

Using Anti-Müllerian Hormone Level in Infertile Women with Ovarian Endometrioma for Selection of the Laparoscopic Management Modality

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Abstract

Background: Ovarian function is affected by the presence of endometrioma and by its management. Treatment of endometrioma should be tailored according to the ovarian reserve.

Aim of the study: To evaluate the role of AMH in guiding the method of surgical management of endometrioma.

Design: Prospective comparative clinical study.

Setting: Gynecology Department-Tanta University and private clinic.

Patients and Methods: 330 women with ovarian endometrioma, complaining of infertility were classified according to AMH level and laterality of endometrioma into 4 groups: group I (120 women) with unilateral endometrioma and AMH above 3ng/ml, group II (80 women) with unilateral endometrioma and AMH below 3 ng/ml, group III (50 women) with bilateral endometrioma and AMH above 2.7 ng/ml and group IV (80 women) with bilateral endometrioma and AMH below 2.7 ng/ml. In groups I and III, laparoscopic ovarian endometrioma resection was done while in groups II and IV, laparoscopic endometrioma drainage with bipolar coagulation was done.

Results: AMH did not decrease significantly in all groups after 3 months, while it decreased significantly after 6 months in groups 2 and 4 and highly significant decrease was found in groups 1 and 3. Endometrioma recurrence occurred in groups (II&IV), while no recurrence occurred in groups (I&III).

Conclusion: Laparoscopic management of endometrioma should be guided by serum AMH level and cystectomy should be avoided if lower levels of AMH were found.

Keywords: Endometrioma, Ovarian, Gynecology, Laparoscopy, Surgeries

Introduction

Ovarian endometrioma is present in 17-44% of women complaining of endometriosis and it is the commonest indication for ovarian surgery [1,2].

The effect of ovarian endometrioma on the fertility is a debatable issue with a controversy about its best treatment method [3].

Several surgical approaches for the treatment of endometriomas such as aspiration, cystectomy, fenestration and ablation of the cyst wall are performed worldwide, but currently there is no consensus about the most favorable approach that does not affect the ovarian reserve [4]. La marca et al. recommended the use of anti-müllerian hormone (AMH) as an informative marker that reflects the degree of ovarian reserve damage in cases ovarian cystectomy [5,6].

The aim of this study was to set up a guideline for surgeons when dealing with endometrioma keeping in mind two main outcomes: ovarian reserve and recurrence after laparoscopic management of endometriomas.

Patients and Methods

Infertile women with ovarian endometrioma who were referred to the infertility clinic, in Tanta university hospital, Gynecology Department and in private clinic for management of their condition from January 2009 until June 2012-were included in this study, their age ranged between 20 to 35 years with no previous surgical or medical treatment of endometrioma in the preceding 6 months. The exclusion criteria included the women with suspicious ovarian malignancy detected by ultrasound appearance (as complex echogenicity, bilaterality, presence of endocystic and exocystic papillae, presence of ascites and the rapid increase in size) and Doppler study (low resistance of the blood flow in both intracystic and extracystic vasculatures and the presence of neoangiogenesis) as well as elevated tumor markers especially CA125. We excluded also the patients with contraindications for laparoscopy as morbid obese and the presence of previous abdominal surgeries.

All the patients signed an informative written consent to participate in the study after full explanation.

330 women were enrolled in this study, 130 of them had bilateral endometrioma and 200 had unilateral endometrioma.

All women underwent to full history taking and clinical examinations including the menstrual and obstetrics history, duration of infertility and medical & surgical history.

Grouping of the patients were done according to the level of AMH and transvaginal ultrasonography, the both former investigations were done before the laparoscopic intervention and then after 3 and 6 months, the recurrence rate was observed during this period of follow up.

Intervention

According to the level of AMH and laterality of endometrioma, the patients were classified into four groups:

Group I: included 120 women with unilateral endometrioma with AMH equals 3 ng/ml or more.

Group II; included 80 women with unilateral endometrioma with AMH equals less than 3 ng/ml.

Group III: included 50 women with bilateral endometrioma with AMH equals 2.7 ng/ml or more.

Group IV: included 80 women with bilateral endometrioma with AMH equals less than 2.7 ng/ml.

The cutoff level of AMH was chosen after collecting the data of the first 50 patients and analyzing the mean level of AMH. It was found that, in unilateral endometrioma the mean of AMH level was swinging around 3 ng/ml, while in bilateral endometriomas, the mean AMH level was swinging around 2.7 ng/ml.

