



Original Article

Effect of Vasopressin Injection Technique in Laparoscopic Excision of Bilateral Ovarian Endometriomas on Ovarian Reserve: Prospective Randomized Study

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ABSTRACT **Study Objective:** To evaluate the effects of vasopressin injection technique in laparoscopic cystectomy on ovarian reserve in patients with bilateral endometriomas.

Design: Randomized prospective study (Canadian Task Force classification I).

Setting: University hospital.

Patients: Eighty-six women with bilateral endometriomas.

Interventions: Laparoscopic cystectomy of bilateral endometriomas was performed using different techniques including laparoscopic cystectomy by stripping without injection (control group), laparoscopic cystectomy by stripping with injection of saline solution (saline group), and laparoscopic cystectomy by stripping with vasopressin injection technique (VIT group).

Measurements and Main Results: The number of coagulation events on the ovarian cortex for hemostasis was counted in different groups, and the thickness of ovarian tissues removed was measured. The basal follicle-stimulating hormone (FSH) level was determined before surgery and at 3-, 6-, and 12-month follow-up after laparoscopic cystectomy in the different groups. In the saline group, fewer coagulation events were required to achieve hemostasis, less ovarian tissues were removed, and lower preoperative FSH levels were detected than in the control group ($p < .01$). In the VIT group, even fewer coagulation events ($p < .01$) and lower preoperative FSH levels ($p < .01$) were detected than in the saline group. There was no significant difference in the thickness of ovarian tissues removed in the 2 groups ($p > .05$). Basal FSH levels were significantly different before and after surgery in the control and saline groups ($p < .01$) but not in the VIT group ($p > .05$).

Conclusion: Vasopressin injection is an ideal procedure to reduce damage from usual laparoscopic cystectomy of bilateral ovarian endometriomas to protect ovarian reserve. Journal of Minimally Invasive Gynecology (2013) ■, ■-■ © 2013 AAGL. All rights reserved.

Keywords: Bilateral endometriomas; Follicle-stimulating hormone; Laparoscopic cystectomy; Ovarian reserve; Vasopressin

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Supported by the National Natural Science Foundation of China (grants 81270678 and 31200661) and the Suzhou Science and Technology project, Suzhou, Jiangsu, China (grant sys201268).

The authors declare no conflicts of interest.

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Submitted May 4, 2013. Accepted for publication July 2, 2013.

Available at www.sciencedirect.com and www.jmig.org

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<http://dx.doi.org/10.1016/j.jmig.2013.07.024>

The ovary is the most common organ affected by endometriosis. Seventeen percent to 44% of patients with endometriosis have ovarian endometriomas, and about 19% to 28% are bilateral [1–3]. Laparoscopic cyst excision is considered an adequate treatment for endometriotic ovarian cysts insofar as lower rate of recurrence and improved fertility [4]. The usual laparoscopic cystectomy procedure in which the cyst is removed via stripping and bipolar coagulation is swift, safe, and well accepted, with low lesion recurrence rate [5]. However, several previous studies

have indicated that this procedure was associated with decreased postoperative ovarian reserve [6–8], in particular in women with bilateral endometriomas [4,7,9–12]. Early menopause and a high percentage of premature ovarian failure were observed in women who had undergone surgery to treat bilateral endometriomas [13]. Studies have reported that removal of healthy ovarian tissues and thermal destruction of ovarian follicles due to excessive use of bipolar coagulation during laparoscopic surgery may be the primary causes of damage to ovarian functions [10,14–16]. However, there is still no ideal laparoscopic cystectomy procedure that reduces the loss of healthy ovarian tissues and limits the use of bipolar coagulation.

Recently, a randomized prospective study was the first to investigate the efficacy of the vasopressin injection technique for laparoscopic cystectomy of ovarian endometriomas with regard to operative time and coagulation events [17]. The authors reported that the vasopressin injection technique could clarify the boundary between the cyst and the ovarian stroma, and thus the number of coagulations necessary to achieve hemostasis could be reduced. They suggested that with use of this technique it may be possible to protect ovarian reserves after laparoscopic cystectomy. However, there was no corresponding quantitative comparison of ovarian reserve before and after laparoscopic cystectomy.

