Original Article

Clinical study of the impact on ovarian reserve by different hemostasis methods in laparoscopic cystectomy for ovarian endometrioma

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A R T I C L E   I N F O

A B S T R A C T

Objective: To evaluate the impact of different hemostasis methods on ovarian reserve in laparoscopic cystectomy in treatment of ovarian endometrioma for the long-term.
Materials and Methods: A total of 207 patients with ovarian endometrioma, aged from 18 years to 45 years, were randomized into three groups: Group A (69 patients) treated by bipolar electrocoagulation hemostasis in laparoscopic cystectomy for ovarian endometrioma; Group B (69 patients) with ultrasound scalpel hemostasis; and Group C (69 patients) with suture technique hemostasis. The follicle-stimulating hormone (FSH), anti-Mullerian hormone (AMH), antral follicle count (AFC), and peak systolic velocity (PSV) were observed and compared at the 3rd day of the 1st, 3rd, 6th, and 12th menstrual cycle after surgery.
Results: (1) A total of 13 out of 207 patients failed; four in Group A, five in Group B, and four in Group C. There was no statistically significant difference between groups ($p > 0.05$). The failure rate was the highest during the 3rd month in the follow up (10 cases). (2) FSH: at the 1st month, 3rd month, 6th month, and 12th month follow up, FSH was higher in Group A and Group B than in Group C ($p < 0.05$). (3) AMH: AMH was significantly lower in Group A and Group B than in Group C ($p < 0.05$) during the same period. (4) AFC: no difference of AFC was observed at the 1st month and 3rd month ($p > 0.05$), whereas at the 6th month and 12th month, AFC in Group C was obviously higher than that in Group A and Group B ($p < 0.05$). (5) PSV: at the 1st month, 3rd month, 6th month, and 12th month follow up, PSV was significantly lower in Group A and in Group B than in Group C ($p < 0.05$).
Conclusion: Ultrasonic scalpel or bipolar electrocoagulation hemostasis applied to laparoscopic cystectomy is associated with a significant reduction of ovarian reserve. Electrocoagulation of hemostasis should be used with caution.

Introduction

Endometriosis, often presenting with infertility, is a common disease of women with rising incidence [1]. Ovarian endometrioma is the most commonly encountered diagnosis, accounting for 17–44% pelvic endometriosis, and the incidence of bilateral ovarian endometrioma is up to 29% [2]. The reduction of ovarian reserve due to follicle loss and even premature ovarian failure in laparoscopic cystectomy of ovarian endometrioma has attracted a large amount of domestic and foreign attention [3]. Although follicle-stimulating hormone (FSH) is one of the monitoring indexes of ovarian reserve, it has certain limitations. In a majority of unilateral ovarian endometriomas, compensated by healthy ovaries, no obvious difference is seen in FSH. At present, antral follicle count (AFC) and peak systolic velocity (PSV) are the commonly used indexes to evaluate ovarian reserve, as well as anti-Mullerian hormone (AMH), without effect on the menstrual cycle to a great extent [4]. Researchers hope that FSH, AMH, AFC, and PSV levels can be observed during different periods in the follow up, so that the impact on ovarian reserve by different hemostasis methods in laparoscopic cystectomy of ovarian endometrioma can be assessed accurately.

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Materials and methods

Patients

A total of 207 patients, aged from 18 years to 45 years with a mean age of 31.8 ± 8.2 years, primarily diagnosed with ovarian endometrioma in our hospital, were studied between March 2013 and September 2013. The patients were randomized into three groups, with 69 cases in each group. The inclusion criteria were as follows: (1) aged from 18 years to 45 years; (2) primarily diagnosed with unilateral or bilateral ovarian endometrioma by ultrasonography and clinical examination; (3) regular menstrual cycles with 25—35 days in the first 6 months of operation; and (4) informed consent. The exclusion criteria were as follows: (1) previous intake of contraceptive pills or hormone medicines; (2) history of ovarian surgery; (3) confirmed diagnosis of endocrine system disease or polycystic ovary syndrome; (4) excision of hysterectomy and adnexa; (5) ovarian malignant cancer; and (6) conditions incompatible with the ideas of the investigators.

Methods

A total of 207 patients with ovarian endometriomas, treated by laparoscopic cystectomy, were averagely randomized into three groups: Group A (69 patients) with bipolar electrocoagulation hemostasis; Group B (69 patients) with ultrasound scalpel hemostasis; and Group C (69 patients) with suture technique hemostasis. The FSH, AMH, AFC, and PSV were observed and compared at the 3rd day of the 1st, 3rd, 6th, and 12th menstrual cycle after surgery.