Ovarian surgery technique

Laparoscopy was done under general anesthesia during the early proliferative phase of the menstrual cycle. The pneumo-peritoneum was achieved by inflating CO₂ (14 mmHg) through the Veress needle, then a three-port laparoscopy technique was used and included a 11 mm trocar that inserted through a short infra-umbilical incision and connected to a video monitor (Karl Storz Endoscope) and two additional 5 mm operating ports were inserted in the iliac regions. At the start of laparoscopy staging of endometriosis were done with adhesiolysis and fraying of the ovary from its bed with bipolar cauterization of the peritoneal endometriotic implants. If the ovarian endometrioma remained intact, antemesentric incision along its entire length were done to aspirate the chocolate material then washing the interior of the cyst wall was done with hot saline for better inspection. All the incised and aspirated materials were sent for histological examination.

Here two different techniques were done according to the AMH levels

1. Enucleation the endometrioma with the stripping technique was done in 170 women (120 in group I and another 50 in group III). The cyst wall and the adjacent tissue was grasped between two atraumatic forceps, enucleation of the cyst was done by gentle traction and counter traction of these two forceps to strip the cyst wall from the adjacent tissue.
2. Endometrioma drainage and systematic bipolar electro coagulation of the wall was done in 160 patients (80 in group II and another 80 in (group IV).

In all patients, the last laparoscopic step was irrigation of the pelvis with hot saline and suction of the fluid until the clear bloodless view is obtained, then deflation of the pneumo-peritoneum and withdrawal of the inserted trocars.

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences software (SPSS 17, Chicago, IL, USA). Mean and SD values were calculated for continuous variables, and numbers and percentages for categorical variables. A value of P < 0.05 was considered statistically significant.

Results

The personal characters of all patients as regards age, type and duration of infertility and body mass index are shown in (Table 1).

AMH levels in the 4 studied groups preoperatively and after 3 and 6 months are shown in (Table 2).

The size and the site of endometrioma and the recurrence rate in all groups are shown in (Table 3).

No complications occurred in the four groups and all the patients were discharged at the day after laparoscopy.

Spontaneous pregnancy occurred in 38 patients in group I (29%), 32 patients in group II (40%), 12 patients in group III (24%) and 28 patients in group IV (35%).

Table 1 Patient's personal data in the four groups.

		Group I (N=120)	Group II (N=80)	Group III (N=50)	Group IV (N=80)
Age	Range	23-32	20-29	22-35	24-35
	Mean ± SD	27 ± 2.5	25 ± 3.2	31 ± 3.4	28 ± 4.2
Primary infertility	Number	90(75%)	55(68.75%)	40(80%)	65(81.25%)
	Duration in years	3-7	2.5-6	4-9	2-8
	Mean ± SD	4.5±1.2	3.6 ± 1.5	5.5± 1.1	4.5±1.9
Secondary infertility	Number	30(25%)	25(31.25%)	10(20%)	15(18.75%)
	Duration in years	4-8	3-7	4-9	3-9
	Mean ± SD	5.5 ± 2.2	6 ± 1.5	5.3±1.7	5.3±2.1
BMI in kg/m ²	Range	19-24	18-26	19-26	19-27
	Mean ± SD	22.1± 1.5	24.3 ± 1.7	24.4 ± 1.9	23.5 ± 2.1

Table 2 AMH level before surgery then 3 and 6 months after.

AMH	Group I (N=120)	Group II (N=80)	Group III (N=50)	Group IV (N=80)	
Before surgery	Range	3 -3.5	2-2.9	2.7-3.2	1-2.6
	Mean ± SD	3.1± 0.31	2.4± 0.22	2.9±0.40	1.9± 0.24
After 3months	Range	2-3.1	1.4-2.5	1.9-2.7	0.8-1.9
	Mean ± SD	2.5±0.11	2± 0.23	1.7 ± 0.3	1.3± 0.1
	P value	>0.05	>0.05	>0.05	>0.05
After 6months	Range	1.7-2.8	1-2.3	1.2-2.1	0.7-1.7
	Mean ± SD	2.2 ± 0.27	1.9 ± 0.21	1.6 ± 0.12	0.97 ± 0.11
	P value	<0.01**	<0.05*	<0.01**	<0.05*

NB:- * means significant and ** means highly significant

Table 3 The site and the size of endometrioma and the recurrence rate in all groups.

		Group I (N=120)	Group II (N=80)	Group III (N=50)	Group IV (N=80)
Rt Ovary	Range	5-8 cm	4-7cm	3-7cm	4-7cm
	Mean± SD	6.5± 1.2	5.4± 1.6	5.5± 1.5	5.6 ± 1.3
Lt Ovary	Range	4-8cm	4-8cm	4-6cm	5-7cm
	Mean± SD	5.5 ± 1.5	5.8 ± 1.8	4.8 ± 1.5	5.7 ± 1.7
Recurrence rate	Rt.ov	0%	5/45(11%)	0%	7/80(8.75%)
	Lt.ov	0%	3/35(8.5%)	0%	5/80(6.25%)
	Sum	0%	8/80 (10%)	0%	12/80 (15%)

Discussion

Ovarian endometriomas are usually associated with infertility, which may be attributed to either the negative impact of the endometrioma on the spontaneous ovulation or the reduction of ovarian reserve [7-9].