The objective of the present prospective randomized study was to estimate whether the vasopressin injection technique could enable retention of ovarian reserve in women undergoing laparoscopic cystectomy of bilateral endometriomas by reducing the loss of healthy ovarian tissue and limiting the use of bipolar coagulation. Ovarian reserve was determined via measurement of the basal follicle-stimulating hormone (FSH) level before surgery and at 3-, 6-, and 12-month follow-up.

Material and Methods

The study subjects were women with bilateral ovarian endometriomas who were scheduled to undergo laparoscopic surgery between August 1, 2008, and July 31, 2011, at the Second Affiliated Hospital of Soochow University. Eligibility criteria were bilateral endometriotic cysts with a mean diameter of 4.0 to 6.0 cm, as confirmed via ultrasound assessment; age 30 to 38 years; regular menstrual flow, defined as cycle duration of 28 to 30 days in the 6 months before surgery; no previous surgical treatment of endometriosis; no medical treatment of endometriosis in the previous 9 months; no intent to become pregnant for 1 to 2 years after the operation; and no known endocrine disease. The study protocol was approved by the Institutional Ethical Review Committee of our hospital, and all of the women gave written consent before laparoscopy was performed.

After the final assessment of eligibility was completed, women with bilateral ovarian endometriomas were randomly allocated randomly to 3 groups, as follows. First,

the random number of each patient was found in a table of random numbers according to admission number. The remainder when the random number was divided by 3 was the group number. If the remainder was 1, the patient was allocated to group 1 (control group, routine laparoscopic cystectomy without injection). If the remainder was 2, the patient was allocated to group 2 (saline group, laparoscopic cystectomy with injection of saline solution). If the remainder was 3, the patient was allocated to group 3 (VIT group, laparoscopic cystectomy with vasopressin injection). All operations were performed by a single experienced surgeon (Q.Z.R.).

In the usual procedure for laparoscopic ovarian cystectomy, the ovarian cyst was stripped from the ovary, and bleeding points on the normal ovary were coagulated using bipolar forceps (Karl Storz GmbH, Tuttlingen, Germany) with 20 to 30 W of current. To reduce damage, the duration of each coagulation was no more than 1 second.

In the VIT group, after diluted vasopressin was injected into the space between the cyst wall and the normal ovarian cortex, the cyst wall was stripped from the normal ovarian tissue. In brief, 20 to 30 mL diluted vasopressin (vasopressin concentration 0.06 U/mL) was injected into the space between the cyst wall and the normal ovarian cortex using 22-gauge suction needles, with one puncture for each ovary. In most cases, puncturing the ovary above the cyst caused no or little bleeding. Medially, a total of 2.4 to 3.6 U vasopressin was injected in each cyst.

In the saline group, rather than diluted vasopressin, 20 to 30 mL saline solution was injected into the space between the cyst wall and the normal ovarian cortex.

During review of the video, we counted the number of coagulation events on the ovarian cortex necessary to achieve hemostasis.

After excision of bilateral ovarian endometriomas, a 2 × 2-cm sample was taken from the thickest part of each ovarian cyst for histologic examination to evaluate the occurrence rate of ovarian tissue in the cyst wall specimens and the mean thickness of ovarian tissue removed. The mean thickness of the cyst wall in each patient and the mean thickness of the ovarian tissue removed (when present) were measured in millimeters.

The plasma FSH concentration was determined via an enzyme-linked immunosorbent assay (ELISA) using a FSH ELISA kit (KA0213; AmyJet Scientific, Inc., WuHan, HuBei, China) on day 3 of the cycle before and at 3, 6, and 12 months after surgery. In patients with amenorrhea, the FSH concentration was determined on postoperative days 90, 180, and 360. When the FSH concentration was ≥ 40 IU/mL, premature ovarian failure was diagnosed. At each follow-up visit, women were interviewed to verify cycle length and pregnancy status.

Statistical analysis was performed using the χ^2 test or the Fisher exact test for categorical variables, and the Student *t*-test or analysis of variance for continuous variables. FSH values, the number of coagulation events, and the thickness

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