Surgical techniques

The procedures were performed as follows. All patients underwent the surgery under general anesthesia with endotracheal intubation and were placed in the Trendelenburg position. Then, the pneumoperitoneum was established in laparoscopic operation. A sharp cortical incision on the ovarian cyst surface and less vessels regions was made using scissors. The cyst wall was incised and the entire cyst was stripped away from the normal ovarian tissue completely by blunt dissection of opposite traction using two grasping forceps, followed by washing with saline after puncture, until there was clear cystic fluid. All patients were divided into three groups by a random number table, according to different hemostasis methods: bipolar electrocoagulation hemostasis (Group A), ultrasound scalpel hemostasis (Group B), and suture technique hemostasis (Group C). Bipolar electrocoagulation (WOLF, Germany, rated power of 25 W) hemostasis was performed in the bleeding site, accompanied by washing, in case more ovarian tissue was damaged excessively by electric coagulation. Ultrasound scalpel (Johnson & Johnson, USA) hemostasis was operated in the clear bleeding site. Natural curling was observed at ovarian hemorrhage in both groups above, without suture or other managements. Absorbable sutures (3-0; Johnson & Johnson) were used to suture the cortex and the medulla for hemostasis in Group C, avoiding ovarian cortex curl.

Outcome measures

FSH and AMH of fasting venous blood, obtained on the 3rd day of menstrual cycle prior to surgery, were determined through an ELISA kit. AFC and PSV of bilateral ovariectomy were measured after no difference of ovarian cyst diameter was observed by transvaginal color ultrasound. The number of follicles with a 2—10-mm inner diameter in bilateral ovarian cysts were calculated through ultrasonography. PSV was tested until at least five consecutive and stable waveforms were obtained when the flow spectrum appeared stable in the ovarian stromal artery. The final value of the blood flow parameters was the mean of two values.

Follow up

The FSH, AMH, AFC, and PSV were measured and compared on the 3rd day of the 1st, 3rd, 6th, and 12th menstrual cycle after surgery, whereas AFC and PSV were statistically analyzed for unilateral ovarian endometrioma. Routine obstetric examination was performed in the termination patient in case of pregnancy.

Statistical analysis

Statistical analysis was performed using SPSS version 16.0. The continuous variables were described using the mean $\pm$ standard deviation (SD) ($\bar{x} \pm s$) and the incidences were presented as number and percentage. The χ^2 and the Student t test were used for analysis of categorical variables in cases where the variables showed a normal distribution. The mean comparison was expressed as Q test. All results were considered statistically significant at $p < 0.05$.

Results

Comparison of basic clinical data

No statistically significant difference was observed in age, cyst diameter, gravidity, and parity of patients in the three groups ($p > 0.05$) (Table 1).

Comparison of compliance

A total of 13 out of 207 patients failed, including four cases in Group A (5.8%), five cases in Group B (7.2%), and four cases in Group C (5.8%). There was no statistically significant difference between groups ($p > 0.05$) ($\chi^2 = 0.3810$, $p > 0.05$). The failure rate was the highest during the 3rd month in the follow up (10 cases). The reasons included no follow up, no association, and others (Table 2).

Assessment of detection indexes

Comparison of detection indexes: (1) there was no statistically significant difference in preoperative FSH and AMH levels between groups ($p > 0.05$). At the 1st month, 3rd month, 6th month, and 12th month follow up, FSH levels in Group A and Group B were higher than those in Group C; AMH levels in Group A and Group B were lower than those in Group C. All results were considered statistically significant ($p < 0.05$; Tables 3 and 4). (2) No statistically significant difference of preoperative AFC and PSV was observed between groups ($p > 0.05$). At the 1st month, 3rd month, 6th month, and 12th month follow up, AFC and PSV in Group C were obviously higher than those in Group A and Group B, with statistical significance ($p < 0.05$), with the exception of no difference of AFC in the 1st month after operation ($p > 0.05$; Tables 5 and 6).

Table 1
Baseline characteristics of patients.

Groups	No.	Age (y)	Cyst diameter (cm)	Gravidity (time)	Parity (time)
Group A	69	30.9 ± 8.2	5.2 ± 2.6	1.24 ± 0.24	0.54 ± 0.40
Group B	69	31.4 ± 8.5	4.9 ± 2.9	1.21 ± 0.29	0.52 ± 0.37
Group C	69	33.1 ± 7.2	5.3 ± 2.7	1.30 ± 0.17	0.49 ± 0.41