The negative effect of endometrioma on the ovarian reserve is very difficult to assess and quantify. In the previous studies, the damaging effect of endometrioma per se on ovarian reserve was assessed by either histological study of the ovary [10], Antral Follicle Count (AFC) [11], ovulation rate [12], or responsiveness to gonadotropins as the surrogate marker [13,14]. Because the endometrioma per se has a negative impact on the ovarian reserve [4], it was planned in this study to manage endometrioma according to AMH level. Laparoscopic stripping of the endometrioma pseudo capsule, which was done in groups I&III, had no significant effect on the level of AMH after 3 months

from surgery but with highly significant drop in AMH level after 6 months from surgery in both groups.

In in groups II&IV, where Laparoscopic endometrioma drainage and bipolar coagulation of the pseudo capsule was done, the mean AMH level dropped to non-significant level after 3 months from surgery but it dropped significantly after 6 months from surgery.

In the current study, the decrease in the ovarian reserve was greater in cases subjected to cystectomy after 3 and 6 month, this can be attributed to sacrificing of healthy adherent ovarian tissue if cystectomy was done which is usually associated with remarkable bleeding that may nesseciate the use of extensive coagulation with more thermal damage to the ovary especially if needed near the ovarian hilus with more interruption of the ovarian blood supply. However; both stripping and cystectomy techniques led to statistically significant reduction in the AMH

levels if compared with its levels before the study, this reduction became highly significant if cystectomy was done.

Yuh-Ming Hwu et al., compared the effect of endometrioma on ovarian reserve, namely on AMH level, with laparoscopic ovarian cystectomy, they stressed on the negative impact which endometrioma exerts on ovarian reserve specially when endometrioma is bilateral and the more reduction of ovarian reserve after laparoscopic cystectomy [13].

The mechanism of endometrioma induced ovarian reserve damage is still a controversial issue. Maneschi et al. reported that endometrioma is associated with microscopic alterations of the follicular and vascular patterns. In addition, they concluded that the ovarian cortical tissue alterations could be related to either the inflammatory response to the endometriosis implants or to the toxic nature of the cystic fluid [8]. Meanwhile, Fauvet et al discovered an increased pro-apoptotic protein expression (bax and p21) in endometriomas compared with benign ovarian tumors [13].

The results of the present study coincided with those of Tsolakidis et al, who reported that the mean serum AMH level was significantly reduced 6 months after surgery if cystectomy was done [15]. Chang et al observed a significant decrease in serum AMH levels 3 months after laparoscopic cystectomy [16]. While, Lee et al, found that serum AMH levels decreased immediately after laparoscopic ovarian cystectomy for endometrioma [17]. Ercan et al stated that laparoscopic endometrioma stripping did not impair ovarian reserve on the short-term follow up and emphasized that laparoscopic endometrioma stripping is a valid approach in experienced hands [18].

Mohamed et al compared laparoscopic bipolar electro coagulation versus laparotomy hemostatic sutures during unilateral ovarian cystectomy and found a significant reduction in ovarian reserve after laparoscopic ovarian cystectomy, which was explained by damage to the ovarian vascularity and excision of a large area of ovarian tissue [19]. More recently Chen Y et al found that the

surgical related reduction of the ovarian reserve, if laparoscopic cystectomy was done, is more if the endometrioma was bilateral and if the preoperative size was more than 7 cm, he also found that there is a negative correlation between the preoperative level of the AMH and the ovarian reserve damage [20].

As regards recurrence rate, in group (I) and group (III) where resection of pseudo capsule of the endometrioma was done the, the follow up to 6 months revealed no recurrence, while in group (II) and group (IV) where endometrioma drainage and bipolar coagulation of the wall were done, the recurrence rate in group (II) was found in 8 from 80 patients (10%) while in group (IV), the recurrence rate was found in 12 from 80 patients (15%). This is in agreement with Hart et al, who concluded that excisional surgery for endometriomata provided a more favorable outcome than drainage and ablation as regards the recurrence rate [21]. The recurrent endometriomas in the present study, and according to our results and the results of the previous studies, were treated medically to avoid further reduction in the ovarian reserve.

Conclusion

Laparoscopic endometrioma resection and laparoscopic endometrioma drainage with bipolar coagulation have a negative impact on ovarian reserve after 6 months from surgery namely on AMH, this reduction in AMH was higher if cystectomy was done. The recurrence rate was higher in groups with laparoscopic drainage. AMH should be measured before surgery to guide the management of endometrioma away from cystectomy if lower level was found. In addition, further researches on large number of patients are needed to determine the cut off level of AMH that can guide the surgeon before undertaking endometrioma surgery.

Declaration of interest

The author reports no declarations of interest.

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