrated in order to reduce pain, prevent recurrence, restore normal anatomy, and increase pregnancy rate.¹⁴ It is also reported that patients will not be benefited from medical therapy if they are reported with pelvic adhesion, endometriomas and infertility.¹¹

We conducted this study with the aim to assess the changes in pre-and post-operative serum FSH in reproductive age group females undergoing laparoscopic ovarian cystectomy in order to identify the harm to the ovarian reserve caused by laparoscopic ovarian cyst excision. The baseline serum FSH was 5.69 mIU/mL, which substantially inclined post operatively as 7.68 in this study. Similar outcomes have been found in prior studies, showing significant follicle stimulating hormone level increased for benign ovarian cysts after laparoscopic cystectomy.¹⁵⁻¹⁸ On the other hand, it has been observed that there were modifications in other ovarian reserve markers, which include FSH.¹⁹

The findings of this study have shown a significant inclination in serum follicle stimulating hormone when comparing with older as well as younger age group, which indicate no difference between the two groups.²⁰

Another study has found that there was a weak negative correlation between preoperative FSH level and age, as well as no independent impact of age on postoperative FSH level.²¹⁻²³ Similarly, a significant and positive correlation was found between FSH level and age.²⁴

The ovarian reserve after surgery is related with tumor recurrence when the ovarian tumor is reported with reproductive age group. The laparoscopic cystectomy is considered as a first

line treatment in specific endometriomas by stripping technique. The removal of ovarian tissue is led by the removal of any benign cyst inadvertently; however, the impact is more substantial in endometriomas. It has been observed that due to the presence of a pseudocapsule, this difference was observed in an endometrioma as compared to a real capsule in a non-endometriotic cyst, which already had an independent tissue plane allowing the dissection from tissue easily.²⁵⁻²⁶ It has been found that patients with ovarian endometriomas significantly declined serum FSH level at 3 months postoperatively as compared to non-endometrioma cyst.²⁷ In addition, damage to ovarian vasculature or an inflammation-mediated injury can result in the healthy ovarian follicles loss, which leads to the reduction in serum FSH level.

Generally, there was a reduction in the process of follicular diminution as well as decrease in the quality of oocyte through the ovarian reserve. The FSH levels substantially inclined postoperatively after 3 months of laparotomy in this study. Similar findings have been observed in which majority of the females had gone with normal BMI. On the contrary, minimal extent of patients had satisfactory ovarian reserves with high BMI.²⁷⁻²⁸

Thus, it is imperative to identify patients with poor ovarian reserve prior to surgery for advice to patients with ovarian endometrioma. Evaluation of ovarian reserve before cystectomy may assist after cystectomy to avoid ovarian failure.

CONCLUSION

The FSH level increased after laparoscopic cystectomy for benign ovarian cysts, especially in older patients and those with unilateral and larger cysts indicating significant ovarian damage post operatively. The FSH level increased after laparoscopic cystectomy for benign ovarian cysts.

AUTHORS' CONTRIBUTION: SH, SSD substantially contributed to the conception and design of the study. SB, KA worked in the acquisition, analysis, and interpretation

of data. SH, AB drafted the study and revised it critically for important intellectual content. SSD, AB gave the final approval of the manuscript.

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