



ORIGINAL ARTICLE

Argon beam coagulator versus cystectomy for endometrioma treatment in infertile women and the impact on ovarian reserve. A case control study



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KEYWORDS

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Abstract *Objective:* To evaluate the impact of two different surgical modalities, traditional cystectomy and argon beam coagulator vaporization–ablation (ABC) of ovarian endometrioma on the ovarian reserve in terms of antimüllerian hormone (AMH) and antral follicle count (AFC).

Patients and methods: Eighty infertile women with ovarian endometrioma were included in this case control study. Patients were selected to undergo either traditional cystectomy (Group I, $n = 40$) or argon coagulator beam vaporization (Group II, $n = 40$). Mean serum AMH changes and antral follicle counts (AFC) were the primary and secondary outcomes of this study.

Results: At 2 weeks follow-up, postoperative mean serum AMH levels were markedly decreased, though not significantly different between both treatment groups and mean AFC was higher in both groups, though statistically significant in the ABC group.

Conclusion: Our study clearly demonstrated that the surgical management of endometrioma, with either ovarian cystectomy or argon beam coagulator vaporization causes a significant decrease in ovarian reserve in terms of AMH levels in women of reproductive age.

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1. Introduction

Endometriosis affects almost 10% of the females in their reproductive years (1). Ovarian endometrioma is present in up to 30–40% of those women (2). There is an impression that endometriosis negatively affects the pregnancy rate either spontaneously or following ART (3). Two main surgical approaches are widely used for the treatment of ovarian endometrioma including cystectomy or ablation of the inner cell lining using either bipolar or laser vaporization. However,

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surgical treatment of endometriomas has been implicated in reducing the ovulation rate in the ovary that has been operated upon (4). This has been explained by unintended removal of healthy ovarian tissue, surgically related to local inflammation or vascular compromise.

Ovarian reserve is a term used to reflect the number and quality of oocytes (5). The anti-Müllerian hormone (AMH) has been acknowledged as the most useful, reliable, and sensitive hormonal serum marker of the ovarian primordial follicle pool compared with other known serum markers (6,7). Furthermore, serum AMH levels are strongly correlated to the antral follicle count (AFC) as measured by ultrasound (8–10). Currently, there is a scarcity and heterogeneity in randomized or comparative studies addressing the most effective treatment of ovarian endometrioma taking into consideration not only the relief of symptoms, recurrence, and pregnancy rate, but also the ovarian reserve after surgery. In the present study, our purpose was to assess the effect of the surgical method of endometrioma treatment, namely argon beam coagulator (ABC) and traditional cystectomy, on the ovarian reserve tests in the terms of antimüllerian hormone (AMH) and antral follicle count (AFC).

2. Patients and methods

This study was conducted at the department of obstetrics and gynecology, Faculty of medicine - Cairo University from July 2009 to January 2012. Inclusion criteria were as follows: (1) history of primary or secondary infertility (2) regular menstrual cycles, basal FSH level on day 3 is ≤ 12 IU/L, a body mass index (BMI) < 27 kg/m², no history of previous ovarian surgery and no use of estrogen suppressive drugs, such as oral contraceptives, GnRH analogs, progestins or danazol in the preceding 3 months. This study was approved by the Institutional Review Board and informed consent was obtained from all patients. On the third day of the menstrual cycle antimüllerian hormone (AMH) was measured and the AFC in both ovaries and dimensions of endometrioma were assessed by transvaginal ultrasonography by an expert sonographer. Antral follicle was considered as cysts measuring 2–10 mm in diameter within the ovary. Mean endometrioma diameter was measured in three dimensions. Definitive diagnosis of endometrioma was done by the observation of endometriotic foci during the operation as ovarian cysts containing dense brown chocolate-like fluid. The patients were divided into two groups according to the intraoperative surgical approach and based on the complexity of the operation and surgeon's preference and expertise; Group I where the traditional cystectomy approach was used ($n = 40$) and Group II where argon beam coagulation (ABC) was used for vaporization–ablation of the inner lining ($n = 40$). The operation was performed by experienced surgeons particularly aware of the need to avoid damaging the healthy part of the ovarian tissue. Two weeks after the surgery all the patients had the ultrasound scan repeated in order to obtain an AFC and another blood sample is obtained to check the levels of the serum AMH hormone. The serum was separated from whole blood, transferred to sterile polypropylene tubes and stored at -80 C until assay. AMH levels were measured by a commercial enzyme-linked immuno-sorbent assay kit according to the manufacturer's instructions. The limit of detection of the kit is 0.006 ng/ml. The intra-assay coefficient of variation was between 2.4 and

4.6% and the coefficient of variation between 4.8 and 8.0% as described in the directions of use. AMH measurements were all performed in the same laboratory.

In Group I (traditional cystectomy group, $n = 40$), the traditional cystectomy technique, either through laparoscopy ($n = 20$) or laparotomy ($n = 20$), was used where a large part of the endometrioma is excised. The endometrial cyst is opened and washed out with irrigation fluid. After identifying the plane of cleavage between the cyst wall and ovarian tissue by applying opposite bimanual traction and counter-traction with two grasping forceps, providing strong but non-traumatic force, the inner lining of the cyst is stripped from the normal ovarian tissue and was subsequently sent for histological examination. Hemostasis was secured by the application of a 30-W current using bipolar forceps on the cyst bed. In Group II (ABC vaporization–ablation group, $n = 40$), either through laparoscopy ($n = 20$) or laparotomy ($n = 20$), after opening and drainage of the endometrioma, argon beam coagulator (ABC) is used with higher frequency monopolar output settings for the tissue vaporization, the probe was directed at the lesions from a distance of close to 2–8 mm, spraying the tissue surface at an angle of approximately 45° until the tissue surface demonstrated a characteristic silver, shiny appearance and there was visual confirmation of complete eradication of the lesions (11,12). The power density used varied between 70 and 90 W at the tissue level and was applied for a period ranging from 0.5 to 2 s. There was no use of ovarian suture to control bleeding in both groups.

Commercial statistical analyses were performed with SPSS software (Statistics Package for Social Sciences) version 17 for Windows. Concentrations of serum AMH were compared between each sampling point (preoperatively, postoperatively at week 2) using paired samples *t*-test and Wilcoxon signed-rank test. Means were presented with SD. Simple linear regression analyses and the Pearson's correlation were applied where appropriate. Significant $P < .05$ was considered statistically significant.

3. Results

According to the inclusion criteria, a total of 80 women were enrolled in this study. There was no significant difference between both groups as regards the mean age (27.4 ± 4.5 vs. 28.42 ± 4.2 , $p = 0.4$), parity and type of infertility. The endometrioma was unilateral in 64 women and bilateral endometriomas in 16 women with no significant difference between both groups ($p = 0.6$). Furthermore, there was a significant difference between both groups as regards the size of the mean endometrioma diameter which was measured with transvaginal ultrasound (5.8 ± 1.1 vs. 7.85 ± 1.6 , $p = 0.00$) in favor of ABC vaporization-ablation group (Group II). There was no evidence of statistically significant difference between both groups as regards the level of AMH either before (8.8 ± 4.5 vs. 8.9 ± 4.5 , $p = 0.9$) or after (2.65 ± 1.38 vs. 3.0 ± 2.1 , $p = 0.36$) intervention. Meanwhile, there was a statistically significant decrease in the level of AMH within each group after the intervention, Group I (8.9 ± 4.5 vs. 3.0 ± 2.1) and Group II (8.8 ± 4.5 vs. 2.65 ± 1.38 , $p = 0.0$) respectively. In contrast, there was a marked increase in the AFC between both groups after the intervention (7.6 ± 1.9 vs. 6.4 ± 2.08 , $p = 0.01$) in favor of argon beam coagulator group (ABC – Group II) and within each group, (Group I: 2.9 ± 1.2

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